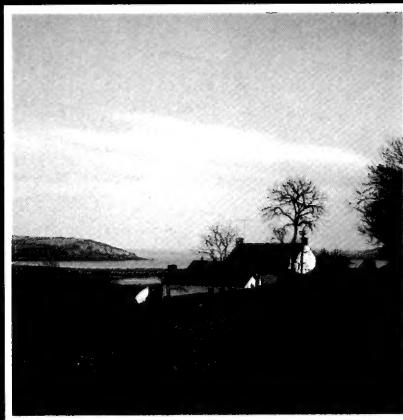
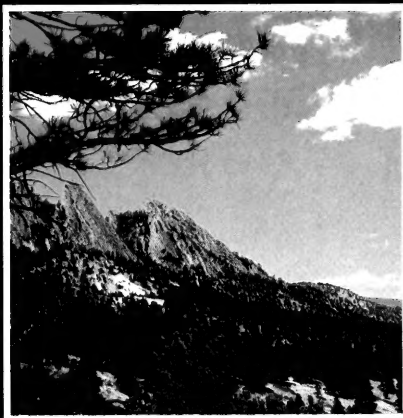
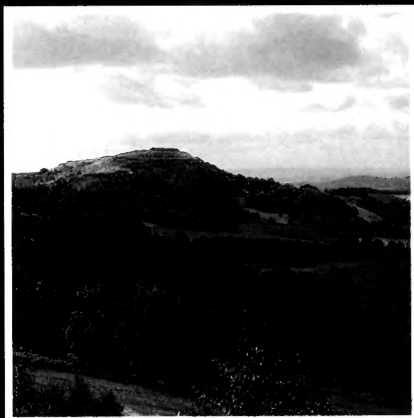


Protected Landscapes

Experience around the World



A/N 358-2 : Habitats

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Protected Landscapes

Experience Around the World

Prepared by the

IUCN Conservation Monitoring Centre

for the

**International Symposium on Protected Landscapes
Grange-over-Sands, Cumbria, England
5-10 October 1987**

with the support of
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and the Council of Europe's European Campaign for the Countryside



with the support of
The British Petroleum Company p.l.c.



'A better life in
the countryside'

The work of the IUCN Conservation Monitoring Centre is a contribution to GEMS, the Global Environment Monitoring System

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CONTENTS

	Page
Foreword	ii
Introduction	111
What the data sheets contain	iv
Acknowledgements	x
Europe	1
Austria	2
Czechoslovakia	11
France	64
Greece	121
Federal Republic of Germany	129
Italy	136
Norway	145
Poland	153
Spain	179
United Kingdom	187
Yugoslavia	192
Asia	198
Bangladesh	199
Hong Kong	205
Japan	235
Pakistan	292
Australia	298
United States and Canada	306
Latin America and the Caribbean	327
Costa Rica	328
Ecuador	337
Martinique	346
Peru	351
Africa	359
Algeria	360
Zimbabwe	367
Pacific	374
Guam	375
Western Samoa	383
Antarctic and Arctic	387
Alaska (US)	388
Draft List of Protected Landscapes	390

FOREWORD

Five years ago, in October 1982, some 450 of the world's leading authorities on national parks and other protected areas met at the World Congress on National Parks in Bali, Indonesia, to exchange experiences, and to identify necessary future activities for the improvement of protected area networks and their management. A predominant theme running through discussion at this meeting was the contribution that protected areas make to society, and indeed the Congress proceedings were subtitled *The Role of Protected Areas in Sustaining Society*.

Central to this theme is the understanding that a range of protected areas is therefore necessary, with management objectives sometimes differing quite markedly between one area and the next. The primary objective within one area, for example, may be to protect the habitat of a particular species, within another to protect a watershed, and within a third to provide recreational and educational opportunities. IUCN's Commission on National Parks and Protected Areas has been working for some years to provide a set of defined categories of protected areas, both to identify key management objectives, and to provide a framework for comparison. One such category is the protected landscape.

The objectives of protected landscapes were defined at the World Congress as being "to maintain nationally significant natural landscapes which are characteristic of the harmonious interaction of man and land, while providing opportunities for public enjoyment through recreation and tourism within the normal lifestyle and economic activity of these areas", although the definition also included those areas "that are primarily natural areas managed intensively by man for recreational and tourism uses".

Recently there has been increasing interest in this category, and it has been suggested that, while the scope for establishing the more traditional types of protected area is decreasing in many countries as more of the unaltered natural environments are either degraded or effectively protected, conservation priorities are likely to focus increasingly on those man-modified environments which show best how man and nature can coexist.

Discussion of the role and future of protected landscapes is therefore timely, both to establish the concept of protected landscapes more clearly, and to raise their status as means of linking conservation and development. The *International Symposium on Protected Landscapes* has been convened by the Countryside Commission, jointly with the Council of Europe and with the support of the IUCN, the British Council and the Lake District National Park Authority.

This directory, prepared specifically for this meeting by the Protected Areas Data Unit at the IUCN's Conservation Monitoring Centre, with support from British Petroleum, attempts to draw together information on a wide variety of protected landscapes from around the world. It is not comprehensive (it is not intended to be), but aims to provide participants with a useful working document. It is also hoped that presentation in this way will help to generate an increased exchange of information on protected landscapes.

The *International Symposium on Protected Landscapes* also contributes towards two international events taking place during 1987; the European Economic Community's European Year of the Environment and the Council of Europe's European Campaign for the Countryside. IUCN is happy also to offer this directory as a contribution to these events.

Hal Eidsvik, Chairman
Commission on National Parks and Protected Areas, IUCN

INTRODUCTION

IUCN's Commission on National Parks and Protected Areas (CNPPA) has been collecting information on protected areas for many years, for use in programme planning and development, and in increasing the level of awareness of protected area developments through preparation of publications. Since 1959 IUCN has also been charged by the United Nations with maintenance of a *United Nations List of National Parks and Equivalent Reserves*. Over the years the information management role has increased to the extent that in 1981 CNPPA set up the Protected Areas Data Unit (PADU) to provide this service to the Commission and the Union. This unit is now a part of the Conservation Monitoring Centre (CMC), a division of the IUCN Secretariat which is based in the United Kingdom.

Information is collected from a wide range of sources, and essentially managed in three ways. Basic information on each area is stored in a computer database, closely linked to information sheets for both individual sites and protected area systems, managed as word-processing documents. This information is further backed up by extensive files of books, papers and reports. PADU currently has basic information on computer for over ten thousand protected areas (of which protected landscapes is just one subset). This is, of course, nowhere near the total number of protected areas in the world: Sweden alone has 1200 nature reserves and 1300 natural monuments, Australia has over 1250 nature reserves, and the New Zealand register of protected natural areas includes some 1660 sites.

The PADU files essentially contain at present information on those sites of over 1000 hectares which are protected by the "highest competent authority" (except islands, where the size cut-off is 100 hectares). The more detailed information held on information sheets in word-processing includes descriptions of the protected area systems of each country, with basic details of legislation and administration, as well as further details of many of the individual sites; location, physical features, flora and fauna, management, problems, and so on.

This book is a compilation of examples of protected landscapes around the world, based on the information available within this database. Information is presented on the protected areas systems of 26 countries, and over 140 individual sites are discussed. For some countries, this is most of their protected landscapes, for others just a few. This information is not intended to be either comprehensive or complete, but is intended rather to serve as a working document for participants in the *International Symposium on Protected Landscapes*.

The content of the directory runs parallel to the content of a paper prepared for the symposium by Harrison and Karpowicz, and these two items should be taken as complimentary, the one serving to reinforce the message of the other. The directory should also be used in conjunction with its companion volume on protected landscapes in the United Kingdom, produced likewise for this meeting (*Protected Landscapes: The United Kingdom Experience*).

Finally, we hope that presentation of information on protected landscapes in this form will help to increase the "visibility" of the protected landscape and to increase the information available on such areas. Knowing that our information is patchy, we look forward to improving it.

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WHAT THE DATA SHEETS CONTAIN

INFORMATION ON THE COUNTRY'S PROTECTED AREA SYSTEM

Each country section consists of a data sheet arranged under standard headings detailing background information on the country's protected areas system. The text is referenced, as appropriate, by the names of authorities. NB The completeness of the data sheet is dependent on the availability of information.

Country

This gives the full name of the country or political unit, as used by the United Nations (Appendix I).

Area

This states the area of the country or political unit as given in the *Times Atlas of the World* (Seventh Edition, 1986), unless otherwise stated in the text.

Population

This gives the population of the country or political unit as cited in the *Times Atlas of the World*, unless more recent information is available in *The Statesman's Yearbook*. If any other source is used, it is cited. The date is given in parentheses, along with a mention of a census if appropriate.

Parks and Reserves Legislation

This provides a brief historical account of legislation concerned with the establishment of the protected areas system, including dates and numbers of acts, decrees and ordinances. In addition, it defines each category of protected area, citing (where available) the name of each category in the original language. It also includes details of activities permitted or prohibited within each category. This section further outlines the procedure for the establishment of new areas and provides details of legislation concerned with forest or other types of reserves not included in the national protected areas network. Finally, it covers state membership of relevant international conventions with dates of accession or ratification (i.e. World Heritage, Ramsar and, as appropriate, regional agreements, such as African, ASEAN, South Pacific, Western Hemisphere). It also includes participation in Unesco's Man and the Biosphere (MAB) Programme.

Parks and Reserves Administration and Management

This gives details of the authorities responsible for the administration and management of protected areas, including a brief history of their establishment. It also outlines administrative organization, staff structure and, if appropriate, training programmes as well as giving details of how each category of protected area is managed.

Addresses

This gives names and addresses of authorities responsible for administering the protected areas system.

Additional Information

This provides a brief review of the amount of undisturbed/vegetated land in the country. If appropriate, it refers to IUCN's systems reviews for summary data on the main vegetation types. It provides background information on nature conservation in the country, including

details of major conservation issues, systems reviews, national conservation strategies as well as giving details of non-governmental organizations involved in the protected areas system and details of threats and problems specific to the protected areas system.

References

Key references (including all cited works) are given about the system of protected areas, in particular, and nature conservation, in general, within the country.

Protected Areas List

Lists Category V areas within the country, together with their biogeographical codes, sizes and dates of establishment (see Appendix II).

INFORMATION ON INDIVIDUAL AREAS

Information on the protected area is given in data sheets arranged under standard headings. The text is referenced, as appropriate, by the names of authorities. NB The completeness of the data sheet is dependent on the availability of information.

Country

This gives the short name of the country or political unit, as used by the United Nations (Appendix I).

Name

This gives the official name of the area in the original language, with the English translation underneath, as cited by the responsible management authority. If the site consists of more than one gazetted area, such as a national park and strict nature reserve, the names of each are given.

Management Category

The site is allocated to the most appropriate IUCN category (in this case Category V)(see Appendix II) for subsequent verification by the Commission on National Parks and Protected Areas and national experts.

Biogeographical Province

This gives the name of the biogeographical province in which the site falls, based on Udvardy's classification (see Appendix III). In the case of discrepancies between the text and figures in Udvardy, precedence should be given to the text. NB This system is currently being revised by Udvardy.

Geographical Location

This gives the general location of the site within the country, including province and/or administrative district, proximity to major towns and/or topographical features, and latitude and longitude. Mention is made of the the location of different units, if applicable. It also provides a brief description of the park boundary.

Date and History of Establishment

This gives the date of establishment and the act/deGREE/ordinance number of the original and subsequent legislative articles relating to its establishment. It also provides a brief chronological history of previous designations, together with details of subsequent additions (including their sizes in ha) and if applicable, gives dates of establishment as World Heritage Site, Biosphere Reserve, Ramsar Site or other appropriate international designations.

Area

This gives the total area in ha, noting size of different units if applicable and names any contiguous or otherwise associated protected areas, with their sizes in ha in parentheses.

Land Tenure

This gives details of land ownership (e.g. state, provincial, freehold, private, customary etc.), mentioning sizes of respective areas if owned by several authorities.

Altitude

This provides general details followed, in parentheses, by highest and lowest altitude in metres above (or below) sea level.

Physical Features

This briefly describes the outstanding topographical features, including major rivers and their catchments, and give details of coastal and marine features if applicable as well as briefly describing the geology, geomorphology, soils and hydrology of the area, particularly as they affect its management.

Climate

This gives details of seasons, annual rainfall and maximum and minimum temperatures, with respect to altitude, if appropriate.

Vegetation

This briefly describe the main vegetation types, including their approximate areas and give details of dominant species and secondary formations. It also provides a general account of threatened (see Appendix IV), endemic, economically important and potentially economically important (e.g. crop relatives) species of flora. Included are references to species lists. NB Scientific nomenclature of species should be based on the relevant authorities (see Appendix V).

Fauna

This provide a general account of dominant, endemic, threatened (see Appendix IV) or otherwise significant species, giving details of population sizes and gives a resumé of mammal, bird, reptile, amphibian, fish and invertebrate faunas in relation to different habitats. Included are references to species lists. NB Scientific nomenclature of species should be based on the relevant authorities (see Appendix V).

Cultural Heritage (if relevant)

Mention is made of archaeological features and cultural monuments and ethnic groups and their traditions.

Local Human Population (if relevant)

This gives the size of the resident population, together with details of the number and distribution of villages. It also briefly describes the local livelihood and economy, mentioning the numbers of livestock and amount of land under permanent and temporary (shifting) cultivation.

Visitors and Visitor Facilities (if relevant)

This gives the annual number of visitors, with proportions of nationals and foreigners, and total revenue accruing from tourism; briefly describes the means and ease of access to different parts of the protected area; gives details of the different types of accommodation available within the protected area (or nearby), including the number of beds; mentions the availability and location of interpretation programmes, including visitor centres and mentions recreational facilities, if appropriate.

Scientific Research and Facilities

This provides a brief historical account of research undertaken, including ongoing studies and gives details of laboratories and other facilities, including accommodation, available to scientists.

Conservation Management

This mentions any legal protection specific to the area. Give details of activities (e.g. hunting, fishing, grazing) specifically permitted or prohibited; outlines the justifications for conserving the area; states the management objectives, as outlined in the management plan, and assess their degree of implementation. (NB Categorically mentions the existence of a management plan and, if appropriate, the authority responsible for its implementation.); gives details of major management activities (e.g. controlled burning, culling); outlines the system of zonation, including sizes of zones, if applicable; mentions significant training, interpretative and extension programmes and outlines recommendations, as proposed in the management plan.

Management Problems

This briefly describes past and current problems, such as poaching, fire, disease, agricultural encroachment, impact of tourism, relationship between park authorities and local people, and proposed developments (e.g. roads, dams), with emphasis on the main threats and their significance.

Staff

This gives details of the number of staff allocated for each position and, if applicable, provide details of voluntary staff.

Budget

This gives the annual budget, with year in parentheses, in local currency and in US dollars (for ease of comparison). Wherever possible it differentiates between capital (e.g. construction of facilities) and recurrent (e.g. salaries) costs and gives details of other financial support (e.g. from Unesco, WWF etc.), if applicable.

Local Administration

This gives the names and addresses of the local administrative entities for the area.

References

This lists key references, including management plans, reports, scientific monographs, bibliographies and handbooks, in addition to other scientific papers or popular articles and books. Particularly relevant references not consulted may also be cited.

Appendix I - Country Names

See United Nations (1982). Names of countries and adjectives of nationality. *Terminology Bulletin* No. 327.

Appendix II - IUCN Management Categories

See IUCN's Commission on National Parks and Protected Areas (1984). Categories and criteria for protected areas. In McNeely, J.A. and Miller, K.R. (Eds), *National parks, conservation, and development. The role of protected areas in sustaining society*. Smithsonian Institution Press, Washington. Pp. 47-53.

Category V (Protected Landscape or Seascape)

The scope of areas that fall within this category is necessarily broad because of the wide variety of semi-natural and cultural landscapes that occur within various nations. This may be reflected in two types of areas: those whose landscapes possess special aesthetic qualities which are a result of the interaction of man and land; and those that are primarily natural areas managed intensively by man for recreational tourism uses.

In the former case, these landscapes may demonstrate certain cultural manifestations such as: customs, beliefs, social organisation, or material traits as reflected in land use patterns. These landscapes are characterised by either aesthetically attractive or unique patterns of human settlement. Traditional land use practices associated with agriculture, grazing, and fishing are dominant. The area is large enough to ensure the integrity of the landscape pattern.

The latter case often includes natural or scenic areas found along coastlines and lake shores, in hilly or mountainous terrain, or along the shores of rivers, often adjacent to tourist highways or population centres; many will have the potential to be developed for a variety of outdoor recreational uses with national significance.

In some cases the area may be privately held and the use of either central or delegated planning control would be necessary to ensure the perpetuation of both the land use and lifestyle. Means of government assistance might be required to improve the standard of living while maintaining the natural quality of the site through appropriate management practices. In other instances, the areas are established and managed under public ownership, or a combination of public and private ownership.

Appendix III - Biogeographic Provinces

See Udvardy, M.D.F. (1975). *A classification of the biogeographical provinces of the world*. IUCN Occasional Paper No. 18, Morges, Switzerland.

Appendix IV - IUCN RDB Status Categories

The IUCN Red Data Book status categories are defined as follows:

Extinct (Ex)

Species not definitely located in the wild during the past 50 years.

Endangered (E)

Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating.

Vulnerable (V)

Taxa believed likely to move into the "Endangered" category in the near future if the causal factors continue operating.

Rare (R)

Taxa with small world populations that are not at present "Endangered" or "Vulnerable" but are at risk.

Indeterminate (I)

Taxa known to be "Endangered", "Vulnerable" or "Rare" but where there is not enough information to say which of the three categories is appropriate.

Insufficiently Known (K)

Taxa that are suspected but not definitely known to belong to any of the above categories, because of lack of information.

Threatened (T)

This is a general term to denote species which are "Endangered", "Vulnerable", "Rare", "Indeterminate" or "Insufficiently Known" and should not be confused with the use of the same term by the US Office of Endangered Species.

Commercially Threatened (CT)

Taxa not currently threatened with extinction, but most or all of whose populations are threatened as a sustainable commercial resource, or will become so, unless their exploitation is regulated.

IUCN Conservation Monitoring Centre (1986). *1986 IUCN Red List of Threatened Animals*. IUCN, Cambridge.

Appendix V - Taxonomy

- Plants- For generic names, see Willis, J.C. (1973). *A dictionary of the flowering plants and ferns*. Eighth edition. Cambridge University Press, Cambridge.
- Mammals- Corbet, G.B. and Hill, J.E. (1980). *A world list of mammalian species*. British Museum (Natural History), London.
- Honacki, J.H., Kinman, K.E. and Koepl, J.W. (1982). *Mammal species of the world: a taxonomic and geographic reference*. Allen Press and The Association of Systematics Collections, Lawrence, Kansas, U.S.A.
- Birds - Morony, J.J. Jr, Bock W.J. and Farrand Jr (1975). *Reference list of the birds of the world*. American Museum of Natural History, New York.
- Reptiles- (in prep.). *Reptile species of the world: a taxonomic and geographical reference*. Allen Press and The Association of Systematics Collections, Lawrence, Kansas, U.S.A.
- Amphibia- Frost, D.R. Ed. (in press). *Amphibian species of the world: a taxonomic and geographical reference*. Allen Press and The Association of Systematics Collections, Lawrence, Kansas, U.S.A.
- Fish - Nelson, J.S. (1984). *Fishes of the world*. John Wiley, New York.
- Invertebrates- Parker, S.P. (1982). *Synopsis and classification of living organisms*. 2 volumes. McGraw Hill, New York.
- Sims, R.W. Ed. (1980). *Animal identification*. 3 volumes. British Museum (Natural History), London and John Wiley, Chichester.

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Notwithstanding the significant input to the directory of all those mentioned above, the editors accept responsibility for any errors of fact or omission. Also, the information contained in the book for any one country has been compiled from a number of sources and does not necessarily represent the view of any one individual.

EUROPE

With a few exceptions it is in Europe where the protected landscape category is used to its greatest extent, and virtually every country has a network of protected landscapes which complements other systems of conservation area. Even where there are still extensive areas of natural landscapes existing as in the Nordic countries protected landscapes play an increasingly important role. In Norway, for example, national parks cover over 19,000 sq.km (9,000 sq.km excluding those on Svalbard), while protected landscapes amounted to around 2,000 sq.km; in Sweden over 6,000 sq.km are in national parks compared to around 1,000 sq.km in protected landscapes. Nevertheless, in spite of the apparent availability of natural land areas, the trend towards the creation of a more extensive system of protected landscape areas, at least in terms of the total number of sites is noticeable even in Norway, where the total number of protected landscapes (of all sizes) has increased from 6 in 1975 to 24 in 1980 and 55 in 1987. The lower average population densities and lower average GNPs in Mediterranean countries would suggest that pressures on traditionally protected natural areas are not sufficiently severe to merit expansion in landscape protection area systems. In fact, the total coverage of protected landscapes in Mediterranean countries is only three to four times greater than national parks (markedly less than in central and eastern Europe) and the rate of designation of new landscape protection sites is also lower. This may be, at least in part, the result of a lack of suitable landscape areas for designation due to the combined features of intensive historical and pre-historic land use, international tourist pressure and the complex ownership of land. Aside from population and GNP, the two factors of agricultural and forestry practices that have been pivotal (especially so in central Europe) in creating a landscape of secondary ecosystems and which also tend to be traditional and harmonious, are now threatened as a result of intensive mechanisation and related government policies. This is also reflected in protected landscape designations. For example, in the Federal Republic of Germany, numbers of nature parks has risen (according to IUCN figures) from 1 site in 1910 to 62 in 1987. These figures are also reflected in the area covered by national parks compared to protected landscapes - less than 6000 sq.km of national parks and over 18,000 sq.km of protected landscapes. A similar situation exists in France, where the 24 regional nature parks cover more than 12,000 sq.km, compared with around 2,600 sq.km of national parks. In eastern Europe, collectivisation and nationalisation of land has had profound influences on the landscape. This is coupled with post-war industrialisation and the urbanisation of the population, resulting in a tendency towards rural depopulation, shorter working time and increased rural recreation. Further, due to governmental policies, intense development of heavy industry has also led to rapid environmental degradation in a much shorter timescale than occurred in western Europe. In some central and eastern European countries this assault on traditional landscape areas is reflected in the proportionately greater areas and numbers of sites designated as protected landscapes. In fact, in eastern Europe there has been a marked expansion of the protected landscape category in recent years with, for example, an increase from 24 to 34 landscape protection areas in Czechoslovakia between 1985 and 1987, and an increase from 11 to 35 landscape parks in Poland between 1980 and 1987. In Czechoslovakia, national parks cover 172,200ha, compared to protected landscapes with their 1,426,300ha. In Poland, national parks barely cover 0.4% of the surface area of the country, compared to 3% of coverage by protected landscapes. Existing protected landscape areas often contain within them (and on their borders) a range of other protected natural areas. This could be loosely interpreted as a unofficially designated "zoning" policy. For example, the national parks in the United Kingdom have within them national nature reserves, sites of special scientific interest, and other planning designations, and often abut onto areas of outstanding natural beauty and heritage coasts. In Poland, landscape parks can, and do, have within them national parks, nature reserves and natural monuments and are often surrounded by areas designated as "regions of protected landscape" (a Category VIII designation).

AUSTRIA

Area 83,848 sq.km

Population 7,555,338 (1981 census)

Parks and Reserves Legislation There is no federal legislation on nature conservation in Austria, conservation laws and ordinances being issued by the nine provinces to cover their own territories (COE, 1984). The earliest environmental legislation is the Act issued in Steiermark on 26 June 1935 (Reichsnaturschutzgesetz). The basic legal principles for nature conservation are laid down in the provincial laws (Landesgesetze); further details on wildlife protection (and, in some cases, rules covering protected areas) are set out in ordinances (Verordnungen, Anordnungen), whilst their administration is dealt with in specific regulations (Verwaltungsvorschriften). A special ordinance has to be issued for the establishment of each protected area (nature reserve, protected landscape, natural monument and site), designating the area and its boundaries and permitting or restricting land uses or other activities. Other aspects of conservation are covered in the provincial hunting laws which not only authorise the taking of game but also cover a number of species which have a "closed season throughout the year". In addition, the laws governing forestry, fisheries, physical planning and water include regulations for the conservation of nature. In general, the conservation content of these laws consists simply of a basic provision that the objectives of nature conservation and landscape management must be considered in physiographic and land use planning, insofar as this is compatible with social planning and economics (Poore and Gryn-Ambroes, 1980; COE, 1984). According to the "Definitions for Nature Conservation" set up by the Working Group of the Conference of provincial officials responsible for nature conservation in Austria (Anon., 1975) the following categories of protected areas are distinguished:

- a) *Nature Reserve* (Naturschutzgebiet): an area which is distinguished by its highly natural character, by its diversity of fauna or flora and which acts to protect rare or endangered animals, plants or biocenoses.
- b) *Protected Landscape* (Landschaftsschutzgebiet): an area of special beauty or special importance for public recreation.
- c) *Natural Monument or Site* (Naturdenkmal): a natural feature of scientific or cultural interest or of special character, aesthetic value or rarity, or a typical feature characteristic of the particular countryside or settlement.
- d) *Nature Park* (Naturpark): an area, open to the public, of special recreational or educational value for the interpretation of nature and landscape. The recreational or educational values of the parks are managed and developed for the public.
- e) *National Park* (Nationalpark): an area of representative national value because of its characteristic geomorphological features, its fauna and flora, and of scientific and recreational interest. The area must be protected through legal measures and must be divided into a core zone (of the rank of a "nature reserve") and a fringe zone of the rank of a "protected landscape". It must have a continuous administration and must be under scientific control.

The systems of protected areas in the different Austrian provinces can only be classified as one system according to the 1975 "Definitions for Nature Conservation", if the existing protected areas are re-categorised according to the new terminology. Interestingly enough, while the 1975 classification defines nature reserves as one category, the laws of Burgenland, Kärnten, Niederösterreich, Salzburg and Vienna distinguish two sub-categories, namely:

- Strict Nature Reserve (Vollnaturschutzgebiet)
- Partial Nature Reserve (Teilnaturschutzgebiet) (Poore and Gryn-Ambroes, 1980).

Austria

The general criteria for selection of nature reserves are laid down in the conservation laws of the provinces and in the 1975 terminology paper. They provide for safeguarding of areas

- of a totally or highly natural (original) character;
- as habitats or biotopes sustaining a high diversity of fauna and flora or what may be classified as rich biocenoses;
- in which rare or endangered species of animals or plants or rare or endangered biocenoses are found;
- which can be regarded as in any way of special interest and significance for natural history.

However, standardised and detailed criteria for the selection of areas are not available. There are specific objectives in certain provinces but no national plan or programme, principally because of the lack of a central responsibility for nature conservation in the Federal Government. Surveys have, however, been going on in most provinces, since 1965, to find out which kinds of habitat and which areas should be set aside as nature reserves, as natural monuments or as protected landscapes (Poore and Gryn-Ambros, 1980).

In theory, the legal procedures for the establishment of reserves are easy to use and, in many cases, may take no more than a year or two from the first official or administrative step until completion. But there have been instances when the process has taken more than ten years. Thus delays can be expected if many landowners are involved, or if landowners form a powerful lobby (COE, 1984). All provincial laws provide regulations for the preliminary or provisional protection of an area designated to become a nature reserve. If an area is purchased, either by the conservation administration or by a private conservation organisation, the price for the land is subject to voluntary negotiations. According to the laws of some provinces, land can be expropriated with compensation to establish a nature reserve but, as far as is known, this has never been applied in practice. Normally, when the landowners or public body in charge of the land (like the Federal or State Forestry Administration or a community) is not willing to submit to restrictions on their land, some compromise is found, such as establishing a partial nature reserve instead of an intended full nature reserve or by zoning the reserve (Poore and Gryn-Ambros, 1980).

The Austrian section of the International Waterfowl and Wetlands Research Bureau recommended that four areas should be included in the list of wetlands of international importance established under the Ramsar Convention which was ratified on 16 December 1982 and five sites inscribed. Four areas have been approved as Unesco MAB biosphere reserves, these being Gurglu Kamm, Gossenköllesee, Neusiedlersee and Lobau. In 1967 the Krimml Waterfalls Natural Site in the province of Salzburg (part of the 20,000ha protected landscape of "Wildgerlos, Krimmler Achenal, Oberes and Unteres Sulzbachtal") was awarded the European Diploma for Nature Conservation.

Parks and Reserves Administration and Management There is no administrative organisation responsible for nature conservation at the federal level in Austria. The conservation administration in the provinces is part of the general administration, undertaken by the Office of the Provincial Government (Amt der Landesregierung), or, in Vienna, the municipal authority (Magistrat). Day to day responsibility is given to different departments in different provinces (Departments of Agriculture, Cultural Affairs, Physical Planning and Justice). There are apparently no special administrative bodies at the district or local level, where the execution of conservation laws is part of the general administration. However, most of the executive work lies with the district administration (Bezirksverwaltungsbehörde), whereas the provincial authorities are responsible for general concepts and conservation policy, initiatives in legislation, release of ordinances and the establishment and abolition of reserves. At provincial level there is an honorary council (Beirat) for nature conservation; at district level an honorary adviser (Konsulent) has to be appointed by the provincial government. Members of the provincial council are elected from different groups, such as the board of agriculture

(Landwirtschaftskammer), board of labour (Kammer für Arbeiter und Angestellte), boards for the economy, natural history, forestry, tourism, hunting and fisheries (Poore and Gryn-Ambroes, 1980).

Permanent staff are not specifically assigned to administration or management of protected areas and the only qualified full-time employees are those in the Office of the Provincial Government (Ämter der Landesregierungen). The conservation branch or section is generally headed by a person qualified as either a lawyer or a senior biologist. Only in a very few provinces is there a second senior official working full time for nature conservation and there are usually no more than 3-5 technicians and office personnel. In some provinces, such as Burgenland and Vorarlberg, there is a part-time commissioner (Landesbeauftragter) for nature conservation, having the function of scientific adviser, who is mainly occupied as a scientist (biologist) at the provincial museum. However, in Oberösterreich there is a full-time post of commissioner for nature conservation, filled by a qualified biologist (Poore and Gryn-Ambroes, 1980; COE, 1984).

In Oberösterreich, in 1974, 20 million AS were allocated for nature conservation and recreation of which only 2 million AS were earmarked for the management of nature reserves, general publications on nature conservation and the running of the station for bird protection. In Niederösterreich, also in 1974, a total of 800,000 AS was made available for nature conservation (including acquisition of land, management of reserves, publications), but there was a further sum of 4.2 million AS for nature parks and recreation. Funds could be switched between the two principal heads so that actual expenditure on nature conservation could have been higher or lower than the original budget. In both examples, staff salaries are not included. Additional sources of funds for nature conservation in general and reserves in particular are sometimes available in other branches of administration, for example, the forestry administration or the provincial museums, since the museums are involved in public relations campaigns, while the forest department has a similarly active interest in the management of any nature reserve containing substantial amounts of woodland or forest (Poore and Gryn-Ambroes, 1980; COE, 1984).

Guidelines are generally not prepared for reserve management nor are there management plans for particular areas (the exceptions include Hohe Tauern National Park and the Neusiedlersee area). However, local forestry administrations establish guidelines for forest areas, particularly those in nature reserves, as well as rules for game management in those protected areas under the auspices of the forestry administration. Some reserves with particularly urgent management problems have specific regulations, for example, reed-cutting, maintenance of peatbogs and grasslands and the mowing of sedge-meadows (Poore and Gryn-Ambroes, 1980). Normally the conservation branch of the provincial government is responsible for the management and control of nature reserves; but in forest areas this is generally left to the forestry administration in agreement with the conservation administration. In certain areas, specific bodies are charged with management plans and their control.

Voluntary conservation organisations (such as the Austrian Association for Nature Conservation, ÖNB, or WWF-Austria) have taken over the responsibility for management and control of reserves that they own or lease. They have appointed wardens (Berg- und Naturwachen) who patrol reserves, rare plant sites and rare breeding bird areas. In the early 1980s there were about 8,500 nature wardens who worked as "Official Guards" in the provinces of Vienna, Niederösterreich, Steiermark, Kärnten, Tyrol and Vorarlberg (Poore and Gryn-Ambroes, 1980).

Responsibility for scientific research rests with the conservation administration of the provinces and the degree of activity differs from one province to another. There is close cooperation between the provincial administration and certain biological institutions whose research includes conservation management problems. The former Austrian Institute for Nature Conservation and Landscape Management (Institut für Naturschutz und Landschaftspflege) of the ÖNB, renamed the Institute for Environmental Sciences and Nature Conservation (Institut für Umweltwissenschaften und Naturschutz) undertakes research in existing protected areas, on areas deserving protection, as well as on the improvement and greater effectiveness of conservation management (Poore and Gryn-Ambroes, 1980).

Austria

The degree of protection as well as the range of exemptions from protected status are laid down in a specific ordinance for each protected area. The ordinances provide for general rules, mainly repeating the regulations of the law, as well as very detailed rules (such as the removing of grass sods, exact dates when mowing is allowed and the size of sign posts):

- a) in general all activities which conflict with the specific conservation objective(s) of the nature reserve are forbidden;
- b) when public interests in economic exploitation are superior to those of nature conservation, exemptions can be granted from this general line of protection;
- c) in nearly all privately-owned reserves, it is usual to keep the *status quo*, i.e. economic activities can usually be continued as they were before the establishment of the reserves; forestry, hunting and fishing are not or only partially controlled;
- d) in all reserves on public lands, forestry, hunting and fishing are normally allowed, as well as the collecting of mushrooms and wild berries; but it is generally forbidden to remove any other plants from a reserve (special regulations dealing with mushroom-gathering are often provided in plant reserves).

With the exception of the Hohe Tauern area, the zoning systems have been fixed by written administrative regulations not in management plans. Nevertheless, in practice, there is some sort of zoning at least in some reserves. In the large protected area including the Neusiedlersee, the status of combined nature reserve and protected landscape includes a zoning system of strict sanctuaries and the cultivated lands as protected landscapes (Poore and Gryn-Ambroes, 1980). In other protected areas nature reserves are surrounded by protected landscapes or a nature park or by protected lake shores, which in effect amounts to some sort of zoning. The combination of nature reserve and other protected areas is seldom established systematically, only more or less accidentally, except for those very few areas which were specifically created as combined nature reserve and protected landscape (Poore and Gryn-Ambroes, 1980).

Addresses Available for each province

Additional Information The different forms of land use cover includes 38.6% forests and woodland, 33.1% arable and pasture land and 12.8% built-up areas (Poore and Gryn-Ambroes, 1980). A lack of general vegetation maps for Austria has resulted in the Austrian National Council of the International Commission for the Protection of the Alpine Regions undertaking a protected area survey in late 1986 (Anon., 1986). Up to this date, the extent to which fauna and flora is sufficiently represented in nature reserves could not be determined with any confidence. Yet on the other hand the network of nature reserves is considered by some to be sufficient to safeguard adequate habitats for large mammals and migrating birds. As agriculture, hunting and fishing are generally allowed in the partial nature reserves, regulations for some of the areas may still have to be strengthened. The system of *Seuferschutz* in some of the provinces provides some additional habitat protection and prevents disturbance, especially of waterfowl, and this supplements the network of nature reserves.

As access to reserves is generally not limited, there is no way of handling the problem of too many visitors and there is a general lack of interpretative material about reserves or in reserves. In general local inhabitants, mainly landowners, in rural areas are not sympathetic to the establishment of new reserves or of improving the conservation status of an existing reserve, for both lead to a lowering of the landowner's position. This attitude is made clear by the length of time taken in negotiating the establishment of a reserve or enlarging its boundaries. On the other hand, local bodies responsible for tourism often make use of the existence of nature reserves in their area when advertising its touristic values (Poore and Gryn-Ambroes, 1980).

The first seminar on nature and national parks throughout Austria was held in May 1986. The joint organisers were the Nature Park Administration and CIPRA (Commission Internationale pour la Protection des Regions Alpines)(Nature and National Parks, 1986). There is now a policy in Austria to establish larger reserves in order to ensure a higher extent of representation of the major geo-ecological regions. As in other countries where no national parks or other extended protected areas existed before 1945, nature parks have been established to safeguard outstanding landscapes for recreation and proposals have been made for national parks (Poore and Gryn-Ambroes, 1980).

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Protected Landscapes

	(hectares)
<i>Unspecified areas</i>	
Blockheide Eibenstein	1,400
Bohmerwald	96,000
Eisenberg-Konigsberg-Csaterberg-Punitzer Wald	
Feldwachgebiet	
Forchenstein-Rosalia	
Grossfragant	1,115
Gschnitztal	
Hagensdorf	
Keutschacher See-Tal	2,532
Kothbergbachtel	
Lindenwalder bei Ramsberg	
Millstatter See-Sud	1,984
Neusiedlersee-Seewinkel	40,000
Rohrbacher Kogel	
Siegendorfer Pussta und Heide	
Vornbacher Enge	3,000
Weissensee	7,648
Wollanig-Oswaldi Berg	1,120
Zurnsdorfer Eichenwald	
Subtotal	154,799
<i>National Parks</i>	
Hohe Tauern	25,000 *
<i>Nature Reserves</i>	
Altausseeersee	1,050
Arnspitze	12,500
Bernstein-Lockenhaus-Rechnitz	
Brunnsteinersee-Teichboden	
Dachsteingebiet	20,000
Gesause und anschliessendes Ennstal	23,800
Grundlsee, Toplitzsee, Kammersee	9,700
Hohe Wand	1,800
Kaisergebirge	10,200
Karwendel	72,000

Austria

Kellerviertel Heiligenbrunn	
Lainzer Tiergarten	2,300
Mutterer Alpe	
Reithermoor bei Seefeld	
Scheulingwald	
Traunstein	
Valsertal	3,300
Villacher Alpe	1,902
Vilsalpsee	
Wildapenar Salzatal	51,460
Subtotal	210,012

Landscape Protected Zones

Lobau	1,000
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Parks

Ausins
Prater

Hohe Tauern National Park

Management Category V (Protected Landscape)

Biogeographical Province 2.32.12 (Central European Highlands)

Geographical Location The proposed area of the national park is divided between three Länders (states) namely Kärnten, Salzburg and Tyrol, and is part of the eastern Alps stretching 143km east to west. The Kärnten part of the park lies within the area known as the Upper Möll Valley (Oberes Mölltal) in the districts of Heiligenblut, Grosskirchheim and Winklern. Approximately centred 47°05'N, 12°50'E.

Date and History of Establishment A major initiative to create a national park in this area was put forward in 1913, although similar efforts can be traced back to 1909. In 1914 the Nature Reserves Association (based in Stuttgart) and the German-Austrian Alpine Club (now the Austrian Alpine Club) began to purchase private and state property in the region in order to create nature reserves, and by 1918 large areas had been bought up. The Kärnten state government passed a decree dated 1 July 1935 declaring the area a conservation zone, followed by an ordinance in 1939 enacted as part of the "Reichsnaturschutzgesetz" passed that year. The area was proposed as a national park in 1970 and confirmed in accordance with the Heiligenblut Agreement on 21 October 1971 (LGBl No. 72/1971). Following the disruption of plans for the national park (caused by factional interests), the Kärnten state government decided to press ahead with the creation of the national park within that state. On 24 January 1981 it declared its intention and on 15 September 1981 passed a resolution on a bill creating the National Park Hohe Tauern. This resolution passed into law on 1 July 1983 (LGBl No. 55/1983). The Salzburg state followed suit with the Salzburg National Park Hohe Tauern Law on 1 January 1984. The area of the proposed national park within Tyrol (70,000ha) had by mid-1986 yet to be confirmed by the legislator.

Area The proposed park area was to cover between 250,000ha and 260,000ha with a core zone of 90,000ha. At present the Kärnten national park section covers 20,000ha, and the Salzburg section 66,700ha. The Krimml Ache National Monument is 59ha.

Land Tenure The area has a complex system of land ownership and administration. Two major land owners are the Nature Reserve Association and Austrian Alpine Club which own 3,400ha and 30,800ha respectively. The national park area also includes several nature

reserves, protected landscapes and natural monuments established by the Salzburg and Kärnten state governments in the 1950s and 1960s. Much of the land remains in private ownership, however, and it seems likely that this will continue to be the case.

Altitude 1,100-3,789m

Physical Features The Glockner group is a fold mountain which has been thrust up leaving deep-lying zones (the deepest being the Penninikum) comprised of crystalline rock with a covering of upper schist. This is an extensive crystalline massif, mainly of granite and gneiss, consisting of a chain of forty 3,000m plus mountains which have permanent snowfields. Over half the area is over 1,700m and consequently is alpine and subalpine in character. The Salzburg part of the national park has ten north-south hanging valleys which are U-shaped in cross section as a result of ice action. The area contains the highest mountain in Austria, the 3,798m Grossglockner, and the largest glaciated massif, the Paszterz glacier, which is 10km long, 1.5km wide and 300m deep. It is also noted for its many waterfalls which include the Krimml Ache, ranked eighth in the world and the highest in Europe, falling 400m in three stages and discharging 7 cubic metres of water a second. The Kärnten part of the park, in the centre of the Hohe Tauern (Glockner and Schober group) is a rocky region of high alpine galdiers, lakes and waterfalls. It lies within the Upper Möll which is a typical high alpine valley over which the glaciated Schober group and main Tauern ridge extend up to the snowline.

Climate No information

Vegetation In the sub-alpine zone there are mountain pastures and alpine forests with stone pines *Pinus cembra*, larches *Larix europaea*, spruce fir *Picea excelsa* and a number of other tree and scrub species such as rowan, whitebeam, bird cherry, mountain pine and sea buckthorn (*Sorbus aucuparia*, *Sorbus aria*, *Prunus padus*, *Pinus mugo* and *Hippophae rhamnoides*). Pre-glacial relics of upper alpine flora have colonized the area since the beginning of the last interglacial period. Above the treeline there is willow scrub, stunted rhododendrons, golden saxifrage, wild azalea, alpine toadflax, spring gentian and red lichen (*Saxifraga oppositifolia*, *Loiseleuria procumbens*, *Linaria alpina*, *Gentiana verna* and *Xantheria elegans*).

Fauna Mammal species recorded include red deer, ibex, chamois, alpine marmot (*Cervus elaphus*, *Capra hircus*, *Rupicapra rupicapra*, *Marmota marmota*) and a variety of smaller species. Of the bird species recorded the most important is the summering population of about 70 griffon vultures *Gyps fulvus*, present annually in the Rauristal area. The World Wildlife Fund has established a feeding programme here for the vultures, and the site has also been selected as the release point for lammergeiers *Gypaetus barbatus* captive bred under a WWF project initiated in 1979. Other notable species include golden eagle, pygmy owl, three-toed woodpecker, snow finch and water pipit (*Aquila chrysaetos*, *Glaucidium passerinum*, *Picoides tridactylus*, *Montifringilla nivalis* and *Anthus spinoletta*).

Cultural Heritage The park has the remains of a 1,500 years old Bronze Age settlement dating back to the time when the passes over the Central Alps were first crossed by man. Finds of a beautiful bronze dagger in the Glocknerstrasse, the point of a lance of the late Hallstatt period in Heiligenblut (in 1974), a Celtic horseshoe and Roman statuette of Hercules (part of an earthenware lamp) on Hochtorn in the Glocknerstrasse (2,571m) have suggested that gold was an early commodity encouraging traffic through the passes which subsequently led to an early permanent settlement. The Hohe Tauern became world-famous when goldmining activities peaked from 1460-1560.

Local Human Population The Kärnten part of the national park has a population of approximately 5,000. Overall in the Hohe Tauern region the population level is falling due to the decline in mountain farming, and as a result of this and the remoteness of the area there is seasonal out-migration and weekend commuting. A large majority of mountain farms are not self-supporting but rely on income support programmes of both the state and federal governments.

Austria

Visitors and Visitor Facilities Since the first ascent of the Grossglockner in 1800, the area has been opened up to mountaineering, tourism and scientific exploration. Since the most important north/south connection over the Alpenhauptskamm, the Grossglockner Hochalpenstrasse or High Alpine road (56km long and cutting through the park) was completed in 1935 it has brought a new influx of international tourist traffic. The Grossglockner may get up to 200 climbers a day during the summer, and nearly one million tourists annually visit the Paszterze glacier. The Krimml Ache waterfalls have been a tourist attraction since 1879 when the German-Austrian Alpine Club constructed a viewing path from the waterfalls to the Krimml Achen valley. The numbers of tourists increased considerably after the opening of the railway from Zell am See to Krimml in 1898. By 1962 visitor numbers reached 250,000 annually and since then the numbers have risen steadily. Major attractions include hiking, climbing and bird watching. A ski centre was opened at Gerlos Platte, and there is an information centre at Matrei In Osttirol.

Scientific Research and Facilities No information

Conservation Management In Austria both conservation and regional planning are enacted at the state level rather than by the federal government. The State Nature Protection Acts do not include specific guidelines regarding permitted uses in national parks, for example, the Salzburg Nature Protection Act (LGBl No. 86, July 1977) is administered by the Salzburg Department of Regional Planning, Environmental and Nature Protection, which has responsibility for natural and cultural landscapes and the preservation of traditional habitats of animals and plants and man. An overall National Park Commission was established in 1972 in an advisory capacity but in 1974 the Kärnten state government created a separate commission (LGBl No. 179/1974). The overall National Park Commission membership includes representatives from the three states affected, the state conservation and regional planning staff and the Director of the National Park Planning Office. The 32 communities which lie partially or entirely within the proposed park boundary share one representative on the Commission. Membership was later increased to include a representative of the Austrian Alpine Club. By 1978 the Director and the Commission had outlined the national park boundaries and proposed the legislation needed to be adopted by the three states. The National Park Committee co-ordinates, supports and deals with finance and investment. A specific development programme aimed at the development of an agrarian and tourist infrastructure is in progress. Repairs and extensions have been made to existing paths as well as sheep tracks and pack routes and new interpretative paths opened up; car parks have been built at exits to the park; shepherd's huts re-roofed; bridges, an information kiosk and a mill repaired in Apriach (Apriacher Stockmühle), the Rannacherkirche (church) has been restored; an alpine mountain farm set up as a living museum and an exhibit of the park has been included in the Döllach Schlossmuseum in Grosskirchheim. A fully comprehensive survey of the flora and fauna has yet to be completed but a detailed report on the Kärnten part of the national park has been published. Land use is predominantly sheep and cattle grazing on the high pastures but due to a decline in farming incomes are having to be increasingly supplemented by summer tourism. The strict preservation initially proposed for the national park confronted opposition from the traditional land-use lobby within the local communities. Land owners continue to exercise their rights to graze domestic stock and hunt on their lands, even within the core zone, but land owners have been prepared to agree that these rights be exercised in a way conducive to the purposes of the park. In addition to proposals concerning land owners rights, the National Park Commission has also proposed that forest operations be prohibited within the core area, but that recreation (hiking, climbing, cross-country skiing) be encouraged. The outer zone is proposed as a protected cultural landscape in which agriculture and tourism development would be encouraged.

The Kärnten National Park Law and the earlier Heiligenblut Agreement makes provision for a rigorous protective policy and the establishment of a two-zone system (apparently modelled on the French national parks). The Heiligenblut Agreement suggested a core zone of 90,000ha, while productive forest and arable land is limited to 10% of the total proposed area. Within the national park area in the Salzburg state there are two landscape reserves and one lake reserve; Glossglockner Hochalpenstrasse of 1,650ha (created by LGBl 62/57, 57/60 and 43/65), Wildgerlostal, Krimmler Achantal, Oberes und Unteres Sulzbachtal of 28,800ha (created by LGBl 34/58), Karsee of 98ha (created by LGBl 77/1971 d. F 67/1976). Within the national

park area in Kärnten there are two nature reserves; Grossglockner mit Pasterze und Gamsgrube of 3,698ha (LGBl No. 24/67 and 78/73), Schobergruppe-Nord 10,380ha (LGBl No. 48/64 and 79/73). Certain other small areas have been selected for special protection as being of unique interest. The Krimml Ache waterfalls were declared a National Trust property in 1958 and a National Monument in 1961. In 1967 the site was awarded a European Diploma for Nature conservation by the Council of Europe; Category C, which is awarded for sites combining social and recreational functions with the maintenance of biological or aesthetic characteristics. The area designated begins 100m above the first falls and ends 100m below the third waterfall step, and includes a wide strip of land either side. Within this area any activity, except agriculture and forestry, is forbidden.

Management Problems The questions of local tourism development, exploitation of the hydroelectric potential, and the preservation arguments by environmental groups have resulted in protracted and bitter disputes over the establishment of the national park. The problems are compounded by long-established vested interests, and difficulty in reaching agreement between the state governments, the local community and environmental groups. Plans in the 1970s by Federal energy engineers included a 900 megawatts hydroelectric power scheme aimed at tapping the 4,700 megawatt hydroelectric potential of the area. This would have involved diverting 17 of the park's rivers, threatening the waterfalls of Umbal and Innerschloss. In response local conservation groups have suggested that at least these two valleys be conserved. The hydroelectric power scheme is vigorously supported by the Tyrolean state government, and this led to the cancellation and disruption of the future park plans of the National Park Commission and to some extent the plans of the state governments of Salzburg and Kärnten. Apart from this, the construction of a 180 million cubic metre reservoir has been proposed several times for the Upper Krimml Ache Valley, which would threaten the Krimml Ache waterfalls; the Alpine Club's property on the Grossvenediger glacier has been proposed as the site for a summer glacier skiing development (despite local opposition) and other tourist developments include helicopter excursions, cable cars and scenic roads, all of which could potentially have deleterious effects unless development is carefully controlled. The Austrian Alpine Club (210,000 members) acts as a strong lobby for the curtailment of further commercialization of recreation in the Alps.

Staff The Kärnten state government has created a national park administration with an office at Heiligenblut staffed by a state government official.

Budget The State Ministry for Health and the Environment spent 1,799,720 Schillings in 1982 and 2,089,000 Schillings in 1983 on a range of infrastructural and tourism development. The Kärnten State budget for 1984 was set at 2 million Schillings (about US\$136,000).

Local Administration National park-kommission Hohe Tauern, Johann-Panzl Strasse 5, 9971 Matrei In Osttirol.

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Date August 1987

CZECHOSLOVAKIA

Area 127,870 sq.km. (consisting of 78,860 sq.km. of the Czech Socialist Republic and 49,010 sq. km. of the Slovak Socialist Republic)

Population 15,395,970 (1983) (Statesman's Year Book); 15,579,000 (1985) (UN 1985)

Parks and Reserves Legislation The first recorded establishment of protected areas was in 1838 when two forest reserves were created in south Bohemia, followed by additional reserves in 1858 and 1884. An ordinance giving protection to natural monuments was decreed in Slovakia in 1900. The first national park was created in the High Tatras in 1948, and the first Protected Landscape Area (Cesky raj) in 1955. The key piece of legislation is contained in the Constitution of the Czechoslovak Socialist Republic, Law No. 100/1960, Article 15, while the first conservation of nature acts were introduced in the years 1955 and 1956. The two republics have separate laws dealing with conservation: the State Nature Conservancy Act of 1955 - Law No. 1/SNR 1955 for the Slovak Republic, and the State Nature Conservancy Act of 1956 - Law No. 40/1956, for the Czech Republic. Separate decrees were also passed dealing with the protection of plants and animal species and individual trees. (Cerovsky, 1986). Legislation on protected areas and environmental conservation exist at several levels - at the highest level there is the Constitution, followed by Federal laws such as the Law on Protection of Agricultural Lands and at a third level there are the Republic Laws, one for the Slovak and one for the Czech Republics. Republic acts are brought together and integrated by Federal legislation. The conservation of the natural environment and natural resources is fully integrated in overall economic activities by means of legislative measures which deal with sectoral features such as forests, water management, agriculture, mineral surveys, mining, industrial production and construction. Terrestrial resources are all subject to the Act on Physical Planning and Building Order.

Nature in general, the natural environment, the countryside and selected components are subject to the two parallel State Nature Conservancy Acts. These define nature conservation as the preservation, renewal, enhancement and use of natural wealth and the special protection of important areas and natural features. These laws are supplemented by separate republic guidelines issued in 1978 and 1980 dealing with nature conservation development. The overall objective is to integrate conservation and use of natural resources and to apply principles of ecosystem conservation. New State Nature Conservation Acts are being prepared in the two republics (Povolny, 1986) and further decisions affecting environmental conservation were taken simultaneously by the two republic governments in 1984 (Cerovsky, 1986).

The legal basis to park establishment is provided by the 1955 and 1956 Acts by means of decrees and notices which are issued by the Ministry of Culture and act as generally binding legislative guidelines. The Ministry of Culture decides on the establishment of all protected area categories with the exception of national parks which are established under the 1955 and 1956 Acts by decrees of the Czech and Slovak National Councils respectively (IUCN, 1971). Regional National Committees give guidance to the District National Committee who are responsible for nature conservation, protected areas and the establishment of protected natural features and monuments at the district level (Marsakova and Skrivanek, 1982). According to the legislative acts there are eight categories of protected areas:-

National Park: are areas of very valuable natural resource phenomena, as little as possible influenced by human activity with great climatic, health and recreational importance. National parks have complete protection, except for some forest exploitation which is strictly controlled. The parks are zoned with a "controlled area" for recreational development, which includes villages, holiday homes, sanatoria, camp sites and other facilities. Hunting is prohibited. National parks are fully open to visitors with the exception of no access to strict nature reserves within the park. Tourism is regarded as a main objective of national parks.

Czechoslovakia

Protected Landscape Area (PLA): are areas of lower natural values but with significant scenic and aesthetic qualities. They are examples of the harmonious interaction between natural components and traditional human activities. They aim to protect all values and typical features of the landscape and encourage the rational use of natural resources (Povolny, 1986). Thus, Protected Landscape Areas are zones of typical countryside with a status similar to that of national parks and they are also used extensively for recreation (IUCN, 1971). Within PLAs the most valuable parts are strictly protected as nature reserves or natural features. Although they are not excluded from further exploitation, all economic activities are carried out in accordance with the understanding of the republic-level nature conservation bodies. Projects dealing with water management, forest management, agriculture, industry, transportation, building, tourism and recreation, as well as exploitative activities such as mining, must be conducted in accordance with goals of the protected area and accordingly territorial planning is conducted, discussed and revised to be in line with this (Marsakova and Skrivanek, 1982). All PLAs in the Slovak Republic have buffer zones (Wiltowski, 1979).

National Nature Reserve: areas where the complete ecosystem is subject to conservation management (Marsakova and Skrivanek, 1982) and are strictly protected areas of great scientific and research importance (IUCN, 1971).

Protected Habitat: sites in which the occurrence of one or more plant or animal species are subject to preservation.

Protected Study Area: small protected sites designated for research and teaching purposes.

Protected Park or Garden: historic parts protected under the Cultural Monument Act.

Protected Natural Feature: geological features, especially karst areas, as well as individual monumental trees.

Protected Natural Monument: natural elements documenting human activities or associated with historical events.

Four government agencies, including two national park administrations are members of IUCN. The Krkonose National Park administration serves (since 1982) as the permanent secretariat to the East-Europe Committee IUCN Commission on Education which was established in 1967.

Parks and Reserves Administration and Management In 1940 the Trust for Enhancement and Protection of Native Country was founded in Prague. The State Institute for Protection of Monuments and Conservation of Nature was established in Prague in 1958. Ten years later in 1969 the Slovak Union of Nature and Landscape Conservationists (SZOPK) was founded and ten years after that in 1979 the Czech Union of Nature Conservationists was established (Cerovsky, 1986). The administration of protected areas is the responsibility of the respective Ministry of Culture in each republic advised by the respective Centre for Nature Conservation. The two republics each have a separate administrative structure. The central conservation authority in the Czech Republic is the Department for Nature Conservation within the Ministry of Culture with a parallel structure in the Slovak Republic. Each republic Ministry of Culture has a special conservation agency attached to it. In the Czech Republic this is the Centre for State Protection of Monuments and Nature Conservation (*Ustredi státní památkové péče a ochrany přírody* USPPPOP). In the Slovak Republic it is the Centre for State Nature Conservation (*Ustredie štátnej ochrany prírody -USOP*) (Cerovsky, 1986). In addition to the above there are eleven Regional Centres for Protection of Monuments and Conservation of Nature which have representatives present from the nature protection departments (IUCN, 1971), as well as a Council for Environment which is an advisory and consultative body for both republics and deals with the key problems of natural resource conservation (Marsakova and Skrivanek, 1982). The main aim of the two state nature conservation centres is the selection, management and use of protected natural components. They carry out wide-ranging research on threats to protected areas, monitoring and basic inventory work for each protected area and prepare management plans (Marsakova and Skrivanek, 1982). A key exercise is the

preparation and revision every ten years of a special planning document, the "territorial project of nature conservation" which is elaborated for all national parks and protected landscape areas (Povolny, 1986)

In the Czech Republic, respective District National Committees declare, in accordance with territorial plans "quiet areas" - areas where motor vehicles, camping and other recreational activities are prohibited. The Tatra National Park is under the direct responsibility of the Slovak Ministry of Forest and Water Management while the Krkonosze National Park is subordinate to the East-Bohemian Regional National Committee. Many of the frontier national parks and protected areas are organized on a bilateral basis. The administration of the Protected Landscape Areas is separate from local and regional authorities (Wiltowski, 1979). In the Czech republic it is a branch of the Regional Centre for the Protection of Monuments and Conservation of Nature, employing an average of four to ten professional staff members, who are principally involved in planning, management, monitoring and educational work. In the Slovak Republic, PLAs are directed by the Centre for State Nature Conservation with a separate staff of four to fifteen professionals. Each PLA in addition has its local headquarters. Research in PLAs and biosphere reserves is conducted by the Czech and Slovak Academies of Science or by the Research Institutes of the competent ministry. Results are approved by the Regional National Committee and by individual ministries- a complete document is then prepared by the Ministry of Culture.

Addresses

Czech Republic:

- Department for Nature Conservation, Ministry of Culture, CS-118 11 Praha 1, Maltezske nam.1
- Centre for State Protection of Monuments and Nature Conservation, Ministry of Culture, CS-11800 Praha 1, Valdstejske nam. 1.
- Nature Conservation Section (address as previous entry).

Slovak Republic:

- Department for Nature Conservation, Ministry of Culture, CS-031 01 Liptovsky Mikulas.
- Centre for State Nature Conservation, Ministry of Culture, CS-031 01 Liptovsky Mikulas ulica 1. maja 43.
- Centre for Nature Conservation Development (a section of the Centre for State Nature Conservation) CS-841 03 Bratislava, Heyrovskeho 1.

Additional Information Land is in the most part in state ownership, but where private enclaves occur in protected areas, the owners are obliged to conform to legal requirements. Over one-third of the country is covered in forest. Major environmental threats are from acid precipitation and agricultural mechanization. Although problems of environmental pollution are not the direct responsibility of the Ministry of Culture, it does have, through its state nature conservation bodies, an advisory input to discussions regarding state and branch plans, agricultural and water management and energy projects, and all types of physical planning (Marsakova and Skrivanek, 1982). In response to the present environmental crises a national plan - "the eco-programme" - is being developed which is aimed at integrating ecology and economic activities (Cerovsky, 1986). A National Conservation Strategy is also being prepared and contains a Species Preservation Strategy for the Czech Republic. Technical advice is provided by the Nature Conservation Section of the Centre for State Protection of Monuments and Nature Conservation, in the Czech Republic and by the Centre for Nature Conservation Development (*Stredisko rozvoja ochrany prirody*) of the Slovak Republic's Centre for State Nature Conservation (Cerovsky, 1986). There are two major voluntary organizations: the Slovak Union of Nature and Landscape Conservationists (*Slovensky svaz ochrancov prirody a krajiny* SZOPK) (Address: CS-811 01 Bratislava, Leningradska 1) with 14,000 individual and more than 400 collective members, 260 local groups and more than 600 youth groups with 11,000 members; and the Czech Union of Nature Conservationists (*Cesky svaz ochrancu prirody* CSOP) (Address: CS-11000 Praha 1, Staromestske nam. 12) with 24,000 individuals and more than 350 collective members and 768 local groups.

Special governmental decisions were passed in 1976 and 1978 regarding environmental education which was to be promoted in both republics, at all levels. Some universities offer courses on "Protection of the Natural Environment". Selected protected areas are used very extensively for educational purposes and have visitor centres and nature trails. In the Slovak Republic a conservation training centre operates in Gbelany near Zilina and in the Czech Republic there is an establishment in the Krkonose National Park. The Centre for Nature Conservation Development in Bratislava has since 1982 published *Chranene uzemia Slovenska-spravodajca* a yearbook on protected areas in Slovakia.

References

- ° Cerovsky, J. (1986). *Nature Conservation in the Socialist Countries of East-Europe*. East-Europe Committee, IUCN Commission on Education, Administration of the Krkonose (Giant Mountains) National Park. Vrchlabi.
- ° Cerovsky, J. and Petricek, V. (1985). *Rukovet ochrance prirody*. (Handbook of Nature Conservationists). Ministry of Culture of CSR, Praha. (not seen).
- ° IUCN (1971). *United Nations List of National Parks and Equivalent Reserves*. 2nd edition. Hayez, Brussels.
- ° Marsakova, M. (Ed.) (1983). *Statni ochrana prirody v CSR*. (State Nature Conservancy in the CSR). SUPPOP. Praha. (not seen).
- ° Marsakova, M. & Skrivanek, F. (1982). *Conservation of Nature and Natural Environment in the Czechoslovak Socialist Republic*. OBIS SUPPOP, Praha.
- ° Marsakova-Nemejcova, M., Mihalik, S. et al. (1971). *Narodni parky, rezervace a jiha chranena uzemi prirody v Ceskoslovensku*. (National parks, reserves and other natural protected areas in Czechoslovakia). Academia, Praha.
- ° Povolny, F. (1986). *Management of Biosphere Reserves in Czechoslovak protected areas' network*. Paper presented at the European MAB Conference, Ceske Budovice, March 1986.
- ° Wiltowski, J. (1979). *Ochrana przyrody w Slowacji. Chronmy Przyrode Ojczysta*. R. 35 z.l. pp 46-52.

Protected Landscapes

	(hectares)
<i>Protected Landscape Areas</i>	
Beskydy CHKO	116,000 *
Biele Karpaty CHKO	62,808 *
Bile Karpaty CHKO	71,500 *
Blanik CHKO	4,000 *
Ceske stredohori CHKO	107,000 *
Cesky kras CHKO	13,000 *
Cesky raj CHKO	12,500 *
Horna Orava CHKO	70,333 *
Jeseniky CHKO	75,000 *
Jizerske hory CHKO	35,000 *
Kokorinsko CHKO	27,000 *
Krivoklatsko CHKO	62,792 *
Kysuce CHKO	65,462 *
Labske Piskovce CHKO	30,000 *
Luzicke hory CHKO	35,000 *
Mala Fatra CHKO	19,792 *
Male Karpaty CHKO	65,504 *
Moravsky kras CHKO	12,000 *
Muranska planina CHKO	21,931 *
Orlicke hory CHKO	20,000 *
Palava CHKO	7,000 *
Podyji CHKO	10,300 *
Polana CHKO	20,079 *
Ponitrie CHKO	37,665 *
Slavkovsky les CHKO	64,000 *
Slovensky kras CHKO	36,165 *
Slovensky raj CHKO	14,230 *
Stiavnicke vrchy CHKO	77,630 *

Sumava CHKO	160,000 *
Trebonsko CHKO	70,000 *
Velka Fatra CHKO	60,610 *
Vihorlat CHKO	4,383 *
Vychodne Karpaty CHKO	66,810 *
Zdarske vrchy CHKO	71,500 *
Subtotal	1,626,994

Beskydy CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05 (Middle European Forest)

Geographical Location Situated between the towns of Valasske Mezirici to the west and Jablunkov to the east, 20km south of Ostrava in northern Moravia on the Czech-Slovak border. 49°30'N, 18°15'E.

Date and History of Establishment The area was created on 5 March 1973 by Decree No 5373/73. The decree aims to preserve and enhance the quality of the landscape and to control its development.

Area 116,000 ha.

Land Tenure State-owned

Altitude 300-1324m (the highest point being Lysa hora)

Physical Features Centred on the mountain area of the Moravian Beskids and parts of the Javorniku and Vsetinskych heights which are largely built of Flysch sandstones.

Climate No information

Vegetation This is a mainly wooded territory but with smaller belts of alpine meadows and isolated peat bogs occurring locally. The forests are of beech *Fagus sylvatica* and silver fir *Abies alba*. At higher altitudes there are stands of norway spruce *Picea abies* and at lower altitudes mixed forests with scattered oak *Quercus sp.* Typical of the area are remnants of virgin forest with outstanding specimens of beech, fir and spruce. Typical peatbog flora is common and is represented by such plants as *Drosera rotundifolia*, *Oxycoccus quadripetalus* and *Andromeda polifolia*. On the foothills there are meadows with *Crocus heuffelianus*.

Fauna Red deer *Cervus elaphus* are common and of the rarer birds, eagle owl *Bubo bubo* breed as well as three-toed woodpecker *Picoides tridactylus*, white-backed woodpecker *Dendrocopus leucotos* and pygmy owl *Glaucidium passerinum*. The fauna has, however, not yet been properly investigated. This used to be the extreme western part of the east European range of lynx *Lynx lynx*.

Cultural Heritage No information

Local Human Population There are a large number of villages within the site as well as a few towns, the largest being Roznov, Hor. Becva, N. Hrozenkov, V. Karlovice and Moravka.

Visitors and Visitor Facilities The area is intensively used for both winter and summer recreation. There are many hotels in the area and particularly trade-union and other organization owned hostels for miners from the near-by Ostrava industrial region.

Scientific Research and Facilities None.

Czechoslovakia

Conservation Management The area includes 17 nature reserves and other protected areas.

Management Problems In the foothills zone there has been a deterioration in the landscape due to uncontrolled building of second (recreation) homes. Forestry and agriculture is not restricted except in the national nature reserves.

Staff None.

Budget No information

Local Administration Krajske stredisko pamatkove pece a ochrany prirody Ostrava.

References

° Marsakova-Nemejcova, M and Mihalik, S. (1979). *Narodni parky, rezervace a jina chránena uzemi prirody v Ceskoslovensku*. Academia Praha.

Date August 1987

Biele Karpaty CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05. (Middle European Forest)

Geographical Location Situated in western Slovakia extending along some 90km of the Czech-Slovak boundary from Povazska Bystrica in the north to Skalica in the south. This belt of protected landscape varying from 10km to 2km in width lies to the west of the Vah river valley, 60km north of Bratislava. 48°52'N, 17°50'E.

Date and History of Establishment The area was created on 12 July 1979, by Decree No 111 of the Ministry of Culture of the SSR. The decree stipulates the protection and cultivation of nature and provides for the coordination of its agricultural exploitation.

Area 62,808ha.

Land Tenure State-owned with parts held by agricultural cooperatives.

Altitude 240-970m above sea level.

Physical Features The White Carpathians are made of flysch with sandstones and claystones and partially of klippen zone with limestones.

Climate This is generally cool with 700-800mm rainfall and 120 days of snow cover.

Vegetation The site is largely covered with deciduous forests, the prevailing portion of which are beech *Fagus sylvatica* and oak *Quercus sp.* There is also some agricultural land. Mountainous ground flora include species: *Mulgedium alpinum*, *Geranium sylvaticum*, *Polygonatum verticillatum*, *Campanula latifolia*, *Valeriana sambucifolia*, *Circaea alpina*, *Asplenium viride*, *Orchis globosa*, *Gentiana carpatica*. Thermophilous species: *Iris variegata*, *Scorzonera purpurea*, *Adonis vernalis*, *Iris graminea*, *Anacamptis pyramidalis*, *Stipe stenophylla*.

Fauna The White Carpathians belong to the deciduous forest zone and other elements include mountains, rocky outcrops, fields and meadows, water and their associated wildlife communities. Invertebrates are well represented with several species of the genus *Carabus* as well as *Lucanus cervus*, *Rosalia alpina*, *Mantis religiosa*, *Ascalaphus maceronius*, *Parnassius mnemosyne* and *P. apollo*. Reptile include the green lizard *Lacerta viridis*, wall lizard *Podarcis muralis* and aesculapian snake *Elaphe longissima*. Birds include rock thrush,

eagle owl, honey buzzard, peregrine, black kite, lesser spotted eagle and golden eagle (*Monticola saxatilis*, *Bubo bubo*, *Pernis apivorus*, *Falco peregrinus*, *Milvus migrans*, *Aquila pomarina* and *A. chrysaetos*). Mammals are represented by lynx *Lynx lynx*, wild cat *Felis silvestris*, and pine marten *Martes martes* as well as several species of genus *Chiroptera sp.* and *Sorex sp.*

Cultural Heritage No information

Local Human Population There appears to be only one sizeable settlement within the protected landscape (Horna Suca) but there are at least 11 towns located around the periphery, mostly concentrated in the Vah valley. Four roads cross the mountain range, all of them following the river valleys, as well as two railway lines connecting the Vah and the Morava valleys.

Visitors and Visitor Facilities No information

Scientific Research and Facilities Preliminary research results have been published.

Conservation Management There are six protected nature reserves and three other protected habitats within the protected landscape area as well as eight protected natural features. The area is contiguous with the Biele Karpaty CHKO.

Management Problems The intensification of forest management and agricultural exploitation are the major threats to the area.

Staff 4 professional workers and guards.

Budget No information

Local Administration Ustredie statnej ochrany prirody Liptovsky Mikulas (State Nature Protection Centre Liptovsky Mikulas), Sprava CHKO Biele Karpaty, 914 41 Nemsova-Klucove.

References

° Klinda, J. (1985). *Chranene uzemia prirody v Slovenskej Socialistickej Republike*. Vydavateľ'stvo Obzor, Bratislava.

Date August 1987.

Biele Karpaty CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05. (Middle European Forest)

Geographical Location Situated in the eastern part of the Czech republic extending some 90km along the boundary with Slovakia and contiguous with the Biele Karpaty CHKO. The area lies between Skalica in the Morava valley to the west and the Javorniky range to the north-east, varying from 2km to 25km in width. It lies some 70km north of Bratislava and 10km south-east of Gottwaldov. 49°58'N, 17°50'E.

Date and History of Establishment The area was created on 3 November 1980 by Decree No 17 644/80. The decree refers to the need to preserve and enhance the quality of the landscape and to control its development.

Area 71,500ha

Land Tenure State-owned

Czechoslovakia

Altitude 300-970m

Physical Features Consists of a range of hills and foothills largely of sandstone and slate rocks (flysh).

Climate No information

Vegetation The flora is very rich with 35 species of Orchidaceae as well as rare communities of thermophile and mountain plants. Approximately a quarter of the area consists of native beech forest *Fagus sylvatica* as well as oak *Quercus sp.* and hornbeam *Carpinus betulus*. At higher elevations there are herb-rich meadows and also beech forest. The meadows and steppe-like habitats dotted with solitary trees are in fact characteristic of the region and are often the only locations for some of the rarer species of plants. Notable species include cornel *Cornel sp.* and spindle *Euonymus europaeus*.

Fauna Not as yet investigated

Cultural Heritage No information

Local Human Population There would appear to be only one sizeable village-Slavicin-within the area but with a number of other settlements on the edge of the area (Skalice, Straznice and Uhersky Brod) and several close by (Gottwaldov).

Visitors and Visitor Facilities The area is apparently not frequently visited or used for tourism.

Scientific Research and Facilities Investigations have been carried out principally in botany but also in other biological spheres.

Conservation Management Within the area there are two national nature reserves; Javorina (situated at the highest point in the park) and Luh. There are a further four just beyond the boundary: Haj u Lipova, Oskovec, Vicnovsky haj and Lacnov. In total there are 46 smaller protected areas. Javorina consists of native beech forest and meadows on a steeply inclined area with an abundance of orchid species. Luh is a herb-rich meadow.

Management Problems The area has been exploited for agriculture for a long time but is now threatened by intensive amelioration projects. Four roads and two railway lines cross the area linking the Vah and Morava river valleys.

Staff Four workers from Krajske stredisko

Budget No information

Local Administration Krajske stredisko pamatkove pece a ochrany prirody Jimomoravskeho kraje, Brno.

References

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- ° Datasheets provided by Ustredie statnej ochrany prirody. Bratislava (1986).

Date August 1987.

Blaník CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.32.12. (Central European Highlands)

Geographical Location Situated in central Bohemia in the mid-Czechoslovak uplands, some 30km north-east of Tabor and 50km south-east of Prague. 49°40'N, 14°50'E.

Date and History of Establishment The area was created on 29 December 1981, by Decree No 17 332/81. The decree refers to the need to preserve and enhance the quality of the landscape and to control its development.

Area 4,000ha

Land Tenure State-owned

Altitude 500 - 638m

Physical Features The site is centred on the isolated hill of Velký Blaník consisting of crystalline rocks and is crossed north to south by the valley of the river Blanice.

Climate No information

Vegetation The site consists of a mosaic of small woods, meadows, ponds, streams and related riverside vegetation.

Fauna No full surveys have been carried out but the site probably holds otter *Lutra lutra*.

Cultural Heritage No information

Local Human Population There are very few isolated settlements in the area with the nearest town of any size (Vlasim) being 5km to the north.

Visitors and Visitor Facilities The area is apparently not much used for tourism

Scientific Research and Facilities None reported

Conservation Management There are no nature reserves or monuments located within the site and there is no internal zoning established.

Management Problems None. The site is crossed by one road.

Staff 1 worker from Krajské středisko

Budget No information

Local Administration Krajské středisko památkové péče a ochrany přírody Středočeského kraje, Praha.

References

- ° Světská, J. (Ed). (1976). *Chráněná území přírody ČSSR*. 2nd. edition. Kartografie Praha.
- ° Datasheets provided by Ústředie štátnej ochrany prírody. Bratislava (1986).

Date August 1987.

Ceske stredohori CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.32.12 (Central European Highlands)

Geographical Location Situated in northern Bohemia, 50km north-west of Prague and 5km south of the border with the German Democratic Republic, extending some 75km from the town of Most in the south-west to Decin in the north and averaging a width of 15km. 50°40'N, 14°15'E.

Date and History of Establishment The area was created on 19 March 1976 by Decree No 6.883/76. The decree refers to the need to preserve and enhance the quality of the landscape and to control its development.

Area 107,000 ha.

Land Tenure State-owned

Altitude 150-837m. (Milesovka)

Physical Features The area consists mainly of hills built by volcanic rocks. It is bisected by the deep canyon valley of the river Labe (Elbe) a feature known under the name of Porta Bohemica.

Climate The benefits from a warm climate especially in the Labe valley and its canyon.

Vegetation The fertile substrate and warm climate has allowed the appearance of steppe habitats and forest-steppe habitats with a rich flora. Some of the area is covered by thermophilous woods dominated by downy oak *Quercus pubescens* and hornbeam *Carpinus betulus*. Rare plants include *Dictamnus albus*, *Iris aphilla*, *Pulsatilla pratensis* ssp. *nigricans*, *P. patens*, *Saxifraga decipiens* and *Stipa* sp.

Fauna Not yet investigated.

Cultural Heritage No information

Local Human Population There are some 40-odd villages and small towns within the area which is bordered by many more such settlements and several larger towns such as Louny (to the south), Most (to the west), Usti n. Labe (to the north-west), Decin on its northern edge and Teplice (some 5km to the north).

Visitors and Visitor Facilities The area is intensively used for tourism and recreation.

Scientific Research and Facilities Investigations in botany, geology and geomorphology are carried out by the Czechoslovak Academy of Sciences. No facilities. There are organized excursions by specialists and scientific groups.

Conservation Management The protected landscape is part of a larger area including three other category V areas (Labske Piskovce CHKO, Luzicke hory CHKO and Kokorinsko CHKO) to all of which it is contiguous. Within the site there are some 23 nature reserves, three protected habitats and 10 protected natural features.

Management Problems Several commercially-operated quarries are located in the area. Forestry and agricultural activities are not restricted.

Staff Four officers.

Budget No information

Local Administration Krajske stredisko pamatkove pece a ochrany prirody. Usti nad Labem.

References

- ° Marsakova-Nemejcova, M and Mihalik, S. (1979). *Narodni parky, rezervace a jina chranena uzemi prirody v Ceskoslovensku*. Academia Praha.
- ° Svetska, J. (Ed). (1976). *Chranena uzemi prirody CSSR*. 2nd. edition. Kartografie Praha.
- ° Datasheets provided by Ustredie statnej ochrany prirody. Bratislava (1986).

Date August 1987

Cesky kras CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.32.12 (Central European Highlands)

Geographical Location Situated in central Bohemia immediately to the south-west of Prague lying along the valley of the Berounka river between the capital and the town of Beroun. 49°50'N, 14°15'E.

Date and History of Establishment The area was created on 12 April 1972 by Decree No 4.947/72. The decree refers to the need to preserve and enhance the quality of the landscape especially the subterranean karst phenomena and to control its exploitation.

Area 13,000 ha.

Land Tenure State-owned

Altitude 200-487m.

Physical Features Part of a vast denudation platform with the deeply cut canyon valley of the Berounka river and other canyon valleys formed by Silurian and Devonian beds belonging to the Palaeozoic (Barrandien). The area is rich in surface and subterranean karst phenomena, and contains valuable palaeontological and archaeological remains.

Climate No information

Vegetation A part of the area is covered by thermophilous woods with oak *Quercus sp.*, hornbeam *Carpinus betulus* and smaller areas of beech *Fagus sylvatica*; another considerable part by steppe plant communities. Among plant species protected by law in the Czech Socialist Republic, the following occur here: *Cornus mas*, *Anemone silvestris*, *Dictamnus albus*, *Orchis purpurea*, *Melittis melissophyllum*, *Iris aphylla*, *Pulsatilla pratensis* subsp. *nigricans*, *Saxifraga aizoon*, *Centaurea triumphettii*, *Dracocephalum austriacum*, *Antericum liliago*, *A. ramosum*, *Stipa ioannis*, *S. capillata* and *Anacamptis pyramidalis*.

Fauna Rare thermophile insects occur, such as *Harpalus sabucicola* and *Ocybus biharensis*, also an endemic mollusc *Laciniaria sp.*

Cultural Heritage Archaeological remains

Local Human Population There are four larger and some 12 smaller settlements within the protected landscape and the capital city, Prague, lies on the eastern edge of the area.

Visitors and Visitor Facilities The area is regularly and extensively used for tourism and recreation.

Czechoslovakia

Scientific Research and Facilities Investigation have been carried out in speleology, palaeontology, archaeology, botany and forestry by the central scientific organizations and universities. There are no facilities but there are organized excursions by scientific groups and specialists.

Conservation Management Within the area there are six nature reserves including three large ones (Karlické údolí, Koda and the most extensive, the 1,600ha Karlštejn) and four protected natural features. Some 5km to the west is the 65,452ha Krivoklátsko CHKO. The Karlštejn reserve contains some of the best and most typical examples of natural forests, forest-steppes and steppes remaining on the Czech karst.

Management Problems There are several big limestone quarries and cement factories close to the area but their construction and operation is negotiated with conservation authorities. Forestry and agricultural activities are not restricted.

Staff None to date

Budget 5 million Kcs.

Local Administration Krajské středisko památkové péče a ochrany přírody Středočeského kraje. Praha 5.

References

- ° Marsáková-Nemejcová, M and Mihalík, S. (1979). *Národní parky, rezervace a jiná chráněná území přírody v Československu*. Academia Praha.
- ° Světská, J. (Ed). (1976). *Chráněná území přírody ČSSR*. 2nd. edition. Kartografie Praha.
- ° Datasheets provided by Ústředí státní ochrany přírody. Bratislava (1986).

Date August 1987

Cesky raj CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.32.12 (Central European Highlands)

Geographical Location Situated in eastern Bohemia, south and east of the Jizera river valley 18km south of Liberec and 60km north-east of Prague. 50°35'N, 15°08'E.

Date and History of Establishment This, the oldest protected landscape in Czechoslovakia was created on 1 March 1955 by Decree No 70.261/55. This decree aims to protect the quality of the landscape and to control its development.

Area 12,500 ha.

Land Tenure No information

Altitude 250-489m.

Physical Features The area is built of Turonian sandstone. Locally, Tertiary volcanic eruptions emerge forming isolated dominating summits. The originally complex sandstone platform has been eroded by water and wind into typical "rocky cities" with labyrinths of canyon-like valleys, rocks and pinnacles.

Climate No information

Vegetation The area is covered mostly by secondary pine *Pinus sp.* forests. Only isolated areas of natural relict pines with rowan *Sorbus aucuparia* and birch *Betula alba* remain. In moist valleys there are remnants of alder *Alnus glutinosa* woodland. The most characteristic element of the vegetation, however, is dry growths of Scot's pine *Pinus sylvestris*, locally with an understorey of bracken *Pteridium aquilinum*, heather *Calluna vulgaris* and bilberry *Vaccinium myrtillus*.

Fauna Not investigated.

Cultural Heritage No information.

Local Human Population There are many hamlets within the area and several small towns (Turnov, Sobotka) on the borders of the site

Visitors and Visitor Facilities The area is frequently visited by tourists and is also used by mountaineers.

Scientific Research and Facilities None to date. No facilities.

Conservation Management The area as a whole has a single management plan for its conservation based on the original decree of establishment.

Management Problems None. Forestry and agricultural activities are not restricted.

Staff Two officers from local administration.

Budget No information.

Local Administration Krajske stredisko pamatkove pece a ochrany prirody, Pardubice.

References

- ° Marsakova-Nemejcova, M and Mihalik, S. (1979). *Narodni parky, rezervace a jina chranena uzemi prirody v Ceskoslovensku*. Academia Praha.
- ° Svetska, J. (Ed). (1976). *Chranena uzemi prirody CSSR*. 2nd. edition. Kartografie Praha.
- ° Datasheets provided by Ustredie statnej ochrany prirody. Bratislava (1986).

Date August 1987

Horna Orava CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05. (Middle European Forest)

Geographical Location Situated in northern Slovakia on the Polish border, north of the Orava river and adjoining the Orava River Reservoir, 30km north-east of Zilina and 30km north-north-east of Martin. The area is centered on the Slovenske Beskydy. 49°25'N, 19°25'E.

Date and History of Establishment The area was created on 12 July 1979, by Decree No 110 of the Ministry of Culture of the SSR. The decree stipulates the protection and cultivation of nature and natural values and provides for their optimum exploitation.

Area 70,333ha

Land Tenure Mostly in State-ownership with the rest in agricultural cooperatives.

Altitude 610-1,725m above sea level.

Czechoslovakia

Physical Features The area is made up of Tertiary flysh sediments with representative areas of sandstones, claystones, clays and marls.

Climate No information.

Vegetation Half of the site is covered with forests whilst agricultural areas (arable soils, pastures, meadows) occupy significant areas as does the Orava dam water reservoirs. In the forests there are zones of beech *Fagus sylvatica*, fir *Abies sp.* and spruce *Picea sp.* with mountain pine *Pinus mugo* occurring at higher elevations. The flysh character of the territory results in a low diversity of plant communities, however, peatbog communities are relatively rich in species. The alpine communities at the highest elevations have some endemics like *Cerastium alpinum ssp. babiogorense*, *Chrysanthemum rotundifolium*, *Festuca versicolor*, *Melampyrum sylvaticum ssp. carpaticum*, *Salix kitaibeliana*, *Saxifraga moschata ssp. kotulae*, and *Tozzia alpina ssp. carpatica*. Relict species include *Ledum palustre*, *Andromeda poliofolia*, *Listera cordata*, and *Cynclidium stygium*.

Fauna The territory is part of the forest zone of the palaeartic area and this is reflected in the species present, for example, *Lampetrea planeri*, *Triturus alpestris*, *Rana esculenta*, and *Vipera berus*. Birds include lesser spotted eagle *Aquila pomarina*, black grouse *Lyrurus tetrix*, capercaillie *Tetrax urogallus*, and eagle owl *Bubo bubo*. Mammals are represented by lynx *Lynx lynx*, brown bear *Ursus arctos*, and wolf *Canis lupus*.

Cultural Heritage No information.

Local Human Population This would appear to be a remote area with very few settlements and a very small resident population.

Visitors and Visitor Facilities No information.

Scientific Research and Facilities The results of preliminary research have been published.

Conservation Management The area lies adjacent to the Babia Gora National Park in Poland and contains six national nature reserves and seven smaller protected territories of other categories located within the territory.

Management Problems Increased exploitation of agricultural and forest areas. Industrial air pollution in the vicinity of the protected landscape is a major threat.

Staff Four professional workers and guards.

Budget No information.

Local Administration Ustredie statnej ochrany prirody Liptovsky Mikulas (State Nature Protection Centre Liptovsky Mikulas), Bernolakova 422, 029 01 Namestovo.

References

- ° Klinda, J. (1985). *Chranene uzemia prirody v Slovenskej Socialistickej Republike*. Vydavatel'stvo Obzor, Bratislava.
- ° Marsakova-Nemejcova, M and Mihalik, S. (1979). *Narodni parky, rezervace a jina chranena uzemi prirody v Ceskoslovensku*. Academia Praha.
- ° Svetska, J. (Ed). (1976). *Chranena uzemi prirody CSSR*. 2nd. edition. Kartografie Praha.
- ° Datasheets provided by Ustredie statnej ochrany prirody. Bratislava (1986).

Date August 1987.

Jeseniky CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05 (Middle European Forest)

Geographical Location Situated in northern central Moravia, at one point adjoining the Polish border and centred on the Hruby Jeseník uplands and some 35km north of Olomouc. 50°08'N, 17°10'E.

Date and History of Establishment The area was created on 19 June 1969 by Decree No 9.886/69. This decree aims to preserve the quality of the landscape and to control its development.

Area 75,000 ha.

Land Tenure State-owned.

Altitude 650-1492m.

Physical Features A mountain area built mainly of crystalline schists. The territory bears evidence of a Pleistocene glaciation.

Climate No information

Vegetation The area is mostly covered, in lower parts particularly, by secondary forests of Norway spruce *Picea abies* with local remnants of natural mixed growths of beech *Fagus sylvatica*, sycamore *Acer pseudoplatanus*, and maple *Acer platanoides*. The upper limit of forests is about 1250 meters and above this there are alpine meadows, in which *Nardus stricta* is the dominant species. In the area of Jeseníky there are numerous peatbogs. The site holds many important mountain species and among the species protected by law are the following: *Mulgedium alpinum*, *Lunaria rediviva*, *Aconitum napellus*, *Delphinium elatum*, *Dronicum austriacum*, *Lilium martagon*, *L. bulbifera*, *Blechnum spicant*, *Daphne mezereum*, *Campanula barbata*, *Saxifraga sisoon*, *Anemone narcissiflora*, *Aster alpina*, *Ledum palustre*, and *Drosera rotundifolia*.

Fauna Red deer *Cervus elaphus*, and birds such as capercaillie *Tetrao urogallus*, black grouse *Lyrurus tetrix*, and hazel hen *Tetrastes bonasia* are common in the area and, among birds of prey, eagle owl *Bubo bubo*. In the past the chamois *Rupicapra rupicapra* was introduced, and the animals are surviving very well.

Cultural Heritage No information.

Local Human Population The area is largely free from human habitation except on the edges of the protected landscape and in the form of linear villages in the valleys. The largest of these settlements are Jeseník and Loučna n. Desna.

Visitors and Visitor Facilities The area is frequently visited by tourists both in summer and winter seasons.

Scientific Research and Facilities Research has been undertaken by several institutions, for example, in the field of botany, by the Palacky University in Olomouc. The local conservation authority is responsible for the conservation management of the area and publishes the technical yearbook "*Campanula*".

Conservation Management Within the protected landscape there are 12 national nature reserves including the extensive Serak-Keprník, Vrchol Pradedu, Bila Opava, Velka Kotlina and the Mala Kotlina.

Czechoslovakia

Management Problems None reported although forestry and agricultural activities remain uncontrolled, except in the nature reserves.

Staff Four officers.

Budget No information.

Local Administration Sprava CHKO Jeseníky, Mala Moravka, Krajske stredisko pamatkového ochrany prírody Ostrava.

References

- ° Marsakova-Nemejcova, M and Mihalik, S. (1979). *Narodni parky, rezervace a jina chránena uzemi prírody v Československu*. Academia Praha.
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- ° Datasheets provided by Ustredie statnej ochrany prírody. Bratislava (1986).

Date August 1987

Jizerske hory CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.32.12 (Central European Highlands)

Geographical Location Situated in northern Bohemia on the south-facing slopes of the Sudeten Mountains between the Polish border to the north-east, the Krkonosky narodni park to the east and the town of Liberec lying on its south-western boundary. 50°50'N. 15°15'E.

Date and History of Establishment The area was created on 8 December 1967 by Decree No 13.853/67. This decree aims to preserve the quality of the landscape and to control its development.

Area 35,000 ha.

Land Tenure State-owned.

Altitude 350–1140 m.

Physical Features A mountain area built mainly of granite, and partly of crystalline schists, with some isolated basalt effusions. Jizerske hory were never covered by the continental ice-sheet, nor by their own glaciers. The mountain range declines abruptly to the north but gradually to the south.

Climate No information

Vegetation Most of the area is covered by secondary forests of norway spruce *Picea abies*. Natural growths of norway spruce *Picea abies* were preserved only on the highest summits and on the margins of numerous peatbogs. The peatbogs are predominantly covered by mountain pine *Pinus mugo*. On the steep stony and rocky northern slopes there are well preserved deciduous forests of beech *Fagus sylvatica*, maple *Acer platanoides*, and sycamore *Acer pseudoplatanus* together creating a mosaic of woodland cover. The flora of Jizerske hory is rather poor with rare species found on peatbogs only, for example: *Drosera rotundifolia* and *Betula nana*. The nature reserve "Bukovec", is rich in floral species and is called "The Garden of Jizerske hory". The following species have been recorded here: *Gentiana asclepiadea*, *Lunaria rediviva*, *Epipactis latifolia*, *Lilium martagon*, *Blechnum spicant*, *Daphne mezereum*, and *Hieracium aurantiacum*.

Fauna Red deer *Cervus elaphus* are numerous, including some very fine specimens. Birds include the capercaillie *Tetrao urogallus* and the hazel hen *Tetrastes bonasia*, but these tend to be rare.

Cultural Heritage The area of Jizerske hory, the southern foothills in particular, are occupied by scattered settlements, mostly of wooden folk cottages. A major part of these settlements is nowadays being used for recreation purposes.

Local Human Population Within the protected landscape there appear to be at least ten small towns and many other settlements (principally in the southern half of the area and in the valleys). On the park boundaries there are a number of larger towns, the largest being Liberec (99,000 population) followed by Jablonec n. Nis and Frydlant.

Visitors and Visitor Facilities The area is frequently visited by tourists in both summer and winter seasons and there are many public, trade-union and other organization owned hostels and camping grounds.

Scientific Research and Facilities None to date. No facilities.

Conservation Management The protected landscape area abuts onto the Krkonosky national park to the east and contains 22 national nature reserves (the largest being Polednik, 132ha with a 220ha buffer zone) and the Raselinisk Jizery (199ha and a 127ha buffer zone), one protected habitat area and one protected research area.

Management Problems None reported. Forestry and agriculture is not restricted or controlled.

Staff Four officers.

Budget No information.

Local Administration Sprava CHKO Jizerske hory, Liberec.

References

- ° Marsakova-Nemejcova, M and Mihalik, S. (1979). *Narodni parky, rezervace a jina chranena uzemi prirody v Ceskoslovensku*. Academia Praha.
- ° Svetska, J. (Ed). (1976). *Chranena uzemi prirody CSSR*. 2nd. edition. Kartografie Praha.
- ° Datasheets provided by Ustredie statnej ochrany prirody. Bratislava (1986).

Date August 1987

Kokorinsko CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.32.12 (Central European Highlands)

Geographical Location Situated in north-central Bohemia on the Dubske Uplands and the Psovky river valley, just north of the confluence of the rivers Labe (Elbe) and Vltava, 28km north of Prague and 10km south of Ceska Lipa. 50°30'N, 14°45'E.

Date and History of Establishment The area was created on 19 March 1976 by Decree No 6.070/76. This decree aims to preserve the quality of the landscape and to control its development.

Area 27,000 ha

Land Tenure State-owned

Czechoslovakia

Altitude 200-614m (Vlhost)

Physical Features The area lies on turonian sandstone. Locally tertiary volcanic eruptions have emerged forming isolated peaks. The originally complex sandstone platform has been eroded by water and wind action into typical "rocky cities" with labyrinths of canyon-like valleys, rocks and pinnacles.

Climate No information

Vegetation For the most part the area is covered by secondary pine forest, although in places natural pine forest remains and in the valleys there are broadleaved woods. In general, the flora is sparse, but typical wetland species can be found in the valleys and in the many pools present in the Kokorinsko nature reserve.

Fauna Not yet investigated and no information

Cultural Heritage No information

Local Human Population There are approximately 15 small villages and settlements within the protected landscape and several small towns (Melnik, Doksy) in the vicinity.

Visitors and Visitor Facilities There are many tourist hotels, trade-union owned hostels and some camping grounds.

Scientific Research and Facilities None to date and no facilities

Conservation Management Within the protected landscape there is one very large national nature reserve (Kokorinsky dul (2,000ha) located in the Psovsky valley, as well as one protected natural feature and one protected habitat area. This area is separated from the large Ceske stredohori CHKO to the north-west by the valley of the Zahradky river.

Management Problems The level of tourism is high and recreational activities, if not controlled, may cause problems.

Staff Two workers.

Budget No information

Local Administration Krajske stradisko statni pamatkove pece a ochrany prirody, Praha, Stredocesky kraj.

References

- ° Marsakova-Nemejcova, M and Mihalik, S. (1979). *Narodni parky, rezervace a jina chranena uzemi prirody v Ceskoslovensku*. Academia Praha.
- ° Svetska, J. (Ed). (1976). *Chranena uzemi prirody CSSR*. 2nd. edition. Kartografie Praha.
- ° Datasheets provided by Ustredie statnej ochrany prirody. Bratislava (1986).

Date August 1987

Krivoklatsko CHKO

Management Category V and I and IX (Protected Landscape, Strict Nature Reserve and Biosphere Reserve)

Biogeographical Province 2.32.12 (Central European Highlands)

Geographical Location The area is situated in the western part of the Middle Bohemian range in the Czech Socialist Republic in the districts of Beroun, Kladno, Rakovník, Plzeň-Sever and Rokycany. It is centred on the valley of the Berounka river and lies only 16km west of Prague and 23km north-east of Plzeň. The Český Kras Landscape Protected Area is 7km to the east along the Berounka valley. 50°00'N, 13°52'E.

Date and History of Establishment Declared a biosphere reserve; in January 1977 and as a protected landscape area under Decree No. 21.972/78, in November 1978. The whole area is protected as a Protected Landscape Area created in 1978.

Area 62,792ha

Land Tenure State and private. Forests, waters and most of the arable land are owned by the state; limited areas of fields, gardens and orchards are in private ownership.

Altitude 223-616m

Physical Features The highly meandering river Berounka divides the Krivoklat Highlands into the northern hills of Lány and the southern Zbiroh highlands. It is remarkable for its diversity of relief, with deeply cut valleys and numerous lateral gorges and hollows. The Krivoklat area is built up of folded Upper Proterozoic and Lower Palaeozoic complexes of the Barrandian basin. The central part is formed of shales, lydites and spilites flanked in the north-west by Cambrian marine deposits and terrestrial volcanics, and in the south-east by Ordovician sediments and submarine effusive rocks. Near Skryje, the famous localities of Middle Cambrian fauna (renowned for the numerous development forms of trilobites) are situated. Important palaeontological localities of Ordovician age are spread within the south-east marginal zone.

Climate The mean annual precipitation is 500-550mm; the mean annual temperature is 7-8°C.

Vegetation The area is largely covered by natural, mixed forest (64%) deciduous. Forests of oak *Quercus* sp., hornbeam *Carpinus betulus*, beech *Fagus sylvatica*, maple *Acer* sp. and lime *Tilia cordata*, *Sorbus terminalis*, *S. aria*, are mixed with *Abies abba* and grade into stands of yew *Taxus baccata* and juniper *Juniperus communis* on steep slopes, over an understorey of *Cornus mas* and *Cotonaster integrima*. Rare and interesting plants in the area include: *Adenophora liliifolia*, *Daphne mezereum*, *Adonis vernalis*, *Allium ursinum*, *Cephalanthera rubra*, *Cypripedium calceolus*, *Dianthus superbus*, *Lunaria rediviva*, *Ophrys mucifera*, *Orchis purpurea*, also *Sesleria calcarea*, *Saxifraga aizoon*, *Anthericum liliago*, *Orphantha lutea*, *Woodsia ilvensis* and *Pra badensis*.

Fauna Mammals include otter *Lutra lutra*, red deer *Cervus elaphus*, fallow deer *Dama dama*, roe deer *Capreolus capreolus* and wild boar *Sus scrofa*. Uncommon bird species present are the eagle owl *Bubo bubo*, black stork *Ciconia nigra* and wallcreeper *Tichodroma muraria*. Amphibians and reptiles are represented by the alpine newt, warty newt, smooth newt, fire salamander, green lizard and viviparous lizard (*Triturus alpestris*, *T. cristatus*, *T. vulgaris*, *Salamandra salamandra*, *Lacerta viridis* and *Lacerta vivipara*). There are also two species of crayfish. Invertebrate fauna is diverse with the endemic *Laciniaria nitidosa*, and butterflies *Parnassius apollo*, *P. mnemosyne* and the long horn beetle *Rosalia alpina*.

Cultural Heritage There are a number of castles and many villages remain in the traditional architectural style which adds to the landscape value of the area.

Local Human Population There is a sparse population due to the relief of the terrain, the dense forest cover, and the ownership relations. Population density is 40 persons per square kilometre.

Visitors and Visitor Facilities The area being so close to large urban centres such as Prague and Plzeň acts as a recreation area for a large number of tourists. Various sporting activities take place here.

Scientific Research and Facilities Within the area there are several designated forest-research areas. Research projects are mainly concerned with the structure and functioning of various ecosystems and is coordinated within the framework of the State Plan of Technical Development conducted by the Central Geological Institute. During 1981-1985 the State Institute for Protection of Monuments and Nature Conservation conducted research on the conservation of threatened and rare plants and biogenetic research. Botanic, murangic, malacozoologic and geologic research are carried out by the Czech Academy of Sciences and the National Museum. A complex investigation into watershed energy transfer and the biogeochemical balance in the reserve has been in progress in four watershed areas.

Conservation Management The area is characterized by a pattern of small core areas surrounded by zones of variously managed landscape, in which agriculture and forestry activity is not restricted. Additionally there are 16 areas protected a national and local nature reserves and three as protected natural monuments. The larger national nature reserves include Tyrov, Kohoutov, Vrani skala, Certtova skala, Dubensko and Svata Alzbeta. The large Tyrov reserve situated on either side of the Uporskeho stream represents the most typical and characteristic remnants of the vegetation in ther protected landscape consisting of a mosaic of oak *Quercus sp.* woods and rocky steppe meadows. In 1980 a School Nature Trail Krivoklat was opened in the core of the area, with 25 interpretive stations.

Management Problems The forest area have in ancient times been owned by Czech kings and served as a hunting ground and source of timber. In the area there is only one small industrial enterprise which does not influence the natural environment by its activities.

Staff Staff of four

Budget No information

Local Administration Centre for Monument and Nature Conservancy, (Krajske streidko pamatkovce pece ochrony prirody) Praha 5, Zborovska 11.

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- ° Moldan, B. and Stepanek, P. (1983). Biogeochemical balance as a prerequisite to ecological stability: A model for the Krivoklatsko Biosphere Reserve, Czechoslovakia In: *Conservation, Sciences and Society*. Contributions to the First International Biosphere Reserve Congress, Minsk, Byelorussia/USSR. Unesco-UNEP. Pp. 340-346.
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- ° Pompecki, J.F. (1896). Die fauna des kambriums von Tejrovic and Skrej in Bohmen. *Jb. Geol. Reichsanst.* 45: 495-614.
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Date January 1977, revised August 1986, May 1987, August 1987

Kysuce CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05 (Middle European Forest)

Geographical Location The site consists of two separate parts. The western section is located along the Czech-Slovak border extending for some 50km (from Lysa in the south to near Cadca in the north) along the Javorniky range of hills 20km west of Zilina. The second, eastern section is situated in the Slovenske Beskydy in north-western Slovakia on the Polish border, to the north-east of Zilina (15km) and including, along its southern edge, the valley of the Kystuca river. 49°20'N 19°00'E (eastern section); 49°10'N 18°30'E (western section).

Date and History of Establishment The area was created on 21 May 1984, by Decree No 68 of the Ministry of Culture of the SSR. This decree stipulates to protect and cultivate nature, natural values and the landscape with scattered settlements with regard to the mosaic of forest and agricultural land and to provide for its optimum exploitation in respect of its multi-functional uses as a cultural, scientific, economic, water management and health recreational resource.

Area 65,462ha

Land Tenure Mostly state-owned although parts are in the ownership of agricultural cooperatives.

Altitude 400 - 1,236m above sea level

Physical Features From the geological aspect the area is made of flysch rocks alternated with outcrops of sandstones, claystones and clay shales. The erosion processes have cut the rock complex with a network of rivers and created a system of gently undulating ridges and valleys. In areas of thicker sandstone layers, sharper mountain ridges occur. Small characteristic forms like emanation, oil springs, hydrogene sulphide springs, geological sections, and unique examples of jointing are noticeable. The impermeable substratum is related to smaller reserves of ground water and lower yield of springs whilst larger ground water reserves are only to be found in alluviums.

Climate No information

Vegetation The area has west Carpathian species of flora with a majority of mountainous species present and a sporadic occurrence of thermophilous species. The more significant protected species are *Blechnum spicant*, *Drosera rotundifolia*, *Lycopodium annotinum*, *Aconitum lycoctonum* subsp. *lycoctonum*, *Soldanella montana* subsp. *hungarica*, *Matteucia struthiopteris*. Other rare species *Orchis mascula*, *O. morio*, *Dactylorhiza sambucina*, *Anacamptis pyramidalis*, *Veronica montana*, and *Veratrum album* subsp. *lobelianum*.

Fauna In general the area has a character of west Carpathian zoocenoses of the montane and submontane zone with solitary subalpine elements. Mammals include brown bear, lynx, otter (*Ursus arctos*, *Lynx lynx*, *Lutra lutra*) and *Sorex alpinus*. Birds include eagle owl, black stork, raven and Tengmalm's owl (*Bubo bubo*, *Ciconia nigra*, *Corvus corax* and *Aegolius funerus*). Amphibians and reptiles include *Triturus montadoni*, *Lacerta vivipara*, and *Sicista betulina*.

Cultural Heritage No information

Local Human Population There are several small settlements in the western section usually located in the valleys. The nearest large urban centre is Zilina with a population of 87,000.

Visitors and Visitor Facilities No information

Czechoslovakia

Scientific Research and Facilities Studies are being conducted. The results of completed research work has been published.

Conservation Management Within the two separate sections there are a total of four national nature reserves and five other protected areas. The eastern section is contiguous to Horna Orava CHKO to the east, while the western section is contiguous for over 50km with the Beskydy CHKO.

Management Problems High concentration of visitors in some centres, and the intensification of agriculture and forest management activities.

Staff Three professional workers and guards.

Budget No information

Local Administration Okresny narodny vybor v Cadci (District National Committee at Cadca), Sprava chránenej krajinej oblasti Kysuce, 022 01 Cadca.

References

- ° Svetska, J. (Ed). (1976). *Chranena uzemi prirody CSSR*. 2nd. edition. Kartografie Praha.
- ° Datasheets provided by Ustredie statnej ochrany prirody. Bratislava (1986).

Date August 1987.

Labske piskovce CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.32.12 (Central European Highlands)

Geographical Location Situated in northern Bohemia along the border with the German Democratic Republic. The area which stretches some 45km along the border is divided into two by the River Labe (Elbe) and lies 10km north of Usti n. Labem and 45km west of Liberec. This site on the Decinska uplands is better known as the Czechoslovak "Switzerland". The town of Decin lies partly within the area. 50°48'N, 14°20'E.

Date and History of Establishment The area was created on 27 July 1972 by Decree No 4.946/72. This Decree aims to preserve and enhance the quality of the landscape and to control its development.

Area 30,000 ha.

Land Tenure State-owned.

Altitude 220-717 m.

Physical Features The area is a vast plateau of Cretaceous sandstones belonging to the Lower and Middle Turonian while during the Kenozoic the area was penetrated by isolated basalt effusions. In the Kenozoic era the sandstone platform was lifted and broken, followed by the creation of typical topographically differentiated "rock cities". The river Labe (Elbe) flows through the area forming a deep canyon.

Climate No information.

Vegetation Most of the area is covered by secondary forest monocultures of pine *Pinus sylvestris* and Norway spruce *Picea abies*. Natural communities containing these species occur in isolated habitats only, as well as occasional natural stands of *Fagus sylvatica* woodland preserved on basalt effusions. The flora is rather poor, but includes some sub-mountain and

mountain species, such as *Streptopus amplexifolium*, *Thalictrum aquilegiifolium*, *Urostachys selago*, *Blechnum spicant*, *Viola biflora*: in several places there are small peatbogs with *Drosera rotundifolia* and other common peatbog flora. A remarkable feature is the occurrence of *Ledum palustre* on sandstone rock walls and in canyon-valleys.

Fauna Among the rarer bird species present, the eagle owl *Bubo bubo* and peregrine *Falco peregrinus* deserve to be mentioned.

Cultural Heritage No information.

Local Human Population The area lies in a densely populated part of Bohemia and the largest settlement within the area itself is the town of Decin which lies on the River Labe. In addition, there are some seven villages and a number of hamlets. Along the borders of the protected landscape several larger settlements are to be found, while slightly further away are the towns of Liberec (99,000 population) and Usti nad Labem (90,000 population).

Visitors and Visitor Facilities The area is under strong tourist pressure and there are many hotels, trade union and organization owned hostels, and second holiday houses used for recreation purposes, as well as a number of camping grounds.

Scientific Research and Facilities None. No facilities.

Conservation Management Within the protected landscape there are five national nature reserves and one other in the process of establishment as well as a protected natural feature. The area as a whole is part of a larger complex of protected landscapes which adjoin it, namely, the Ceske stredohori CHKO to the south and the Luzicke hory CHKO to the east.

Management Problems None reported but forestry and agricultural activity is not restricted.

Staff Two officers from local administration.

Budget No information.

Local Administration Krajske stredisko pamatkove pece a ochrany prirody Severoceskeho kraje. Usti nad Labem.

References

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Date August 1987

Luzicke hory CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.32.12 (Central European Highlands)

Geographical Location Situated in northern Bohemia on the border with the German Democratic Republic and 10km west of Liberec. 50°50'N, 14°38'E.

Date and History of Establishment The area was created on 19 March 1976 by Decree No 6.972/76. The decree aims to preserve the quality of the landscape and to control its development.

Area 35,000 ha

Czechoslovakia

Land Tenure State-owned

Altitude 300–750m

Physical Features The area is built mainly of Turonian sandstones and crystalline schists with outcrops of volcanic rocks.

Climate No information

Vegetation The area is covered mostly by secondary forests of pine *Pinus sylvestris* and Norway spruce *Picea abies*. Also found are remnants of natural mixed growths with codominants beech *Fagus sylvatica*, sycamore *Acer pseudoplatanus* and maple *Acer platanoides*. The less steep slopes are mainly under pasture.

Fauna Not yet investigated.

Cultural Heritage Typical for this territory are scattered village settlements, mostly of wooden folk cottages, the major part of which is nowadays used for recreational purposes.

Local Human Population There do not appear to be any towns located within the protected landscape area itself, but there are several urban centres within easy reach of the site. Liberec with a population of 99,000 is only 10km to the west.

Visitors and Visitor Facilities The whole area is widely used for recreation and tourism purposes both in summer and winter seasons.

Scientific Research and Facilities None. No facilities.

Conservation Management Within the protected landscape there are 11 national nature reserves and other protected areas (three protected natural features and one protected natural habitat). The site is contiguous with Labske Piskovce CHKO and Ceske stredohori CHKO.

Management Problems None. Forestry and agricultural activities are not restricted, except in the nature reserves.

Staff Two workers from the local administration.

Budget No information

Local Administration Krajske stredisko pamatkove pece a ochrany prirody Severecekeho kraje. Usti nad Labem.

References

- ° Svetska, J. (Ed). (1976). *Chranena uzemi prirody CSSR*. 2nd. edition. Kartografie Praha.
- ° Datasheets provided by Ustredie statnej ochrany prirody. Bratislava (1986).

Date August 1987

Mala Fatra CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05 (Middle European Forest)

Geographical Location Situated in north-west Slovakia at the northern end of the Mala Fatra mountain range, flanked to the south-west, south and south-east by the Vah and Orava river valleys. The town of Martin is immediately to the south of the area, and Zilina is 5km to the west. 49°10'N, 19°00'E.

Date and History of Establishment The area was created on 3 January 1967 by Provision No 22 of the Slovak National Council Commission for Education and Culture. This legal provision stipulates the preservation, regeneration and cultivation of the natural wealth and landscape beauties of the site.

Area 19,792ha (protective zone 26,354ha)

Land Tenure State-owned to a large extent

Altitude 350 - 1,711m above sea level

Physical Features The granite core emerges on the southern slope of the mountain range and above the Vah river valley. Mesozoic sets and nappes of limestone, dolomites and marl, less of quartzite and slate adjoin the core from the north-west. The Choc group with Triassic dolomites forms the cliffs of Rozsutec, Boboty and Sokolie and contrasts with the round landform of the Stoh and Steny formed by the Neocomian marls of the Kriznany group. The rocks of the cover set, mainly limestones but also quartzites and diverse slates, emerge at the ridge from Chleb to the Big and Small Krivan.

Climate No information

Vegetation The area is mostly covered with forests, alpine meadows and rocks. Forest vegetation ranges from oak-hornbeam *QuercusCarpinus betulus* groves to conifers. Beech *Fagus sylvatica* groves prevail. The plant communities reflect the diversity of the underlying rock. The west Carpathian endemics present here are *Saxifraga wahlenbergii*, *Dianthus nitidus*, *Ersimum wittmanii*, *Galium anisiophyllum fatrense* and others; Carpathian endemics *Salix kitaibeliana*, *Hesperis nivea* and others. Relicts: pine woods (on dolomites), *Matteucia struthiopteris*, *Salix reticulata*, *Aster alpinus* and others. Protected species: *Aconitum firmum*, *Amelanchier ovalis*, *Cortusa matthioli*, *Drosera anglica*, *Phyllitis scolopendrium*, *Pinus mugo*, *Pulsatilla alpine* and yew *Taxus baccata*.

Fauna Rare species include *Columella columella*, *Helicigona cingulella*, *Trichopterna fatrensis*, *Carabus obsoletus*, *Nebria tatraica*, *Silpha tyrolensis*, *Adkinia zophodactyla*, *Audoria petrophilla*, *Psolos alpinata* and *Hucho hucho*. Amphibians and reptiles include *Lacerta muralis*. Birds include black stork *Ciconia nigra*, golden eagle *Aquila chrysaetos*, black grouse *Lyrurus tetrix*, and alpine accentor *Prunella collaris*. Mammals include brown bear *Ursus arctos* and *Myotis myotis*.

Cultural Heritage No information

Local Human Population The site appears to have no villages within its area, but it adjoins immediately to the south the town of Martin and is only 5km east of Zilina, which has a population of 87,000.

Visitors and Visitor Facilities No information

Scientific Research and Facilities An inventory of Rozsutecs was carried out and preliminary research on other areas has also been published. Two field stations exist, but lack instruments and equipment.

Conservation Management The protected landscape is surrounded by a 26,354ha protective buffer zone and includes within the CHKO 13 national nature reserves, two protected habitats, one protected natural formation (cave); with a further three national nature reserves, one protected habitat and three protected natural formations in the protective zone. The larger reserves are Tiesnavy, Rozsutec and Sutovska dolina, and the area is separated from Velka Fatra CHKO by the valley of the river Vah.

Management Problems Some places have experienced overcrowding by tourists. Forest management and agricultural activities are increasing in intensity and may result in future threats.

Czechoslovakia

Staff Ten professional workers and guards

Budget No information

Local Administration Ustredie statnej ochrany prirody (State Nature Protection Centre)
Liptovsky Mikulas - Sprava CHKO Mala Fatra
013 02 Gbelany

References

- ° Klinda, J. (1985). *Chranene uzemia prirody v Slovenskej Socialistickej Republike*. Vydavateľstvo Obzor, Bratislava.
- ° Marsakova-Nemejcova, M and Mihalik, S. (1979). *Narodni parky, rezervace a jina chranena uzemi prirody v Ceskoslovensku*. Academia Praha.
- ° Svetska, J. (Ed). (1976). *Chranena uzemi prirody CSSR*. 2nd. edition. Kartografie Praha.
- ° Datasheets provided by Ustredie statnej ochrany prirody, Bratislava (1986).

Date August 1987.

Male Karpaty CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05 (Middle European Forest)

Geographical Location Situated in south-west Slovakia, extending some 90km south-west to north-east along the Mala Karpaty range of hills from Bratislava in the south to Nove Meso n. Vah in the Vah river valley in the north. 48°28'N, 17°15'E.

Date and History of Establishment The area was created on 5 May 1976, by Decree No 64 of the Ministry of Culture of the SSR. This decree stipulates the protection and cultivation of nature and natural values and provision for the coordination of its economic exploitation.

Area 65,504ha (protective zone 45,063ha)

Land Tenure State-owned

Altitude 135 - 768m above sea level.

Physical Features The area is mostly identical to the orographic unit of the Small Carpathians. It consists of a crystalline complex mostly with granite, crystalline schist, mica schist, phyllite, gneiss, then Mesozoic outcrops of limestone, dolomite, sandstone, quartzite and slates, Palaeogene outcrops of limestone, conglomerates and breccia, and Neogene outcrops of conglomerate, sandstone, gravel and sands.

Climate No information

Vegetation The largest part of the territory lies in the deciduous forest zone and only a part in the steppe-forest zone. The area is covered mostly with forests of mainly beech *Fagus sylvatica* and oak *Quercus sp.* Thermophile species are represented especially in the non-forest communities by, for example, *Dianthus lumnitzeri*, *Helianthemum canum*, *Stipa capillata*, *Ruscus hypoglossum* (Small Carpathians endemic), *Vicia incana*, *Coronilla emerus*, *Ceterach officinarum* all of which should be considered as rare species. Yew *Taxus baccata* and silver fir *Abies alba* representing mountainous species occur at isolated localities.

Fauna The majority of species are European-Siberian ones, however, Oriental, European and Mediterranean species also occur. Significant species include *Bythinella austriaca*, *Trichia lubomirskii*, *Mantis religiosa*, *Odealeus nigrofasciatus*, *Zygsena panctum*, *Euphydryas maturna*, *Ergates faber*, *Anthaxia hungarica*, *Eudontomyzon vladkovi* amongst the invertebrates.

Amphibians and reptiles are represented by *Salamandra salamandra*, *Lacerta muralis* and *Elaphe longissima*. Birds include stock dove *Columba cenas*, imperial eagle *Aquila heliaca* and saker falcon *Falco cherrug*. Mammals recorded include *Plecatus auritus*, *Meles meles* and *Sus scrofa*.

Cultural Heritage No information

Local Human Population The heavily forested ridge is little inhabited but is within easy reach of Bratislava (Czechoslovakia's second largest city, with a population of 394,000) and other urban centres such as Trnava, to the south-east. Only two major roads and one railway (in the extreme north) cross the area.

Visitors and Visitor Facilities None reported

Scientific Research and Facilities Preliminary research results have been published.

Conservation Management The protected landscape is surrounded by a protective buffer zone. There are 11 national nature reserves, three protected habitats and ten protected natural formations (of which seven are protected caves) in the protected landscape; one national nature reserve and three protected territories of other categories are in the protective zone.

Management Problems Intensification of forest management and excessive visitor pressures are reported in some parts.

Staff Six professional workers and guards.

Budget No information

Local Administration Ustredie statnej ochrany prírody Liptovský Mikuláš (State Nature Protection Centre Liptovský Mikuláš), Sturova 115, 900 01 Modra.

References

- ° Klinda, J. (1985). *Chranené územia prírody v Slovenskej Socialistickej Republike*. Vydavateľstvo Obzor, Bratislava.
- ° Svetska, J. (Ed). (1976). *Chranená územia prírody CSSR*. 2nd. edition. Kartografie Praha.
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Date August 1987

Moravský kras CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.32.12 (Middle European Forests)

Geographical Location Situated in south-central Moravia on the Dražanská Vrchovina immediately to the north of Brno. 49°15'N, 16°40'E.

Date and History of Establishment The area was created on 4 July 1956 by Decree No 18.001/1955. This Decree aims to preserve the quality of the landscape, the subterranean karst phenomena and to control its development.

Area 12,000 ha

Land Tenure State-owned

Altitude 470-548m

Physical Features The area is built of Devonian limestones and shows a series of outstanding surface and subterranean karst phenomena. There are several systems of karst caves, most of them accessible to the public. The area is also famous for the chasm of Macocha, 138m deep, and a series of underground lakes along the river Punkva.

Climate No information

Vegetation There are well preserved remnants of natural mixed growths of beech *Fagus sylvatica* and silver fir *Abies alba*. In the canyon-like valleys there are fine growths of yew *Taxus baccata*. Among rare plants the following species have been recorded: *Phyllites scolopendrium*, *Saxifraga aizoon*, *Gentiana ciliata*, *Alyssum saxatile*, *Stipa ieannis*, *Adonis vernalis*, *Anthericum ramosum*, *Gortusa matthioli* and *Anthericum liliage*.

Fauna Various cave dwelling species are common, such as *Arrhopalites bufudus* and *Schafferia emucronata*, as well as several species of bats: *Plecotus auritus*, *Myotis smarginatus*, *M. myotis*, *Berbastella barbastellus* and *Rhinolophus hipposideros*.

Cultural Heritage The area is noted for its archaeological remains.

Local Human Population There are no sizeable settlements in the area (although there are many villages on the boundary), but it adjoins the northern suburbs of Brno, Czechoslovakia's third largest city with a population of 379,000.

Visitors and Visitor Facilities The area is visited by many tourists, attracted by the subterranean cave systems. The subterranean river Punkva which has created numerous lakes, can be in some places visited by boats.

Scientific Research and Facilities Speleological and archeological investigations are carried out by the Czechoslovak Academy of Sciences.

Conservation Management The site had at one point nine national nature reserves but by 1986 there were only four sites registered, the largest of these being the Moravsky kras reserve. There was also one protected natural feature.

Management Problems None reported, however, despite the fact that forestry is restricted, the forests are managed commercially.

Staff Five officers, four scientific workers

Budget One million Kcs

Local Administration Krajske stredisko pamatkovpe pece a ochrany prirdy, Jihomoravakeho kraje, Brno.

References

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- ° Datasheets provided by Ustredie statnej ochrany prirdy. Bratislava (1986).

Date August 1987.

Muranska planina CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05 (Middle European Forest)

Geographical Location Situated in central Slovakia at the western end of the Slovenske Rudohorie range of hills, 15km east of Brezno and south of the Hron river valley. 48°45'N, 19°58'E.

Date and History of Establishment The area was created on 30 December 1976, by Decree No 9 of the Ministry of Culture of the SSR. This decree stipulates the protection and cultivation of nature and natural values, and the provision for coordination of their economic exploitation.

Area 21,931ha (protective zone 34,250ha)

Land Tenure State-owned

Altitude 390-1,439m above sea level

Physical Features The area is one of karst limestone-dolomite with a crystalline complex representation. Geomorphological variation is such that there are examples ranging from steep scarps right through to rock walls and plain rock faces.

Climate No information

Vegetation The majority of the area is covered with forest communities ranging from oak *Quercus sp.* and beech *Fagus sylvatica* to silver fir *Abies alba* groves with the largest representation being of spruce *Picea sp.* groves. Most interesting is the occurrence of the palaeoendemic *Daphne arbuscula* as well as species such as *Juniperus sibirica*, *Lonicera alpigena* and *Waldsteinia trifoliata*. The area represents the southern and altitudinally the lowest locality of mountain pine *Pinus mugo mughus*. Other species: *Delphinium oxyspalum*, *Dianthus praecos*, *Festuca tatrae*, *Festuca carpatica*, *Aconitum dominii*, *Dryas octopetala* and yew *Taxus baccata*.

Fauna The relatively well preserved forests which exhibit a diversity of plant communities due to the karst substratum and the areas substantial elevation differences results in faunal diversity. Species of invertebrates include *Eisenia submontana*, *Mesoniscus graniger*, *Hyalomyia surigera*, *Ernestis vivida*, and *Iphyclides podalirius*. Amphibians are represented by *Lacerta vivipara*. Birds include black stork, buzzard, imperial eagle, hobby and eagle owl (*Ciconia nigra*, *Buteo buteo*, *Aquila heliaca*, *Falco subbuteo* and *Bubo bubo*). Mammals of note include *Neomys anomalus* and brown bear *Ursus arctos*.

Cultural Heritage No information

Local Human Population The area is remote and it would appear that there are no sizeable settlements present. The surrounding villages and towns are also of a relatively small size and are almost exclusively located in the valleys of the rivers Hron and Muran.

Visitors and Visitor Facilities No information

Scientific Research and Facilities The results of preliminary research have been published.

Conservation Management The protected landscape is surrounded by a protective buffer zone of 34,250ha. There are eight national nature reserves and two protected habitats in the protected area; and three national nature reserves and three protected habitats in the protective zone. The largest of the reserves is Velka Stozka (209ha).

Management Problems The intensification of forest management and agricultural activities are the major threats to the area.

Staff Four professional workers and one guard

Budget No information

Czechoslovakia

Local Administration Ustredie statnej ochrany prírody Liptovský Mikuláš (State Nature protection Centre Liptovský Mikuláš), Správa CHKO Maránska planina, ul. Janka Kráľa 12, 050 01 Revúca

References

- ° Klinda, J. (1985). *Chránené územia prírody v Slovenskej Socialistickej Republike*. Vydavateľstvo Obzor, Bratislava.
- ° Svetska, J. (Ed). (1976). *Chránená územia prírody CSSR*. 2nd. edition. Kartografie Praha.
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Date August 1987.

Orlicke hory CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.32.12 (Central European Highlands)

Geographical Location Situated in east Bohemia on the Polish border, extending some 40km in a north-west to south-east direction between Olesnice Orł. Horach in the north and the Divoká Orlice valley in the south. 50°15'N, 16°25'E.

Date and History of Establishment The area was created on 28 December 1969 by Decree No 16.368/69. This Decree aims to preserve the quality of the landscape and to control its development.

Area 20,000 ha

Land Tenure State-owned

Altitude 620-1,115m at Velkou Destnou

Physical Features A mountain area built mainly of crystalline schists and intrusive rocks, whilst in the southern part there is a small occurrence of sandstones and calcareous claystones. The rather narrow ridge is cut through by the deep valley of the Divoká Orlice river.

Climate No information

Vegetation The major part of the area is covered by a secondary growth of Norway spruce *Picea abies*. Only in isolated remnants is there a well preserved natural growth of beech *Fagus sylvatica*. On the flatter areas of the mountain ridge there are small peat bogs. Among rare plant species found here are the following: *Leucjum vernum*, *Mulgedium alpinum*, *Aconitum napellus*, *Daphne mezereum*, and other mountain species.

Fauna Not yet surveyed, but mostly species typical for such a mountain area.

Cultural Heritage No information

Local Human Population There are at least six villages within the area and many more hamlets and settlements, and the southern foothills have a dense pattern of such constructions composed of scattered folk buildings. The nearest large urban centre is Hradec Králové (population 97,000) and Pardubice (population 93,000), 30km and 45km away respectively.

Visitors and Visitor Facilities The area used extensively for both summer and winter recreation and tourism. There are many public, trade-union and other organization owned hostels, hotels and camps.

Scientific Research and Facilities Investigations in botany and forestry have been conducted by the Botanical Institute of the Czechoslovak Academy of Sciences and other scientific research bodies. No facilities exist at present.

Conservation Management Within the protected landscape area there are five national nature reserves and one protected natural feature.

Management Problems None. Forestry and agricultural activities are not restricted or controlled.

Staff None yet

Budget No information

Local Administration Krajske stredisko pamatkove pece a ochrany prirody Vychodoceškeho kraje, Pardubice.

References

- ° Marsakova-Nemejcova, M and Mihalik, S. (1979). *Narodni parky, rezervace a jina chránena uzemi prirody v Ceskoslovensku*. Academia Praha.
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Date August 1987.

Palava CHKO

Management Category V and I and IX (Protected Landscape, Strict Nature Reserve and Biosphere Reserve)

Biogeographical Province 2.11.05 (Middle European Forest)

Geographical Location The area is situated 35km south of Brno in southern Moravia and adjoins the Austrian border. It is 11km from east to west and 12km north to south and includes, amongst others, the town of Mikalov. 48°50'N., 16°45'E.

Date and History of Establishment The Protected Landscape Area designation was applied in 1976. The area was approved as a biosphere reserve in 1986. The Protected Landscape Area was established by a decree of the Czech Ministry of Culture (No. 5790/76 on 19 March 1976) under the legislation No. 40/1956 on the State Protection of Nature. Strict nature reserves are governed by decrees conferring strict protection. The Act aims to preserve and enhance the quality of the landscape and to control the development of this area. The biosphere reserve covers 8,071ha and is designated as a Protected Landscape.

Area The protected landscape covers 7,000ha but the total area including the biosphere reserve is 8,017ha, which includes 11 strict nature reserves totalling 672ha.

Land Tenure Mostly State ownership, with some cooperative lands and partially private. The forests are totally state owned; the agricultural areas are both state and cooperative owned whilst small areas such as orchards, vineyards and gardens are private.

Altitude 163-550m

Physical Features The area includes the westernmost extent of the White Carpathian range, the Mikulov Highlands where they adjoin the Dyje river valley. The area has been formed by periglacial and karst processes resulting in limestone outcrops (Pavlovské vrchy) in an otherwise rolling landscape of lowlands and hills. There are thick loess and colluvial deposits some of which are of European stratigraphic importance, present in the flood plain of the Dyje River.

Climate Mean annual temperature of 9°C and mean annual precipitation of 524mm.

Vegetation Oak *Quercus petraea* and hornbeam *Carpinus betulus* forests grade into forest steppe and steppe with smaller areas of saline steppe which support rare halophytes such as *Crypsis aculeata* and *Samolus valerandii*. The steppe and forest steppe habitats support pontic-pannonian and submediterranean communities present here at their northern and western limits, for example, such species as *Salvia aethiopsis*, and *Orlaya grandifolia*. On the southern slopes there is the appearance of *Quercus petraea* and *Quercus pubescens* woodland with associations of lime *Tilia platyphyllos*, sycamore *Acer pseudoplatanus* and *Cornus mas* and *Prunus mahaleb* on scree slopes. The Dyje river flood plain remnants of alluvial forest of *Q. robur* and *Fraxinus angustifolia* with an understorey of *Leucjum aestivum* some 56% of the reserve is agricultural land and 33% is forest which is used mainly as game parks. Very important steppe plant communities include *Poa badensis*, *Festuca glauca*, *Sesleria calcarca*, *Alsine setacea*, *Festuca vallesiaca* and *Ranunculus illyrius*. Other species include *Fumana procumbens*, *Iris pumila*, *Iris arenaris*, *Verbascum phoeniceum*, *Dianthus plumarius*, *Biscutella laevigata* and *Saxifraga aizoon*.

Fauna There are no mammals of note (a number of deer species are kept in the game parks) few birds which, however, include eagle owl *Bubo bubo* and rock thrush *Monticola saxatilis* and grey-lag geese *Anser anser* but particularly rich insect fauna which supports a number of ponto-mediterranean, pontic and sarmatic species are at their northern most boundary here. These include *Saga pedo*, *Mantis religiaru*, *Bombus fragrans*, *Zerynthia hypsipyle*, *Anthaxia hungarica* and *Marumba quercus*. A number of interesting molluscs are also present including *Chondrula tridens* and *Helicopsis striata*.

Cultural Heritage Archaeological evidence suggest settlements in the area since 25,000 years ago. There are remains of the Great Moravian Slavonic hill-forts present.

Local Human Population In total there are ten municipalities, both rural and urban with a total population in 1977 of 12,370 which has subsequently increased. Half the area is agricultural and there are numerous settlements, the largest being the town of Mikulov with a population of 13,000.

Visitors and Visitor Facilities The area is commonly used for tourism and recreation at a local level.

Scientific Research and Facilities Research in this area has been carried out since before 1900 and continues to date in the form of several long-term studies organized principally by the Czechoslovak Academy of Sciences and several universities. The Forest Ecology Institute of Brno Agricultural College has researched the riverine forests within the framework of MAB Project 2. The Institute of Geography of the Academy of Sciences has researched landscape structural changes using remote sensing by aerial photographs taken from a model airplane. There are several field and research stations with continuous monitoring of climate, vegetation, soils, hydrology, and flora and fauna populations. Accommodation for researchers is available at Lednický luh, Lednicke rybniky, Lednice, Drnholec, and Nove Mlyny with the administrative building in Mikulov capable of putting up 25 persons. there is an extensive environmental education programme designed around the requirements of the local population and their attitudes to nature conservation consisting of adult education, lectures and excursions. The most recent of these has been a public opinion poll on the attitudes of the resident population to the protected landscape area, which revealed amongst other things that only 63% realized they lived in a protected landscape area and that 84% were hostile to the idea of tourism in the area. Through a series of local and District National Committees the resident population via its representative, takes an active part in the short and long term. Management of the strict reserves and local inhabitants have become voluntary wardens. the reserves are also utilized in field courses for students of J.E. Purkyne University and Brno Agricultural College.

Conservation Management The steppes and forest-steppes are not suited for agriculture and are left in a natural state while most of the forests have been coppiced in the past. Within this there are 11 strict nature reserves defined as core areas which cover 672ha. The remaining buffer area contains numerous settlements and extensive agricultural lands. Overall about half the area is used for extensive agriculture and another third as game parks. The territorial management plan governs the principles of reserve management and proposes the demarcation of core areas and bio-corridors linking the cores. The plan proposes the optimal economic use of land which does not endanger the natural resources. A separate management plan has been prepared for a system of reserves Devin-Souteska-Kotel in the buffer zone which deals with the location of farmlands and the use of traditional agricultural practises. Within the strict nature reserves all damaging activities are prohibited and they are separated from the intensively agricultural landscapes by buffer zones. The only national conservation strategy existing in eastern Europe, which is in fact a sub-national conservation strategy, is the Frysavka CS which is based on the areas to the south and south-east of Brno. It is possible that this protected landscape is linked in an overall manner to this strategy.

Management Problems The forests were once coppiced and are now largely used as game parks and there is an unspecified level of tourism use. At Musov, on the road between Mikulov and Pohorelice, immediately north of the reserve, the once extensive riverine forest had by 1984 been reduced by two-thirds of its area and replaced by shallow basins which retain water for irrigation. Some pollution has occurred.

Staff Of the staff of four, two are university trained

Budget No information

Local Administration Sprava Chranene krajinne oblasti Palava, namesti J. Fucika 15, 69201 Mikulov.

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Date August 1986, May 1987, revised August 1987

Podyji CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05 (Middle European Forests)

Czechoslovakia

Geographical Location Situated in south Moravia on the Austrian border and extending 20km along the Dyje river between the town of Znojmo in the east and the Vranov reservoir in the west. 48°50'N, 15°57'E.

Date and History of Establishment The area was created on 11 December, 1978 by Decree No 22.927/78. This Decree aims to preserve and enhance the quality of the landscape and to control its development.

Area 10,300ha

Land Tenure State-owned

Altitude 288-510m

Physical Features The site is dominated by the deep canyon of the river Dyje with rocky slopes, consisting of gneiss outcrops.

Climate No information

Vegetation The steep rocky slopes are covered by thermophile tree and shrub species represented by Cornelian cherry, whitebeam, service tree, oak and wayfaring tree (*Cornus mas*, *Sorbus aria*, *S. torminalis*, *Quercus sp.* and *Viburnum nantana*). Rarer species include the following: *Iris variegata*, *Stipa ioannis*, *Pulsatilla pratensis ssp. nigricans*, *P. grandis* and *Dictamnus albus*.

Fauna Among rare species present are: eagle owl *Bubo bubo*, black stork *Ciconia nigra*, and the following amphibians and reptiles *Salamandra salamandra*, *Lacerta viridis*, *Elaphe longissima* and *Hucho hucho*.

Cultural Heritage No information

Local Human Population There would appear to be no sizeable settlements in the area, but it abuts on to the town of Znojmo. The nearest urban centre is Brno, 50km to the north-east.

Visitors and Visitor Facilities The area is not used for tourism.

Scientific Research and Facilities Various investigations in botany, zoology and geology have been undertaken by the state scientific organisations.

Conservation Management Within the protected landscape there is one national nature reserve, Pusty kopec, and one protected habitat. There are no zoning plans in operation.

Management Problems None, however forestry and agricultural activities are not restricted.

Staff Three officers

Budget No information

Local Administration Krajske stredisko pamatkovpece a ochrany prirody, Brno.

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Date August 1987.

Polana CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05 (Middle European Forest)

Geographical Location Situated in central Slovakia at the western end of the Slovenske Rudohorie range of hills, centred on the Polana peak. The river valleys of the Hron and the Slatina flow on the western and northern flanks and on the southern flank respectively, and the town of Banska Bystrica lies 20km to the west. 48°38'N, 19°29'E.

Date and History of Establishment The area was created on 12 August 1981, by Decree No. 97 of the Ministry of Culture of the SSR. The objective of the decree is the protection and cultivation of nature and natural values, provision for their optimum exploitation with respect to their multifunctions in terms of their cultural, scientific, economic, water management and health recreational resources.

Area 20,079ha

Land Tenure State-owned

Altitude 465-1,458m

Physical Features The major part of the area is made of stratovolcanic complexes - pyroxenic andesites of the second phase of andesite Tertiary neovolcanism. In the eastern part Hercynian intrusion, magmatites and subalpine metamorphigites emerge to the surface. Erosion lava sheet and flow debris forms table tops in some places, as well as caldera, belong to this characteristic formation.

Climat No information

Vegetation Forest cover changes with altitude from oak-hornbeam *Quercus sp.-Carpinus betulus* groves through beech *Fagus sylvatica* groves and silver fir *Abies alba* groves to maple *Acer platanoides* mountainous forests and spruce *Picea sp.* groves. Deforested areas with grass meadows occur in the foothills of the mountain range. The following species have been recorded: *Viola lutea ssp. sudetica*, *Hesperis nivea*, *Crocus heuffelianus*, *Trollius europaeus ssp. europaeus*, *Aquilegia vulgaris*.

Fauna Mammal species recorded include brown bear *Ursus arctos*, lynx *Lynx lynx* and others such as *Microtus agrestis* and *Sorex alpinus*. Breeding birds include capercaillie, spotted eagle, eagle owl, ring ouzel and three-toed woodpecker (*Tetrao urogallus*, *Aquila clanga*, *Bubo bubo*, *Turdus torquatus* and *Picoides tridactylus*). Amphibians and reptiles are represented by *Lacerta vivipara*, *Triturus alpestris* and *Rosalina alpina*.

Cultural Heritage There are historical monuments in the area.

Local Human Population It appears that there are no settlements within the protected landscape and no roads cross or enter it. The nearest large urban centre is Banska Bystrica (population 71,000), located 20km to the west.

Visitors and Visitor Facilities No information

Scientific Research and Facilities No information

Conservation Management Within the protected landscape there are four national nature reserves, the largest being Polana (685ha) and six protected natural features. Polana protected hunting area is a part of the PLA.

Management Problems No major threats reported.

Czechoslovakia

Staff Three professional workers

Budget No information

Local Administration Ustredie statnej ochrany prirody Liptovsky Mikulas (State Nature Protection Centre Liptovsky Mikulas), Sprava CHKO Polana, Hurbanova ul. 20, 960 01 Zvolen.

References

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Date August 1987

Ponitrie CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05. (Middle European Forest)

Geographical Location Situated in the mountain ranges of the eastern part of central West Slovakia and western part of Central Slovakia. The area extends some 50km along the Tribec and Vtacnik ranges flanked to the east and the south by the Nitra river valley running from Nitra in the south to Novaky in the north. The area is centred on 48°33'N, 18°30'E.

Date and History of Establishment The area was created on 24 June 1985, by Decree No 58 of the Ministry of Culture of the SSR. The decree stipulates the protection and cultivation of nature, especially the Tribec and Vtacnik mountain ranges, their natural values and the landscape with its dispersed settlement; and provides for its optimum exploitation with respect to the overall cultural, scientific, economic, water management, health and recreational significance.

Area 37,665ha

Land Tenure Mostly in state ownership although parts are held by agricultural cooperatives.

Altitude 160 - 1,346m above sea level.

Physical Features The area belongs to the geomorphological units of Tribec, Vtacnik and Pohronsky Inovec. From the geological aspect Tribec is a crystalline secondary era mountain range, Vtacnik a young Tertiary volcanic mountain range; in the appropriate part of Pohronsky Inovec the Tertiary volcanic rocks alternate with Tertiary sediments.

Climate The climate of Tribec base belongs to the mildly warm humid zone and the high altitude sections to the mildly cold humid zone.

Vegetation More than 800 species of higher plants have been recored in the area. Of these *Aconitum anthora*, *Adenostyles alliariae*, *Crepis sibirica*, *Dianthus superbus* ssp. *superbus*, *Hacquetia epipactis*, *Lathyrus venetus*, *Ranunculus slovacus*, *Rosa pimpinellifolia*, *Scorzonera humilis*, and *Stipa pulcherrima* are the most notable. At Jelenec introduced sweet chestnut *Castanea sativa* trees have been rejuvenating naturally for centuries.

Fauna The following species of invertebrates occur: *Salaca diceros*, *Charopus pallipes*, *Lasius bicornis*, *Rhinomias autriacus*, *Rosalia alpina*. Amphibians and retiles are represented by *Bombina variegata*, *Elaphe longissima*, *Hyla arborea*, *Lacerta viridis*, *Rana temporaria*,

and *Triturus vulgaris*. Birds include goshawk *Accipiter gentilis*, imperial eagle *Aquila heliaca*, black stork *Ciconia nigra*, and honey buzzard *Pernis apivorus*. Mammals include wild cat *Felis sylvestris*.

Cultural Heritage No information.

Local Human Population There would appear to be no villages or towns wholly within the protected landscape area, and only one road (from Zlata Moravce to Partizanske) crosses the site. The area does, however, abut directly onto the town of Nitra which has a population of 80,000.

Visitors and Visitor Facilities No information.

Scientific Research and Facilities Research is being conducted. The results of completed research work are now published.

Conservation Management Within the protected landscape there are eight national nature reserves and three other protected territories. The largest of these nature reserves is the Vtacnik reserve which occupies the highest peak in the site. A protected study area, "Zubria obora" (European bison *Bison bonasus*) enclosure borders with the territory.

Management Problems Some negative effects are being felt from the surrounding areas particularly with regard to the urbanisation pressures.

Staff Ten professional workers and guards.

Budget No information.

Local Administration Sprava chránenej krajinej oblasti Ponitrie (Ponitrie Protected Landscape Area Management), Slovanskej vzajomnosti 8, 949 01 Nitra.

References

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Date August 1987.

Slavkovsky les CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.32.12 (Central European Highlands)

Geographical Location Situated in north-west Bohemia at the northern end of the Cesky Les including the Tepla river valley and immediately south of Karlovy Vary and 45km north-west of Plzen. 50°05'N, 12°42'E.

Date and History of Establishment The area was created on 3 May 1974 by Decree No 7.657/74. This decree aims to preserve and enhance the quality of the landscape and to control its development.

Area 64,000 ha.

Land Tenure State-owned.

Altitude 550-850 m.

Czechoslovakia

Physical Features The whole area is built of crystalline schists and in addition, there are many warm mineral springs.

Climate No information

Vegetation The area is mostly covered by Norway spruce *Picea abies* forest whilst the flora of the several peatbogs in the area include the following species: *Drosera rotundifolia*, *Pinquicula vulgaris* and *Oxyccocus quadripetala*. On the Serpentic rocks there are species like *Erica carnea*, *Asplenium adianthum nigrum* ssp. *cuneifolium*. There is also the endemic plant *Cerastium alsinifolium*.

Fauna The birds recorded include eagle owl *Bubo bubo*, Tengmalm's owl *Aegolius funereus*, pygmy owl *Glaucidium passerinum* and capercaillie *Tetrao urogallus* and *Lyrurus tetrrix*. Of the larger mammals there are red deer *Cervus elaphus*, wild boar *Sus scrofa*, pine marten *Martes martes* and *Mustella erminea*.

Cultural Heritage No information.

Local Human Population The suburbs of the town of Karlovy Vary are included within the protected landscape as are the towns of Loket, Hor. Slavkov, Becov n. Teplon, Tepla and Mariánské Lázně. In addition, there are a large number of scattered settlements and hamlets.

Visitors and Visitor Facilities The whole area is frequently visited by many tourists during both the summer and winter seasons. Close by there are the famous spas Karlovy Vary and Mariánské Lázně with their warm mineral water springs, which also act as tourist attractions.

Scientific Research and Facilities Recent surveys have been undertaken by several institutions specially in the fields of botany and forestry. No facilities.

Conservation Management Within the protected landscape there are seven national nature reserves (the largest being Kladske ráselinisté, 264ha) one protected natural habitat and one protected natural feature.

Management Problems None. Forestry and agricultural activities are not restricted except in the nature reserves.

Staff Four workers from the local administration

Budget No information

Local Administration Krajské středisko památkové péče a ochrany přírody Západočeského kraje, Plzeň.

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Date August 1987.

Slovenský kras CHKO

Management Category V and I and IX (Protected Landscape, Strict Nature Reserve and Biosphere Reserve)

Biogeographical Province 2.11.05 (Middle European Forest)

Geographical Location Situated in the south-east of the Slovak Socialist Republic, some 20km south-west of Kosice stretching 50km between the River Bodva in the east, the River Muran in the west, the Rudo Horic Uplands in the north and the Hungarian border (Aggtelek National Park) in the south. 48°35'N, 20°40'E.

Date and History of Establishment Established as a Protected Landscape Area in 1973 and approved as a Biosphere Reserve in January 1977. The legal status of the region is derived from the law on Nature Protection no. 1/1955 Zb.SNR/Slovak National Council. By virtue of this law, the Slovak Karst was declared a protected landscape area by decree of the Ministry of Culture of the Slovak Socialist Republic No. 110 dated August 31 1973. The protected landscape area consists of one large, very irregularly shaped unit separated from a smaller unit to the west by the valley of the river Slana which is itself separated from a yet smaller area to the west by the valley of the river Stitnik. The protected landscape area is surrounded on all sides (except for the boundary where it forms the border with Hungary) by a buffer zone covering 38,334ha. The total area is 74,499ha.

Area The protected landscape area is 36,165ha, the same size as the biosphere reserve.

Land Tenure The Central Management (State Forest Service) administers 75% of the territory, the remaining 25% being under local management (Agricultural Cooperatives, local National Councils, private owners).

Altitude 200-925m (at Matesova Skala)

Physical Features The Slovak Karst is the largest and most outstanding and characteristic karst area in Czechoslovakia, consisting of a system of plateaux, separated by deep canyons of the Slana and Stitnik rivers, and the gorges of Zadiel, Hajske and Miglinec. The Slovak karst is composed of two groups of rock formations of different geomorphology. The subsoil comprises lower Triassic impermeable, weakly resistant, argillaceous and marly slates, variegated grit and sandstone, and marly limestones. In the overlay there are massive layers of predominantly middle Triassic, but also upper Triassic, extremely resistant limestones and dolomites. There are numerous surface and underground karst phenomena, developed in a classic shape over an extensive territory. Some underground passages connect with systems originating in Hungary.

Climate The mean temperature in the lowest altitude, is below -3°C in January and above 19°C in July; these values drop with increasing altitude so that the corresponding figures for the highest altitude sites are about -7°C and 14°C respectively. The annual rainfall amounts to about 620mm in the lowest, and about 1000mm in the highest parts of the tablelands. Depending on elevation, snow cover persists here between 60 and 139 days.

Vegetation Agricultural land covers 7,203ha and forests 27,542ha. The forests are largely hornbeam *Carpinus betula*, oak *Quercus petraeae* and beech *Fagus sylvatica* but include such species as *Fraxinus ornus* and *Acer tataricum* especially on the areas occupied by forest-steppes. The flora of the area is among the most interesting of the Western Carpathians and has been extensively documented. The wealth and colourfulness of plant life has been expressed in some 100 publications describing the flora of the Slovak Karst. Among the more interesting species are: *Onosma tornensis*, *Sesleria heufleriana*, *Crataegus domicensis*, *Sorbus austriaca* spp. *hazslinszkiana*, and *Dianthus lumtizeri* var. *pseudopraecox* (endemics). In Slovakia, this is the only place where *Ajuga laxmanii*, *Erythronium dens-canis*, *Carex brevicollis*, *Astragalus vesicarius*, *Cytisus procumbens*, *Gasparinia peucedanoïdes* and *Euphrasia pectinata* are present at the northernmost limit of their distribution. The limestone underlay and the warm, moderately dry climate, provide habitats for over 900 species of vascular plants, making this territory among the richest taxonomically in Central Europe. Even though the original forest vegetation has been considerably altered through man's intervention, there are still a whole series of oak associations and floristic elements with unique features, considered to be indicative of the development of a Matran-Carpathian vegetation. Also of interest are the marshes and meadows, association of pseudo-rocky steppes and rocky overhangs, cliffs, chasms and ravines. The inversion of vegetation zones in deep crevasses and ravines is so well developed as to have no parallel within the Carpathian arch.

Fauna The fauna is characteristic of steppe or forest-steppe habitat with montane elements preserved in the damp and cool valleys. Of particular scientific interest are the fauna of caves and subterranean karst waters. Karst forms of beetles and insects are abundantly represented and mention should be made of the occurrence of the endemic snail *Sadleriana pannonica*. Among reptiles, lizards are the most numerous with *Lacerta viridis*, *Lacerta vivipera* and *Podarcis muralis* all present. The rocky steppes and forest steppes are the haunt of rock bunting *Emberiza cia*, the northernmost locality in Europe. In addition, rock thrush *Monticola saxatilis*, peregrine falcon *Falco peregrinus*, saker *F. cherrug*, short-toed eagle *Circus gallicus*, lesser spotted eagle *Aquila pomarina* and others are present, while innumerable colonies of bats haunt the caves. The area marks the westernmost distribution for striped field mouse *Apodemus agrarius* whilst Miller's water shrew *Neomys anomalus* is found here in large numbers. Also present are red deer *Cervus elaphus*, roe deer *Capreolus capreolus* and introduced species such as *Ovis* sp., and wild boar *Sus scrofa*.

Cultural Heritage No information

Local Human Population There appears to be only one sizeable settlement - Silica - and several hamlets within the protected landscape area with the larger villages and towns located in the valleys outside the boundary.

Visitors and Visitor Facilities Out of the great number of caves, four may be visited by the public but general access to the reserve requires the authority of the Management of the Protected Regions of the Slovak Karst, with headquarters at Brzotin. An international nature trail has been created which connects the Slovak Karst with Aggtelek National Park in Hungary.

Scientific Research and Facilities In addition to earlier research conducted on flora, fauna, speleology, geomorphology and geology of the territory, a complex floristic and phytocenologic survey was undertaken in 1970 on a selected part of the Slovak Karst, the Silice Tableland, by the Department of Geobotanics of the Natural Science Faculty, Comenius University, in Bratislava. The flora of the site has been recorded in over 100 publications. As a first stage, as the basis for a map of the climax vegetation. For the period 1976-1980, approval was given for a complete survey of the entire Slovak Karst within the state plan of research for the Comenius University, titled "Study of Plants and their evolution in the Carpathian Region" as well as research conducted by the Central Office for State Nature Conservation in the programme "Protection of Nature and its Components". The main objective of the survey will be to determine the types of vegetation and their syntaxonomic evaluation, along with mapping of all contemporary vegetation. In the future, research on the effects of man's interactions with various ecosystems within the region has to be reinforced. Research permits are required from the Management of the Protected Region of the Slovak Karst, with headquarters at Brzotin.

Conservation Management The aim is to protect and improve the natural conditions and nature resources of the territory; to ensure coordination of its economic exploitation in conformity with measures for the protection of the natural landscape in view of its multiple use as a cultural, scientific, economic and health-recreational reserve. The area includes twelve national nature reserves one protected forest reserve, and nine protected monuments. There is a buffer zone surrounding the area.

Management Problems In the past, much of the region was affected by deforestation, which together with grazing resulted in soil erosion on steep terrain; elsewhere it promoted the appearance of steppes and of xerothermic vegetation. Despite this, the majority of the protected area is still covered by natural vegetation. However, present threats change from traditional agriculture to large scale production of cereals; the accompanying increased use of fertilizers and pesticides that introduce considerable quantities of chemical compounds into the underground cave waters; the motorized tourism causing air pollution in the underground river courses and chasms and pollutant emission from industrial sources.

Staff Five persons are assigned to the protection of the area and 16 scientific-research workers.

Budget No information

Local Administration The Slovak Institute for the conservation of the Monuments and Nature Conservation of the Protected Region of Slovak Karst, Slovensky Kras, 049 51 Brzotin, Biely Kastiel', okr. Rožnava, Czechoslovakia. Scientific Research Centre, Department of Geobotanics, Natural Science Faculty, Comenius University, 80000 Bratislava, Moskovska 2/a, Czechoslovakia.

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Date 1977, revised August 1986, May 1987, and August 1987

Slovensky raj CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05. (Middle European Forests)

Geographical Location Situated in the eastern part of Slovakia, on the eastern edge of the Nizke Tatry range between the towns of Spisska Nova Ves (to the east), Hrabusice (to the north) and Dobsina (to the south) and between the rivers Hornad and Hnilec. 48°55'N, 20°25'E.

Date and History of Establishment The area was created on 21 August 1964, under the Provision of Slovak National Council Commission for Education and Culture, No. SaK 48 441/1964-osv. The provision stipulates the preservation, regeneration and cultivation of the natural wealth and landscape beauties.

Area 14,230ha (protective zone 19,615ha)

Land Tenure To a large extent state-owned.

Altitude 520 - 1,186m above sea level

Physical Features The area consists of the high plateau of Triassic limestones and dolomites cut by canyons, cloughs and narrow passages. Surface karst phenomena (swallets, karrens), caves, tunnels and windows are well represented here.

Climate No information

Vegetation The majority of the area is covered with spruce *Picea sp.* forest mixed with fir *Abies sp.* and beech *Fagus sylvatica* groves. Large areas of meadow occur on the plains. The area is noted for its thermophile species with a significant diversity due to the presence of cloughs. A selection of the more interesting species includes: *Primula auricula*, *Polygala amara brachyptera*, *Ctenidium molluscum*, *Allium ochroleucum*, *A. montana*, *Calamintha alpina*, *Spiraea media*; endemics *Campanula carpatica*, *Hesperis nivea*, *Soldanella carpatica*, *Pulsatilla slavica*, *Dianthus praecox*; and the relict species *Ligularia sibirica*, *Saxifraga aizoon*, and *Drays octopetala*.

Fauna Invertebrates recorded included species such as *Trichopterna fatrensis*, *Astacus torrentium*, *Parnassius apollo*, and *Harpalus punctatulus*. Fish include *Salmo trutta m. ferio* while amphibians and reptiles are represented by *Triturus montandoni*. Breeding birds include black stork, short-toed eagle, raven, golden eagle, saker falcon, black grouse and eagle owl (*Ciconia nigra*, *Circus gallicus*, *Corvus corax*, *Aquila chrysaetos*, *Falco cherrung*, *Lyrurus tetrrix* and *Bubo bubo*). Mammals include *Myotis dasycnema*, otter *Lutra lutra*, and brown bear *Ursus arctos*.

Cultural Heritage No information.

Local Human Population The small towns of Dedinky and Stratena are present in the south of the area; the central and northern parts are almost completely uninhabited. In the valleys to the north there are a number of small towns, and the nearest large urban centre, Kosice (population of 213,000) is some 60km to the east.

Visitors and Visitor Facilities No information.

Scientific Research and Facilities A comprehensive inventory is being carried out. The results of preliminary surveys and other research have been published.

Conservation Management The protected landscape is completely surrounded by a buffer zone covering 19,615ha. Within the protected landscape itself there are 12 national nature reserves (the largest being Prielom Hornadu, 290ha; Kysel', 880ha; Sokol, 700ha and Stratena, 678ha) and three protected natural features which are caves. Within the buffer zone there are a further two national nature reserves and two protected natural features.

Management Problems There is an over-concentration of visitors at some of the recreational centres. A railway line follows the Hnilec valley through the extreme southern edge of the area and acts as the main access point for visitors.

Staff 12 professional workers and guards.

Budget No information.

Local Administration Ustredie statnej ochrany prirody, Liptovsky Mikulas - Sprava CHKO, Slovensky raj, (State Nature Protection Centre Liptovsky Mikulas - PLA Slovak Paradise Management), Gottwaldova 13, 052 01 Spisska Nova Ves

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Date August 1987.

Stiavnicke vrchy CHKO

Management Category V (Protected landscape)

Biogeographical Province 2.11.05. (Middle European Forest)

Geographical Location Situated in the southern part of Central Slovakia centered on the Stiavnicke peak and the Krupinska plateau and including the Pliesovka and Ziarska valleys. The area is bounded to the west and north by the Hron river and lies 18km south-west of Banska Bystrica and 35km east of Nitra. 48°25'N, 18°52'E.

Date and History of Establishment The area was created on 22 September 1979, by Decree No 124 of the Ministry of Culture of the SSR. The decree stipulates the protection and cultivation of nature and natural resources and provides for the coordination of their economic exploitation but at the same time giving due regard to the valuable cultural monuments to mining technology which exist in this territory.

Area 77,630ha

Land Tenure Mostly State-owned but parts are held by agricultural cooperatives.

Altitude 185-1,009m above sea level, at Sitno.

Physical Features The Stiavnicke Hills are made mostly of igneous rocks.

Climate No information.

Vegetation The majority of the area is covered with forests while the smaller part is under agricultural use. Natural vegetation cover is found only rarely with the original beech *Fagus sylvatica* groves, fir-beech *Abies-Fagus* groves and mountainous maple *Acer platanooides* groves having been substantially transformed by human activity or destroyed by deforestation. Xerophilous communities with oak *Quercus pubescens* and Pannonian flora elements are present on sunny rocky hillsides and ridges. Notable species include: *Adonis vernalis*, *Fraxinus ornus*, *Festuca valesiaca*, *Stippa joannis*, *Stipa pennata*, *Iris graminea*, *Drosera rotundifolia*, *Pulsatilla grandis*, and *Crocus heuffelians*.

Fauna The site is noted for the occurrence of xerophilous Pannonian species and mountainous Carpathian species; eastern and western elements are also encountered here. Protected species include the invertebrates: *Carabus nitens*, *Ergates faber*, *Rosalia alpina*, *Parnassius fuscus*. Amphibians and reptiles are represented by *Lacerta vivipara*. Birds include black woodpecker, red-breasted flycatcher, honey buzzard, black stork and Syrian woodpecker (*Dryocopus martius*, *Muscicapa parva*, *Pernis apivorus*, *Ciconia nigra* and *Dendrocopus syriacus*). Other species recorded include *Rhinolophus ferrum equinum*.

Cultural Heritage The territory is a mining area with a mining tradition spanning several centuries, including the extraction of silver ore. This tradition is now commemorated in the form of examples of mining and metallurgical relics.

Local Human Population In the centre of the protected landscape is the town of Banska Stiavnica - the only major settlement present (two smaller villages do exist, one in the north-west and the other in the south). The towns of Banska Bystrica (71,000 population) and Nitra (80,000 population) are the nearest sizeable urban centres.

Visitors and Visitor Facilities No information.

Scientific Research and Facilities Studies are being conducted. The results of completed nature and historical surveys have been published.

Czechoslovakia

Conservation Management Within the protected landscape there are six national nature reserves, two protected habitats, two protected natural features and two protected gardens. Of the latter two, one is the botanical garden at Banska Stravnica and the other the arboretum Kysihybel.

Management Problems The high concentration of visitors in some recreation centres are causing problems.

Staff Six professional workers and guards.

Budget No information.

Local Administration Ustredie statnej ochrany prirody Liptovsky Mikulas (State Nature Protection Centre Liptovsky Mukulas), Sprava CHKO Stianicke vrchy, ul. Cervenej armady 26, 969 01 Banska Stianica.

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Date August 1987.

Sumava CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.32.12 (Central European Highlands)

Geographical Location Situated in south-west Bohemia, along the West Germany border in the Bavarian-Sumava Forest. It extends some 110km from Vyrsko in the north-west to Loucovice in the south-east. 49°00'N, 13°30'E.

Date and History of Establishment The area, the largest protected area in the country, was created on 27 December 1963 by Decree No 53.855/63 (though parts of the area have been protected for much longer). This Decree aims to preserve and enhance the quality of the landscape and to control its development.

Area 160,000 ha

Land Tenure State-owned

Altitude 470-1,378m (Plechý). Several peaks reach 1,300m and higher (Jezerní hora, Plesná and Trojmezna hora, for example)

Physical Features An extensive mountain area which is a continuation of the Böhmerwald in West Germany. The rocks are mainly crystalline schists, with smaller areas of crystalline limestones and quartzite dykes. Most of the mountains have the geomorphological pattern of a peneplain dissected into broad ranges with flat tops. In the Pleistocene, Sumava was partly covered by small glaciers. Eight lakes, most of them protected as nature reserves, remain as the evidence of glaciation. In addition, in the south of the area there is a large artificial reservoir, the vodní nádrž Lipno, as well as a canal which skirts the Piecký and Smrcina peaks.

Climate No information

Vegetation Sumava is more or less completely covered with forests. Typical mountain growths of norway spruce *Picea abies* with rowan *Sorbus aucuparia* and maple *Acer platanoides* occur here, as well as mountain growths of beech *Fagus sylvatica* with a series of other deciduous trees and shrubs. Locally there are isolated growths of mountain pine *Pinus mugo*. The Boubinsky prales Nature Reserve is well known as an area of virgin forest, as is the area between the Cerne and Certovo lakes. A very characteristic component of the landscape are the peat bogs such as the one within the Jezerni slat Nature Reserve. Here, at an altitude of over 1,000m, is a raised peat bog with characteristic species such as *Eriophorum vaginatum*, *Carex* spp., *Sphagnum* spp., and on drier sites the dwarf birch *Betula nana*. The following important plant species should also be mentioned: *Aconitum variegatum*, *A. napellus*, *Arnica montana*, *Blechnum spicant*, *Calla palustris*, *Campanula glomerata*, *Cephalanthera alba*, *Daphne mezereum*, *Dianthus superbus*, *Doronicum austriacum*, helleborines *Epipactis latifolia*, *E. atrorubens* and *E. palustris*, *Gentiana pneumonanthe*, *G. crudiata*, *G. Pannonica*, *Gentianella ciliata*, *Gymnadenia conopsea*, *Chamaebuxus alpestris*, *Ledum palustre*, *Lilium bulbiferum*, *L. martagon*, *Menyanthes trifoliata*, *Mulgedium alpinum*, *Platanthera bifolia*, sundew *Drosera rotundifolia*, and *Soldanella montan*.

Fauna Once the Sumava woods were the natural habitat of European bison, brown bear, wolf and lynx. Today, of the larger mammals only red deer *Cervus elaphus* and lynx *Lynx lynx* live here. Northern birch mouse *Sicista betulina* is a glacial relict, and Alpine shrew *Sorex alpinus* pre-glacial. The otter *Lutra lutra* is rare. Eagle owl *Bubo bubo*, pygmy-owl *Glaucidium passerinum* and Tengmalm's owl *Aegolius junereus* breed, as well as three-toed woodpecker *Picoides tridactylus*, nutcracker *Nucifraga caryocatactes*, ring ouzel *Turdus torquatus* and several grouse species such as capercaillie *Tetrao urogallus*, hazel hen *Tetrastes bonasia* and black grouse *Lyrurus tetrix*. The two lakes within the Cerne and Certovo Jezero Nature Reserve are extremely oligotrophic, but they have a characteristic fauna.

Cultural Heritage No information

Local Human Population There are a large number of villages and settlements in the protected landscape area, the largest being Volory in the south east. The nearest large town is Ceske Budejovice (population 92,000), some 35km to the east.

Visitors and Visitor Facilities The area is being used extensively and intensively for both summer and winter recreation. There are many hotels, trade-union and other organization owned hostels and camping places.

Scientific Research and Facilities None yet in most of the region, but research has been continuing into the hydrobiology of the Cerne and Certovo lakes since 1897. No facilities.

Conservation Management Ten nature reserves are found within the protected landscape:- Bila Strz, Cerne a Certovo jezero (152 ha), Jezerni slat (120 ha), Mlynarska slat, Rokyske slat, Rokyske slat, Bukova slat, Lipka, Boubinsky prales (666ha), Mrtvy luh (283ha) and Trojmezna hora (386ha). The area abuts onto the Bayerischer Wald National Park in the Federal Republic of Germany, as well as the Naturpark Oberer Bayerischer Wald and the Naturpark Bayerischer Wald.

Management Problems None at present, though forestry and agricultural activities are not controlled except, apparently, in the nature reserves.

Staff Sixteen officers.

Budget No information

Local Administration Sprava CHKO Sumava, Vimperk, dtto Sueice Krajske stredisko pamatkove pece a ochrany prirody Plzen dtto Ceske Budejovice.

Czechoslovakia

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Date August 1987

Trebonsko CHKO

Management Category V and I and IX (Protected Landscape, Strict Nature Reserve and Biosphere Reserve)

Biogeographical Province 2.11.05 (Middle European Forest)

Geographical Location The reserve is situated in the Czech Socialist Republic in southern Bohemia, centred on the town of Trebon, 100km south of Prague, 13km due east of Ceske Budjovice and extending to the Czechoslovak-Austrian border. 49°00'N, 14°50'E.

Date and History of Establishment Declared a Biosphere Reserve in January 1977 and as a Protected Landscape Area by Decree No 22.737/79 of the Minister of Culture in November 1979, coming into force in March 1980. The whole site is protected as a Protected Landscape Area created in 1979.

Area 70,000ha

Land Tenure State and private (forests, fishponds and most of the arable land is state owned; a limited area of fields, gardens and orchards are private)

Altitude 407-613m (Homolka Hill in the south-east)

Physical Features The local topography is flattish or slightly undulating with a lack of sharp relief although the eastern part lies in the hilly region of southern Bohemia. Underlying rocks are primarily Cretaceous and Tertiary sedimentary, with some cristallines present in the eastern part of the reserve at the Nova Bystrice Hills. Soils are composed of sands, clays, gravels and peats, and the site is characterised by a complex of rivers, streams and channels together with fishponds, although there are also small areas with sand dune systems.

Climate The climate is marked by relatively long periods of clear weather with an annual mean air temperature of 7.8°C and annual mean precipitation of 627mm.

Vegetation A large part of the area is covered in forests, mainly Scots pine *Pinus silvestris*, silver fir *Abies alba* and Norway spruce *Picea abies*. Smaller remnants of broadleaved forests are found in river flood-plains with *Quercus robur*, *Acer* spp., *Tilia* spp. and *Ulmus* spp. Fen woodlands occur in swampy areas with *Alnus glutinosa* as the characteristic species. Peat and moorland communities include *Pinus rotundata*, *Pinus sylvestris* ssp. *uncinata* and numerous shrubs. Wet meadows, xerothermic grasslands and sandy habitats complete the ecological diversity within the reserve. Among rare and protected plants are: *Caltha palustris*, *Daphne cneorum*, *Dianthus superous*, *Drosera anglica*, *D. intermedia*, *D. obovata*, *D. rotundifolia*, *Dryopteris cristata*, *D. thalypteris*, *Gentianella bohémica*, *Ledum palustre*, *Lilium martagon*, *Liparis loeseli*, *Malaxis paludosa*, *Nuphar luteum*, *N. pumilum*, *Nymphaea alba*, *N. candida*, *Orchis morio*, *Pulsatilla vernalis* and *Trapa natans*.

Fauna The reserve is particularly important for birds with nearly 200 species recorded including 150 breeding species such as greylag goose, goldeneye, mute swan, white stork, marsh harrier, grey heron (the largest colony in Czechoslovakia with 500 nests), purple heron, cormorant (small colony), red crested pochard, white-tailed sea eagle, kingfisher, bittern, Savi's warbler, penduline tit (*Anser anser*, *Bucephala clangula*, *Cygnus olor*, *Ciconia ciconia*, *Circus aeruginosus*, *Ardea cinerea*, *A. purpurea*, *Phalacrocorax carbo*, *Netta rufina*, *Haliaeetus albicilla*, *Alcedo atthis*, *Botaurus stelaris*, *Locustella luscinioides*, *Remiz pendulinus*), and numbers of crane species, duck, geese and warblers. Rare mammals and amphibians include otter, elk, tree frog, common spadefoot, natterjack toad, viviparous lizard and grass snake (*Lutra lutra*, *Alces alces*, *Hyla arborea*, *Pelobates fuscus*, *Bufo calamita*, *Lacerta vivipara* and *Natrix natrix*). There are also numerous species of insects peculiar to peat bogs, wetlands and sandy habitats, rare boreal and tundra species and some endemic species.

Cultural Heritage Since the 14th century the area has been gradually transformed by man, resulting in a landscape comprising all kinds of natural, semi-natural and artificial ecosystems as well as numerous monuments, old villages, churches, and castles.

Local Human Population The area is much frequented by tourists, and serves as a centre for various sports and other types of recreation.

Visitors and Visitor Facilities Parts of the Cervene Blato Nature Reserve is open to the public along a nature trail starting at Jirikovo Udoli near Slamanovice.

Scientific Research and Facilities Research projects refer to the structure and functioning of various ecosystems, and to interrelationships between ecosystems and agriculture. The area was used for the International Biological Programme projects, and is also considered for research within the framework of MAB projects Nos. 2 and 8. Several permanent laboratories and temporary field stations are situated in the Trebon (since 1953), namely those of the Czechoslovak Academy of Sciences (Dept. of Botany, Dept. of Hydrobotany, Dept. of Microbiology, Dept. of Landscape Ecology, Dept. of Parasitology and Dept. of Entomology) and the National Museum. The Hydrobotany Department employs 31 permanent researchers and hosted the 2nd INTECOL/SCOPE International Wetlands Conference in 1984. Four working groups coordinate an extensive research programme covering algal ecology, vascular plant communities, wetland ecology and their synecology.

Conservation Management The aim of the reserve is to preserve the landscape for national use and recreation. The reserve is characterized by a pattern of small core areas surrounded by zones of variously managed landscape. Woodlands cover 35,900ha, arable land and meadows 25,300ha and water areas 8,000ha in some 500 fishponds. Additionally there are nine areas strictly protected as national nature reserves. These include bird reserves at the Maly and Velky Tisy fishponds, one of the largest forest and reserves in the country at Stara Reka and two extensive peat bogs - Cervene Blato and Zofinka. In 1980 a detailed project was completed entitled "Ecological Optimization of the Management in the Trebon Landscape and Biosphere Reserve" a part of which was devoted to environmental education.

Management Problems The region around Trebon represents a landscape modified since the fourteenth century by man's activities. The water regime has been greatly altered and forests and agricultural land has been drained but has resulted in the establishment of a large scale fisheries operation and fish ponds which have created near-natural conditions. The most valuable portions of the reserve are protected in nine nature reserves. New proposals have been presented to regional and national bodies for further conservation designations. The main objective of the reserve is to support an ecologically sound management using scientific landuse methods, for the coexistence of agriculture, forestry, fisheries and wildlife. There is exploiting of gravel and forestry and agriculture practices are not overtly controlled. Other problems include aerial spraying of pesticides, possible over-exploitation of peat, extraction of sand with resultant open pits and mineral extraction affects the ground water level.

Staff Between three and five officers work with the authorities of the Trebon Basin Reserve; approximately 30 officers perform research in the resident scientific institutions. It is not known how many specifically administer to the reserve.

Czechoslovakia

Budget No information

Local Administration Sprava CHKO Trebonsk, 37901 Trebon, Coordinator Centre for Monument and Nature Conservancy, (Krajske stredisko pamatkove pece a ochrony prirody) Ceske Budejovice, Zizkovo Square, CSSR.

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Date 1977, revised September 1986, May 1987 and August 1987.

Velka Fatra CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05. (Middle European Forest)

Geographical Location Situated in central Slovakia, part of the Vtacnik Fatra and the Nizke Tatry mountain ranges. This protected landscape area, 40km north to south and between 16km and 20km east to west lies due south of the Vah river valley, 8km east of Martin and 5km north of Banska Bystrica. 48°57'N, 19°10'E.

Date and History of Establishment The area was created on 28 December 1973, by Decree No 8 of the Ministry of Culture of the SSR. The decree stipulates the protection and cultivation of nature and natural beauties and provides for the coordination of its economic exploitation.

Area 60,610ha (protective zone 20,500ha)

Land Tenure Predominately state-owned.

Altitude 440 - 1,592m above sea level at Ostredkom.

Physical Features The granitoid core emerges on the surface on only small parts of the territory while the larger part of the area is made of the Mesozoic series, limestones, dolomites and slates.

Climate No information

Vegetation The area is mostly covered by a range of forest communities consisting of spruce *Picea sp.*, fir *Abies sp.* and beech *Fagus sylvatica* forests, as well as mountain pine *Pinus mugo* and alpine meadows which are of secondary origin resulting from pasturing activities. Mountain flora species include Carpathian endemics such as *Erisimum wittmannii*, *Dianthus nitidus*, *Carex sempervirens* ssp. *tatorum* and others. Subalpine species include *Amelanchier ovalis*, *Cotoneaster integerrima*, *Seseli osseum* and others. Limestone outcrops have *Primula auricula*, *Leontopodium alpinum* and *Bellidiastrum michelii*.

Fauna Mountain species predominate. Protected and rare invertebrate species include *Carabus auronitens*, *Atomaria carpatica*, *Bombus sorensis*, *Papilio machaon* and *Hucho hucho*. Amphibians include *Lacerta vivipara*. Breeding birds include black grouse *Lyrurus tetrrix* and peregrine *Falco peregrinus* whilst among the mammals recorded there are *Sorex araneus*, brown bear *Ursus arctos* and lynx *Lynx lynx*.

Cultural Heritage No information.

Local Human Population Within the protected landscape area there are no settlements apart from a number of hamlets. The surrounding valleys, however, have several small towns (Ruzomberok, Turc Teplice).

Visitors and Visitor Facilities No information.

Scientific Research and Facilities A comprehensive inventory of Gaderska dolina (Gaderska Valley) has been completed. The results of preliminary research and other surveys have been published. Two field stations exist but lack instruments.

Conservation Management The protected landscape has a protective buffer zone of 20,500ha and includes 16 national nature reserves, seven protected natural formations (of which three are caves) and one protected habitat all of which are within the CHKO; in addition, one national nature reserve, one protected habitat and one protected natural formation are located in the protective zone. The largest of these are the Tlsta reserve (3,066ha) and the Padva reserve (325ha). The area is separated from the Mala Fatra CHKO to the north by the river Vah and from the Nizke Tatry narodni park to the east by the road from Krkava skala to Banska Bystrica.

Management Problems There is some damage caused by visitors. Intensification of forest management and agricultural activities may be a threat in the future.

Staff Seven professional workers and guards.

Budget No information.

Local Administration Ustredie statnej ochrany prirody Liptovsky Mikulas (State Nature Protection Centre Liptovsky Mikulas), Sprava CHKO Velka Fatra, Cechovsky rad 7, 038 61 Vrutky

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Date August 1987.

Vihorlat CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05 (Middle European Forest)

Geographical Location Situated in east Slovakia 10km west of the Soviet border and 20km east of Humenne, and to the south of the Cirocha valley. 48°54'N, 22°08'E.

Date and History of Establishment The area was created on 28 December 1973, by Decree No 9 of the Ministry of Culture of the SSR, and represents the smallest landscape protected area in Czechoslovakia. The decree stipulates the protection and cultivation of nature and natural resources and the provision for the coordination of its economic exploitation.

Area 4,383ha (protective zone 25,350ha)

Land Tenure Mostly State-owned

Altitude 320-1,023m above sea level (Nezabec)

Physical Features The area covers the central part of the Vihorlat volcanic mountain range made of andesite. One larger and two smaller lakes found here were formed by subsidence.

Climate The area experiences annual average rainfall of 1000mm and has snow-cover from an average of 140 days a year.

Vegetation The vast majority of the area is covered by forest (some 7ha is agricultural land). The forest consists of beech *Fagus sylvatica*, maple *Acer platanoides*, hornbeam *Carpinus betulus* and oak *Quercus sp.* East Carpathian floral elements include the endemics *Aconitum toxicum lasiocarpum*, *Festuca ovine vihorlatica*, and *Scopolia carniolica*, *Symphytum cordatum*, *Hieracium transsilvanicum*, *Aposeris foetida* also occur. At colder locations on the ridges *Cicerbita alpina*, *Gentiana asclepiadea*, *Doronicum austriacum*, *Veronica montana*, *Lycopodium selago*, *Valeriana tripteris* are found.

Fauna Species include *Rosalia alpina*, *Stragnalia chloratica*, *Dicelophylus carniolensis*, *Polydesmus tataranus*, *Iulus vagabundus fructicus*, *Heteroporalia vihorlaticum*, *Acrolocus lacustris skuhravyi*, *Coronella austriaca*. Breeding birds are represented by black stork *Ciconia nigra*, lesser-spotted eagle *Aquila pomerina*, ural owl *Strix uralensis* and raven *Corvus corax*. Mammals include wolf *Canis lupus* and wild cat *Felis sylvestris*.

Cultural Heritage No information

Local Human Population Apparently there are no settlements within the protected landscape and only one in the buffer zone.

Visitors and Visitor Facilities No information

Scientific Research and Facilities Partial and preliminary research results have been published.

Conservation Management Four national nature reserves, one protected nature formation and one protected habitat are in the protected landscape area. The small protected landscape core is surrounded by a larger protective buffer zone.

Management Problems Some damage by visiting tourists. Major threat is from the intensification of forest exploitation.

Staff Eight professional workers and guards, shared with the Vychodny Karpaty CHKO.

Budget No information

Local Administration Ustredia statnej ochrany prírody Liptovský Mikuláš (State Nature Protection Centre Liptovský Mikuláš), ul. Červenej armády 19, 066 01 Humenné

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Date August 1987

Východné Karpaty CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05 (Middle European Forest)

Geographical Location Situated in the extreme eastern part of Slovakia, adjoining the Polish border in the north and north-east, and with the USSR in the east, and extending some 80km from the Dukliansky pass in the west to the Soviet border in the east. 49°05'N, 22°15'E.

Date and History of Establishment The area was created on 1 September 1977, by Decree No 70 of the Ministry of Culture of the SSR. The decree stipulates the protection and cultivation of the area and provides for the coordination of its economic exploitation.

Area 66,810ha (protective zone 30,000ha)

Land Tenure Largely State-owned but with some holdings by agricultural cooperatives

Altitude 198–1,221m above sea level

Physical Features The area belongs to the flysch belt with stratigraphic ranges from the Upper Cretaceous to the Palaeogene, comprising slates, sandstone, claystones and conglomerates as well as locally loess blankets.

Climate Annual rainfall varies from 800 to 1000mm and snow cover lasts from 130 to 170 days per annum.

Vegetation The area consists of Bukovské vrchy (Bukovské Hills) and Nízke Beskydy (Low Beskydy) and is covered mostly with beech forests. Other woodland components include natural conifer forests and isolated valley fir woods. In total, some 44,000ha of the area are covered in forest. The Bukovské Hills are characterised by east Carpathian species of flora like *Aconitum lasiocarpum*, *Campanula abietine*, *Euphobia sojakii*, *Iris transsilvanica*, *Laserpitium alpinum*, although there are elements of west Carpathian flora. Low Beskydy is not characterised by east Carpathian species but forms a transient zone to the West Carpathians. Rare species include *Thelypteris sibirica*, *Gratiola officinalis*, *Veronica filiformis*, *Waldsteinia geoides* and *Carex strigosa*. There are areas of agricultural land.

Fauna The area has a typical East Carpathian biocenoses. Rare and protected species include the invertebrates *Danderbardia calophana*, *Iphigena tumida*, *Leptoiulus baconyensis stuzicensis*, *Diceklophilus carniolensis*. Fish include *Lampetra planeri* and *Gobio uranoscopus*. Amphibians and reptiles are represented by *Salamandra salamandra*, *Lacerta viridis* and *Coronella austriaca*. Rarer breeding bird species include white-backed woodpecker *Dendrocopos leucotos*, raptors such as black kite, booted eagle, golden eagle,

Czechoslovakia

lesser-spotted eagle, hobby, ural owl and barn owl (*Milvus migrans*, *Hieraetus pennatus*, *Aquila chrysaetos*, *A. pomarina*, *Falco subbuteo*, *Strix uralensis* and *Tyto alba*). Mammals are represented by brown bear *Ursus arctos*, wolf *Canis lupus* and others.

Cultural Heritage No information

Local Human Population The area is remote and under-populated with only three small settlements and with only one road crossing the site to the Dukliansky pass. The nearest large town Humenné is 25km to the south-west.

Visitors and Visitor Facilities The area is presently little visited.

Scientific Research and Facilities Research is in progress and preliminary results have been published.

Conservation Management The site consists of a core protected area and a buffer zone. Eleven national nature reserves and three smaller protected areas of other categories are in the protected landscape; three national nature reserves are in the protective zone. The two largest nature reserves are Jaraba Skala and Stuzica (659ha). The latter adjoins Polish and Soviet reserves and includes the highest peak, Kremeneč, as well as 300 year old spruce (48m high) and 185 year old beech (38m high).

Management Problems Major threats are from the intensification of agriculture and forest exploitation.

Staff Eight professional workers and guards (shared with the nearby Vihorlat PLA).

Budget No information

Local Administration Ustredie statnej ochrany prírody Liptovský Mikuláš (State Nature protection Centre Liptovský Mikuláš), Správa chránených krajinných oblastí Východné Karpaty a Vihorlat, ul. Červenej armády 19, 066 01 Humenné

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Date August 1987.

Zdarske vrchy CHKO

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05 (Middle European Forests)

Geographical Location Situated in south Moravia and east Bohemia on the Czech-Moravian plateau at the headwaters of the Svratky and Sazary rivers, 45km north-west of Brno and 25km south-east of Pardubice. 49°35'N, 16°00'E.

Date and History of Establishment The area was created on 25 May 1970 by Decree No 8.909/70. This Decree aims to preserve and enhance the quality of the landscape and to control its development.

Area 71,500 ha

Land Tenure State-owned

Altitude 550-836m (Devet skal)

Physical Features The site consists of a moderately elevated upland area of mainly crystallised rocks.

Climate No information

Vegetation The area has a mosaic of small woods, fields, meadows, ponds, small peat bogs and human settlements representing a typical landscape pattern of this part of the country. The forest cover is largely secondary and monocultural and occupies nearly 50% of the area, but in places there are remnants of beech-fir *Fagus sylvatica*-*Abies alba* forest as at Zakova hora. The flora is rather poor. Among rare plant species the following occur: *Lycopodium selago*, *Blechnum spicant*, *Mulgedium alpinum*, *Crocus albiflorus*, *Soldanella montana*, *Drosera rotundifolia* and *Calla palustris*. A large part of the area under cultivation.

Fauna Not fully investigated, although the mollusc fauna is rich with records for *Pseudalina turgida* and earthworm *Eisenia submontana*.

Cultural Heritage There are very old human settlements in the area.

Local Human Population There are at least a dozen towns within the area (the largest being Zdar n. Sazava, Nove Mesto na Morave and Hlinsko) and innumerable small villages and hamlets. Brno to the south is Czechoslovakia's third largest city (379,000 population) and Pardubice (to the north) has a population of 93,000.

Visitors and Visitor Facilities The area is frequently visited and used for tourism. Tourist and recreational facilities are, however, rather poor.

Scientific Research and Facilities No facilities

Conservation Management Within the protected landscape there are six national nature reserves and five protected natural features. The reserves consist of two peatbog areas, two meadow areas (one with the only locality for *Crocus albiflorus* in Moravia) and two forest areas. The site has been selected as the area for the enlarged Frysavka sub-national conservation strategy which will be developed by Professor V. Vanicek of Brno University and is called the "Svratka River Headquarters Conservation Strategy".

Management Problems The area is threatened by projects of large scale amelioration combined with land drainage. Forestry and agricultural activities are not controlled.

Staff Four workers from Krajske stredisko.

Budget 100.000 Kcs

Local Administration Krajske stredisko pamatkove pece a ochrany prirody Jihomoravskeho kraje, Brno.

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Date August 1987

FRANCE

Area 543,965 sq.km

Population 54,540,000 (1984)

Parks and Reserves Legislation The Constitution of the Fifth Republic, superceding that of 1946, came into force on 4 October 1958. It has 92 Articles (2) and gave rise to the current conservation legislation. The general framework for establishing *national parks* (Parcs Nationaux) is provided by Act No. 60.708 of 22 July 1960 and its enforcement order, No. 61.1195 of 31 October 1961. The open wording of Article 2 of the 1960 Law has resulted in flexible application of its protective measures from one national park to another (Saussay, 1980). Protection is a priority criterion in the creation of national parks which by definition "safeguard a finite part of the national territory from human interference, in order to preserve its original beauty and conserve its biological assets".

For the creation of a National Park a draft project by the Ministry of the Environment is presented to local authorities for opinion (such bodies as municipal councils, rural authorities, chamber of agriculture, commerce and industry in the relevant departments, the National Nature Conservation Council and the Interministerial Committee on National Parks) and then passed to national advisory bodies. If agreed by the Head of State it is passed back again to the local consultants for an obligatory survey. The final decision is expressed by a decree which lays down the applicable regulations and arrangements for the level of development and management, the level of protection, and lists of activities permitted. Special arrangements governing hunting, fishing and so on maybe introduced and the decree may also embody regulations on farming, grazing and forestry. In national parks, the population is so reduced that rural renovation is not one of the objectives of management and the purposes are for the protection of flora, fauna, natural landscapes against harmful influences, public recreation and promotion of the development of certain rural areas. National parks usually consist of two parts - a central core surrounded by a peripheral zone. The emphasis on protection in the core area means that there is a ban on hunting (some exceptions), road construction, building, camping and other activities. The peripheral zone is used for outdoor recreation with various authorities cooperating with the park authorities to introduce social, economic and cultural improvements. Decree 77-1299 simplified the procedure applicable to breaches of regulations in national parks.

Numerous laws dating back to the 1920's relate to the creation of *nature reserves* (reserves naturelles) (eg. Decree 30 December 1924 which established a national park in 1938 in the French possession of the Southern Hemisphere). Article 8-bis of the Act of 2 May 1930 (concerning sites of natural beauty and historical archeological or natural monuments) was superceded by the Act of 1 July 1957, the Act of 28 December 1967 and the Decree of 13 June 1969. The first text to provide a real definition of a nature reserve was the Nature Conservation Act of 10 July 1976 Act No. 76 629. The 1976 law allowed the establishment of new categories of nature reserves (geological, minerological, marine and botanical gardens). Those areas declared before 1976 are covered by the Act of 7 July 1957 and "reserves" can also be created on orders of the Ministry of Transport (Merchant Navy) but these need renewing every two years. Voluntary nature reserves are covered by Article 24 of the 1976 law, and regulated by Articles 17-25 of the Decree No. 77-1298 of 25 November 1977.

Nature reserve are established, sometimes on local initiatives with the Ministry of the Environment giving approval and thus creating an agreement of a contractual nature. Subject to the owner's consent the decision to establish a reserve is issued in the form of a decree after the local authorities have been consulted (as stipulated by Decree 77-1298 of 25 November 1977) and the scientific authorities (National Nature Conservancy Council) have given their opinion. If the owners object, publication is followed by a survey and the reserve is designated by a Council of State decree which sets out details of the activities which are permitted and takes into account the maintenance of traditional activities and if compatible, their development. The government has preferred to seek agreement with local landowners and not

purchase land and this has resulted in delays. To avoid objections, the Decree of 25 November 1977 requires that the request is accompanied by an agreement from the owners or title holders of the land (Article 17). The legislation stipulates that approval may not be granted for projects incompatible with management and urbanization laws, but once given the approval constitutes the act binding interested parties. The approval for a nature reserve on private property is valid for a six-year period renewable by tacit agreement. The owner may interrupt the process, but only with a notification period of two years before termination. During this period, modification of the statutes and boundaries can only be affected with agreement of the parties and following the prescribed procedure.

The concept of *regional natural parks* (Parcs naturel régionaux) was advanced in the early 1960's, by DATAR, an agency responsible for establishing regional planning policy and the first park, St Amand-Raismes was created in 1968 (Nowicki, 1983). The main aim of these regional natural parks is to provide facilities for tourists, to preserve traditional architecture and landscapes, and stimulate local enterprises and rural development. Wildlife conservation is incidental and there is no restriction on hunting. The criteria for establishment and designation of areas was set out in Decree No. 67-158 date 1 March 1967 and updated by Decree No. 75-983 of 24 October 1975. Since administrative "regions" had not yet been set up between 1967 and 1975 regional natural parks creation depended upon a ministerial decree, although the state assumed less than half of the operating and investment costs. After 1975 the regional natural parks have been created on the initiative of the local population, the local authorities, trade and industry and regional associations. In 1978 a new generation of regional parks were established, the *espace naturel regional*, the first of which was the Nord-Pas-de-Calais park which was created in 1978. This type of park is essentially the same as the parc naturel regional but consists of many fragmented sections. The establishment of a regional natural park is dependent upon the creation of a draft "constitutive charter" drawn up by common agreement between the regions and the interested local communities. It covers five main points: administrative organization; plan of work; the park facilities; the legal measures to be taken; and arrangements for financing the provision of facilities and management. These points effectively become the park's bye-laws once it is established under existing regulations (without requiring a specific Act of Parliament). Various bodies (town council civil and military administrations, department commissions, local hunting organization) are consulted upto a maximum of four months. During the approval period modifications to statutes and boundaries can only be carried out by agreement with the parties, but central authorities can extend the powers of managers and the regulatory measures of the Conservation Police. Approval may be withdrawn by the Ministry of Environment. In regional natural parks (as in national parks) compensation is collective with indemnification for losses suffered by the communes in the park itself.

Other protected area categories include hunting reserves, where shooting may or may not be permitted; game reserves, where hunting is considerably reduced; biogenetic reserves; buffer zones, existing around national parks, and a number of large towns and reserves to preserve terrains against building and exploitation; and scenic zones where there are restrictions on buildings for aesthetic and architectural reasons.

Marine environmental protection relies on a whole series of legal instruments governing the occupation and utilization of the maritime public domain (for fishing, mining, sea transport and industrial pollutant discharge). Marine areas cover protective fisheries which are set up by permit or lease of occupation of the marine public domain on the basis of Decrees of 9 January 1852 and 21 December 1915. They are renewable every 25 years (non-mobile establishment) and five years (mobile establishment); fishery preserves are governed by Ministerial Decree of 4 June 1963, and their establishment or abolition is decided by the Maritime Affairs Department, usually taking into account users opinions. These are sites of edible species conservation and for experimental restocking schemes. By definition they include no onshore territory. *Marine nature parks* maybe created by a legal management body which can be one of the following; a foundation, departmental administration, a joint syndicate or an association subject to the 1901 Act. The Decree of 24 October 1975 has no provision for including a marine element and where this is included, it is only covered by a general law. In such cases nature reserves have to be created under the 1976 Act. Coastland protection is possible under the Act of 10 July 1976, whilst the Coastland and Lake Shore Conservancy exist mainly for the

purchase of natural coastland areas whilst hunting in coastal zones is authorized by the Navy. The Council of Europe's European Diploma has been awarded to two national parks and one reserve.

The Nature Conservation Act 1976 protected all rare, endangered, noteworthy or declining plants and animal species and in addition all large game animals are also protected in national hunting reserves. Law enforcement constitutes repression and so comes under criminal law and the penal code is used to fine for contravention of decrees or orders (Article 26. 15e).

The World Heritage Convention was acceded to 27 June 1975.

Parks and Reserves Administration and Management The Ministry of Regional Planning has responsibility for land-use planning and is closely concerned in the elaboration of the "zone peripherique" of national parks. Administrative responsibility for nature conservation is by the Ministry of the Environment and the Quality of Life, in which the Department of State of the Environment has three Directorates advised by a National Nature Conservation Council and by the Ministry's General Secretariat of the Environment Committee, which has responsibility for long term studies and basic research and its *ad hoc* group on fauna and flora. Of the three Directorates, the Directorate of the Quality of Life is responsible for Regional Nature Parks and rural development whilst the Directorate of Nature Conservation is further divided into three Departments; the Department of Hunting, the Department of Fisheries and Hydrobiology and the Department of Parks and Reserve. The latter includes four bureaux responsible for National parks, Nature reserves, Fauna and flora and Information and education. The Department of Parks and Reserves acts as a coordinating body for the establishment and management of national parks and nature reserves. It is responsible for all decisions not taken locally, for the supervision of reserves, for implementing agreements concluded between the Ministry and the managing body and for producing reports on new areas. By a Decree of 25 November 1977 (77-1295 and 77-1296 adopted for the application of Articles 3,4 and 5 of Law No. 76-629, Decree No. 77-1300 adopted for the application of Law No. 76-629 and concerning the National Council for the Protection of nature its powers were increased and its composition was modified, to reflect its more important role. It is advised by the National Nature Conservation Council which meets four times a year on average at the request of the Directorate of Nature Conservation.

In 1977 the total budget for the Ministry including the "Intervention and Action Fund for Nature and the Environment FIANE" was 219M francs. Under the 1976 Finance Act, the central authority responsible for the environment had a staff of 375 individuals, 177 permanent staff, 168 contract staff and 30 research staff. Regional and landscape teams and regional delegations on the environment had 114 staff. The Directorate of Nature Conservation had 20 administrative posts mostly held by land-use graduates in water and forestry. The Ministry of Environment started out as a small office exclusively dealing with the environment, including protection of nature, prevention of pollution and management of the rural or urban environment. It combined with the Ministry for Public Works, and is complemented at national level by coordinating structures and advisory bodies. The coordinating structures are the ministerial councils such as the Inter-Ministerial Committee on the Quality of Life, chaired by the Head of State with 11 ministers. It has special credits from the "Fund for Action on the Quality of Life". Advisory bodies specializing in different aspects of the environment include representatives of the different authorities concerned at national and local level (50% of membership) with the remainder including conservation societies, agricultural interests, hunters and scientists. A number of seats are given to competent persons chosen by the Administration.

The Act of 22 July 1960 classifies national parks as public institutions, (although most of the land is owned either privately or by local communities) which until 1971 under the Ministry of Agriculture when responsibility was transferred to the Ministry of the Environment. They are managed by public authority; its director having almost absolute regulatory powers over its territory. Each national park has a Board of Directors with the total membership fixed by decree. Its members are drawn from civil servants (representing the various ministries); conseils d'administration (representatives of associations); conseillers generaux (county

councillors and mayors); two representatives of the National Nature Conservation Council, one from the National Museum of Natural History and one from the National Centre for Scientific Research (CNRS). The total number vary between national parks (50-27).

The central authorities issue no general instructions on management. In every national park the Board of Directors decides, in principle, how the park is to be administered, managed and regulated. The executive director is, however, responsible for day to day administration. A national park may consist of upto three concentric zones; strict reserves, core zones, and peripheral zone. The core zone of the national park is managed by the director and his staff with the protection of wildlife as its first objective. Advice is given by a council of administration consisting of the prefect of the department and other regional and local administrations appointed by the Minister. Coordination of scientific research is entrusted to the Scientific Committee which has a purely advisory status but prepares yearly and five yearly research programmes. The Directorate of Nature Conservation has established a working group to coordinate the research done in all national parks. Since national parks are public institutions, almost all the operating expenses, capital investment and research costs are borne by the State (Ministry of the Environment). The Park Director does not come under hierarchial authority of the Minister, his actions and the administrative council are controlled by oversight which exercises approval of the budget, management plans for interior regulation of the park and acts such as the purchase or sale of estate property. The Directors and executive members belong to central administration and are often water and forestry personnel. Staff numbers in national parks vary from 24 to 70. The administration of a national park's peripheral zone is borne at national level by the Ministry of Regional Planning, and at the local level by the Departmental Committee, headed by the "prefet" concerned. The park authorities have a say in planning annual and longer term programmes but can be overridden by local wishes. The main objective of management is the maintenance of the area's traditional landscape and way of life and the provision of tourist facilities. There is a certain lack of administration in the peripheral zone where Public Works, Agriculture and the Delegation for Territorial Management, carry out improvement programmes without coordination or participation of the Parks Administration.

The State very rarely purchase land for nature reserves; it may compensate an owner, after the value is fixed by mutual agreement or by the Expropriations Judge. As soon as a new reserve is established the owner is notified and cannot make changes for 15 months. The management of these areas is entrusted by the State to qualified bodies, usually a nature conservation society, sympathetic owners, local authorities and non-profit making organizations with the necessary advisory, management and scientific boards also established. The State normally covers the management costs (within the budget for the Ministry for the Environment) but financial assistance of the local authority (region, department, municipality) is also regularly sought. The Directorate of Conservation can initiate research for the purposes of nature reserve establishment and works in consultation with the National Nature Conservation Centre. Control by oversight is exercised by the central authorities and monetary control being given by the Ministry of Finance.

The 1975 Decree on Regional Nature Parks implied that they should be administered by organizations different from the communities which created them. It may be entrusted to a public establishment - a joint syndicate of commune, department and region connected with the park or to a society or foundation under the sovereignty of Private Law. However, there is a clear preference for public institutions. Regional nature parks are managed by a Board composed of representatives of the municipalities, the departments and professional organizations. The Director in charge of administration carries out duties delegated to him by the Board. Each regional nature park is different but all of them have three characteristics.

1. Each has a special development plan, aimed at maintaining and preserving the traditional landscape. These are codified in a charter, accompanied by a budget for investment and operating costs for the last few years.
2. A management authority, manages the park but with no regulatory powers.

3. Engaged in several types of activity; protection of the natural resources, development of the economy, education of the public and directing visitors to possible activities.

The law of establishment compels local communities to finance the public institutions they may have constituted. Although preliminary studies are largely self financing the cost of most of the parks facilities is borne by the local communities assisted the normal state subsidies. Management costs are calculated to be twice that of national parks. As an example, in the Parc Naturel et Regional d'Armorique, the Department of Finistère bears all the capital costs and 70% of the running costs, the balance coming from 27 constituent rural communes which contribute 20% and the City of Brest giving the remaining 10%. Membership of the associations controlling the park is voluntary and although most of the stimulus and enthusiasm for the park comes from the department level, most decisions have to be implemented by rural communes by their approval. The decentralization of political authority over the designation of Regional Nature Parks has meant that official approval for such areas rests with regional politicians. However, since 1983, three new parks have been designated and administration rests with the regions.

Of other areas, the "Conservatoire du littoral français" a public institution works to safeguard sea and lake shores from urbanization through acquisition. The management of Coastland and Lakeshore Conservancy lands is mainly a prohibitive activity whilst protective fisheries management is entrusted to a private body, such as a fisherman's guild or an association founded in accordance with the 1901 Act. The public bodies may have a role in management financing and experimentation.

Addresses

- Ministère de la Qualité de la Vie et de l'Environnement, Protection de la Nature, 14 Boulevard du General Le clerc, 92521 Neuilly-sur-Seine.
- Federation Francaise des Societies de Protection de la Nature (FFSPN), 57 rue Cuvier, 75005 Paris.
- Federation des Parcs Naturels de France, 45 rue de Lisbonne, 75008 Paris.

Additional Information Up to 1973 nature reserves were established on a case by case basis but in that year a nature reserve programme was formulated based on a national stocktaking covering 350 sites. The present system is incomplete, being strongly in favour of mountains. A seven year programme was launched and 100 sites were given priority rating and approved by the inter-Ministerial Action Committee on nature and the environment (CIANE) in December 1973, intended to be implemented throughout the 6th Plan and the beginning of the 7th Plan. Upto 1977, 36 sites covering 41,000 hectares had been selected and 59 by the end of 1977. Further to this the Ministry of the Environment, Directorate of Nature Conservation was to launch a campaign in 1982 to compile an inventory of natural zones of ecological, faunistic and floristic interest (ZNIEFF).

Conservation legislation was fairly slow in being formulated and the first nature reserves were created by private societies; the first state reserves not appearing till 1961 and the first national park not till 1963.

The national parks and peripheral zones cover approximately 2% of the land area and are open to the public, but generally there are no roads. The zoning system used in national parks has been adapted by at least one other European country (Greece) but in operation it has created a certain amount of conflict between objectives in the two main zones, although this is partially to do with the interpretation of the rather flexible law of 1960. For example, in Vanoise National Park this law is applied very strictly but in Cevennes National Park the same law is much less strict. Most recently the Minister of the Environment has agreed to set up a study group to look into the definition of national park boundaries due to the frequency of occurrence of local disputes. Surveys of possible future areas have been carried out but have encountered difficulties. The establishment procedure for the Mercantour National Park gave rise to heated local opposition and the consultation period lasted some five years. The slowness of establishment procedure can, however, be useful for actions against declassification, as for example in the Vanoise National Park. A new park is being discussed in the Haute-Arriège.

France

The management of cross-border national parks is best dealt with by international coordination. The French and Spanish parks of Pyrenees/Val d'Odessa have a bipartite international commission and are attempting to formulate a text for a convention.

The most effective private organization is the National Society for the Protection of Nature (SNPN) whilst the oldest is the Society for the Study and Protection of Nature in Brittany where the majority of private nature reserves are to be found. The French Federation of Nature Conservation Societies (FFSPN) incorporates most of the numerous local and regional nature conservation societies of the country. Some of the societies have established and manage nature reserves (Brittany, Côte d'Azur and in Vendée) and may receive government funding.

An EEC study of ecological mapping of the European Community identified 351 sites of importance for nature conservation of which 30 are strict nature reserves and 7 are partly protected. The International Council for Bird Preservation (ICBP) in an EEC study to identify areas needing Special Protected Area status under the Birds Directive legislation identified 135 sites important for birds. In a separate study on behalf of the Council of Europe ICBP identified 97 sites important for birds under COE criteria. Since 1968 24 Regional Nature Parks had been established covering 3,167,000 hectares and 1 is in process of being established. There are some 40 onshore nature reserves, and 19 marine of which at least 17 are in the Mediterranean.

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Protected Landscapes

(hectares)

<i>National Parks</i>	
Cévennes	84,800 *
<i>Pre-Parks</i>	
Cévenns pre-parc	228,000
Ecrins pre-parc	178,600
Mercantour pre-parc	200,000
Pyrenees Occidentales pre-parc	206,000
Vanoise pre-parc	145,000
<i>Regional Nature Parks</i>	
Armorique PNR	65,000 *
Brière PNR	40,000 *
Brotonne PNR	40,000 *
Camargue PNR	82,000 *
Corse PNR	150,000 *
Forêt d'Orient PNR	70,000 *
Haut Languedoc PNR	145,000 *
Haut-Jura PNR	62,088 *
Haute Vallée de Chevreuse	25,600 *
Landes de Gascogne PNR	206,000 *
Livradois-Forez PNR	297,000 *
Lorraine PNR	205,000 *
Luberon PNR	120,000 *
Marais Poitevin PNR	200,000 *
Montagne de Reims PNR	50,000 *
Morvan PNR	173,000 *
Nord-Pas-de-Calais PNR	167,000 *
Normandie Maine PNR	234,000 *
Pilat PNR	65,000 *
Queyras PNR	60,000 *
Vercors PNR	135,000 *
Volcans d'Auvergne PNR	346,000 *
Vosges du Nord PNR	120,000 *
<i>Regional Marine Parks</i>	
Côte Bleue RMP	3,070 *

Cévennes National Park

Management Category V (Protected Landscape) (also Cat IX Biosphere Reserve)

Biogeographical Province 2.09.05 (Atlantic) / 2.17.06 (Mediterranean sclerophyll)

Geographical Location The park is situated in the southern part of the Massif Central in the zone between Millau, Mende and Ales. It is situated in the départements of Lozère, Gard and Ardèche on the extreme south-east of the Massif Central, about 120km from Nimes and Montpellier. 49°20'N, 1°40'E.

France

Date and History of Establishment The national park was established on 2 September 1970 under Order 70-777 and is protected under the French National Parks Act, 1960. The core zone is fully protected but the park regulations do not apply to the buffer zone. The area was accepted as a Biosphere Reserve in 1984. In the core zone, 17% of the area (15,000ha) consists of game reserves. The national park's zone of cooperation corresponds to the biosphere reserve's buffer zone, but boundaries are not exactly coincident, the biosphere reserve's being based on vegetation boundaries and including the Tarn river gorge.

Area Total 323,000ha; core zone 84,800ha and peripheral zone 236,000ha.

Land Tenure Core zone: (30,000ha government; 6,000ha common land; and approximately 49,000ha private ownership); Buffer zone: (the Cévennes pre-parc: mostly private ownership).

Altitude 400-1,700m

Physical Features The park is geologically and scenically diverse and has undergone much alteration, metamorphosis and faulting throughout geological time. The area is dominated by metamorphic rocks and granites with some carboniferous deposits on the eastern slopes. In the north is Mont Lozère, a crystalline granite massif which is 40km by 15km and rises to 1,699m. The central area is composed of schists, micaschists, gneiss and granite. The Aigoual Massif forms the watershed between Mediterranean and Atlantic drainage. This area is rich in minerals including uranium which is found on the slopes of Mt Lozère. In the west the limestone plateau of Causse Mejean is an undulating area bounded by deeply cut valleys of the Avants Causse Jurassic limestones and dolomites. They include the dramatic gorges as typified by the Gorge du Tarn and Jonte valleys. The gorge canyons are often very narrow and the sheer cliff faces may reach 500m high. The Mont du Bouges of metamorphic substrate is cut by the tributaries of many of the valley rivers opening towards the Mediterranean. The limestone areas are deeply cut by permanent rivers but there are also numerous pot holes and Caverns such as the Peuch Negre.

Climate At an altitude of 900m, the mean annual temperature is 8°C and precipitation 1500mm per annum. At the Aigoual Observatory at 1,567m altitude, mean annual temperature is 4.2°C and annual precipitation 2242mm.

Vegetation The variety of rock types and altitudes in the park has caused a diverse and interesting flora to develop, most notably on the distinctly different limestone and granite habitats. The vegetation has been much altered by man and today the area is still grazed by livestock as well as being fire managed. In general the flora is sub-mediterranean, with about 1,800 species present. Four distinct vegetation zones have been recognised, those of the holm oak scrub stage up to 500m, the deciduous oak and sweet chestnut stage from 500-1,000m, the beech stage from 1,000-1,500m and the non wooded zone on the massif summits from 1,500m.

The Forest, which covers 25% of the park, exhibits mediterranean, atlantic and middle european mountain characteristics. The holm oak zone is characterised by *Quercus ilex* scrub and *Cistus*. Coniferous forest covers about a quarter of the park much of which have been established as plantations of scots pine *Pinus sylvestris*, Salzman's pine *P. clusiana* ssp. *salzmanni* and silver fir *Abies alba*. Natural broadleaf forest covers a similar area, generally at lower altitudes, and includes beech *Fagus sylvatica*, silver birch *Betula pendula*, white oak *Quercus pubescens*, holm oak *Q. ilex* and sweet chestnut *Castanea sativa*. Heather *Calluna vulgaris* dominated moorland covers about 20% of the park where soils are acid (also in association with *Genista pilosa* and *Vaccinium myrtillus*). Smaller areas of grassland occur on calcareous and siliceous soils, whilst on poorly drained areas there is bog vegetation including sphagnum *Oxycoccus quadripetalus*. Cliff habitats are of interest for a diversity of species including *Potentilla caulescens* var. *cebennensis*, *Saxifraga cebennensis*, *Daphne alpina*, *Draba aizoides*, *Arabis saxatilis* and *Campanula speciosa*. The calcareous grasslands are dominated by *Stipa pennata* and *Festuca ovina* or by *Brachypodium pinnatum* and *Bromus erectus*. The siliceous grasslands are composed either of *Deschampsia flexuosa*, with *Festuca rubra* or *D. caespitosa*, *Nardus stricta* and *Poa chaixii* or by the pseudo-alpine environment with *Nardus stricta*, *Trifolium alpinum*, *Phyteuma hemisphaericum*, *Juncus bifidus* and *Vaccinium uliginosum*.

Fauna The fauna is diverse, due to the variety of habitats and mixture of maritime, mediterranean and continental influences. About 50 mammal, 150 bird, 30 reptile and amphibian and 20 fish species have been recorded. There are many wild boar *Sus scrofa*, red deer *Cervus elaphus* (400 in 1985), corsican moufflon *Ovis musimon* (60 in 1985), European beaver *Castor fiber* (over 20 families in 1986) and some genet *Genetta genetta*. The avifauna includes many cliff living species such as choughs and raptors including the golden eagle *Aquila chrysaetos*, peregrine falcon *Falco peregrinus* and eagle owl *Bubo bubo*. There are also alpine swifts, rock thrushes, ortolan buntings and little bustards.

Cultural Heritage Much of the characteristics of the landscape are derived from man's influence. The Causses were the meeting place of two megalithic civilisations and there are many dolmens, menhirs and cromlechs remaining from the fourth and third centuries B.C. In the schist areas, cultivation is difficult due to the steep slopes, so for centuries these have been terraced. Development in the Cévennes has been related to two trees, the chestnut and mulberry but most of these were killed by disease at the end of the nineteenth century. The forest at Aigoual was almost totally destroyed, leading to erosion and floods but massive reforestation was undertaken and now forest cover a significant proportion of the mountain.

Local Human Population About 600 people live in the core zone in villages, hamlets and isolated farms. In the buffer zone there are well over 4,100,000 permanent residents (Duffey, 1982). Stock herding, rural farming and forestry are the major occupations of the region.

Visitors and Visitor Facilities The area is a very popular site for visitors and there are well over 60,000 every summer (Duffey, 1982). In the core zone (zone centrale), camping and caravanning is only permitted in designated areas (camping à la ferme), whilst hunting and fishing are strictly regulated. Accommodation includes 48 "gites", (simple self-catering accommodation), built on farmers' property with financial assistance from the park, as well as three country inns at Cabrillac, l'Hospitalet and la Croix de Berthel. The main hotel centres are in the buffer zone. An information bureau at Château de Florac is open all year and in summer there are six additional centres which distribute information leaflets and two publications. Main roads cross the park from which circular walks of varying lengths have been signposted, and guided tours with special themes are organised in summer. There are many bridle paths, cycle routes, canoe areas, several horse-riding centres and facilities for skiing on Mont Lozère and Mont Aigoual. In summer, series of concerts are organised in buildings of particular archaeological interest.

Scientific Research and Facilities Past and future research is concentrating on assessing the best means of managing the park to maintain an equilibrium between human activities and the environment. Research financed by the EEC from 1978-1980 concentrated on Mont Lozère and from 1981-1983, PIRENS-CNRS financed studies of the Aigoual-Lingas region. Park staff help with scientific observations and day-to-day monitoring. There is a meteorological station on Mont Aigoual and some accommodation set aside for about 30 workers.

Conservation Management In the core area, park officials have statutory authority to supervise hunting, building licences and traffic. A board of 50 directors meets twice a year to discuss policies and problems. The buffer zone is not directly under their control and park officials can only advise and persuade. A management plan first came into effect from 1981-1985. Management policies aim to preserve the local way of life, as well as the natural features of the park, by providing subsidies for such matters as using traditional materials for building repairs, gates and employing farmers for park work when there is no other work available. A programme of winter social gatherings, meetings and summer educational activities for the local population as well as tourist information facilities is organised by the Centre d'Animation Cévenol. An interdepartmental advisory committee from Gard, Lozère and Ardèche has approved a programme of development for the buffer zone, which aims to maintain the present population but improve living conditions and develop tourism. There are measures to reintroduce some animals, including griffon vulture *Gyps fulvus*, which now breed in the Tarn gorge. The Corsican moufflon was introduced into the Cévennes (first in 1954-55) following the decline of the traditional use of the uplands by livestock. Moufflon are maintained in this traditional man-made landscape to graze the pasture and prevent its loss to scrubland. Since 1977 there has been a programme to conserve the European beaver. A small

France

group was re-released from the original Rhône population to the river Tarnon and the Tarn. Other projects include a semi-reserve which has been set up, to try and establish a viable population of the Przewalski horse *Equus przewalskii*, partly supported by WWF-France (Bouman, 1984).

Management Problems The park authorities do not have direct control over the buffer zone, although there is a high degree of cooperation by the local people. A number of species of animals once resident have disappeared, and some reintroductions are being undertaken.

Staff There was a staff of 62 in 1980, including Park Director and assistant, 35 administrative staff, six researchers and 27 technical staff attached to research work.

Budget Most of the park's finance comes from the state Department of Environment.

Local Administration Parc national des Cévennes, 48400 Florac.

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Date August 1987.

Armorique Parc Naturel Regional

Management Category V (Protected Landscape)

Biogeographical Province 2.09.05. (Atlantic)

Geographical Location The park lies in western Brittany in the north-west of France. It is split into five separate areas: two small sections approximately 30km south-west of Brest, another immediately to the north-west of Chateaulin and stretching westwards to the Aulne River estuary; a large block 80km east of Brest (10km south of Morlaix and 35km north-west of Carhaix-Plouguer) and another zone which consists of the Ile d'Ouessant (Ushant), Ile de Molene and their associated islands. 48°20'N, 4°00'W.

Date and History of Establishment Created in September 1969 by Decree No. 67-158 of 1 March 1967 and updated by Decree No. 75-983 of 24 October 1975, on the basis of a ministerial decree.

Area 65,000ha (in five separate units). Included is a coastal and island sanctuary.

Land Tenure Both private and public ownership.

Altitude From sea level at Camaret to 391m at Montagne St. Michel (the highest part of the Montagnes d'Arrée).

Physical Features The park consists of a very varied topography ranging from the dramatic Arrée massif to 90km of France's most spectacular coastal scenery. The eastern part is the most elevated in the region and comprises the granite uplands of the Montagnes d'Arrée which rise gently from the Rade du Brest. Over the centuries the sandstone or granite substrate has formed into the characteristic rounded hills or *Menez* of the region. The quartz formations, exposed by the action of water on the schists around them have become sharp crests. The second largest section in the park consists of the wooded "ria" estuary of the River Aulne (below Chateaulin) and its deeply incised river valley. The smallest areas are separate blocks, one on the Atlantic coast around the Pointe de Penhir and the Pointe des Espagnoles and the others being the island chain of Ile d'Ouessant (Ushant) and Ile de Molene. Wetlands include a reservoir (St. Michel) in the central part of the uplands as well as marshland on the coastal estuary, the Rade de Brest.

Climate The climate can be extremely inhospitable and the frequent strong winds have been given local names - such as Mervert, Kornog and Gwarlarn. The average temperature of the coldest month is 6.2°C and the mean of the hottest month, 15.8°C. Annual rainfall averages at 1205mm.

Vegetation The site is represented by over 35% heathland and moors, as well as bogs and a typical small hedged field and copse landscape (particularly in the section south of Morlaix). The uplands of the Montagnes d'Arrée are wooded in parts, but the summits usually consist of gorse *Ulex* and heather *Calluna* communities, with small-scale agriculture dominant in the valleys. Although the region is one of the least wooded in France it still possesses a few relict forested areas. The river valley of the Aulne has deciduous woodlands on its steeper slopes with intensively farmed areas on the gentler slopes and the flatter land of the plateau. The state forest, Forêt du Cranou consists of oak *Quercus* and beech *Fagus*. The extreme climate on the moor has resulted in stunting of much of the vegetation and the creation of a great peat bog, Yeun Elez at the foot of Montagne Michel.

Fauna The typically north-west European fauna includes such mammals as otter, wild boar, fallow deer, stoat, mink, marten (*Lutra lutra*, *Sus scrofa*, *Dama dama*, *Mustela erminea*, *Lutreola lutreola*, *Martes martes*), and introduced European beaver *Castor fiber* on a tributary of the River Aulne. On the offshore island of Ushant there are colonies of grey seals *Halichoerus grypus* and common seals *Phoca vitulina* are also seen occasionally in the area. Great colonies of sea birds nest on the island's cliffs as well as raptors such as marsh harrier *Circus aeruginosus* and Montagu's harrier *Circus pygargus*.

Cultural Heritage The entire region is rich in prehistoric megalithic remains. For example, there are more than 3,000 great stones in the Carnac district alone. The isle of Ushant preserves a closely-knit farming and fishing community, and the park maintains a strong Breton culture, with traditional festivals promoted by the park authorities. Virtually every village stages some kind of annual procession, and the larger ones are great tourist attractions. Local crafts such as lace-making and hand-carving of sabots are also promoted by the park authorities. There is a magnificent restored eighteenth century farmstead at Saint Rivoal and many historic churches, chateaux and cathedrals in the region.

Local Human Population There are no very large cities in the area but a number of small towns are located within the park including Huelgoat, Landevennec, Roscanvel and Lampaul. Camaret-sur-Mer lies just on the park limit, whilst the largest town in the region, Brest, is situated 80km to the west and has a population of 190,000. The total number of inhabitants within the park is about 33,000 and includes 30 parishes (communes). The economy of the region is based on agriculture (20% of the working population) although many people are also involved in the fishing industry. The main crops are cereals, fodder, fruit and vegetables. Up to 15% of the French dairy produce comes from the region.

Visitors and Visitor Facilities There is a park centre, Maison du Parc - Menez Meur, at the western end of the Montagnes d'Arrée, near the town of Hanvec. The centre has been built in a 400ha wooded site and combines the roles of information service for the park as a whole and a centre for general environmental education. There are lecture halls and residential quarters, and a series of nature trails and permanent exhibitions, including a restored tuna fishing boat.

France

Over 60,000 people visited the centre in 1974. At the *Centre permanent d'initiation à l'environnement* there are organised nature courses as well as exhibits such as wild and domestic livestock including wild boar, moufflon and Shetland ponies. On the Ile d'Ouessant there is a craft exhibition building. Elsewhere in the park there are two ecomuseums, interpreting traditional lifestyles and the local environment, one at Niou village and the other at St. Rivoal/Kerouat. Camping and caravanning sites are maintained by the local communities and in the summer months there are traditional festivals, coordinated by the park administration. There are two tourist beaches at Camaret-sur-Mer and Landevennec, and the estuary of the River Aulne is now a quiet waterway.

Scientific Research and Facilities The farm at Menez-Meur specialises in rearing rare local breeds, in particular the small Ushant sheep. At Logueffret on the River Eley a European beaver reserve has been established with some attempts at naturalisation, using animals originally caught the Rhône valley (Wirth, 1979; Desjeux et Desjeux, 1984).

Conservation Management Management of the park is undertaken by a Board composed of representatives of the municipalities, the departments and professional organisations. They delegate duties to a Director who is in charge of day-to-day administration. The park authorities have opted for dynamic conservation of the natural heritage rather than turning it into a vast static zoo or museum and have a special development plan aimed at maintaining and preserving the traditional landscape, which is codified into a charter. The serious problems of rural decline are being counteracted by active promotion by the park authorities of traditional crafts and the encouragement of traditional building methods and styles, as well as sponsoring new trades in association with the Chamber of Commerce (DATAR). The management authority has no regulatory powers but deals with protection of natural resources, development of the economy, education of the public and directing visitors to possible activities. The stimulus and enthusiasm for the park is generated at regional "department" level, but most decisions have to be implemented by the rural communities themselves. Activities ranging from landscape protection to tourism promotions, tend to be organised by local associations or co-operatives. These tend to be unco-ordinated and are limited by restricted finance.

Management Problems Membership of the association of the park is voluntary and several of the rural communes comprising the 'syndicat mixte' have threatened to withdraw. The organisation has no statutory basis, and the control of land use and building standards is advisory, not compulsory. St. Michel's reservoir and Brennilis thermo-nuclear power station, located at the dam itself, are intrusions on the landscape and threats to the environment.

Staff No information.

Budget The Management Charter is accompanied by a budget covering investment and operating costs. The cost of the park's facilities is borne by local communities assisted by normal state subsidies. The Department of Finistère bears all the capital costs and 70% of the running costs, the balance coming from 27 constituent rural communes which contribute 20% and the City of Brest giving the remaining 10%.

Local Administration Maison du Parc, Centre de Menez-Meur, Hanvec, 29224 Doroulas. Telephone: (98) 21.90.69.

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Date August 1987

Brière PNR (including the Grande Brière NR)

Management Category V (Protected Landscape)

Biogeographical Province 2.09.05. (Atlantic)

Geographical Location The park is located on the south-western seaboard of Brittany in the Pays de la Loire (Loire-Atlantique department), immediately north of the city of St. Nazaire. The site, a discrete entity, extends 15km north to south and 30km inland from the Côte d'Amour on the Atlantic coast via Pontchâteau around to Baule. 47°25'N, 2°25'W.

Date and History of Establishment Created in October 1970 by Decree No. 67-158 of 1 March 1967 and updated by Decree No. 75-983 of 24 October 1975, on the basis of a ministerial decree. The area is partially protected through land-use zoning, although in practice the whole area is unprotected (ICBP-ECWG, 1984).

Area 40,000ha. Included in the site is the Marais de Brière nature reserve (10,000ha).

Land Tenure 7,000ha of the park are jointly owned by 21 neighbouring villages (the area has remained common property to Briérons and is confirmed in several royal edicts).

Altitude From sea-level at the western coastal sections.

Physical Features The park essentially consists of the Loire basin and estuary marshland (marshland constitutes 38% of the park). The basin containing the marsh was formed by Tertiary earth movements causing the underlying rocks to sink. Over millions of years the sea has laid down deposits of sediments and about eleven million years ago the basin was cut off from the sea by the formation of a littoral sand-bar. Subsequently, marshes formed behind the alluvial banks, the forests died and were submerged, decomposing to form peat bogs. Today the park, as part of a 20,000ha marshland, covers the periphery of the salt marshes around Guerende, and is bounded by the Loire estuary to the south and the valley of the river Vilaine in the north. It occupies the southern edges of the Bretonne Massif and is centred on an expansive area of marshes, the Grand Marais de Brière, which is 7,000ha in area and 100km in length. The marshes are criss-crossed by a network of canals created in the 19th century.

Climate The climate at nearby Nantes ranges from averages of 4.9°C in the coldest months to 18.5°C in the hottest month. Annual rainfall averages 841.1mm

Vegetation The Grand Marais de Brière is one of the most important wetlands in France, consisting of marshes and wet meadows covering some 7,000ha. The flora is particularly rich in species, with interesting heathland and marsh plants such as the heath lobelia *Lobelia urens*. The area contains a distinctive type of heath, merging into boggy meadows which are occasionally inundated by high tides. The water channels can often be filled with yellow iris *Iris pseudacorus* and water lilies Nymphaeaceae as well as reeds *Typha* sp.

Fauna Mammals include otter *Lutra lutra* and wild boar *Sus scrofa*. The area is particularly important for migratory birds, especially for waterfowl. Breeding species include *Recurvirostra avosetta* (4,000), *Botaurus stellaris*, *Ardea cinera* (150 pairs), *A. purpurea*, *Circus aeruginosus*, *C. pygargus*, *Chionides niger*, *Alcedo atthis*, *Luscinia svecica* and *Sylvia undata*; wintering

species include *Circus cyaneus* and *Anas crecca* (2,000)(ICBP-ECWG, 1984). The mixed freshwater/saltwater character of the area gives rise to a diversity of habitats for a large number of fish species (including introduced species).

Cultural Heritage The area has an unusual and traditional form of architecture. Boating has always been an integral part of the Brièron's life, the traditional craft being a *Blin*, a flat-bottomed boat propelled with a pole. Traditional activities such as fishing, stock raising, reed and peat-cutting have declined over the years as a result of new employment opportunities and the development of the ship-building industry in St. Nazaire.

Local Human Population The park lies adjacent to the city of St. Nazaire, which had a population of 119,418 in 1977. Within the park are also several smaller towns including St. Joachim and Missillac. The rural population of the park has declined in recent years. However, it still has 50,000 inhabitants in 18 parishes (communes).

Visitors and Visitor Facilities The park caters well for the visitor. There is a 100ha open-air animal park at St. Malo de Guersac which is designed to provide visitors with an idea of the typical flora and fauna of the marshes. Small scale tourist facilities (such as camping grounds) are located around the park to attract visitors away from the more sensitive areas. There are horse and cycle trails, footpaths and bridlepaths and also canoe-kayaking. Organised excursions in typical Brière flat-bottomed barges are provided for the visitor from at least five villages. There are a number of museums around the park which inform the visitor about contemporary history, architecture and agriculture. The Ile de Fedrus museum, opened in 1975, in a traditional village-style building, is run by the local people. At Kerhinet, in the municipality of Saint Lyphard, private accommodation is being built for visitors and is to be used for organised courses (started in March 1978).

Future plans for the park include two museums (one of which is the Haut-Marland), an ethnographic village, an artist's house, an architectural workshop, a typical village building, a zoological garden and a recreational park. Accommodation includes auberges, hotels, camp sites and gîtes.

Scientific Research and Facilities Work has been directed at combatting the excessive expansion of reedbeds. An experimental herd of cattle has been introduced to investigate cattle grazing, an activity which has increasingly declined on the marshland pastures. Complex natural and sociological research was carried out prior to the preparation of a tourist management plan in the 1970s.

Conservation Management The management authority is the "Syndicat Mixte", composed of representatives of towns and villages located in the park, of landowners and communes and of regional, and department authorities. There are 5 commissions: architecture and urban planning; tourism and information; environment, history, folklore and archaeology; and finance and planning. The "Syndicat Mixte" appoints the park director and staff. The park was established for tourism and recreation, and there is a comprehensive long-term programme for the protection of the area. The first project was the recovery of the marshes, which had been increasingly neglected due to the decline in traditional economic activities such as fishing, reed-cutting, peat-digging and the maintenance of expanses of open water. A dredger is now in use to carry out such work. Projects include the control and preservation of the very unusual and traditional architecture. Architectural standards have been improved, at first by compulsory notification of building projects, and now by a more flexible and simplified method. The park is divided into zones each with its separate building conditions, and an architect is provided free of charge for any prospective developer to ensure standards are maintained. Building development is controlled by a sub-committee of the 21 communes. The park management has also set up a studio to provide technical advice on building work for the public. Tourism is actively promoted by means of visitor facilities, trails and organised excursions. The staff of the park are in regular touch with the farmers and associations, and evening audio-visual performances are provided in villages. Other work undertaken in the park includes opening up and cleaning out the network of canals. Reeds are being harvested again and a hunting reserve has been established on the 7,000ha of community-owned marshland. In addition some 33,000ha of small-scale farming land is being improved and 12

parishes have been declared "zones of agricultural renewal". Additional routine management control includes restricting tourist access to certain zones of the park and motor boats to a limited number of routes.

Management Problems The park is particularly threatened by pollution from industry and tourism complexes. The Grand Brière is insufficiently inundated by flood waters during the summer and the resulting increased salinity level is having a detrimental effect on the vegetation (as a result of influx of saltwater from Estuaire de la Loire). Further problems include depopulation of the area which has resulted in villages being abandoned, canals not being cleared and the decline of stock management (ICBP-ECWG, 1984).

Staff The Ministry of Education has provided a natural science teacher, who prepares instructions, particularly for school visits. An agricultural engineer is responsible mainly for cattle breeding problems. Other staff consists of architects, scientists, park guides and administrative personnel.

Budget The "Syndicat Mixte" is financed through membership fees and by state subsidies.

Local Administration Parc Naturel Régional de Brière, Syndicat Mixte, Maison du parc, 180, Ile de Fedrun, 44720 St. Joachim. Téléphone: (40) 88.42.72.

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Date August 1987

Brotonne Parc Natural Régional (includes the Réserve Naturelle des Mannevides)

Management Category V (Protected Landscape)

Biogeographical Province 2.09.05. (Atlantic)

Geographical Location The site lies near the English Channel coast of northern France in the Haute-Normandie region (partly in the departments of Seine-Maritime and Eure). It extends immediately north of the A.13 autoroute, centred on the estuary and valley of the River Seine, 15km west of Rouen and 30km east of Le Havre. The park consists of one main block and four smaller fragments. 49°32'N, 00°35'E.

Date and History of Establishment Created in May 1974 by ministerial decree No 67-158.

Area 40,000ha

Land Tenure State and private ownership

Altitude No information

France

Physical Features The park is crossed by one of the largest rivers of France, the Seine, which cuts the plateau in two along its meandering path: to the north are the Pays de Caux, rolling sandy hills with scattered trees; to the south are the Marais Vernier and the Roumois forests. The terrain essentially lies upon the alluvial deposits of the river Seine rising to the Cretaceous chalk rock deposits of the Caux and Perche Normand. The river Seine is said to derive from the celtic *Squan* meaning to curve or bend- the river being likened to a coiled snake. This old aged meandering river has numerous concave river banks with uniform appearance. The concave bends in the river are often deeply eroded with steep slopes or cliffs whilst the inner convex promontories are often shallow stony alluvial. The Marais Vernier, once a bend in the river, cuts a vast bay of 5,000ha out of the Roumois plateau between Quillebeuf and Roque point. In ancient times the area was a vast forest, but on subsequent submergence the trees died leaving peat deposits of fossilised tree trunks. The area has undergone centuries of land reclamation with major drainage projects in 1847 and 1950 subsequently leaving a complex series of grazing land and drainage ditches.

Climate No information

Vegetation The environment of the area consists of marshes, rough grazing land and on drier land the wooded copses and forests of the Seine valley and plateau. The Forêt de Brotonne, a large massif enclosed in a bed of the river Seine, consists of high canopy woodland of beech *Fagus sylvatica*, oaks *Quercus robur*, hornbeam *Carpinus betulus* and pine *Pinus sylvestris*. At Haye-de-Routoty are 2 ancient yew trees *Taxus baccata*, 16 and 14m in circumference and reputed to be thousands of years old.

Fauna No information

Cultural Heritage The area is still very traditional even though the old way of life is gradually dying out. There is without doubt only one Gribane-de-Seine traditional boat left in the area, to-day preserved in the Marine Ecomuseum. Architectural heritage includes the ruins of the Abbey of Jumièges founded in the 7th century AD and one of the greatest ruins in France. The renowned bonfire festival of St. Clare is on the night of 16-17 July.

Local Human Population There are a number of small towns located in the park area including Caudebec, Jumièges, La Mailleraye-sur-Seine and Le Trait. The total population of the park is 33,000 in 39 parishes (communes). The nearest large town is Rouen with a population of 388,711 (1975). The chief economy of the area is based on the fruit growing industry (cider apple, cherry) and beef cattle raising.

Visitors and Visitor Facilities The park caters well for outdoor activities, many of which are orientated to the exploration of the countryside. Such examples include the ecomuseum and the museum of traditional crafts of the Basse Seine, each of which has assembled information and video-films on the activities on the river Seine, its crafts and ecology. There are also hiking trails and horse-riding stables. There is a House of Crafts located in Bourneville which encourages the maintenance of the traditional craft industries of Normandy. At Jumièges-le Mesnil disused sand pits have been converted into an open-air recreational centre, which specialises in courses on sailing and canoeing. Accommodation includes rural gîtes, camp sites, farm accommodation, hotels and caravans.

Scientific Research and Facilities Ecological studies on the botany, zoology, mammalogy, herpetology, entomology and ornithology of the park have been undertaken at the Réserve des Manneville by the Centre de Decouverte de la Nature (CEDENA) of Le Trait.

Conservation Management The park was created to act as a "green barrier" to prevent the uncontrolled development of the region. It proposes to maintain rural landscape and agriculture even under the threat from increasing industrial and urban expansion. An Assistant Technique des Métiers is charged to promote and ensure the success of local craft enterprises in the park. A réserve naturelle has been established in the Marais Vernier marshes at the Réserve Naturelle des Manneville. Management in the reserve has included the introduction

of highland cattle to maintain the vegetation height and grazing regimes. The water table in the Marais Vernier is controlled by sluice gates balancing the water level on the myriad of canals, dikes and ditches.

Management Problems The area was once an important marsh wetland site on the river Seine. In 1847 up to 351 landowners formed a syndicate to undertake a drainage project - the "dike" (Digue des Hollandais) was constructed and the land reclaimed. From 1950 to the 1970's 35km of canal have been dug and 2,000ha of land reclaimed, leaving only remnant marshland in the Grande Mare/Ste. Opportune-la-Mare area. The remaining marshes are under threat from run-off pollution from the surrounding agricultural land. The forest of Brotonne has in recent years been put under greater tourist pressure since the opening of the Brotonne bridge (opened in 1977) which spans the Seine above Caudebec-en-Caux.

Staff No information.

Budget No information.

Local Administration Maison du Parc, 2, Rond-Point Mardec, 76580 Le Trait. Téléphone: (35) 91.83.16.

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Date August 1987

La Camargue Parc Naturel Régional (includes the Réserve Nationale de Vaccarès, Réserve des Impériaux and the Tour du Valet Private Réserve)

Management Category V (Protected Landscape); also includes Cat I and IX

Biogeographical Province 2.17.06 (Mediterranean sclerophyll)

Geographical Location The park is located on the southern French Mediterranean coast, in the delta of the river Rhône, which divides just north of Arles into the Grand Rhône and Petit Rhône (Département of Bouches-du-Rhône). The PNR consists of a triangular area with the two arms of the Rhône and the Mediterranean sea as its boundaries. It is composed of a number of elements, the Etang du Vaccarès - Camargue réserve nationale, the Impérial réserve - Etang des Impériaux, the Tour du Valet private réserve and a significant area of the communes of Arles and Saintes Maries de la Mer. Along the coastline of the Impériaux and Etang de Vaccarès reserves there is a hunting reserve which extends 2 km into territorial waters. The coastal perimeter of the Parc Naturel Régional includes territorial waters up to about 22km offshore. This area is not however included in the Ramsar site. 43°16'-43°44'N, 4°14'-4°50'E.

Date and History of Establishment The Parc Naturel Régional (85,000ha) which was created in 1972 to preserve the equilibrium between human activities and the natural environment, includes the above three reserves. The Réserve Nationale de Camargue on the Etang de Vaccarès (13,117ha) was formed in 1928; it is state owned and financed but managed by a private organisation, the Société Nationale de Protection de la Nature. The Réserve des Impériaux (2,777ha) is a départemental réserve, bought from the state in 1964 by the commune of Les Saintes-Maries-de-la-Mer. Tour du Valat (1070ha) has been a private reserve since the early 1950s, managed since 1978 by the "Fondation Sansouire", a public service foundation

France

under French law. Much of the area outside the reserves is privately owned. The whole area was listed as a Ramsar site on ratification in October 1986, and accepted as a Biosphere Reserve in January 1977. There is integral protection for all native flora and fauna within the Etang de Vaccarès reserve and in two small areas adjoining it to the east.

Area 85,000ha (including the Etang des Impériaux 2,777ha, Tour du Valat Réserve 1,070ha and Etang de Vaccarès 13,117ha). (28,000ha of cultivated land; 15,000ha of saltmarsh, 27,000ha of hunting and livestock réserves and 13,000ha of réserve naturelle).

Land Tenure The majority of the park is under multiple private ownership, the Etang de Vaccarès is state owned; Etang des Impériaux and a significant proportion of the park grazing land is owned by the commune of Saintes-Maries-de-la-Mer and the Tour du Valat is under private ownership.

Altitude 0-9m (water depth averages at 0.4-0.6m deep; maximum 1.8m).

Physical Features The site includes an extensive area of low-lying delta (0-4.5m) between the two main branches of the river Rhône. Much of the delta is composed of very fine alluvial deposits, although there is a remnant of former coastal dunes now 5km from the present coastline, the Bois de Rièges, just to the south of the large Etang lakes. 100km of sand dunes currently lies parallel to the sea, broken only in a few places. The central part of the delta consists of a network of lagoons, the largest being the Etang de Vaccarès, which is only slightly brackish (3-6g.NaCl per litre). The majority of the marshes are fed by canals, their water tending to be fresh. The lagoon water along the coastline is saltwater, becoming more saline than the Mediterranean itself in summer, due to high evaporation rates. In the south-east, about 10,000ha of marshes have been turned to commercial saltpan production. Water levels in the lagoons vary considerably throughout the year and in winter about 95% of the Etang de Vaccarès is flooded but in summer this falls to 60% due to high evaporation rates and low summer rainfall. The lagoon waters are on average 0.5m deep maximum 1.8m.

Climate The area has a Mediterranean climate. The mean monthly temperature varies from 23°C in July to 6°C in January, and average annual rainfall is only 500mm. Most months are very windy, and for six months of the year are dominated by the Mistral, a dry wind from the north-east which increases evaporation rates considerably.

Vegetation The Camargue exhibits a rich diversity of undamaged wetland ecosystems. The dominant sand dune vegetation is marram grass *Ammophila arenaria*, *Pancreaticum maritimum* and sea medick *Medicago marina*. Behind the dunes is low-lying salt steppe or "sansouire" sparsely covered with glasswort *Arthrocnemum glaucum* interspersed with brackish lakes and submerged tassel pondweed *Ruppia maritima*. Further inland the steppes have a denser cover of the glasswort *Salicornia fruticosa*, in areas which are often flooded in winter. In the slightly saline waters of the northern part of the Etang de Vaccarès grow plants such as pondweeds *Potamogeton* spp., reeds *Phragmites communis*, bulrushes *Scirpus* spp. and water buttercups.

The drier upper sansouire has a dry grass community dominated by sea lavender *Limonium* spp., a false-brome grass *Brachypodium phoenicoides* and scattered mock privet *Phillyrea angustifolia*. This vegetation is important as grazing land for semi-wild cattle and horses (sheep in winter on higher ground). Much of the land near the Rhône has been converted to rice-growing, in a terrain covered with a dense network of canals. However, the habitat is of greatest importance for waterfowl as there are a number of freshwater lakes and marshes with submerged vegetation of water milfoil *Myriophyllum spicatum*, fennel pondweed *Potamogeton pectinatus* and tassel pondweed *Ruppia spiralis* in more brackish waters. Many of these are fringed with rushes *Scirpus* spp. and reeds *Phragmites* spp. which are important for a number of nesting birds. On the ancient dunes of the Bois de Rièges are undisturbed woodland habitats of juniper *Juniperus phoenicia* and *Pistacia lentiscus* (Britton and Podlejski, 1981). Along the banks of the Rhône there are relict strips of deciduous forest consisting of species such as willows *Salix alba*, white poplar *Populus alba*, elm *Ulmus* sp., alder *Alnus glutinosa*,

white oak *Quercus pubescens* (on sections of bank less liable to flooding) and ash *Fraxinus oxycarpa*. Along some of the drainage canals are remnant patches of woodland, particularly those which follow former courses of the Rhône (Carp, 1980).

Fauna The Camargue is important for thousands of wintering, breeding and migrating birds, en route between Europe and North Africa. It is the only regular breeding place in Europe for greater flamingo *Phoenicopterus ruber* (up to 6,000 pairs), and the only breeding place in France for several other species: gull-billed tern *Gelochelidon nilotica* (250-300 pairs), pratincole *Glareola pratincola* (150-200 pairs), cattle egret *Bulbulcus ibis* (100 pairs) and squacco heron *Ardeola ralloides*. Other nesting birds include several hundred pairs of avocet *Recurvirostra avosetta*, and black-winged stilt *Himantopus himantopus*. About 200,000 ducks overwinter including over 50,000 mallard *Anas platyrhynchos* (of which some also breed), gadwall *A. strepera* (1973 maximum: 13,500), wigeon *A. penelope* (1976 maximum: 26,500), pintail *A. acuta* (up to 10,000) and shoveler *A. clypeata* (10,000). Large numbers of waterfowl pass through on autumn and spring migration, including thousands of garganey *A. querquedula* and many ringed plover *Charadrius hiaticula* and little ringed plover *C. dubius*. Eight species of gull occur, including thousands of pairs of breeding black-headed gull *Larus ridibundus* and hundreds of pairs of breeding herring gull *L. argentatus*. Ten species of tern include six which breed, particularly on islands in the lagoons. Common crane *Grus grus* visit occasionally in winter (Carp, 1980). Other interesting birds include European bee-eater *Merops apiaster*, common roller *Coracias garrulus* and penduline tit *Remiz pendulinus*. Mammals include beaver *Castor fiber*, wild boar *Sus scrofa*, fox *Vulpes vulpes* and coypu *Myocaster coypus*. Both freshwater fish, such as pike perch *Lucioperca lucioperca* and pike *Esox lucius*, and sea fish like sole *Solea vulgaris* and sea bass *Morone labrax* are present, as well as brackish water species. Many eel *Anguilla anguilla* are present. The Camargue's ecology is described in detail by Hoffmann (1958). This wetland area is also rich in reptiles and amphibians and includes the ocellated lizard *Lacerta lepida*, wall lizard *L. muralis*, montpellier snake *Malpolon monspessulanus*, western spadefoot frog *Pelobates* sp.

Cultural Heritage The Camargue is traditionally a grazing area for semi-wild horse, cattle and sheep. The horses and cattle are recognised rare local breeds restricted to the Camargue. The area within the reserve has remained uninhabited as it is too costly to drain for the intensive agriculture which has encroached in the rest of the area. The livestock is still herded and managed by 500-600 "gardians", cowboy-like horsemen (now formed into an association - Confrérie des Gardians). Every spring there is a world renowned gypsy festival at the small chapel at Saintes Maries.

Local Human Population The park contains two parishes "communes" - (Bouches-du-Rhône) that of Arles and the Saintes Maries-de-la-Mer with a total population of 8,500. The only inhabitants within the Etang de Vaccarès réserves are found in the two wardens' lodges whilst the main population is centred around the towns of Saintes-Maries-de-la-Mer and Salin-de-Giraud. The economy of the region is based upon rice culture, beef, sheep, tourism, cereal crops, hunting and fishing (80,000 sheep remain in the Camargue over winter - returning to the Alps in spring).

Visitors and Visitor Facilities Park facilities are extensive and centred at Saintes-Maries, the Centre d'information de Gines and the Musée Camarguais (Le Mas du Pont de Rousty) where there are exhibitions, audio-visual displays, craft objects, films about the Camargue and literature including pamphlets. There are hiking trails to "discover the Camargue countryside", horse routes and schools and cycle trails. To cater for the visitor there are numerous hotels, gites, campsites and farm accommodation.

Scientific Research and Facilities Research has been carried out since 1954 by the Station Biologique de la Tour du Valat, a privately run institution specialising in wetland conservation. The Centre Nationale de la Recherche Scientifique (CNRS) has run the Centre d'Ecologie de la Camargue since 1970. Most of the recent research includes work on hydrology, waterfowl feeding ecology and botanical ecosystems. The applied studies include investigating the effects of human modification on the natural environment. About ten other organisations are involved in research and efforts are being made to co-ordinate work by the Délégation Générale à la

France

Recherche Scientifique Technique (DGRST). Currently a permanent means of baseline data collection is being set up. A project to monitor pollution was funded by WWF Project 1034 from 1971 to 1976. Other surveys have been undertaken by the IWRB. Research programmes have also been undertaken by the Faculty of Science of Marseille, the Faculty of Science and Medicine of Montpellier, the Institut Pasteur and ORSTOM (Carp, 1980).

Conservation Management The Parc Naturel has been established to ensure the combined protection of wildlife and a rural landscape along with traditional land uses. The park is a major tourist attraction centred around the little town of Saintes-Maries-de-la-Mer where there are numerous visitor facilities. The tourist coastal sites and the traditional land use sansouire and agricultural land act as buffer zones for the more delicate Etangs de Vaccarès and Impériaux where access is restricted to permit holders. Shooting, grazing and salt extraction are not permitted. A few professional fishermen from Les-Saintes-Maries are allowed to fish in the Impériaux réserve. The 25,000ha surrounding these reserves is intended to be maintained as a buffer between the inner waterfowl breeding zones and the peripheral agricultural lands (by agreements with landowners). There is also emphasis on protecting the coastline. In the park as a whole policies include limiting the spread of commercial salt pans and rice-growing, subsidising traditional land uses such as horse and cattle open grazing, diverting drainage from agricultural lands into the Rhône rather than into the centrally-situated Etang de Vaccarès, controlling shooting (only allowed from 15 August till the end of February) and organising tourism so as to cause minimum damage to the environment. Special management has been necessary since a dry winter in North Africa during 1977 caused many more flamingoes to winter here; farmers at first shot them, but now bird scaring devices are set off throughout the evening to discourage night feeding in the ricefields. The carrying capacity for breeding flamingoes has also been increased by creating artificial nesting islands from clay and mud; previously many nest-islands had suffered from erosion since the birds remove the vegetation before nesting.

For any modification to the landscape in the whole area covered by the park, as well as in an area to the north-west enclosed by the Canal du Rhône à Sète, four months' notification must be given to the park administration

Management Problems The Camargue has been much affected by the activities of man, most notably livestock grazing, salt extraction and canalization of the marshland fringes. The geomorphological evolution of the delta as a whole was arrested in 1860, when it was dyked and since then, man has harnessed the water, pumping it or discharging it into the Rhône and therefore influencing the water levels and salinity in the centre of the delta. Changes to the natural and semi-natural environment are continuing despite the policy to limit agricultural intensification and preserve traditional land uses. Traditional farming has become unprofitable, and alternative land uses do not often benefit wildlife; altering water levels has destroyed shoreline habitat and fish farming has made some pools too deep for many birds to feed in; shooting continues to be a problem and the closed season is not respected. Changes in rice-growing have had a special impact, with the introduction of large volumes of fresh water onto rice fields (1950-1960) and then the gradual abandonment (1960-1976) of this type of cultivation. Air pollution from nearby industry is increasing, and there is an inflow of excess water from agricultural land, which has washed out part of the salt content from some of the étangs and introduced increasing amounts of toxic chemicals. Unexplained changes in bird numbers may be due to increases in pollution; although the waters of the Rhône do not directly enter the Camargue except through irrigation channels and the wild part of the Camargue is mainly rain-fed, some areas have high sulphate levels. Tourists and campers are causing increasing disturbance and sometimes invade the coastal part of the reserve.

Staff The park includes a Director, accounting clerk, technician and three guards in the Etang de Vaccarès Réserve.

Budget 200,000 French francs (US\$40,000) in 1973

Local Administration Parc Naturel Régional de Camargue, Le Mas du Pont de Rousty, 13200 Arles. Telephone: (90) 97.10.93.

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Date July 1987

**Corse Parc Naturel Régional
(including the reserves of Scandola, Iles and Lavezzi)**

Management Category V (Protected Landscape) X (World Heritage site consisting of Scandola, Cape Girolata and Cape Porto)

Biogeographical Province 2.17.06 (Mediterranean sclerophyll)

Geographical Location The park is located along the central ridge of the Mediterranean island of Corsica. It extends from the coastal reserve of Scandola (42°21'N, 6°13'E) inland to include Corte, Vizzavona and southward to Zonza and Levie between Portvecchio and Sartene. 41°40'N, 68°30'E.

Date and History of Establishment The site was created as a parc naturel régional in 1972 under the Decree No. 67-158 of 1 March 1967 to maintain and preserve the traditional landscape and lifestyles of the region. The legislation was updated by Decree No. 75-983 of 24 October 1975 on the basis of ministerial decrees. The prime objectives of the park include a) the protection of the natural surroundings and b) the rejuvenation of the rural economy. The Reserve Naturel of Scandola was established by ministerial decree No. 75-1128 of 9 December 1979 and 12 May 1979. The World Heritage Site of Scandola, Cap Girolata and Cap Porto was inscribed in 1983.

Area 200,000ha (including the reserves of Scandola (1,919ha), Iles Cerbicale (36ha) and Lavezzi (79ha)).

Land Tenure Mixed ownership. The Scandola area belongs to the Commune of Osani.

Altitude Sea level to 2,622m

Physical Features The park consists of the central granite red porphyry and basalt mountains and the rugged Mediterranean coastline of bays, deltas, marshes and peninsulars around Scandola. There are more than twenty mountain peaks of over 2,000m, the highest of which is 2,622m. Geologically both Corsica and Sardinia were part of southern France but gradually drifted southwards during the Tertiary period. A number of important caves exist in the coastal region along with lakes and fast-flowing montane rivers and streams.

Climate Typical mediterranean climate with the possibility of snow falling at high altitudes from January until May. There are average annual rainfall values of 750mm with mean cold season temperatures of 7.8°C and of 21.9°C in summer. The area is well known for its diversity of strong wind currents of up to 180 km/hr, the dominant winds coming from the south-west, west-north-west and north-east.

Vegetation The flora of the region is distinctly mediterranean in character, but with the island's long period of isolation has many endemic plant species (58 species representing 8% of the flora). The vegetation has been much modified by agriculture and past human interference but natural vegetation trends such as altitudinal zonation are still apparent within the park. At the lowest altitudes there is mixed agricultural land and maquis with scattered trees up to 800m. Typical native species at these altitudes are *Quercus ilex*, *Quercus suber* and *Pinus halepensis*. From 800-1,000m the vegetation is dominated by the supra mediterranean mixed deciduous and evergreen woodland of *Pinus nigra*, *Larico* spp., *Quercus pubescens* and *Castanea sativa*. At high altitudes (1,000-1,700m) the natural vegetation is represented by *Pinus nigra*, *Larico* spp. along with *Fagus sylvatica* and in the subalpine zone, 1,600-2,100m, of *Quercus ilex* and *Abies alba* (Dupias, 1976, 1978). The coastal area around Scandola is represented by cliff-top open grass swards and degraded maquis dominated by *Arbutus unedo*, *Cistus albidus*, *C. salvifolius* and *Erica arborea*. The endemic *Armeria soleirolii* grows on the coastal cliffs along with *Euphorbia dendroidea* and *Juniperus phoenicea*. Native stands of stone pine *Pinus pinea* or montane pine *P. pinaster* are also found on the coastal plains. The littoral zone is dominated by *Crithmum maritimum* and *Statice articulata*, whilst in the marine zone there are large meadows of Neptune grass *Posidonia oceanica* as well as of *Lithophyllum tortuosum* in the rocky areas, and many rare algae (SPARAC, 1987). In total there are about 58 endemic species of higher plant in the park (Davis *et al.*, 1986).

Fauna The park is particularly rich in mediterranean fauna. Mammals are well represented and include such species as the threatened mouflon *Ovis ammon musimon*, stoat *Mustela erminea*, rare European free-tailed bat *Tadarida teniotis* in the Scandola reserve, red fox *Vulpes vulpes* and rat *Rattus rattus*. The endangered monk seal *Monachus monachus* was last observed off the coast in 1980. The avifauna includes cliff breeding colonies of *Larus argentatus* (700-800), Cory's shearwater *Procellaria diomedea*, *Puffinus puffinus* and *Colonectris diomedea*, as well as the raptors *Aquila chrysaetos*, *Falco peregrinus*, and rare species such as osprey *Pandion haliaetus* (the only nesting colony in France with 3-4 left) and lammergier *Gypaetus barbatus*. In the subalpine and wooded mountain zones are rare species such as the alpine accentor *Prunella collaris* and Corsican nuthatch *Sitta whiteheadi*. There are numerous snakes, including the Aesculapian snake *Elaphe longissima*, lizards, geckos and tree frogs. The marine fauna includes precious corals *Corallium rubrum* and the rare *Patella ferruginea*.

Cultural Heritage The island of Corsica has had a long history of human activity. There are numerous ruins from prehistoric times through the 7th century BC to Roman times. A number of important frescoes exist at Favalellu and Sermanu and Norman churches at San Lurenzu.

Local Human Population The park includes 82 parishes (communes) of the Haute-Corse and Corse du Sud regions with a total of 24,000 inhabitants. Many of the people of the region keep their traditional Corsican lifestyles and language which is very distinct from that of mainland France. One of the major traditional economies in the interior of the park involves livestock grazing and transhumance. In spring the sheep and goat flocks are led up to the mountain pastures. The herders remain with their flocks, living in traditional huts until the autumn when they return to the lowlands. At Venacais the traditional "Cueillette" system of free grazing maintains 2,000-2,500 goats which are managed by 15 or so herders.

Visitors and Visitor Facilities Corsica is increasingly becoming a major tourist resort in the western Mediterranean and an estimated 30,000 people visit Scandola each year (SPARAC, 1987). Facilities range from numerous hotels, chalets, holiday villages such as the Centre de Vacances in the forest of Aitone. There are also gîtes, formal campsites (camping is illegal within the park itself) and mountain refuge huts. Winter skiing is available and there are at least two ski schools and five "stade de neige". Canoeing and kayak activities are available on the fast flowing rivers and the lakes. By the coast there are also diving facilities, underwater fishing and established hiking circuits to explore the countryside. The *Magazin de Porto* is the main centre for information and exhibitions in the park but there are also centres such as the Maison de l'Artisanat, Musée (Pianu) d'Archéologie at Lévie and the Casi di Nature which hold exhibitions and courses for schools.

Scientific Research and Facilities Research facilities include an ecological laboratory in Mano, the centre of research on maquis vegetation. There are also small laboratories, a guest house and a diving centre for the Scandola reserve at Galeria village. A number of bird observatories exist in the park such as the restored 13th century Elbo tower. Research activities include seabed cartography, inventories of the park fauna and flora, breeding trials and behaviour studies on the Corsican mouflon and research on migratory birds. A re-introduction programme for the corsican red deer *Cervus elaphus corsicanus* has been underway since 1985 (Oryx, 1986).

Conservation Management The park is administered by the authorities of the Parc Naturel Régional de Corse at the offices based at Ajaccio. There are 3 principle management objectives, a) resurrecting the rural economy to ensure continued montane livestock transhumance, b) protecting the natural environment and archaeological sites and minimising the threats from tourism and c) fighting against forest fires. For management purposes the park has been divided into four sections. The wildlife reserves are strictly managed for nature conservation. Fishing, underwater hunting, removal of marine animals and vegetation, dumping of waste, incendiary, egg removal and camping are all strictly prohibited. At Scandola there is a patrol boat permanently on station to guard the area. Special reserves exist at Mont Cinto/Asco and Bavella/Mont Solenzara to protect some of the last 200-500 Corsican mouflon. Permanent surveillance and nest guarding of some of the last French osprey is undertaken from May to August.

Management Problems There are a diversity of management problems in the park, the most serious being fire which annually destroys thousands of hectares of woodland and maquis scrub. There is also cause for concern over the over-expansion of the tourist trade into the park. Public pressure may be too high for this delicate Mediterranean ecosystem. Pleasure boats and their anchors have been noted to damage the neptune grass beds and coastal industries have resulted in pollution affecting the Scandola coastline.

Staff No information

Budget In the mid 1980s the annual budget for the Scandola reserve amounted to FF 480,000 (SPARAC, 1987).

Local Administration Siège du Parc Naturel Régional, BP 417, 4 rue Fiorella, 20184 AJACCIO CEDEX, Corsica. Tel: (95) 21 56 54.

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Date July 1987

Forêt d'Orient Park Naturel Régional (including the Lac de la Forêt d'Orient Ornithological Réserve)

Management Category V (Protected Landscape)

Biogeographical Province 2.09.05. (Atlantic)

Geographical Location The park is located just to the east of Troyes, 254km south-east of Paris. It is based around the Lac de la Forêt d'Orient. The park is bounded on the north by Creney, Piney, Lesmont and Brienne-le-Château, thence on the south by Bar-sur-Aube, Vendevre-sur-Barse and Lesigny-sur-Barse. The park is found within the Aube department of Champagne. 48°16'-48°20'N, 4°16'-4°25'E.

Date and History of Establishment The parc naturel régional was created in October 1970 under the Decree 67-158 of 1 March 1967, to maintain and preserve the traditional landscape. The legislation was updated by Decree No. 75-983 of 24 October 1975 on the basis of a ministerial decree. Access is forbidden only in the ornithological reserve.

Area 70,000ha (the Lac de la Forêt d'Orient, reservoir Seine, is 2,300ha and the ornithological reserve is 300ha).

Land Tenure Private and local authority ownership

Altitude No information

Physical Features The area is situated in the flat-land clay regions of eastern France (cretaceous period). Soils in the area tend to be of sandy and clay-like texture. The rivers include the Barse, Aube, Seine, l'Auzon and Amance. At the centre of the park is the reservoir, lake Seine, completed in 1965 which is surrounded by the hills of the Forêt de Larivour, de Piney, le petit Orient and Grand Orient. The lake is fed by the canals from the Seine (Canal d'arrivée and Canal de restitution near Lusigny-sur-Barse).

Climate Mean temperatures for the coldest month are 1.5°C and for the hottest month, 19.6°C. Rainfall averages 745mm per year.

Vegetation The park includes at its centre up to 15,000ha of a forested massif, the Forêt d'Orient or Forêt du Der. The woodland is dominated by oaks *Quercus robur* and *Q. petraea*. In wetter areas along rivers and by lakes or marshes are associations of Alder *Alnus glutinosa*, willow *Salix* and poplar *Populus* sp. Other habitats include lakeland with surrounding wet meadows, grassland and arable land along with small fields bounded by hedgerows.

Fauna The area is renowned for its avifauna and represents one of the principal bird migratory routes across inland France. Annual counts of 6,000 birds from 22 species include such breeding species as *Milvus migrans*, *M. milvus*, *Circus aeruginosus*, *Pernis apivorus*, and *Dryocopus martins*. Passage species include up to 350 *Phalacrocorax carbo*, between

500-5,000 *Fulica atra*, *Grus grus* and 150 *Pernis apivorus*. In winter the lakes have large numbers of duck and other water birds including up to 800-1,200 *Anser fabalis*, 500 *Podiceps cristatus*, *Tadorna tadorna*, *T. ferruginea*, *Aythya nyroca*, *A. marila*, *Mergus merganser* and the occasional *Somateria mollissima*. The area is also the only known wintering quarter for the *Haliaeetus albicilla* in France. The mammal fauna includes the red deer *Cervus elaphus* and roe deer *Capreolus capreolus*.

Cultural Heritage The area is named after the "chevaliers d'Orient", the Knight templers and hospitaliers of the 12th century. In antiquity the Romans had important tile and pottery kilns here and nowadays the area is still renowned for its stone and wood carvings. The Emperor Napoleon studied the area, at Brienne-le-Château, in his youth.

Local Human Population There are approximately 90,000 people in 47 parishes (communes) in the park area. Traditionally the area employed many people in the tile industry and for obtaining the wood fuels, including many hundreds of woodcutters and coppice workers. To-day there are still large clay potteries and tilleries as well as intensive agriculture resulting in large prairie-like cereal fields.

Visitors and Visitor Facilities The main centre for park visitors is the Maison du Parc at Piney. It includes offices, exhibitions and interpretation material, including a park journal, brochures and information on local history. There are also a number of other museums and visitor amenities within the park such as the Napoleon museum, a 80ha captive wild animal park, horse riding centres, camping and cycling activities. Water sports are centred around the main lake-reservoir and include sailing, motor boats, hang gliding, sub-aqua, fishing and canoe-kayaking. Family accommodation, youth hostels, gîtes and camp sites exist in the park.

Scientific Research and Facilities There are currently surveys on the flora and fauna of the park which are being undertaken by the park authorities. The Centre Ornithologique Champagne has undertaken bird observations in recent years. Research facilities include bird observatories and associated record centres. In 1959 work was undertaken on the re-introduction of the red and roe deer into the park.

Conservation Management The directeur d'aménagement et d'urbanisme has been appointed to analyse the ecological potential of the area along with floristic and fauna inventories. There are four main park objectives, those of promoting the "quality of life", the natural environment, the development of tourist knowledge and providing adequate building space for inhabitants in the park. Hunting is prohibited on the Lac de la Forêt d'Orient but is permitted elsewhere in the park.

Management Problems The region has had a long history of flooding as exemplified by the Seine inundations of 1910. In 1920 proposals by the engineer Chabal intended for the immediate establishment of a series of reservoirs. The damming of the Seine at the Lac de la Forêt d'Orient was not complete until 1966. It has damaged the water balance and natural environment of the region but is beneficial for providing hydroelectricity and water for the city of Paris as well as becoming an important bird wetland site. Other dams are under construction including the damming of parts of the Seine and Aube by 1987/1988. The birds of the lake are threatened by tourism development of the area which will result in a significant increase in disturbance by boating and powered hang gliders as well as the creation of an artificial beach with access road (Carp, 1980).

Staff No information

Budget No information

Local Administration La Maison du Parc Naturel Régional de la Forêt d'Orient, 10220 Piney. Telephone (25) 41.35.57.

France

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Date August 1987

Haut-Jura Parc Naturel Régional

Management Category V (Protected Landscape)

Biogeographical Province 2.09.05. (Atlantic)

Geographical Location The park is located in the south-east of France close to the Swiss frontier between Lyon and Geneva. The main towns are Septmoncel on the river Bienne near St Claude and Valserine immediately to the west. The park encircles the area from St Claude in the south to just below Besancon in the north, following the Swiss frontier north of Geneva towards Neuchatel. 46°22'N, 5°44'E.

Date and History of Establishment The site was created as a parc naturel régional in April 1986.

Area 62,088ha

Land Tenure State and private ownership

Altitude Up to 1,463m

Physical Features The park is situated in the Monts du Jura centred around the Vallée de la Bienne, Haute Vallée de l'Ain, Forêt de la Joux and the Vallée de la Loue/Vallée du Doubs. The area is largely undulating limestone plateaux hills (400-900m) which become increasingly folded and steeper towards the swiss frontier, culminating in Mt d'Or (1,463m) and just over the border Mt de la Dole (1,677m). Waterfalls, gorges and rivers are common in this limestone terrain and there is much evidence of former glacial activity, including lakes and jagged peaks.

Climate Mean temperatures for the coldest month are 1.5°C and for the hottest month, 20.1°C. Annual rainfall averages 895mm.

Vegetation The park is typified by vast tracts of forest covering 40% of the land surface in the region. There is a distinct altitudinal zonation of the vegetation ranging from deciduous species between 500-800m rising to silver fir forests of *Abies* on the plateau above 800m. *Picea* is found on the north facing mountains from 1,000m. Low altitude deciduous woodlands consist of the oak *Quercus robur* and *Q. pubescens*, as well as beech *Fagus sylvatica*. The woods are often mixed with cultivated lands of vineyards, fields and small copses of poplar *Populus tremula*, alder *Alnus glutinosa*, ash *Fraxinus* sp. and maple *Acer* sp. The Forêt de la Joux is one of the best fir forests in France. This forest massif is 2,659ha and separated from the forests of la Fresse and Levier by the Angillon river torrent. The forest area is largely a conifer forest with trees up to 45m high and 1.2m diameter. One tree, Sapin Président de la Joux, is 200 years old and 3.85m in circumference. The adjacent fir forest of la Fresse is 1,153ha. The mountain pastures are rich in flowers such as *Lilium martagon*, *Gentiana* and *Cyclamen*. Between 800-1,400m the alpine vegetation is largely grazed by livestock from May to October.

Fauna Forest species include wild boar *Sus scrofa*, red squirrel *Sciurus vulgaris*, roe deer *Capreolus capreolus* and red deer *Cervus elaphus*. Lake fish include bream and carp, and in the rivers salmon and trout. In the 300 or so lakes and ponds are many breeding birds including bittern *Botaurus stellaris*, little bittern *Ixobrychus minutus*, night heron *Nycticorax nycticorax*, squacco heron *Ardeola ralloides*, little egret *Egretta garzetta* and grey heron *Ardea cinerea*, together with several species of duck notably red crested pochard *Netta rufina*.

Cultural Heritage The area is rich in local legends which tell of the long history and cultural heritage of the region. Old roman roads even traverse the more remote Forêt de la Joux areas. Indeed the name *Jura* itself derives from a latin word for "forest". The area remained densely wooded until after the 6th century then slowly became settled as shown by the still surviving Norman and Gothic churches. In the 17-18th centuries the woods were heavily exploited by the iron industry hammer foundries.

Local Human Population The park is occupied by 37 parishes (communes) with a total population of 37,190 inhabitants. The traditional economy is largely based on forestry, livestock rearing and dairy products as well as the old industries of clock manufacture, metallurgy and salt mining.

Visitors and Visitor Facilities The area has been well known over many decades for its spectacular scenery. There are numerous hotels, hostels, camp sites and gîtes to cater for the tourists. Facilities are diverse and include information offices, ski resorts, fishing, hiking trails, swimming pools, boating facilities and canoeing. Numerous museums are established in the area such as the fine arts museum and botanical garden at Besancon.

Scientific Research and Facilities No information

Conservation Management The forests of La Joux are some of the most important and best preserved in France. The woods are managed by the Office National des Forêts which exploits the woods to a limited degree (10,000-12,000 cubic metres per year). Natural regeneration is an important policy of the area along with construction of tourist trails, picnic sites and parking areas.

Management Problems Acid rain pollution has affected the Jura forests

Staff No information

Budget No information

Local Administration Maison du Haut-Jura, Lajoux 39310, Septmoncel. Téléphone: (84) 42.60.37.

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Date July 1987

Haut Languedoc Parc Naturel Régional

Management Category V (Protected Landscape)

Biogeographical Province 2.09.05 (Atlantic)/ 2.17.06. (Mediterranean sclerophyll)

France

Geographical Location The park is located in the Upper Languedoc, 60km from Toulouse, by Castres and Carcassone (South France). It extends 30km north-south and 80km east-west from Castein eastwards via Montredon-Lebassonné Vabre, Brassac, the Coldela Bassine, Murat-sur-Vèbre, Hérépian, Roquebrun, St. Pons, Mazamet and Revel. 43°30'N, 2°15'E

Date and History of Establishment The parc naturel régional was created in 1973 under the Decree 67-158 of 1 March 1967 to maintain and preserve the traditional landscape. The legislation was updated by Decree No. 75-983 of 24 October 1975 on the basis of a ministerial decree.

Area 145,000ha

Land Tenure No information

Altitude up to 1.210m

Physical Features The park is essentially a vast mountain massif consisting of the Lacaune de l'Espinouse, Sidobre, Menervois and Noire mountains. The topography is very extreme with rocky crags, precipices and sheer vertical rock faced riverine gorges. One of the best examples being the Gorge d'Héric at the heart of the massif of Caroux. The area is composed of limestone, karst and granite. Access is along a series of passes from 575m to 885m, the highest route being the Col de la Bassine near Lacaune. Water is very abundant all year round, as characterised by fast flowing mountain streams.

Climate The climate of the area is greatly influenced by the Mediterranean and the Atlantic ocean. Snow falls at higher altitudes from December/January to April.

Vegetation The dominant vegetation types of the park are steppe, heathland, chasmophytic flora and woodland. The area is 37% wooded and characterised by oak *Quercus ilex*, *Q. pubescens* along with sweet chestnut *Castanea sativa* and beech *Fagus sylvatica* at higher altitudes. In the more humid riverine gorges are poplar *Populus nigra*, *P. alba*, willow *Salix* sp., ash *Fraxinus* sp., alder *Alnus glutinosa* and birch *Betulus* sp.

Fauna Typical larger mammals include red fox *Vulpes vulpes*, weasel *Mustela nivalis* and moufflon *Ovis musimon*. In the craggy peaks there are a number of rare breeding raptors and insects.

Cultural Heritage The region has been inhabited from earliest times, as demonstrated by the Megalithic dolmen stones of the Tarn. One of the many important traditions of to-day are musical groups such as the "Musiciens de la Talvern", which perpetuate the traditional songs of the region. Industry has long played an important part for the Languedoc peoples. At Durfort is one of the last iron hammers in Europe, a type of machine that has been used in a traditional metal beating industry since 1415.

Local Human Population The area is heavily populated with over 70,000 inhabitants in the Hérault and Tarn departments (Desjeux et Desjeux, 1984). Industries tend to be on a small and diverse scale, varying from clothmaking, granite extraction, woodworking, iron and copperwork, winemaking and private forestry. Livestock rearing of goats and sheep is carried out on a small localised scale. Crops include oats, barley and wheat. The parc naturel régional is renowned for its numerous associations to promote the activities of the various small businesses. There are currently over 42 associations, ranging from specialists of wood and stone to wool and leather, e.g. Association des Artisans du Pays de Dourgne, Société Co-opérative Ouvrière de Production and the Association de Promotion des Entreprises du Parc.

Visitors and Visitor Facilities The park caters well for visitors, with the central information and co-ordination body being at the Maison du Parc at Saint Pons. There are a diversity of interpretation offices and museums including those of Roman art, history, protestant life and times, traditional culture and traditional farm life. Many of these centres include audio-visual displays and supply information on interesting places to visit. Important museums include an exhibition on the culte des morts and funeral rites, as well as the working example of an iron

hammer at Durfort. Festivals are widespread and include the fête porçale and the fête de la mazellerie. Minibus excursions are available in the park to visit many of the sites. Other activities include caving and canoeing as well as tourist trails for those on horse, foot or cycle. There are also facilities for swimming and skiing. Many of the holiday resorts specialise in aquatic activities on the reservoir-lakes of the haut Agout.

Scientific Research and Facilities A number of research facilities are available within the park including the Laboratoire Biologique de Douch (organises courses on plant ecology), the Centre Permanent d'Initiation à l'Environnement of Salvétat sur Agout (activities include courses on discovery ecology, local economy and traditions) and the Centre de Documentation (undertakes studies and research on local historical books and documentation).

Conservation Management The park has largely been established to ensure the survival of the rural economy, traditional crafts and lifestyles. Co-ordination is undertaken largely through the work of the Parc Naturel Régional offices.

Management Problems No information

Staff No information

Budget No information

Local Administration Maison du Parc naturel régional, B.P. 9-13 rue du Cloître, 34220 Saint Pons. Telephone (67) 97.02.10.

References

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- ° Michelin (1986). Gorges du Tarn, Cevennes, Bas Languedoc, guide de tourisme. Pnue Michelin, Paris.
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Date August 1987

Haute Vallée de Chevreuse Parc Naturel Régional

Management Category V (Protected Landscape)

Biogeographical Province 2.09.05. (Atlantic)

Geographical Location The park is located on the south-western fringe of Paris near Versailles. It is bounded by the new town of Saint Quentin-en-Yvelines in the north, Rambouillet in the west and the Chartres-Paris auto route in the south (Département of Yvelines). 48°47'N, 02°00'E.

Date and History of Establishment The site was created as a Parc Naturel Régional in December 1983 under Decree No. 75-983 of 24 October 1975. The site was actually created 10 years after the area was prepared for protection.

Area 25,600ha

Land Tenure State and private ownership

Altitude No information

France

Physical Features The park terrain is typified by plateaux and valleys situated between the rivers and tributaries of the Yvette and la Rémarche. The topography alternates between forested massifs and plateaux with intensive agriculture. The valleys cut through the various geological strata from the Meulière de Beauce deposits, through Fontainebleau sand deposits to basement deposits of the Meulière de Brie in the river valley.

Climate No information

Vegetation The region still contains vestiges of the immense forest of Yvelines, which in the Middle Ages covered the area from Mantes to Fontainebleau. To-day the forest remnants, dominated by beech *Fagus sylvatica*, oak *Quercus robur*, sweet chestnut *Castanea sativa* and some lime *Tilia cordata*, are found at the heads of valleys in the north of the park.

Fauna No information

Cultural Heritage The park is rich in cultural heritage which includes such sites as the Abbey of Port Royal des Champs and the Medieval fortress of Madeleine. Much of the landscape is dominated by large scale agriculture and particularly by prairies of wheat.

Local Human Population The park has 19 parishes (communes) and a total population of 38,000 inhabitants, and is the most urban of all the Parc Naturel Régionaux.

Visitors and Visitor Facilities The Parc Naturel Régional of Chevreuse is the closest park to Paris (only an hour's drive away) and as such is an important recreation area for the metropolis, especially for weekend excursions. Information and exhibitions are co-ordinated from the Maison du Parc at the Madeleine fort. Activities and facilities include 5 horse riding centres, 4 museums, cycle routes, hiking circuits and local wildlife parks.

Scientific Research and Facilities No information

Conservation Management The park authorities attempt to manage and preserve the rural countryside of the region even under the increasing pressure from the urban expansion of Paris. The economic development of the park is given over to rural industries traditional to the region. The park is also involved in the routine management of the series of channels and lakes which act as reservoirs for the Château of Versailles.

Management Problems There is increasing pressure on the natural vegetation and fauna by the heavy visitor presence and the ever expanding suburbs.

Staff No information

Budget No information.

Local Administration Siège du Parc Naturel Régional, 13 Grand Rue, 78720 Dampierre-en-Yvelines. Téléphone: 30.52.54.65.

References

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Date July 1987

Landes de Gascogne PNR
 (including the Réserve Naturelle du Teich and the Banc d'Arguin NR)

Management Category V (Protected Landscape)

Biogeographical Province 2.09.05. (Atlantic)

Geographical Location The park is located on the western coast of France 20km south-west of Bordeaux and adjacent to the town of Arcachon, over to Labou Payre on the main route N 10. It stretches 80km north-south and 35km east-west from the Arcachon basin to Sabres. The basic shape of the park has been established to enclose the entire Leyre river valley. 44°05'-46°40'N, 1°00'-0°40'W.

Date and History of Establishment The site was created as a park in October 1970 following Decree No. 67-158 of 1 March 1967, to conserve the traditional way of life and the environment. Legislation was updated in Decree No. 75-983 of October 1975. The park was created to "conserve as a witness to a way of life that no longer exists or is in the process of decline, to participate in the evolution of the countryside whilst at the same time preserving the environment, improving the economy of the region, improving and benefiting from quality tourism and finally to improve the knowledge about the countryside and environmental education".

Area 206,000ha (120ha represents the reserve of Teich and 300ha the Banc d'Arguin)

Land Tenure Private and public ownership

Altitude No information.

Physical Features The park lies in low-lying terrain, following the course of the Leyre valley and its tributaries, the Grande and the Petite Leyre to the Delta du Teich (Bassin d'Arcachon). The area is essentially a sandy terrain with dunes and associated salt marshes. The Banc d'Arguin is a sandy oceanic islet oriented NW-SE from Cap Ferret and is nowhere higher than 3m above sea level.

Climate The mean temperature for the coldest month is 5.2°C and the mean for the warmest month 19.1°C. Rainfall averages 970mm per year. The area is also characterised by strong winds during the period September-March.

Vegetation There are over 160,00ha of forest of which the vast majority is *Pinus maritima* which was systematically planted in the 19th century. The pine is found in association with sweet chestnut *Castanea sativa*, oak *Quercus* and an understorey of grass *Molinia* sp., bracken *Pteridium aquilinum* and heather *Calluna vulgaris*. There are numerous former mine workings in the park and all are in the process of being recolonised by vegetation. The wet areas are being recolonised naturally by *Molinia* sp., *Juncus* sp. and *Pinus maritima*. Elsewhere there are areas of intensive cultivation (maize, rape and grazing meadows), whilst remnant natural woodlands of poplar *Populus tremula*, alder *Alnus glutinosa* and willow *Salix* sp., grow thickly along the river banks. The lagoons, river delta and marshes have a rich aquatic flora (Wirth, 1979). Dune vegetation is dominated by marram grass *Ammophila arenaria*, sand couch *Agropyron junceum*, *Convolvulus soldanella*, *Euphorbia paralias*, sea holly *Eryngium maritimum* and *Helichrysum stoechis*. *Linaria thymifolia* is endemic to south-west France.

Fauna The delta of the Teich is part of a humid zone of international importance and is situated on one of the most important migratory routes in France. In the area there are records of more than 260 species of bird, including duck, gulls, geese, waders and water passerines. Nesting birds include oyster-catcher *Haematopus astragus*, and high numbers of sandwich tern *Sterna sandvicensis* (over 2,000 pairs at Banc d'Arguin). Overwintering species include significant populations of grey plover *Pluvialis squatarola*, bar-tailed godwit *Calidris alpina* and 4 species of gull.

France

Cultural Heritage The once rural scene of the region was transformed in the 19th century when systematically planted with the pine to become the biggest forest in Europe. Napoleon III created a law in 1857 which resulted in further afforestation "to the exclusion of other crops". This action caused a loss of grazing land and a wholesale change of economy to forestry.

Local Human Population The park includes 30,000 inhabitants in 22 parishes (communes) (Gironde and Landes departments). The economy is strongly based upon forestry and forestry products, such as conifer resins for the petrochemical industry (colophane and terebenthin). Other industries include iron, pottery and forge works.

Visitors and Visitor Facilities The Maison du Parc (park headquarters) is at Mont de Marson. Facilities in the park include tourism offices, boating lakes, hotels, two holiday villages, aircraft flights, tennis, horse riding and camp sites. The ecomuseum of the Grande Lande at Sabres includes natural history books, pamphlets, reconstructed traditional buildings and rare animal breeds.

Scientific Research and Facilities Inventories of the avifauna, such as work on the sandwich tern, have been undertaken under the auspices of the park authorities in association with the University of Bordeaux. There is also research into certain economic sectors.

Conservation Management The priority management policies of the park authorities are to maintain the landscape in its present state, to aid local industries and to favour the local environment (in particular studies on ornithology to improve the understanding of the social and migratory behaviour of the Le Lande avifauna). An ornithological park was created by the Teich commune in April 1972 (120ha). Much work has been done on the restoration of former industrial land (lignite workings), on riverside and lakeside vegetation management and on fire prevention.

Management Problems Fire destroys about 35,000ha of forest annually. The fires of 1949 ravaged as much as 50% of the forest and ruined the livelihood of the owners. The area also suffers from the difficulty of controlling visitors away from nesting birds.

Staff No information

Budget In the late 1970s the Banc d'Arguin reserve received 60,000FF per year (IUCN, 1977).

Local Administration Maison du Parc, 15 Place Jean Jaurès, 4000 Mont de Marson. Telephone: (58) 06.24.25.

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Date July 1987

Livradois-Forez Parc Naturel Régional

Management Category V (Protected Landscape)

Biogeographical Province 2.09.05. (Atlantic)

Geographical Location The park is located in central France to the west of Lyon, between the towns of Vichy, Clermont-Ferrand, Roanne, St. Etienne, Le Puy and St. Flour. The park is found in the Thiernoise region and includes la plain d'Ambert, mountains of Forez, the high and low Livradois and the massif of the Chaise-Dieu. 45°50'N, 03°33'E.

Date and History of Establishment The site was created as a parc naturel régional in 1983 under the Decree No. 75-983 of 24 October 1975. It was established to promote the economic development of the region and to protect its cultural and natural heritage.

Area 297,000ha

Land Tenure Public and private ownership

Altitude Up to 163m

Physical Features The terrain includes the Monts du Forez prairies, forest massifs, wide basin of the Livradois and the expansive plains near Limagne. The granite mountains of Forez form a 45km long chain which are paralalled by a chain of picturesque valleys such as the Dore. The highest point of the mountains du Forey is Pierre-sur-Haute (1,634m).

Climate No information

Vegetation The majority of the park as exemplified by the Monts du Livradois is mixed woodland cover and pasture. The high plateau of Forez is a heathland scrub vegetation of *Myrtillus* sp, heather *Calluna vulgaris* and *Gentiana* sp. In the valleys the cultivated fields are still largely surrounded by forests ranging from beech *Fagus* at low altitudes to mixed mountain pasture and fir *Abies* on the mountain peaks (such as at the Col de Chansert, 1080m) (Desjeux et Desjeux, 1984).

Fauna No information

Cultural Heritage The plain of Ambert has long been renowned for its wood working and paper industry. Architectural heritage includes the medieval city of Billom and the gothic abbey of Chaise-Dieu.

Local Human Population In the 151 parishes (communes) of the area there is a total of 105,500 inhabitants (Haute-Loire and Puy de Dôme departments). The traditional economy of the area is based on mixed farming (polyculture), livestock rearing and potato growing. Woodworking crafts were once important in the region and are now slowly being restored.

Visitors and Visitor Facilities The park is rich in museums, such as the Museum of Lace at Arlane, the Agricultural Machinery and Steam Engine museum at Ambert and the museum of the paper manufacturing industry at the watermill "Richard de Bas". There are also hotels, gîtes, holiday villages, thermal baths and camp sites. Activities include three ski slopes, tourist holiday routes, traditional fêtes and folklore festivals, horse riding schools and cycle trails. The Zoological park of Bony has 25ha of countryside with native animals in semi-captivity.

Scientific Research and Facilities No information

Conservation Management Forest management and exploitation is a major concern of the Monts du Livradois and Massif de la Chaise-Dieu areas of the park in addition to the major objectives of promoting the various rural industries and activities of the region.

France

Management Problems No information

Staff No information

Budget No information

Local Administration Siège du Parc Naturel Régional, Saint-Gervais-sous-Meymont, 63880 Olliegues. Téléphone (73) 95.54.31.

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Date July 1987

Lorraine Parc Naturel Régional

Management Category V (Protected Landscape)

Biogeographical Province 2.09.05. (Atlantic)

Geographical Location The park is located between the two urban conurbations of Metz and Nancy in north-eastern France, the main town in the park being Pont-à-Mousson. The park is divided into two separate sections by the main Metz-Nancy road and the river Moselle. 48°12'-48°25'N, 40°15'-4°40'E.

Date and History of Establishment The site was established as a parc naturel régional in May 1974 under Decree No. 67-158 of 1 March 1967 and updated following Decree No. 75-983 of October 1975. The aims of the park authority are to develop the area harmoniously for environmental protection, human education and recreation.

Area 206,000

Land Tenure Public and private ownership

Altitude No information.

Physical Features The landscape of the park, the Côte de Moselle, is typified by forests, farms, open fields and the heights of St. Jean, a countryside of étangs (ponds) and green rolling hills on a bedrock of gently sloping Jurassic limestones. The largest of the ponds are the lakes of Madine, Gondrexange, Réchicourt and Le Lindre. The Lac de Madine is the largest expanse, with an area of over 1,100ha.

Climate The mean temperature for the coldest month is 1.1°C and for the warmest month, 18.1°C. There is an average annual rainfall of 715mm.

Vegetation The natural climax vegetation includes oak *Quercus* sp.

Fauna The area is typified by such mammal species as red deer *Cervus elephus*, wild boar *Sus scrofa*, otter *Lutra lutra* and wild cat *Felis sylvestris*. The region is reputed to have the largest population of diurnal raptors in France. Woodland species include as the chaffinch *Fringilla coelebs*. Fish include carp, perch and pike (Wirth, 1979).

Cultural Heritage Many of the towns and villages of the park evolved in the Gallic and Gallo-Roman periods following the expansion of the salt industry. The entire region was an important battleground in the 1914-18 war.

Local Human Population The economy of the area is based upon viticulture, fruit growing, cattle breeding, milk products and salt extraction. The park contains 183 parishes (communes), all of which lie in the Meurth-et-Moselle and Meuse departments (40,000 inhabitants).

Visitors and Visitor Facilities The Maison du Parc at Pont à Mousson includes audio-visual displays and exhibitions. Its information centres arrange natural history courses, games for children and also provide mopeds for exploration of the park. There are various museums in and around the park including a vineyard museum, ecomuseum, Maison des Arts and rural traditions, museum of archaeology, Maison de Sel and the historic salt industry. Activities include fishing, canoeing, picnicing, camping, "chariot" rides, hiking and boating. An activity centre at the Lac de Madine includes fishing, swimming, sailing, golf and horse riding activities.

Scientific Research and Facilities The park authorities undertake studies on the development of the rural economy as well as surveys of the mammals, birds, reptiles and amphibians of the park (Pihani, 1979; Arnaud, 1978; Desjeux et Desjeux, 1984).

Conservation Management The Parc Naturel Régional de Lorraine is one of the few parks to charge an entrance fee.

Management Problems Threats to the environment include pollution of the water table by milk processing installations and atmospheric pollution caused by foundries of Metz, Nancy and Thion-ville (Wirth, 1979).

Staff No information

Budget No information

Local Administration Siège du Parc, B.P. 35, 10 rue Camille Cavallier, 54703 Pont à Mousson Cédex. Téléphone: (8) 381.11.91.

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Date August 1987

Luberon Parc Naturel Régional

Management Category V (Protected Landscape)

Biogeographical Province 2.17.06. (Mediterranean Sclerophyll)

Geographical Location The park is situated in the Vaucluse and Haute Provence departments in the mountains between the valleys of the Apt and the Durance, 70km north of Marseilles. The river Durance represents the southern park boundary. 43°45'N, 5°08'E.

France

Date and History of Establishment The park was created in January 1977 under Decree No 75-983 of 24 October 1975. The park has been established to protect the integrity of the district of Provence-Côte d'Azur and its natural landscape from the threat of increasing urbanisation.

Area 120,000ha

Land Tenure Mixed ownership

Altitude up to 1,125m

Physical Features The park is made up of the syncline limestone of the mountains and valleys of the Luberon massif and the Chaîne des Alpilles. This massif was formed from tectonic activity at the same time as the Pyrenees 40 million years ago. A second phase of mountain building in the area 8 million years ago resulted in a ridge of hilly mountains with a long east-west escarpment on the north side of the Durance valley, the Grand Luberon and the Petit Luberon (divided by the Lourmarin combe). The Luberon chain averages at 500-800m and reaches its highest point at Mourre Negre (1,125m). Caves and limestone cliffs abound in the park. The representative strata of the park include dolomites, sandstones and tertiary sands as well as glacial deposits. Fast flowing streams form tributaries of the river Durance.

Climate The climate is typically Mediterranean with minimum temperatures in the coldest month of 6°C and averages for the warmest month of 25°C. Annual rainfall averages 560mm per year.

Vegetation The countryside of the park consists of a mixed rural landscape of forests, wooded hills and farmland. There are extensive areas of maquis vegetation, dominated by holm oak *Quercus ilex* and various species of rock rose *Cistus*. There is also a large area of oak forest (partly coppiced) and 1,000ha of Atlas cedar plantation *Cedrus atlantica* dating from 1860 (on the forest road from Bonnieux to Cheval-Blanc). Other habitats include short limestone grassland, "herbaceous pseudo steppe" and meadows. In the peaks of the mountains are a number of rare species such as *Ephedra major*, *Ophys* sp., *Lilium martagon*, *Gagea* sp. and various pteridophyte species such as *Asplenium petrarchaea*.

Fauna The fauna includes Mediterranean maquis species typified by the presence of bluerock thrush *Monticola solitarius*. In total there are 130 species of nesting bird which inhabit the rocky limestone cliffs, including short-toed eagle *Circaetus gallicus*, Egyptian vulture *Neophron percnopterus*, *Hieraetus fasciatus*, lesser kestrel *Falco naumanni*, *Sylvia melanocephala*, *S. undata* and *Coracias garrulus*. European beaver *Castor fiber* survives on the Durance and Calavon rivers.

Cultural Heritage The park has been inhabited for many centuries as illustrated by the remains of a neolithic pottery works in the Apt valley. This industry survived until more recent times and included the world renowned earthenware factories of the 1800s and early 1900s. A few small potteries still exist in the area today.

Local Human Population The park is located in a region with 57 parishes (communes) in the Vaucluse and the Alpes-de-Haute-Provence departments (70,000 inhabitants). The rural economy of the area is based upon viticulture, cereals, fruit farming and market gardening.

Visitors and Visitor Facilities The park centre, Maison du Parc, at Apt includes audio-visual presentations, displays and lecture facilities. The area has up to 11 museums, ranging from archaeology to local natural history. Traditional crafts are encouraged in the park and products are sold to visitors. Activities are diverse and include hiking, cycling and canoeing.

Scientific Research and Facilities The park authorities have sponsored inventories of the fauna and flora.

Conservation Management One of the prime objectives of the park authorities is to maintain the ecosystem of the Luberon massif with its exceptional flora and fauna, as well as to maintain and develop the fragile agricultural, economic and cultural heritage of the region as a whole. The traditional rural management of much of the park was once based on domestic livestock grazing but this has declined drastically in recent decades. The number of goats dropped from 6,000 in 1960 to just 450 by 1980. Currently the park authorities are attempting to restore the locally threatened *Rove* goat to the area. Not only will this programme have the effect of rescuing an endangered breed of livestock but their grazing activities will help to maintain fire breaks in areas under greatest threat from incendiary. Concentrated efforts are in force to manage and protect the cliff habitats where endangered raptors nest. General management includes restricting access of vehicles to the park, removing refuse waste. Up to 700/800 tonnes of plastic waste is collected annually and disposed of or recycled. Other programmes include a three year project to renovate buildings in rural villages, to maintain or install small craft industries in the region and manage public places such as roads and park fountains. Improved agriculture is being ensured by irrigation projects to divert waters from the Durance and Verdon to cover 15,000ha of agricultural land.

Management Problems As throughout the Mediterranean region a major threat to the wooded habitats are the problems caused by fire. The park is also under threat from expanding urbanisation and housing construction.

Staff Wardens patrol the park limits.

Budget No information

Local Administration La Maison des Pays du Luberon, 1 Place Jean Jaurès, Apt. Telephone: (90) 74.08.55.

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Date August 1987

Marais Poitevin-Val de Sèvre et Vendée Parc Naturel Régional
(includes the Pointe d'Arçay Réserve Nationale de Chasse,
the Réserve Naturelle of St Denim du Payre, the Baie d'Aiguillon
Réserve Nationale de Chasse and the Réserve Nationale de Chizé)

Management Category V (Protected Landscape)

Biogeographical Province 2.09.05. (Atlantic)

France

Geographical Location The park is located in the extreme west of France, on the Atlantic coast around La Rochelle and is divided between three departments and two regions. The park consists of four separate entities; the main section, the Marais Poitevin, on the rivers Vendée and Sèvre Niortaise (west of Niort to the coast); the Forêt de Mervent-Vouvant next to Fontenay-la-Compte; the Forêt de Chizé and Aulnay; and the Forêt del Hermitoain to the east of Niort. 46°20'N, 01°35'W.

Date and History of Establishment The site was created as a parc naturel régional in 1979 following Decree No. 75-983 of 24 October 1975, with directives to maintain and preserve the traditional landscape and lifestyles of the region. The Pointe d'Arçay reserve was established in 1951.

Area 200,000ha (includes the reserve of Pointe d'Arçay 550ha; Réserve de Chizé 5000ha).

Land Tenure Private, local commune and public ownership

Altitude 0-90m

Physical Features The park consists of the river Sèvre Niortaise and river Lay estuaries (on the Atlantic coast) along with mudflats, salt marshes, sand dunes, wet meadows and low-lying fenland intersected by water channels and marshes. Forest massifs are found inland at the periphery of the Park on sand, clay, calcareous and granite plateau. The high valleys of the Vendée are in the north and the Sèvre river valley to the east.

Climate Average temperatures in the coldest month are 5.2°C and 19°C in the warmest month. The climate is described as temperate oceanic with annual rainfall averages of 800mm.

Vegetation The vegetation of the area is very varied and separated into the littoral humid area, heath, temperate deciduous forest, grassland and dune zones. The wet meadowland tends to be poorly drained and flooded in winter and includes such rare species as the butterfly iris *Iris* sp. The littoral marsh zone is characterised by glasswort *Salicornia glutinosa* and other aquatic species. Water channels are bounded by poplars *Populus*, willows *Salix*, alder *Alnus*, ash *Fraxinus*, and tamarisc. On the older and more stable sand dunes, maritime pine woods (*Pinus pinaster*) have developed and grade into lowland heaths dominated by dwarf ericaceous shrubs such as *Calluna vulgaris* and *Erica cinerea*. The forests of Chizé, Aulnay, Hermitain and Mervent-Vouvant consist of deciduous tree species. They are composed of oaks *Quercus sessiliflora* and *Q. pedunculata* (24%), beech *Fagus sylvatica* (27%), hornbeam *Carpinus betulus* (5%), along with maple *Acer*, hazel *Corylus avellana*, cornel *Thelycrania* sp. and planted conifers *Pinus maritima* and *P. sylvestris* (8%).

Fauna The park is one of the main French wetland sites for breeding and wintering birds. Species include breeding *Ixobrychus minutus*, *Nycticorax nycticorax*, *Ardea cinerea* (up to 680 pairs), *Alcedo atthis* (100 pairs), *Luscinia svecica* (150 pairs) and *Himantopus himantopus* (30 pairs). The park represents the most northern breeding site for *Clamator glandarius*. Migratory and passage species may number up to 100,000 birds and include *Anser anser* (2300), *Calidris canutus* (10,000), *Philomachus pugnax* (2,000), *Limosa limosa* (50,000) and *Numenius phaeopus* (20,000). The most abundant wintering birds include dunlin *Calidris alpina* (40,000) and knot (5000-20,000), *Tadorna tadorna* (4,000), *Anas penelope* (15,000), *A. crecca* (20,000), *A. platyrhynchos* (20,000), *A. acuta* (6,000), *A. clypeata* (5,000), *Melanitta nigra* (10,000) and *Recurvirostra avosetta* (6,660) (one of the largest wintering concentrations of avocet in Europe) (Duffy, 1982). The forests are rich in red deer *Cervus elaphus*, roe deer *Capreolus capreolus*, wild boar *Sus scrofa* and 21 other species of mammal.

Cultural Heritage The forests of Chizé, d'Aulnay and Chef-Boutonne delimit the land of the "Pictons" and "Santons" where in historic times there was a great development of architecture (Roman and Norman). Many of the fortified churches, chapels and châteaux survive to this day.

Local Human Population Within the Park boundaries are 102 parishes (communes) with a total of 80,000 inhabitants (Deux-Sèvres and Charente-Maritime departments). To-day the area is made up of a mix of market and provincial towns as well as rural communities. Agricultural mechanisation and increased productivity has not been always "suitable" or even possible for the marsh area and so grazing of reclaimed salt marshes is still a common practice in the damper areas. The local economy is based upon coastal fishing, oyster and mussel farming, livestock herding, cereals, and market gardening. Traditional Breton boats still ply the canal and marsh waters near the little fishing ports.

Visitors and Visitor Facilities The main information centre in the Park is the Union Poitou-Charentes pour la Culture Populaire (UPCP), established largely to provide information, courses and excursions on natural history and traditions of the region. There are an additional 10 tourist information centres in the Park dealing with all aspects of the region. Facilities include natural history museums, an oceanographic museum, water-mill museum with country life exhibitions, a woodcraft museum, wildlife exhibitions, over 10 horseriding centres, cycling routes, canoeing, fishing and hiking activities. There are also traditional boat trips around the marshes. At the zoorama européen wildlife park are semi-captive European animals and in the area there is also a butterfly house with living lepidoptera.

Scientific Research and Facilities The Institut National de Recherche Agronomique (INRA), with facilities at Magneraud, undertakes to study the effects of the economy on the local environment. Work is also underway to save the local rare donkey breed, the donkey of "Poitevin". This animal has been bred in the region since the Middle Ages, but by 1977 only 44 animals remained. To safeguard the genetics of this breed the INRA has been involved, along with the Museum of Natural History, in starting up a stud farm (the Asinerie du Baudet du Poitan). Research includes studies on the reproduction, genetics and production of the donkey. Other work by the INRA, and CRNS at Villiers en Bois, includes soil mapping and marsh studies (effects of drainage, agriculture, exploitation, soil loss and wild animal biology).

Conservation Management The park was set up to ensure the survival of the wildlife and the traditional lifestyle of the local people. There are now 12 associations for nature and ornithology and a number of nature reserves to protect the wildlife of the region in one of the least disturbed ecosystems on the Atlantic coast. These sites include the Réserve Naturelle de St Denim du Payre, the Réserve Naturelle de Chasse at the Pointe d'Arçay and the Marais Communaux du Poire-sur-Veluire and Montreuil. Each site is maintained and managed by the Association de Défense de l'Environnement de Vendée. Management includes carefully controlling the water table of the wet meadows and ensuring that the bird colonies are not disturbed. The authorities also ensure the maintenance of traditional cattle grazing regimes which is imperative to the continued survival of the meadow habitats.

Management Problems The site is seriously threatened by drainage of wet meadow areas and marshland. Straightening of rivers, channels and streams, removal of hedges and trees by channel side, extension of oyster and mussel farms on the mudflats and intensive agriculture are also threatening the park (Carp, 1980).

Staff No information

Budget No information

Local Administration Maison du Parc, La Ronde, 17170 Courcon. (Tel: 46/01 74 44).

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Date August 1987

Montagne de Reims PNR

Management Category V (Protected Landscape)

Biogeographical Province 2.09.05. (Atlantic)

Geographical Location The Park is situated in north France immediately south of Reims, above Epernay and Châlons-sur-Marne. It is located in the Marne département and its southern boundary is the river Marne. 49°15'N, 04°00'E.

Date and History of Establishment The site was created as a parc naturel régional in September 1976 following Decree No. 75-983 of 24 October 1975, with directives to maintain and preserve the environment, traditional landscape and lifestyles of the region through economic and social development.

Area 50,000ha (20,000ha of forest)

Land Tenure Public and private ownership

Altitude Up to 287m

Physical Features The cliff-like Montagne de Reims represents the outer boundary of the Côte de l'Île de France and is composed of sedimentary tertiary period deposits. The highest point of the massif is at 287m, but distinct mountain peaks are only apparent on Mt Sinai (283m) and Mt Joli (274m). The massif consists of a calcareous plateau, covered with sands and sandstones and dotted with etangs and pot-holes which give rise to small subterranean rivers.

Climate Frosts are not uncommon in winter and spring.

Vegetation Vast forests are present on the central plateau, with dominant species of oak *Quercus*, beech *Fagus* and chestnut *Castanea*. On the north, east and south slopes of the massif is a mantle of vineyards and agricultural land. The Tardenois districts and the valley of the Marne are largely agricultural in aspect.

Fauna Forest species include wild boar *Sus scrofa* and roe deer *Capreolus capreolus*.

Cultural Heritage The region has long had a religious association. St Vincent, as the patron saint protector of the vineyards of Champenois, is commemorated by the confréries (brotherhoods) and the St Vincent committee. There are currently 40 brotherhoods in the region, which as a group disseminate information about viticulture and have created an ecomuseum on the same theme.

Local Human Population In the Marne area there are 54 parishes with 33,000 inhabitants. The economy is based upon viticulture, economic and agricultural farming and forestry (charcoal, coppice-wood, debarked tannin manufacture and furniture industries). The Park authorities have established a zone of activities to ensure rural communities can thrive.

Visitors and Visitor Facilities The Maison du Parc has a series of audio-visual displays and exhibitions, as well as an ecomuseum. The forestry centre organises weekly forestry courses and has an information "pavillon". There are 12 hiking trails, cycle routes, horse riding centres and holiday centres. Other activities include caving and fishing. Accommodation is available

in hotels, gîtes, auberges and caravans. Important cultural attractions include the military observatory of Mont Sinai which was used by General Gonraud in world war 1 and the Abbey of Hautvillers where the "prise de mousse" champagne technique was invented.

Scientific Research and Facilities No information

Conservation Management Park management is particularly orientated towards promoting viticulture and traditional craft industries.

Management Problems The remaining forests are under threat from excessive exploitation and abuse by the inhabitants of Châlons-sur-Marne, Epernay and Reims.

Staff No information

Budget No information

Local Administration Maison du Parc, Pourcy, 51160 AY (Tel: 24/59 44 44)

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Date August 1987

Morvan PNR

Management Category V (Protected Landscape)

Biogeographical Province 2.09.05. (Atlantic)

Geographical Location The park is situated in central France close to the massif central towns of Autun and Saulieu. It is situated in the 4 Burgundy departments: Côte d'Or, Yonne, Saône-et-Loire and Nièvre. 46°50-47°28'N, 3°55'-4°18'E.

Date and History of Establishment The site was created as a parc naturel régional in 1970 under the Decree No. 67-158 of 1 March 1967 to maintain and preserve the traditional landscape and lifestyles of the region.

Area 173,000ha

Land Tenure There are 135,000ha of forest land; 85% of the woodlands are in private ownership; 15% is as public forest or under the forestry regime of the Office National des Forêts.

Altitude Up to 901m

France

Physical Features The park essentially consists of an undulating granite mountain range with rounded peaks sloping down towards the north. The highest point is at Haut-Folin (901m). The surrounding terrain is largely calcareous in origin and quite distinct from the granite areas which are degraded on the surface to give rise to a sandy soil. On the versants the water streams across impervious sands whilst stagnant water forms on the impenetrable granite. Lakes include the Lac des Settons on the river Cure with its associated narrow river valleys.

Climate The Morvans receive a high rainfall ranging from an average of 1000mm a year on its borders to 1800mm on the Haut Folin. On the summits snow may be present for 180 days of the year.

Vegetation The vegetated landscape of the park consists of small wooded fields, grass plains, cereal prairies and mixed woodland. The Morvan massif is covered in total by 137,000ha of woodland which in localised areas covers up to 50% of the area (for example the forests of St Prix and Breuil-Chenu). The main forest species are beech *Fagus sylvatica*, hornbeam *Carpinus betulus*, oak *Quercus robur*, birch *Betulus* sp. and conifers.

Fauna Includes roe deer *Capreolus capreolus* and red deer *Cervus elephus*.

Cultural Heritage The area was first named by the Celts, the word *Morvan* signifying Black Mountain. Evidence of this culture can still be seen in the series of Druid monuments in the park. The entire region has for centuries been well populated even in Roman times. It was in the Morvan region that Vertingetorix led the Gaul tribes into battle against Julius Caesar. By the Middle Ages the onslaught into the forests had increased, vast tracts of land being felled and "improved" to make fields or meadows. The area has long prospered from the rich agricultural and livestock economy which helped build the massive Norman architecture at Vézelay. The abbeys of the area have been known to exploit the Morvan forest since at least the 10th century. By the 17-18th century its timber was used to supplement the fuel wood needs of Paris.

Local Human Population The area consists of 64 parishes (communes) of Nièvre, Yonne, Saône-et-Loire and the Côte d'Or with a total of 33,000 inhabitants. The granite substrate of the Morvans sharply defined the vegetation, agriculture and livestock of the region throughout historic times. For example, hamlets have for centuries been traditionally built of local granite. Livestock, essentially cattle, were in olden days seasonally moved up and down from the mountains. Forestry and the timber trade was, and still is important to the local economy.

Visitors and Visitor Facilities The park, established to protect the local economy and way of life, also encourages visitors. The Maison du Parc at Montsauche includes audio-visual material and exhibitions on local themes. The Maison Vauban at St. Leger-Vauban has exhibits tracing the lives and times of local famous people. Eight other museums in the area illustrate various aspects about the Morvan region. There are chalet refuges, summer schools, holiday centres, youth hostels, skiing facilities, picnic areas, converted forestry houses (to observe the wilderness), gites and hotels. Other activities include aquatic sports (5 aquatic centres), fishing, hill walks, rock climbing, canoeing and horse riding. Hiking tours are also available, such as the "Morvan big lakes trail", a 220km hiking route. There are also 3 wildlife parks, one for semi-captive roe deer (at Breuil), one for wild boar and another for fallow deer (at Duc à Quarre les Tombes) and 12 information centres.

Scientific Research and Facilities No information

Conservation Management The chief aims of the park authorities are to keep the traditions of the Morvans alive, revitalise the economy of the region and protect the historic remains and countryside. Originally the forests of the region were exploited for fire wood and timber which was floated down river to major towns. To-day there has to be a balance between broadleaf and conifer plantations, resin and softwoods being of major use to the timber industry.

Management Problems Potentially damaging hydroelectric dams exist on the rivers Cure, Cousin, Yonne and their tributaries. Extensive reforestation is replacing the native broadleaf species by conifers at a higher rate than anywhere else in France. The consequences would be expected to be harmful to the environment and result in a loss of native wildlife habitats.

Staff No information

Budget No information

Local Administration Maison du Parc, Saint-Brisson, 58230 Montsauche. Telephone (86) 78.70.16.

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Date August 1987

Nord-Pas-de-Calais Espace Naturel Régional (including the former St. Amand Raismes Parc Naturel Régional)

Management Category V (Protected Landscape)

Biogeographical Province 2.09.05. (Atlantic)

Geographical Location The park is located as three separate sectors all near or on the north coast of France around Calais. These areas are the Plaine de la Scarpe (between Flandre and Hainaut), the Domarois-Monts de Flandre and the Boulonnais (in the area surrounding Boulogne-sur-mer, northwards to Calais). 50°27'N. 3°20'E.

Date and History of Establishment The site was originally created as the St. Armand Raismes PNR, the first parc naturel régional in France, in 1968. This immediately followed the Decree No. 67-158 of March 1967 to maintain and preserve the traditional landscapes and lifestyles of the region. In 1978 the area was enlarged from the original 10,100ha to form the new park, Nord-Pas-de-Calais, with three separate sections and managed as a new generation of park - the espace naturel régional (formal creation on 11 February 1986)..

Area 167,000ha (including the Marc à Gorraux bird sanctuary and a faunal protection zone within the National Forest of Raismes).

Land Tenure The site included the National Forest of Raismes which is state owned.

Altitude Sea level to over 200m

Physical Features The park consists of the 2 regions: the Haut Boulonnais, a plateau area attaining 200m and cut by the rivers Slack, Liane and Wimeraux, and the Flandre (Flanders) intérieure. The Plaine de la Scarpe consists of a forest massif with numerous lakes and a largely water-logged soil on sand and clays. The higher altitude is dominated by chalk hills

France

and sea cliffs between Calais and Boulogne sur Mer. There are also coastal marshes and extensive sand dune systems in the park. Canals, marshes and black soils typify the north of St. Omer and Audomarois. The geology of the area varies from chalk (Jurassic) in the Boulogne area to clays (Cretaceous and Tertiary deposits) in the St. Omer region.

Climate Mild climate typical of the English channel area.

Vegetation The region is composed of a wide variety of habitats including woodland, chalk grassland, dunes, bogs and marshes, agricultural land and reclaimed mining land. Approximately 5,000ha of the St. Amand sector is well managed woodland (Forêt de Raimes-St.Amand Wallers) with extensive clearings and rides. The forest species include oak *Quercus*, beech *Fagus*, birch *Betulus* and poplar *Populus*, changing in composition towards the Flandre interieure with dominant species of willow *Salix*, poplar *Populus* and alder *Alnus*. The forests of Raimes-St Amand Wallers, between the Scarpe and l'Escant, is all that remains of the immense forest that once covered the Hainaut in the Middle Ages. The remnant woods have been much altered over the centuries particularly by the plantation programme after the 1914-18 war. The sand dunes of the park are dominated by differing plant communities. The dunes of Lièvre are represented by *Drosera* and *Lycopodes*, the dune Monts des Bruyères by Spagnum and *Genista anglicz* and the dunes of Bussy by *Lycopodes*.

Fauna The mammals of the park include *Cervus elaphus*, wild boar *Sus scrofa* and *Dama dama*. The area is of particular interest for its avifauna and includes such breeding species as nightjar *Caprimulgus europacus* and *Alcedo atthis*. Of the vast numbers of passage species are *Anas erecca*, *A. clypeata*, *Fulica atra*, *Aythya ferina* and *Scolopax rusticola*, along with hundreds of *Phalacrocorax carbo*, *Circus eyaneus*, *Recurvirostra avosetta* and *Charadrius marinellus* (Carp, 1980).

Cultural Heritage The area was much ravaged by the effects of world wars I and II.

Local Human Population The park is located in a region with 167 parishes (communes) and has a total population of 314,350. Much of this area is dependent upon the mining industry. The people of the region are largely involved in market gardening for export of their products to the rest of France. Modern agricultural methods have largely resulted in the mechanisation of this polyculture economy. The clay areas are still used for livestock grazing and timber growing.

Visitors and Visitor Facilities The park has a very high visitor population with up to 3 million people per year. To cater for the visitors there are major interpretation centres (Maisons de Parc) at Arques, Colembert and St. Amand. There are two tourist holiday villages with fishing, camping, canoe, walking and boating facilities. There are also craft museums, a Centre d'Animation et d'Etude des Millieux at Amoury which has been built around an old lake (60ha) created from former mine workings. At this centre are open air activities and picnic sites, a flight school, as well as biological and photographic laboratories. Elsewhere in the park are sports complexes, equestrian centres, boat excursions, "cahiers des enfants" for school children, a navigation and boat museum on the Canal de Neuf Fosse and wildlife parks (140ha in the Raimes forest) with animals in semi-captivity. Coach excursions are run to many of the activity sites. Hotels, gîtes, camping sites and holiday villages are also available.

Scientific Research and Facilities Bird observatories have been constructed at the ornithological reserve. Research is currently underway on the ecology of the sand dune areas and experiments are also being undertaken on re-planting former mine works.

Conservation Management The management of the park is currently undertaken by the espace naturel régional authorities. A number of reserves have been established to protect the more delicate wildlife including *réserve ornithologique* Goriaux near Valenciennes and a number of *réserves botaniques* (sand dunes of Lievre, Monts des Bruyeres). Each reserve is run by the Office National des Forêts. A *réserve naturelle* is currently being created at the Marais du Romelière, of interest for its associations of vegetation and marsh birds (Desjeux et Desjeux 1984).

Management Problems One of the main threats to the area is from the pressure of excessive tourism, such as the effects on the Audomarois marshes and its environment. An agricultural decline was most pronounced in the 1970s. By 1978 work was started to reclaim parts of the marshes - building of exploitation roads and boat quays, etc. Recently agriculture has been modernised in the region, resulting in rapid culture rotation and over use of fertiliser which has led to nitrate leakage, eutrophication and killing off of the aquatic fauna and flora (Carp, 1980).

Staff No information

Budget No information

Local Administration Siège d'Espace Naturel Régional, 57 rue de Béthune, 59800 Lille. Telephone (20) 57.99.99.

Regional Sector Administration:

Secteur Audomarois-Monts de Flandre, Siège, "Le Grand Vannage", Les Quatre Faces, 625110 Arques. Telephone (21) 98.62.98.

Secteur Boulonnais, Siège, Mairie du Huisbois, Le Waast, 62142 Colembert. Telephone (21) 33.38.79.

Secteur Plaine de la Scarpe et de l'Escaut, Siège, "Le Luron", 357 rue Notre-Dame d'Amour, 59230 Saint Amand les Eaux. Telephone (27) 48.78.77.

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Date July 1987

Normandie-Maine Parc Naturel Régional

Management Category V (Protected Landscape)

Biogeographical Province 2.09.05. (Atlantic)

Geographical Location The park is situated in north-west France next to Alençon to the north of Le Mans in the Orne department of the Basse-Normandie region. 48°30'N, 0°50'W.

Date and History of Establishment The site was created as a parc naturel régional in 1975 under the Decree No. 75-983 of 24 October 1975, to maintain and preserve a traditional landscape and lifestyles of the region.

Area 234,000ha

Land Tenure Private and State ownership

Altitude Up to 417m

Physical Features The park consists of a landscape of narrow gorges and broad valleys of the rivers Varenne and Mayenne to the west, of the Udon and Cance to the north towards Caen, and of the Sarthe to the south, which flows from Alençon to Sillé across the Mancelle Alps. The major part of the park lies on the Armorican massif which consists of granite in association with Jurassic deposits.

Climate No information

France

Vegetation The vegetation includes numerous wealden-like wooded areas of oak *Quercus*, beech *Fagus sylvatica* and pine *Pinus sylvestris* in association with fir *Abies* and *Picea* (the latter particularly in the forest of Andaine). The largest woodlands are the Forêts des Ecouves and Perseigne which consist of deep glades of deciduous trees along with pine *Pinus* and spruce *Picea*. Most of the wooded areas are now densely planted with conifers.

Fauna The park fauna include numerous woodland species such as red deer *Cervus elaphus*, squirrel *Sciurus vulgaris* and wild boar *Sus scrofa*. Birds include chaffinch *Fringilla coelebs*, robin *Erithacus rubecula* and blackbird *Turdus merula*.

Cultural Heritage The area was important during the later campaigns of the second world war. Various monuments commemorate the part played by the allied forces against the Germans.

Local Human Population There are 143 parishes (communes) in the park within the Orne, Mayenne, Sarthe and Manche departments (90,000 inhabitants). The population declined drastically after 1914 due to the collapse of the fuelwood-related industries (for example forges), leaving an economy based on small scale agriculture, polyculture, cider-making, cattle breeding (Normandy, frisonne pie noire) and rye grass hay meadows. The park authorities have assisted in a restoration of forest crafts and to-day a number of villages have up to 50% of their population employed in timber trades.

Visitors and Visitor Facilities The Maison du Parc at Carrouges supplies information on the lifestyles, history and environment of the region as well as audio-visual displays and exhibitions. There are a number of museums, woodland craft presentations, information centres and exhibition halls.

Scientific Research and Facilities No information

Conservation Management The main activities of the park authorities are orientated towards assisting local industries. The authorities are currently assisting in the restoration of wood industries and have undertaken experiments building houses with local timber, established cider and pear works at Carrouges and Barenton and established a biannual forum on the "Bois et la Forêt" at Alençon.

Management Problems No information

Staff No information

Budget No information

Local Administration Maison du Parc, B.P. 05, 61320 Carrouges. Telephone: (33) 27.21.15.

References

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Date August 1987

Pilat Parc Naturel Régional

Management Category V (Protected Landscape)

Biogeographical Province 2.32.12. (Central European Highlands)

Geographical Location The park consists of the Pilat mountains, the most northerly extension of the Cévennes mountain range (Rhône Alps) in the Loire department. It is located adjacent to St. Etienne and bounded in the north by the Lyon and St. Etienne main highway (A47), in the west by the river Rhone, Vienne, Roussillon and Annonay. 42°25'N, 4°40'E.

Date and History of Establishment The site was created as a parc naturel régional in May 1974 under the Decree No. 67-158 of 1 March 1967 to maintain and preserve the traditional landscape and lifestyles of the region. Following the principles laid down by Professor Claude Berthier in 1947, Pilat Park has been set up to rejuvenate the rural scene, the economy and cultural heritage. Important elements include the provision of residential space for town folk, as well as assuring the protection and conservation of wildlife and the environment.

Area 65,000ha

Land Tenure No information

Altitude up to 1,432m

Physical Features The park makes up the massif of Pilat with its pyramidal silhouette. The summit at the Crête de la Perdrix (1,432m) has a scattering of vast granite boulders locally called *chirats*. The massif was formed as a result of the Hercynian mountain folding at the same time as the Alps were formed (there was subsequent large scale erosion in the quaternary period). The numerous rivers of the region originate on the massif summits and descend to the Rhone and the Loire along extensive gorge systems.

Climate Average temperatures of the coldest month are 1.0°C and of the hottest month 22°C, whilst rainfall averages 850mm per year.

Vegetation The park consists of a diversity of habitats, including broadleaf and conifer forests on the mountain slopes and open pasture on the plateau. Altitudinal zonation is very pronounced in the park. Lowland forests consist of sweet chestnut *Castana sativa*, white oak *Quercus pubescens*, wild cherry *Prunus avium*, ash *Fraxinus excelsior* and poplars *Populus alba* and *P. tremula* in damper localities. Above 800m woodlands are dominated by pine *Pinus sylvatica*, beech *Fagus sylvatica* and fir *Abies* sp.

Fauna The fauna includes typical woodland species such as wild boar *Sus scrofa*.

Cultural Heritage The Pilat area has long been the main route for man in his travels between the mountain ranges of the Mediterranean, central Europe and the Atlantic Ocean and today archaeological remains abound. Traditional trades are based around the wood and silk manufacturing industries, although both are now in decline.

Local Human Population The park consists of 45 parishes (communes) in the Loire and the Rhône departments and has 39,000 inhabitants. To-day the population is largely centralised in the industrial valleys, leaving the mountains devoid of people. Tourism has become a major source of revenue for the region.

Visitors and Visitor Facilities The park is essentially a weekend retreat for town dwellers. At the Maison du Parc at Pelussin there are audio-visual displays and pamphlets about the park. There are many centres for residential courses such as the Maison de l'Eau (courses on birds, vegetation, ecology), exhibitions about the problems and decline of the region, school workshops, open-air theatres, music festivals, annual book fairs and rock climbing schools.

France

There are 3 water parks, camping and picnic sites, canoeing, sailing and fishing facilities. Within the park there is also a Parc à Moufflon with semi-captive animals. Simple accommodation facilities include hostels, rural gîtes, auberges and farm camp sites.

Scientific Research and Facilities Research is orientated towards agricultural investigations.

Conservation Management One of the priority aims of the park authorities is to improve the development of the local economy. It has assisted in the creation of numerous associations such as the Vergers Associés aux Vignobles, the Co-opérative for Forestry at Pilat and various projects for restoring traditional architecture. The region of North Pilat was largely abandoned in the 19th century, since when park officials have made an inventory of the multitude of isolated "parcelles" of former overgrown agricultural land and attempted to identify all the owners. They then established a forestry group to co-ordinate re-forestation of the area, installation of tracks and fire breaks as well as undertaking a pilot study for restoring pasture land.

Management Problems The greatest of all the problems in the park is the management of the day visitors to the region where public pressure is seriously affecting the environment.

Staff No information

Budget No information

Local Administration Maison du Parc, Le Moulin de Virieu, 2 rue Benay, 42410 Pelussin. Telephone: (74) 87.65.24.

References

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Date August 1987

Queyras Parc Naturel Régional

Management Category V (Protected Landscape)

Biogeographical Province 2.32.12. (Central European Highlands)

Geographical Location The park is situated in south-east France on the border with Italy in the Hautes Alpes department to the east of Vars, Briançon and Guillestre. 44°45'N, 6°55'E.

Date and History of Establishment The site was created as a parc naturel régional in 1977, following Decree No. 75-983 of 24 October 1975 with directives to maintain and preserve the environment, traditional landscape and lifestyles of the region.

Area 60,000ha

Land Tenure Public and private ownership

Altitude over 2,000m

Physical Features The limestone Queyras is a distinct geographical region of the Alps which constitutes the Guil river basin and its tributaries, which runs from its source at the foot of Mount Viso to its junction with the river Durance. The region is rich in lakes, waterfalls and mountain springs, as well as valleys like the narrow Guil gorge which represents the only mountain pass in the area.

Climate The region is described as having a "meridionale" climate with a higher percentage of sun-days and lower rainfall than in coastal regions. Winter snowfalls are succeeded by long dry periods.

Vegetation The Queyras is rich in mountain and subalpine vegetation with up to 2,000 species of plant ranging from mediterranean-type flora to alpine species. Dominant forest communities are represented by larch *Larix europea*, spruce *Picea* sp., pine *Pinus sylvestris* and fir *Abies* sp.

Fauna The park is rich in high altitude species such as marmot *Marmota marmota* and mountain hare *Lepus timidus*. The craggy habitats are nesting areas for a diversity of raptors.

Cultural Heritage No information

Local Human Population The park covers 11 parishes (communes) of the Hautes Alpes. The population declined from 8,476 inhabitants in 1836 to just 1,882 in 1968 and 2,000 by 1984. The return of people to the region has been due largely to the efforts of the Ministry of Agriculture through the establishment of Centres of Agricultural Technology. Tourism has been used as an essential element to renovate the rural economy and maintain country life in the Queyras. The area is largely made up of small market towns and hamlets which still become very isolated in winter. St. Véran represents one of the highest parishes in Europe at 2,000m. Livestock breeding and rearing is one of the main economies of the region.

Visitors and Visitor Facilities At the Park information centres, with headquarters at Guillestre, there are audio-visual displays and exhibitions about the Queyras countryside. Winter ski facilities (5 centres), hiking, canoeing, fishing, climbing and horse riding activities are widespread. There are also holiday villages, gîtes and hotels available in the Queyras region.

Scientific Research and Facilities No information

Conservation Management The policies of the park authorities are to maintain an equilibrium between agriculture, rural crafts and tourism. As one example, in the parish of Arrieux, the authorities rented out 1,000ha of summer grazing land to stock herders in preference to developing the area for tourism. Reserves have been established or are in the process of creation in areas of highest nature conservation interest. There is a botanical reserve in the valley of Escrin on the south-west park boundary near Vais (access is restricted to between June and October) and a réserve naturelle is being created in the south-east of the park on the Italian border.

Management Problems No information

Staff No information

Budget No information

Local Administration Maison du Parc, Avenue de la Gare, B.P. 3, 05600 Guillestre. Telephone: (92) 45.06.23.

France

References

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Date August 1987

Vercors Parc Naturel Régional

Management Category V (Protected Landscape)

Biogeographical Province 2.32.12. (Central European highlands)

Geographical Location The park is located 10km south-west of Grenoble in the Rhône Alps, Drôme and Isère departments. There are six regions in the park, those of Coulmes, Quatre-Montagnes, Royans, Diois, Vercors central and Trieves. 44°45'-45°15'N, 5°18'-5°22'E.

Date and History of Establishment The site was created as a parc naturel régional in 1970 under the Decree No. 67-158 of 1 March 1967 to maintain and preserve a traditional landscape and lifestyles of the region (legislation updated by Decree No. 75-983 of 24 October 1975).

Area 135,000ha

Land Tenure No information

Altitude 300-2,300m

Physical Features The park is situated on a high plateau with an average altitude exceeding 1,200m. It is made up of karst limestone mountains, typified by crags, scree slopes and caves such as the 100m high Grotte du Bournillou. There is extensive evidence of glacial action and fast flowing mountain streams are not uncommon.

Climate No information

Vegetation The park is represented by a very diverse flora and a total of 50% of the park area is under forest cover of pine. The largest forest is the Forêt de Lente. The flora is at a climatic boundary between north and south Alps, with distinct altitudinal vegetation zonation. Woodland types include those of pine *Pinus sylvestris*, spruce *Picea* sp with fir *Abies* and also woods with beech *Fagus sylvatica* and white oak *Quercus pubescens*. Amongst the dominant ground flora are various *Campanula* sp, *Gentiana* sp, *Lilium martagon*, *Calamagrostis* and *Carlina* sp.

Fauna Due to past hunting pressure the natural alpine mammal fauna is sparse but includes red deer *Cervus elaphus*. Other animals include the rare *Pernis apivorus*, *Falco peregrinus*, *Aegolius funereus*, *Dryocopus matius* and *Circaetus gallicus*.

Cultural Heritage The region is important for a number of religious establishments including the renowned Chartreuse Abbey. The area also became important in the winter of 1942-43 as the centre for the French Resistance.

Local Human Population In the park boundaries there are 60 parishes (communes) of the Isère and Drôme departments (26,000 inhabitants). The populations are much divided and separated into small communities due to the natural barrier of the mountain. The economy tends to be very rural and immense flocks of sheep and goats spend the summer in the region, following transhumance from winter pastures in the low-lying Crau and Camargue regions near the Mediterranean coast. In the valleys are fruit orchards of cherry and apple, as well as olive, and vineyards. The Association pour la Promotion des Agriculteurs du Parc and the

Association Régional pour les Metiers du Bois were established in the 1970s chiefly to promote park farm products such as cheese and wood and to combat the import of cheap products and the destruction of local communities.

Visitors and Visitor Facilities The Maison du Parc, acting as the information centre for the park region, includes audio-visual facilities and exhibitions about local themes. There are a number of museums including the Museum de la Memoire du Royans, two speleological centres and a museum for the French resistance. There are various "centres of discovery" and facilities for camping, hiking and riding. There are over 23 ski runs and ski resorts, largely created for weekend trips in winter. Holiday villages are situated at Villard-de-Lans. Other accommodation includes hotels, auberges and rural gîtes.

Scientific Research and Facilities Research facilities include a centre of ecology, the laboratoire de biologie végétale at St. Martin d'Herès, run by the Comité Scientifique du Parc naturel Régional du Vercors at the Maison du Parc. The Maison de la Flore and Chamaloe acts as an information and documentation centre for the flora of the region. A number of animal introductions have been undertaken in the region, including moufflon in 1958 and marmot since 1970 (Wirth, H 1979).

Conservation Management The parc naturel régional is primarily in existence to maintain the agriculture and lifestyle traditions of the region. A réserve naturel des Hauts Plateaux du Vercors is located between 1,400 and 2,400m and was created to protect the regional watershed from pollution.

Management Problems Many of the high altitude meadows and woodlands are threatened by the creation and extension of ski stations and increased recreational disturbance.

Staff No information

Budget No information

Local Administration Maison du Parc, Chemin des Fusillés, B.P. 14, 38250 Lans en Vercors. Telephone (76) 95.40.33.

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Date August 1987

Volcans d'Auvergne Parc Naturel Régional

Management Category V (Protected Landscape)

Biogeographical Province 2.09.05. (Atlantic)

France

Geographical Location The park is located south-west of Clermont-Ferrand in the Cantal and Puy-de-Dôme departments. The park extends in a north-south direction for 120km along the Massif Central. 44°55'-45°5'-N, 2°00'-3°15'E.

Date and History of Establishment The site was created as a parc naturel régional in 1977 under the Decree No. 75-983 of 24 October 1975 to maintain and preserve the traditional landscape and lifestyles of the region. It represents the largest of the regional parks in France.

Area 348,000ha

Land Tenure No information

Altitude Up to 1,885m

Physical Features The park consists of a landscape of extinct volcanoes, plateaus and lakes. The massif of the Puy region is represented by a chain of 80 extinct volcanoes dominated by the Puy de Dôme (1,465m). The area is rich in basalts, granites, tufa and other materials of volcanic origin from the Tertiary period. There are two volcanic lake dams, one at Aydat and the other at Cassière, as well as a multitude of lakes of glacial origin. In the deeper volcanic lakes there are thermal inversions, the hypolimnion is very stable and unusually rich in silica, iron and hydrogen sulphide. Lac Pavin in particular is noted for a characteristic formation of diatomaceous sediment (Carp, 1980). The area is also typified by large areas of poorly drained acid soils.

Climate Snow is not uncommon.

Vegetation The park is represented by a diverse flora, ranging from small broadleaf woodlands and conifer forests, plateau pastures and peat-bogs. Woodlands are dominated by oak *Quercus*, sweet chestnut *Castanea sativa* and beech *Fagus sylvatica*. The high altitude fir forests of *Abies* are most well represented at Col de Guéry. Ground flora species include carpets of daffodils and white narcissus. Wild Orchid are frequent, especially *Orchis provincialis*, along with other monocotyledons such as Herb paris *Paris major*.

Fauna The fauna is typified by a diversity of forest dwelling species such as the red squirrel *Sciurus vulgaris*, European genet *Genetta genetta*, badger *Meles meles* and red fox *Vulpes vulpes*. Moufflon *Ovis musimon* have been re-established in the montaine zone. The great diversity of birds include the red kite *Milvus milvus* and goshawk *Accipiter gentilis*. The black woodpecker *Drycopus martius* is also present (Duffy, 1982). The fish species in the lakes include stable populations of trout, char and crayfish.

Cultural Heritage The inhabitants of the region still keep to their traditional lifestyles, based on market gardening and livestock herding. The annual transhumance of flocks of sheep and goats to summer pastures has been repeatedly undertaken for centuries. Architectural features of the park include the Norman church of St. Nectaire and the Château of Murol.

Local Human Population The park has a population of over 92,000 inhabitants living in 129 parishes (communes) (Cantal and Puy de Dome departments). The inhabitants essentially live in small villages grouped around main market towns, where there are still fairs in spring and autumn. The economy is largely based on livestock rearing and pasture grazing along with cheese manufacture and associated industries.

Visitors and Visitor Facilities The main centre for tourists is the Centre de Découverte des Milieu Naturel where there are audio-visual displays and exhibitions explaining the activities of the park authorities. There are many other information facilities including the Maison de Fromage (a cheese centre), a mineral museum, a cattle centre (buronnier) and the museum of traditional life. There are also 8 winter ski resorts, flying schools, thermal baths and 14 aquatic centres.

Scientific Research and Facilities The Centre de Découverte des Milieux Naturel et Rural de Montlosier offers multiple activity themes including courses and field excursions to study geology, volcanology, botany, ornithology, solar energy and ecology. Introductions of moufflon have been undertaken at Cantol and the Mont Dore. Botanical gardens growing native and local species are at the Maison de la Gentiane et de la Nature at Riomes Montagnes.

Conservation Management The park objectives include maintaining the cultural and economic heritage in rural areas of the park and protecting the environment from public pressure. An important aspect of the park activities includes wildlife educational programmes aimed at the young.

Management Problems Past declines in livestock grazing on the montane pastures has resulted in the loss of traditional lifestyles. The remaining livestock are now brought to the summer pastures by lorry or train. Much of this old pasture has also been converted to forest land.

Staff No information

Budget No information

Local Administration Centre de Couverte du Milieu Naturel et du Milieu Rural, Montlosier près Randanne, Commune d'Aydat, 63210 Rochefort Montagne. Telephone: (73) 21.27.19.

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Date July 1987

Vosges du Nord Parc Naturel Régional

Management Category V (Protected Landscape)

Biogeographical Province 2.09.05. (Atlantic)

Geographical Location The park is situated in the lower Rhine, on the frontier with West Germany at the base of the Vosges massif (the Moselle and Bas Rhin departments). It adjoins the hunting reserve of the Petite Pierre. 48°55'N, 7°35'E.

Date and History of Establishment The site was established as a parc naturel régional in 1976 following Decree No. 75-983 of 24 October 1975 with directives to maintain and preserve the environment, traditional landscape and lifestyles of the region.

Area 118,000ha (including 6,000ha of woodland).

Land Tenure Public and private ownership

Altitude up to 500m

Physical Features The park is located in the northern Vosges mountains, an area of undulating relief, of incised valleys and lakes. The landscape is divided into three types: the hills of the piedmont Vosges, the Lorraine plateau and the intervening terrain of Tertiary deposits. The Piedmont Vosges mountains are largely of limestone origin although there are also sandstone deposits on the fringes. The soils are highly calcareous except in the sandstone areas where poor siliceous deposits predominate. The limestones are rich in fossils. The massif is surrounded by the cultivated plains of Alsace.

Climate The mean temperatures of the coldest month are 0.9°C and of the hottest month 19°C. Average annual rainfall levels approximate at 600mm. Deep snows occur in winter.

Vegetation The flora of the area is extremely rich, with over 600 species recorded. More than half of the Park is high forest of oak *Quercus* sp, beech *Fagus sylvatica* and pine *Pinus sylvestris*, as typified by the Forêt de Mouterhouse. Conifers include fir *Abies*, *Picea* and *Pinus*, many of which have been introduced as plantations. The remaining areas of the park are represented by copses, grazed grassland and hay meadows. Natural grasslands exist on the calcareous soils as at Bastberg, whilst peat bogs are present on sandy soils at higher altitudes (Polunin and Walters, 1985).

Fauna The forest fauna of the Vosges Park is quite rich and includes red squirrel *Sciurus vulgaris*, red deer *Cervus elaphus*, roe deer *Capreolus capreolus* and wild boar *Sus scrofa*. Of the 130 bird species that have been sighted there are 84 nesting species including the capercaillie *Tetra urogallus* along with the cuckoo *Cuculus canorus*.

Cultural Heritage The region has numerous archaeological remains including many ruins from the Gallo-Roman epoch. The traditional glass industry, originally based on forest fuels, was first mentioned in 1586 at Meisenthal and aided to build up a rich economy in the area where there are still 40 extant chateaux.

Local Human Population There are 97 parishes (communes) (and 82,000 inhabitants) in the park (Moselle and Bas-Rhin departments), representing a relatively dense population of 70 inhabitants per km². The majority of the population has moved away from rural life into large towns following the upheavals after world war 2. To-day there are nearly 2.5 million people in the massif foothills around Strasbourg, Palatinat and Rhenanie. Traditional crafts and industries such as the timber trade, herding and small-scale agriculture (polyculture) are threatened as people continue to migrate to jobs in the metal industry and glassworks. The tourist industry is of major importance in the area, the current threat being an excess of preservation, commercialisation of the countryside and the transforming of the region into a "reserve-museum".

Visitors and Visitor Facilities The main park offices and centre for information are at la Petite Pierre, Wingen sur Moder. There are park exhibitions, talks, courses, parkwalks and literature about the Vosges. Accommodation is available in hotels, auberges, gîtes and campsites. There are five horse-riding centres, cycle, canoeing and hiking trails, visits to quaint villages and citadels and excursions to historic towns such as the châteaux of Lichtenberg, La Petite Pierre and Hohenbourg as well as the churches of Neuwiller-lès-Saverne. There are also museums, such as the museums of the petrol industry, town life and natural history. The glass museum, Maison de Verre et du Cristal, at Meisenthal describes the glass industry history from its founding in 1586, as well as the development of the Royal glassworks for Louis XV in the Pays de Bitche. A wildlife park, parc animalier, exists at Schwarzbach.

Scientific Research and Facilities A bird observatory has been installed on the edge of the étang de Baerenthal. The Maison des Forêts undertakes ecological work.

Conservation Management The park authorities manage the park to prevent excessive changes in the landscape and local industries. Forestry management is a major concern for the Vosges massif. The Office National des Forêts undertakes all forestry management and supplies information to visitors. There are proposals to set up a nature reserve covering 8,000ha to protect the more delicate habitats.

Management Problems The greatest threat to the region has been the change of economy towards increased mechanisation of existing industries, with such effects upon the environment as widespread conifer afforestation and associated loss of native broadleaf woodland and soil humidity. Farmers continue to experiment with new crops which tend not to be in keeping with the park's aim of retaining the traditional landscape. Further concern is for the loss of the primary moorland habitats on the Haut Vosges ridges which are gradually being replaced by artificial meadows.

Staff No information

Budget No information

Local Administration Maison du Parc, La Petite Pierre, 67290 Wingen sur Moder (Tel: 88/70 44 30)

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Date July 1987

Côte Bleue Regional Marine Park

Management Category V (Protected Landscape)

Biogeographical Province 2.17.06 (Mediterranean Sclerophyll)

Geographical Location The Regional Marine Park is located on the western side of the Gulf of Marseille on the mediterranean coastline (in the Department of Bouches-du-Rhône) It extends 1.6 km off the coast of Carry-le-Rouet municipality, between La Balise de l'Ane and Cap de Nantes. The peripheral zone includes also the municipalities of Ensues-la-Redonne, Le Rove, and Sausset-les-Pins. 43°19'N, 5°10'E.

Date and History of Establishment The Regional Marine Park was set up in September 1983 while the Marine Park encompassing the Carry-le-Rouet fishing port and seaside resort was established in 1982 (30 December) by local municipalities. The park regulations include a concession of sea space for the protection and rehabilitation of the marine environment, fishery protection and development, and for educational purposes valid for an initial period of three years. The concession was renewed on 30 December 1985 for another three years. The PNR was set up by agreement with the State, the Regional Council, the General Council of Bouches-du-Rhône and government agencies. Regulations are indicated by Prefectorial Decree No. 17/84 of 18 June 1984 and Decree of "Direction des Affaires Maritimes" No. 8 of 17 January 1983.

Area 3,070ha of which 70ha is a marine reserve. Length of coastline 17.5 km, and the peripheral zone extends on average 1.6km offshore (a marine zone of 3,070ha, established by local municipalities).

Land Tenure State ownership

Altitude No information

Physical Features The coastline consists mainly of cliffs of the Estaque mountains which divides the Mediterranean from the Etang de Berre. The rectangularly shaped marine core zone includes mainly rocky bottoms and sandy beds. Maximum water depth 73m, average water depth 30m.

Climate Typical Mediterranean climates with average annual water temperature 18°C (winter average 14°C, summer average 20°C). The Marseille temperatures range from 5.7°C in the coldest month to 23.3°C in the warmest month. Annual rainfall figures are 547mm. Water salinity 35mg/l.

Vegetation Extensive grass beds of *Posidonia oceanica* occur in the marine area whilst coastal vegetation is dominated by holm oak scrub *Quercus ilex*, rock rose *Cistus* sp. and pine *Pinus maritima* on the coast.

Fauna The park is represented by typical Mediterranean marine benthos. The fish species *Epinephelus guaza* and *Sciæna umbra*, which had not been recorded in the area during the last twenty years, have been observed recently.

Cultural Heritage No information

Local Human Population The coastal area has been inhabited and exploited for its rock quarries since early historic times. At present 15,000 permanent residents and an estimated 1,500 summer temporary residents live on the coasts. Tourism is one of the main economies of the region.

Visitors and Visitor Facilities The peripheral marine area is used for boating, diving and swimming by summer visitors, and for fishing by 24 professional fishing boats. The coastal cliffs are barely accessible and therefore not over-frequented. Information, training and marine heritage promotion campaigns are planned.

Scientific Research and Facilities Experiments in mytiliculture (13,000 white bream alevins were released in 1981 and 2,500 lobsters in 1982) and artificial reefs have been initiated (with the immersion of alveolar shelters in 1983). Educational activities include marine ecology and diving classes, exhibits and conferences. Research studies on marine grass ecology and distribution, cartography and pollution are carried out in co-operation with the "Office Régional de la Mer", Marseille. A scientific committee was set up on 2 April 1983.

Conservation Management The regional park is managed by the administration board of the "Club de la Mer" association, which is composed of four local Municipality representatives. The management of the marine park is the responsibility of a non-profit making association set up in 1901 called Association du Parc Marin de la Côte Bleue with representatives of Carry-le Rouet, public figures and various user groups. Fishing, diving, trawling and anchoring are forbidden within the 70ha core zone, whose boundaries are indicated by buoys. No specific regulations exist for the peripheral zone. A cleansing system has been installed.

Management Problems There is an element of over-exploitation of marine resources by commercial interests along with increases in spear fishing and sea-urchin collection. Continuous incursions by fishing boats occur within the 3 miles (5.5km) protection zone.

Staff One person works permanently in the park.

Budget The budget for 1984 was 690,000 French francs partly provided by the Region (65%) and partly by the Bouches-du-Rhône department (35%). In 1985, additional funds have been provided by the national government, the local municipalities and the Council of Europe. The marine park's finances are provided by the Regional Council for Provence-Alpes-Côte d'Azur (Regional Sea and Aquaculture Board), the Maritime Service of the Highways Department

(Marine Pollution Abatement Board), the local authorities, the Scientific and Technical Institute for Sea Fishing, the French Federation for Underwater Research and Sport and various regional sporting clubs including that of Carry, the marine biology laboratory and the marine plant biology laboratory of the Marseille science faculties, St-Jérôme and Luminy.

Local Administration Director, Parc Regional Marin de la Côte Bleue, Club de la Mer-Sausset, B.P. 37, 13960 Sausset Les Pins, France.

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Date August 1987

GREECE

Area 131,957 sq.km
Islands account for 25,042 sq.km

Population 9,740,400 (1981)

Parks and Reserves Legislation A law of 1937 enacted with the support of the Hellenic Alpine Club proposed the creation of five national parks (listed as Ainos, Olympus, Parnassus, Parnes and Samaria), each not less than 3,000ha in area with a buffer zone of 4,000ha. However, under this law, only one park was established and given sufficient protective status (IUCN,1971). Public access to three protected islands (Antimilos, Dilas and Guioura) was successfully prohibited in the constitution of 1937 and 1938 (Gryn Ambroes, 1980). Until recently the 3,000ha lower limit has meant that sites below this figure are automatically disqualified for national park status (IUCN,1971).

Environmental legislation is considered to be advanced but is poorly understood and barely implemented (IUCN, 1987). Article 24 of the 1975 Constitution requires that the protection of the natural and cultural environment is an obligation of the state and Article 24 and Article 117 refer to the protection of the Natural Forest environment. The government has undertaken to develop an appropriate legislature and administrative framework for environmental protection (Cassios, 1980). A new law for the Protection of the Environment covers environmental planning and the marine environment of the entire territory (Law No. 360, 18 June 1976). Article 1.5 defines the environment as embracing land, sea, flora, fauna and natural resources. The institutional and procedural mechanism allows the preparation of national and regional plans as well as specialized plans covering particular sectors or activities. The plans are integrated with economic and social development programmes (Gryn Ambroes, 1980). The new law adapted to the EEC Birds Directive 79/409/EEC is still under preparation and there has been no substantial improvement in the existing hunting regulations. However, a provision of the new Housing Law has been used successfully to protect wetlands (ICBP,1985).

In early 1986 a new institutional law was under preparation and the Greek Cabinet submitted it as a framework bill on the environment to the Parliament on 4 June 1986, to be implemented in detail by a series of Presidential Decrees (EER, 1986). This has recently been ratified by Parliament (Law 1650/1986) but requires further clarification by decrees, and till this stage is passed the existing laws will remain valid (Kassioumis, 1987). However, current legislation has several negative features including the lack of public involvement, insufficient sanctions and administrative difficulties. The new law includes sections covering the protection of natural resources, and landscapes (and introduces certain changes in the existing laws such as the Law 1469/1950 concerning landscapes of natural beauty and Law 996/1971 about national parks, aesthetic forests and natural monuments), environmental protection of planning and the establishment of responsible organisations. Five new categories of protected area are recommended: asolutely protected natural area; protected natural area; national park; protected natural monument; protected landscapes and elements of landscapes; and areas for ecodevelopment. These, once they are established, will become the responsibility of three ministeries, namely Agriculture, Environmental Planning and Public Works and also Manufacture, Energy and Technology (Kassioumis, 1987).

National parks, aesthetic forests and national monuments are established by the Greek Forest Service under the Presidential Decree 996/1971 (Government Gazette, 6 October 1971) (Wade, 1987) and 86/1969. The Forestry code (86/69) dealt with national parks, as well as hunting legislation and faunal, floral and habitat protection. Article 78 of the former governs the establishment of national parks in forested areas for their protection, for the development of tourism and for scientific research. Section 78.1b defines their areas, extensions and boundaries. Section 78.1c allows for the creation of a Council on National Parks, which is required to meet at least biannually, or by the decision of the Minister of National Economy, to advise him of necessary measures. Section 78.1a and 78.2 and 78.3 states that national parks, and aesthetic forests and "preserved monuments of nature" are established by Royal Decree

issued at the proposal of the Council of Ministers and at the acknowledgement of the Technical Council of Forests (Cassios, 1980). The Minister of National Economy may consider the establishment of preserved monuments of nature, trees, and sites of special botanical, phytogeographical, aesthetic and historic meaning. Section 78.4 governs the alteration in character of a protected area's status from one legal classification to another. It also covers the changes to existing boundaries, extensions and areas. Amendment Article 78.A to Article 78 of L.D. 86/1969 governs the granting of a National Decree of Nature to national parks which have a general interest and tourism function. This is granted by Royal Decree issued at the proposal of the Minister of National Economy acknowledged by the Experts' Committee, to the competent Prefect. The Expert Committee is chosen by the Minister and includes the General Director of Forests as President, the Dean of the Faculty of Physics and Mathematics of the University of Athens, and the President of the Greek Associations for Conservation of Nature. Amendment Article 79 to Article 79 of L.D. 86/1969 defines the "synthesis, extension and regulation of the functions of the National Parks". Section 1.a states that the nucleus should be not less than 1500ha (except for islands). Section 1.b defines the regional zone around the nucleus, to be of a size at least equivalent to the core area. Section 2 notes that a regulation is issued by the Ministry of National Economy (and published in the State Gazette) which sets out the organisation, the function and the management of each national park, although in practice these specific regulations do not exist (Wade, 1987).

Amendment Article 80 to Article 80 of L.D. 86.1969 describes the prohibitions covering the nucleus of national parks and the preserved monuments of nature and the organisation of the regional zones of the national parks and the aesthetic forests. Within the core zone this covers the excavation and exploitation of minerals, digging, placement of advertisement hoardings, industrial activities, housing and other constructions, forestry activities, pasturing, hunting and fishing. The regional zones are governed by seven separate activities controlled by the competent forestry service.

Amendment Article 81 of Article 81 of L.D. 86/1969 governs the use of the Forestry Code (Cassios, 1980). By law, *national parks* are owned by the government but purchase of private land within the park boundaries is permitted (Cassios, 1980b). The ownership of aesthetic forests can be public, municipal or private; protective status was extended to wetlands by the Public Law 998/1979 issued to cover forest and forest land protection and under Decree 67/1981 to cover protection to fauna and flora whilst wetland game reserves are established by the Ministry of Agriculture under a decree of 1980 (IUCN, 1987). The Ministry of Coordination issued Public Law 360/1976 dealing with regional planning and the environment and specifically controls the use of certain defined zones and allows their protection, restoration or general environment improvement, followed by the Forest Service Law P.D. 61/1980 for the protection of flora and fauna.

The Forest Service, which is the authority controlling hunting in Greece, also establishes special areas such as game refuges, game breeding stations and controlled hunting areas (of which there are over 500 designated to date) under Law 177/1975 (Article 254) and Presidential Decree 453/1977 (Kassioumis, 1987). The National Council for Planning and the Environment is empowered to take decisions to designate areas (20 so far) which although not yet legally protected in any form, have their protective status widely recognized and acknowledged by the appropriate authorities.

Natural Monuments are areas less than 1,500ha and need not be forested. Prohibited activities in core areas of national parks and natural monuments include quarrying, industrial constructions, grazing, hunting and fishing and general degradation of the sites. Aesthetic forests are open for recreational and tourism activities. Wetlands are officially classified as natural monuments with special treatment.

There are no special laws on *marine protected areas* (government legislation established a marine park in the Northern Sporades in 1986/7), and the establishment of a protected area by a local authority is quite exceptional, but has occurred such as in an order by the Prefect of Evros, of 8 December 1978 establishing a hunting reserve in the Evros delta. This was possible under application of Articles 251 and 267 of the Forestry Code (Gryn Ambroes, 1980). The World Heritage Convention was ratified on 17 July 1981; the Convention on Wetlands of

International Importance was acceded to on 21 August 1975 and the Bern Convention on European Wildlife ratified in 1982. As required under EEC Birds Directive 79/409/EEC Article 4 Member States are obliged to identify and protect important bird areas. The ICBP-EC/WG identified 132 IBA's but by 1985 the government has proposed only 21 sites as Special Protected Areas (ICBP,1985).

Parks and Reserves Administration and Management Under the 1937 law national park administration was to be placed under the Forest Service of the Ministry of Agriculture. The responsibility for national parks and nature reserves was given to the Section of National Parks and Aesthetic Forests (later renamed the National Park Department (1983) but the name had reverted to the original by 1985). This section is one of four reporting to the Protection of Forests and Forest Environment Division, which is one of ten under the Forest Department of the Ministry of Agriculture. Overall environmental activity was coordinated by the Secretary of Physical Planning, Settlements and Environment of the Ministry of Coordination (IUCN, 1987). The National Parks Section is headed by a top forester with a staff of two other foresters, two forest technologists and two support staff (Wade, 1987).

Two Ministries have responsibility for nature conservation. Originally it was administered by the Ministry of Agriculture further controlled by regional forestry departments and locally by forest inspectorates and game wardens. In 1978 the Ministry of Coordination established the National Council for Regional Planning and the Environment governed by law 360/1976, but although not abolished, most of its responsibilities were taken over by the Ministry of Regional Planning, Housing and the Environment itself created in 1980 (later renamed the Ministry of Environment, Regional Planning and Public Works). In 1985 the Secretariat of the National Council was incorporated into the Ministry of Environment. The State Forest Service has the responsibility for Conservation work which is carried out by its national park section (Duffey, 1982). It is also responsible for applying criteria for the selection as well as management of national parks. Of the ten national parks only one has staff and active management, but work is being carried out to produce general management plans for the ten national parks and towards establishing Natural History Museums in each of them. The recreation function is not considered to be a main objective, unlike education, landscape protection and scientific research. However, several national parks (Parnes and Prespa) have heavy tourism pressure and man-made landscapes and as such maybe better defined as regional parks. One positive feature is that every year the budget for national parks increases at a higher rate than for other Forestry Service activities. The budget for the national parks is, however, exceptionally small. The fund in the five-year 1983-87 forestry development plan was 2.5billion drachmas, but in the period 1981 to 1986 the annual expenditure on national parks was only in the region of 1.9million and 119,8million drachmas (Wade, 1987).

The Forest Service is the controlling body for aesthetic forests, and national monuments, whilst the Directorate General of Forests and Forest Environment controls game reserves, hunting areas and other reserves, which cover some 600,000ha in total. Wetland Conservation is the initiative of the Ministry of Planning, Housing and the Environment which is now in the process of establishing boundaries based on the results of study projects which have been completed for each wetland (ICBP,1985), although the authority responsible for implementation of the Wetlands Convention is the National Council for Physical Planning and the Environment at the Ministry of Coordination (IUCN, 1987). All registered wetlands are administered in collaboration with the Hellenic Society for the Conservation of Nature. For example, Mikra Prespa National Park is administered by the district Directorate of Forests based at Florina. In several cases the local authorities are responsible for fishing and hunting regulations. The Forest District Office responsible for each national park appoints one forester and one forest technologist per park. Since 1983 most parks have two permanent wardens and other (temporary) game staff.

The EEC is supporting the establishment of a biological station on Allonisos, part of the Sporades group, to specifically study the monk seal.

Addresses

- Ministry of Agriculture, Section of National Parks and Aesthetic Forests, 3-5 Ippokratous Str., Athens.
- Ministry of Environment, Planning and Public Works. Directorate for the Environment, 17, Amaliados str., GR-115, 23 Athens.
- Hellenic Society for the Protection of Nature, 9 Kydathineon Street, Athens.

Additional Information Non-government organisations exist; the most important being the Hellenic Society for the Protection of Nature, the Hellenic Ornithological Society, the Pan Hellenic Centre for Ecological Studies and the Union for the Quality of Life. However, there is no coordinating body nor formal government contacts. The National Council for Regional Planning and the Environment created twenty protected areas in March 1980 and February 1981. This figure included 13 wetland sites and the protected forests of Dadin and Paranesti. Information dated 1985 suggested that the major threats to protected areas include road construction, tourism development and forest exploitation. Wetlands are threatened by drainage, tourism and uncontrolled hunting.

The ICBP study for the Birds Directive identified 28 sites of importance for birds (ICBP, 1981) whilst the study for the Council of Europe (ICBP, 1985) identified 73 sites. The EEC biotope study listed a total of 42 sites as being of importance for nature conservation (ICBP, 1982).

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Protected Landscapes

	(hectares)
<i>Unspecified areas</i>	
Theodorou Island	3,450
<i>National Parks</i>	
Aenos	2,862
Mikra Prespa	4,900 *
Mount Oeta	3,010
Parnassos	3,513
Parnes	3,812
Pindos (Valia Calda)	3,360
Sounion	750
Vicos-Aoos	3,400
Subtotal	25,607
<i>Forest Reserves</i>	
Farsala Aesthetic Forest	34
Ioannina Aesthetic Forest	86
Kaesariani Aesthetic Forest	640
Kalavrita Aesthetic Forest	1,750
Karaiskaki Aesthetic Forest	252
Kavala Aesthetic Forest	2,816
Kouri Almyrou Aesthetic Forest	100
Magostos Aesthetic Forest	520
Myticas-Nicopolis Aesthetic Forest	66
Nestos Aesthetic Forest	2,380
Ossa Aesthetic Forest	16,900
Paranesti-Dramas Aesthetic Forest	450
Patras Aesthetic Forest	1,850
Pefkias Aesthetic Forest	27
Sciathos Island Aesthetic Forest	3,000
Steni Aesthetic Forest	674
Tembi Valley Aesthetic Forest	
Tithorea Aesthetic Forest	200
Trikala Aesthetic Forest	28
Vai Aesthetic Forest	20
Subtotal	31,793

Mikra Prespa NP

Management Category V (Protected Landscape)

Biogeographical Province 2.33.12 (Balkan Highlands)

Geographical Location The park is situated on the Greece/Albanian frontier, west of the town of Florina in the Prefecture (Nomos) of Florinis, Makedhonia Province of northwest Greece. 40°40'-40°51'N, 20°57'-21°11'E

Date and History of Establishment The site was created as a National Park on 14 January 1974 by the Ministry of Agriculture under Presidential Decree 46, 14/1/1974 and is administered by the District Directorate of Forests, Florina (State Gazette 13, 25/1/74). The area was designated as a Ramsar wetland site after ratification on 19 November 1974 and as a site of superb natural beauty (State Gazette 86, 10/2/77).

Area 5,200ha (fully protected zone of 4,912ha plus 165ha shoreline of 200m width).
Peripheral zone of 20,777ha

Land Tenure 80% government and municipal ownership; 10% private ownership.

Altitude 852m; surrounding area rises to 2,177m

Physical Features The site consists of parts of two inland lakes (Megali and Mikra Prespa, 4,000ha and 4,350ha, respectively) and lakeshore on the borders of Albania and Yugoslavia. Lake Prespa is a shallow basin with a maximum depth of 7.7m separated from the Megali lake (depth 55m) by a strip of land of alluvial origin, 1km wide and 5km long. Soils on the west bank are calcareous, and on the east acid. Prespa, together with the neighbouring lakes of Ohrid, Megali, and Malik, are the remains of the old Dassaritis Lake formed in the west Pelagonian massif of the Adriatic confluence, probably of tectonic and karstic origin.

Climate Sub-mediterranean climate, somewhat intermediate between Mediterranean and continental. The mean annual precipitation is 565mm; mean annual temperature is 11°C. The lake freezes over in winter (Catsadorakis, 1987, *in litt.*).

Vegetation The area has been much altered by the activities of man yet the area is still rich in floral species. The flora of the park consists of over 1,400 wild plant species (Pavlidis, 1985). Among these there are at least 20 species of orchid and one endemic *Centaurea prespansis*, as well as 11 endemic and 8 non-endemic threatened Greek species (Catsadorakis, 1987, *in litt.*). Around the lake there are extensive areas of *Phragmites australis*, and aquatic species such as *Nuphar lutea*, *Trapa natans*, *Nymphoides peltata*, *Nymphaea alba* and *Oenanthe aquatica* (IUCN, 1987). The surrounding area consists of beech forests *Fagus sylvatica*, oaks *Quercus* sp. and a stand of *Juniperus excelsa* which has been declared a National Monument. Other trees include *Carpinus orientalis*, ash *Fraxinus* sp., willow *Salix* sp. and poplar *Populus* sp. (IUCN, 1987).

Fauna The park provides excellent habitat for waterfowl. Up to 1987, 258 species of birds have been identified with 136 of these breeding at the site, including *Pelecanus onocrotalus* and *P. crispus*, *Egretta alba* and *E. garzetta*, *Phalacrocorax carbo* and *P. pygmeus*, *Ardea cinerea*, *A. purpurea*, *Platalea leucorodia* (whose numbers have fallen from 200 pairs to only four pairs) and *Plegadis falcinellus* no longer breed on the lake since at least 1975, as a result of drainage and pollution (Catsadorakis, 1987, *in litt.*) (for a list of bird species see IUCN, 1987). Up to 37 species of mammal have been identified including bear, wolf, jackal, fox, otter, hare, roe deer, wild boar and feral coypu (*Ursus arctos*, *Canis lupus*, *Canis aureus*, *Vulpes vulpes*, *Lutra lutra*, *Lepus europaeus*, *Capreolus capreolus*, *Sus scrofa* and *Myocastor coypus*) (IUCN, 1987). There are records for over 20 species of reptiles and 11 species of amphibians and 14 species of freshwater fish including the endemic *Barbus prespensis* (Catsadorakis, 1987, *in litt.*)

Cultural Heritage There are both ruins and excellently preserved examples of ten Byzantine churches from the 11th and early 15th centuries, situated in the villages of Aghios Germanos, Pili, on the island of Agios Achillios and along the shore of Megali Prespa. Two villages are protected for the traditional architectural styles they exhibit (Aghios Germanos and Psarades) (Catsadorakis, 1987, *in litt.*).

Local Human Population The local population numbers 1,545 inhabitants (1986) dispersed through 12 villages (Catsadorakis, 1987, *in litt.*). The local area is extensively farmed and there is some cattle grazing. Fishing is permitted and the reeds are used by the local people. Fish farming also occurs on the lake (IUCN, 1987).

Visitors and Visitor Facilities The park is a popular tourist attraction and has well developed road systems. Access is from the towns of Florina and Kastoria, to the villages Mikrolimni and Laimos. A system of trails around the lake (5km) was to be developed but there status remains uncertain. It is forbidden to approach the nesting areas. There are first-class hotels in Florina and Kastoria, and small third-class hotels at Mikrolimni and Laimos. (IUCN, 1987). There is also a 50-bed hotel in Psarades within the national park as well as 30 rooms to rent in villages and 10 restaurants (Catsadorakis, 1987, *in litt.*).

Scientific Research and Facilities Several ornithological studies on the lake have been carried out including those by the Ministry of Agriculture; ecological and regional studies. A water quality and fish study is under way at the fish breeding station and a biological station has been founded near Mikrolimni by the Hellenic Society for the Protection of the Environment and Cultural Heritage (IUCN, 1987). A research project to study the management and development of the biology of the Dalmatian Pelican *Pelecanus crispus* in northern Greece is being funded by the EEC (Pyrovetsi, *pers comm.*).

Conservation Management The park was to be managed under the Lake Prespa management plan which unfortunately has yet to be developed. The entire area is apparently under partial protection (70%) under governmental jurisdiction (Greek Forest Service) although there are grave doubts as to the effectiveness of this regime. A peripheral zone has been established covering 16,550 ha, and activities such as grazing and hunting are regulated by the Forest Service. The area around the lake was declared as a reserve in 1971 to protect the pelican breeding colonies. Tourism is prohibited at bird nesting areas. Agriculture continues to be permitted around the lake (IUCN, 1987).

Management Problems A major level of destruction has occurred at this site primarily funded by Public Works Companies, who were themselves funded by the Greek Government as part of an EEC funded Integrated Mediterranean Programme project (EER, 1986). This has resulted in the removal of over 55,000 trees from around the lakes, a massive intensification of agricultural activities and the development of a large fish hatchery scheme within the most sensitive part of the national park. Irrigation and drainage schemes are causing high levels of pollution resulting in the eutrophication of the lakes. The fish farm will have an estimated production level in excess of 100 tons annually with greatly increased ammonia and phosphorus levels (WWF, 1987). There used to be an operational quarry and a disused can factory. Farming and cattle grazing are potentially damaging the lake as is the introduced coypu although this is only presumed and not documented (Catsadorakis, 1987, *in litt.*). The reedswamp was burnt illegally up to 1974 when the practise was stopped resulting in greatly expanded area of reeds which decreased the fish stocks in the lake. More recently Prussian carp have been introduced into the lakes (by the Albanians and the Yugoslavians) and the reeds are now cut legally. Changes have resulted in the eastern part of the wetland to be affected by an irrigation network (IUCN, 1987). There are plans to divert the river currently flowing into Megali Prespa (Catsadorakis, 1987, *in litt.* & Pyrovetsi, *pers comm.*).

Staff One range forester, part-time based at Florina and two permanent Forest Service guards (1987) who lack vehicles.

Budget 8,500,000 drachmas annually (1980)

Local Administration Range Forester located in Laimos and supervision by the District Directorate of Forests, Florina.

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Date September 1987

GERMANY, FEDERAL REPUBLIC OF

Area 248,528 sq.km

Population 61,420,700 (1983)

Parks and Reserves Legislation Constitutionally, West Germany is a federal republic comprising of eleven member states (Länder). Protected area categories, establishment procedures and responsibilities for nature conservation are defined in the nature conservation legislation only at the state level. However, there are general legislative provisions for conservation such as the Federal Law on Nature Conservation (1976) which specifies State landscape programmes, regional landscape development plans, local landscape plans, and their respective contents. General measures are set out for the protection, maintenance and development of nature and landscape. These measures define which general activities and land uses are considered to be in conflict with nature and landscape. These are "alterations" of the physical appearance, and/or variations of land use, which can considerably or permanently impair the capacity (Leistungsfähigkeit) of the ecosystem (Naturhaushalt), or the visual appearance of a landscape. Individuals causing such landscape "disturbances" are obliged to abstain from further avoidable interference and to compensate unavoidable encroachments if the operation under consideration is subject to controls. Further, the phrasing of the relevant sentence concerning agriculture, forestry and fisheries, as "potentially interfering with nature and landscape", allows two - contradictory - interpretations, and at times causes serious conflicts between conservation interests and agricultural concerns. One interpretation is that "farming, as it is consistent with the spirit and purpose of this Act, is not considered as an interference with nature and landscape".

Dealing with recreation in the countryside, the Law refers to the general constitutional right of access and passage, which can be restricted, in order, for instance, to avoid damage to standing crops, or "negative effects for nature conservation". The Länder have adopted their legislation on nature conservation and physical planning in conformity with this Act. There are, in addition, several Orders and Directives relating to species protection, mainly based on international agreements (Holzner, 1986).

At present, existing or potential areas of nature or landscape interests are identified in the regional plans. These plans are based on complex negotiations sometimes lasting up to ten years or more between public authorities, institutions, interest groups and experts; they are led by the regional planning agencies attached to the county governments and who act for the regional planning associations, the members of which are the district and local authorities. The plans are enacted by Länder government orders. National parks and nature parks are established by the Länder; large-scale nature or landscape conservation areas by the counties; smaller ones by the districts. The conservation orders describe a site and its demarcation, and the reasons for its designation; they contain a set of prohibitions, and list the activities for which permission is required and for which exceptions are granted. Depending on the type of conservation area, there are various restrictions on agriculture. These may preclude drainage, removal of landscape features, intensification, the construction of buildings or other permanent facilities, fencing and so on. Usually there are no compensation payments, but there may be grants for active conservation works.

There are five main types of protected areas: nature reserves, national parks, natural monuments/sites, protected landscapes and nature parks. Creation of reserves under the Nature Conservation Law does not exclude hunting and separate declaration of controlled hunting areas or non-hunting areas must be made under the Hunting Laws (Holzner, 1986). Apart from the different categories based on the legal provisions in the field of nature conservation, the forest administration of the Länder has designated small natural forest reserves and natural forest units. No sylviculture takes place in these areas. In accordance with the game laws, it is possible to designate game reserves in order to protect endangered wild animals. Special provisions for the conservation of fish stocks in closed areas exist, according to the laws on fisheries of the individual Länder (Ertz, 1979).

The Federal Republic of Germany ratified the World Heritage Convention on 23 August 1976 and the Ramsar Convention on 26 February 1976, with 20 sites inscribed. The Bayerischer Wald National Park was listed in 1981 as a biosphere reserve. West Germany is also a signatory to the Convention on Trade in Endangered Species (CITES).

Parks and Reserves Administration and Management Nearly all nature reserves are established on private land and in most some form of land use continues. Relatively few of the sites (mostly bird reserves) have staff specifically employed for nature conservation purposes whose expenses tend to be paid from a general budget. At the state level a ministry is responsible for administration of nature conservation together with a scientific and technical agency. Administration and management of nature reserves also has an important place in the work of the "councils for nature conservation and landscape management" which work at local, regional and state administrative levels, advising the authorities concerned. The Federal Institute for Vegetation Research, Nature Conservation and Landscape Management with its Department of Nature Conservation is responsible for research, and provision of advice to federal bodies. Councils for Nature Conservation are established as consultative bodies at all four national administrative levels, federal, state (Länder), region and county. A number of private conservation organisations also own nature reserves, or parts of nature reserves, or have taken over management or wardening of reserves (especially bird reserves) (Ant and Engelke, 1973; Erzt, 1979; Holzner, 1986).

Addresses

- ° Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit, Abteilung Naturschutz, Umwelt und Gesundheit, Postfach 12 06 29, 5300 Bonn 1
 - ° Bundesministerium für Ernährung, Landwirtschaft und Forsten, Abt. 62, Umwelt- und Naturschutz, Rochusstr. 1, Postfach 14 02 70, 5300 Bonn 1
- (Each of the Länder has additional authorities for nature conservation).

Additional Information Two major Federal documents, published in 1986, have officially widened and intensified the debate on environmental problems and advocated solutions to these problems on ecological principles. In the report of the Government's Scientific Advisory Council on Environmental Issues (SRU), for example, the nitrate problem is not only considered to be a groundwater pollution problem, and a health risk, in a number of confined areas, but is also considered to be a country-wide resource pollution and nature conservation problem (a view shared by the Federal Government in its Soil Protection Programme).

There seems to be general concern that even with ten per cent of the land protected, it will not be possible to retain all of Germany's native species. This may be one reason for the SRU to rank species and habitat conservation first, water pollution second, and pesticides third on a priority list of the most urgent environmental issues caused by agriculture, followed by erosion and the required improvement of crop-rotation systems (Holzner, 1986). A number of the SRU points include:

- the immediate establishment of an ecological network system to link up nature conservation areas and to improve the situation in regions with intensive agriculture;
- a supervisory and information system on agriculture;
- an improved legislative framework;
- an increased in compensation payments and management agreement schemes.

Most radical is the proposal to impose a two-fold duty of environmentally sensitive farming on agriculture within the supervisory system: first, to abstain from all avoidable damage to the environment; and second, to obey a number of rules of environmentally compatible farming, derived from the existing local, natural conditions and constraints.

Within the Soil Protection Programme of the Federal Government, agriculture is a major concern, too, followed by the use of land for industrial, infrastructure and housing purposes. Thus, soil protection is seen to be a prerequisite for many tasks in environmental policy, above all for nature protection, species preservation and landscape conservation, as well as for surface and groundwater pollution control. In short, the programme requires the natural resources to be protected as such, irrespective of their abundance or of their state of pollution or disturbance. The amendment of many existing Acts of environmental importance is proposed, in order to satisfy the requirements of this programme. Joint Bund/Länder working groups are at present considering the feasibility of the Government's ideas in order to give recommendations for subsequent legislation. The programme reflects in principle an "ecological approach" to existing issues and to the future management of the environment. It remains to be seen whether the policy proposals will also do so (Holzner, 1986).

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Protected Landscapes

	(hectares)
<i>Nature Reserves</i>	
Ammergauer Berge	27,600
Die Lucie	1,800
Eggstatt-Hemhofer Seenplatte	1,008
Feldberg	3,231
Hahnheide	1,450
Heidenhauschen	114
Hochkienberg in Chiemgauer Alpen	9,500
Hoher Ifen	2,430
Karwendel und Karwendelvorgebirge	19,000
Laacher See	1,743
Lüneberg Heide	19,740 *
Oberharz	7,053
Retterschwanger Tal mit Daumen	2,100
Wahner-Heide	2,630
Subtotal	99,399
 <i>Landscape Protected Areas</i>	
Danube Reservoirs NR &	17,500
Steinhuder Meer NR &	5,780
Subtotal	23,280
 <i>Nature Parks</i>	
Altmühltal	290,800
Augburg-Westliche Walder	117,500
Bayer Rhon	109,000
Bayerischer Spessart	130,700
Bergstrase	40,000
Dummer	3,600

Germany, Federal Republic of

Fichtelgebirge	98,000
Frankenhohe	97,000
Franker Wald	111,600
Frankische Schweizveldensteiner Forest	1,747
Hasberge	86,000
Hessenreuther und Manteler Wald	27,000
Nordeifel	174,300
Oberpfelzer Wald	112,900
Siebengebirge	4,200
Steigerwald	128,000
Steinwald	25,000
Subtotal	1,557,347

Other areas

Baerguendle Oytal and Hoefats	3,850
Buckebergand Suntel	12,000
Deister	9,500
Diepholzer Moorniederung	17,850
Eckernforder Bucht	11,563
Elbe: Bleckede-Lauenburg	1,329
Elbe: Schnackenburg-Hitzacker	2,836
Flensburger Innen und Aussenfoerde	15,000
Gramschatzer	6,000
Grinden-Schwarzwald	15,000
Grosser Ploner See	2,973
Habichtswald	4,000
Hils	10,000
Hoher Vogelsberg	7,000
Hohwachter Bucht	6,849
Kellerwald	12,000
Kermeter	6,000
Nutscheld	5,000
Ostfriesische Meere	7,931
Paderborner Hochebane	3,000
Rheinwald Taubergiesen	1,742
Schachen und Reintel	4,000
Schoenbuch	15,000
Selenter See	2,141
Siebengebirge	4,200
Starnberger See	5,720
Unterer Vogelsberg	10,000
Westerhever Vorlandereien	2,131
Subtotal	204,615

Lüneburger Heide (Luneburg Heath Nature Reserve)

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05 (Middle European Forest)

Geographical Location The protected area lies between Hamburg (40km), Bremen (80km) and Hanover (80km) in the lower Saxony region of northern Germany. 52°59'N, 09°50'E.

Date and History of Establishment The first protection measures were initiated in 1906 when the Verein Naturschutzpark (VNP) purchased large areas of heath and several farm buildings, which later formed the basis of the Nature Reserve. An ordinance was passed in 1921 to protect heath areas not owned by the VNP and these were subsequently declared as part of the nature reserve. After the National Nature Conservation Act (Reichsnaturschutzgesetz) of 1935

the entire reserve area was included in the National Nature Conservation Register. The current legislation is still the 1921 Nature Conservation Ordinance which prohibits alteration or elimination of heath without the permission of the Nature Conservation Authority (only applies to heath areas and not to land under which the NCA has no direct control). Approximately 2,810ha (14.2%) of the reserve is accessible to the public. The remaining area is used by the British Army and NATO (the land being on lease to the Federal Government).

Area 19,740ha

Land Tenure Divided almost equally between the private organisation Verein Naturschutzpark, and the State Forest Administration

Altitude No information

Physical Features The reserve lies on low-lying morainic deposits of sands and gravels, overlain in places by peat deposits (Thompson, 1979).

Climate No information

Vegetation The reserve consists of a diversity of habitats ranging from deciduous and coniferous woods to arable land and grassland areas as well as dry lowland heath and moor. The reserve was established to protect lowland heath, one of the most threatened man-made ecosystems in Europe. The heathland, which represents 4,450ha (22.4% of the total reserve area), is dominated by dwarf shrubs of heather *Calluna vulgaris* and furze *Genista* sp., along with bracken *Pteridium aquilinum*, bilberry *Vaccinium myrtillus* and juniper *Juniperus* sp. Woodlands (50% of the reserve area) consist of birch *Betula* sp. and Oak *Quercus robur*, along with rowan *Sorbus aucuparia* and holly *Ilex aquifolium* (Henke, 1979; Thompson, 1979; Duffey, 1982). There are also plantations and naturalised woodlands of Scots pine *Pinus sylvestris* and spruce *Picea* sp. The pioneering species, birch and pine, are gradually invading onto the former heathland (Henke, 1979; Thompson, 1979). The damper areas have bogs, where a number of herbaceous plants, including cross-leaved heather *Erica tetralix* and also numerous species of moss have been recorded (Duffey, 1982).

Fauna The diverse mammal fauna includes red deer, fallow deer, roe deer, wild boar, hare and red fox (*Cervus elaphus*, *Dama dama*, *Capreolus capreolus*, *Sus scrofa*, *Lepus capensis* and *Vulpes vulpes*). Typical heathland birds include black grouse *Lyrurus tetrix*, hobby *Falco subbuteo*, kestrel *Falco tinnunculus* and raven *Corvus corax* (Henke, 1979; Thompson, 1979; Duffey, 1982).

Cultural Heritage Traditionally the heath areas were used in several ways: for sheep grazing, for bee-keeping and honey production, humus as fertilizer and as sources for building materials (Henke, 1979; Thompson, 1979).

Local Human Population There are some 1,100 inhabitants within the park area. The local economy is based on tourism, agriculture and forestry. The main crops are oats, rye and potatoes and the main timber tree is pine (Henke, 1979; Thompson, 1979).

Visitors and Visitor Facilities The reserve is visited annually by over 3 million people, mostly from Germany, the Netherlands and Denmark. The majority of visitors come to the reserve on day or weekend visits (averages of 200,000 people per weekend in August to October). The village of Wilsede is the information and cultural centre of the reserve. There is an historical museum and information centres (at Niederhauerbeck and Undeloh) and also in the area are inns, hotels and camp sites. Craft and activity centres occur in the park, where tourists can visit honey farms, blacksmiths and wheelwrights (Thompson, 1979). They can explore the park on foot or horseback and there are also facilities to hire bicycles, or horse drawn carriages, but motorised vehicles are prohibited. In addition, there are inns with stable facilities located in and around the reserve (Henke, 1979; Thompson, 1979; Duffey, 1982).

Scientific Research and Facilities The landscape and management plan for the heath was developed following studies by the Lower Saxony State Research Centre for Nature Conservation and Landscape Management. This State research centre was not equipped with sufficient funds or staff to handle a continual research programme to study the heath, and so a special Lüneberg heath research and interpretation academy (Norddeutsche Naturschutz Akademie) was created in April 1981 at Hof Mohr near Schneverdingen on the edge of the heath. Scientific studies are in progress to understand the ageing process and deterioration of the heathland ecosystem. VNP has assisted in heathland investigations, including studies on the changes of the vegetation cover and of fauna in the tank training areas (Henke, 1979).

Conservation Management Lüneburg Heide is one of the best remaining examples of lowland heath in Western Europe. The heath is a man-made landscape which is believed to have originated about 5,000 years ago. Since the reserve is largely in private ownership, it has been necessary to promote the active involvement of local groups and the public in the effective conservation and management of the heathland (legal protection would have the effect of only preventing land use intensification). The Nature Conservation Authority (NCA) has the main nature conservation advisory and supervisory role but has no management function (they have produced a landscape and management plan which has been in use voluntarily since 1969). Management resources have to be implemented largely by the landowners themselves in association with the VNP (Henke, 1979). Management very much involves effective distribution of visitors in order to minimise ecological damage. Parking facilities have been located at numerous places on the fringes of the reserve. Almost all roads are closed to motorised traffic and only local inhabitants are exempt from this regulation. Visitors are also largely restricted to demarcated paths bounded by wooden rails. To maintain the traditional heathland appearance and prevent its reversion to woodland there is a comprehensive system of controlled grazing, use of chemicals and scything. The livestock used are a local breed, heath sheep, related to moufflon *Ovis musimon*, and thought to have been brought to north-west Germany during the Bronze Age. There are about 12 flocks in the reserve, totalling approximately 5,000 animals, which are managed by shepherds and housed in traditional thatched sheep sheds at night (Thompson, 1979). To eliminate tree saplings in the heath there are systematic cutting programmes every year (eliminating pine, spruce and birch, but leaving juniper, rowan, holly and oak). Fire management is not used in the reserve as this form of maintaining heath wood is believed to destroy juniper. Forest areas bordering the heath are managed by the State Forest Administration according to ecological criteria (Henke, 1979; Thompson, 1979).

The British Army uses a proportion of the heath area for military tank manoeuvres. As a result of tank activity, these sections of the heath favour a diversity of wildlife in exposed soil habitats which would be unable to survive in more mature heath land (c.f. the lowland heaths under military management in England). Proposals have been put forward to the Federal Government by the Federal Research Centre for Nature Conservation and Landscape Ecology to designate Lüneberg heath as a National Park (Henke, 1979).

Management Problems The greatest threat to the heathland ecosystem is the spread of regenerating birch and other tree colonisers which invaded the area following the collapse of the traditional livestock grazing regimes and the rise in afforestation programmes in the area (Henke, 1979). The high number of visitors to the reserve has led to a steadily increasing and damaging visitor impact except in the military zones. The tank manoeuvre areas themselves are believed to be harmful to the environment according to the VNP although this appears contrary to experience of lowland heath management under military control in England. In order to stop the military activities in the reserve the VNP have had a legal suit against the Federal Republic of Germany (the lease-holders) for the past few years (Henke, 1979; COE, 1983). Further threat comes from the extraction of ground-water by the Hamburg waterworks and the search for oil and gas. The VNP is currently opposing this potentially damaging activity in the law courts (COE, 1983).

Staff No information

Budget No information

Local Administration (largest heath owner) Verein Naturschutzpark e.V. Stuttgart-Hamburg, Ballindamin 2-3, 2000 Hamburg 1.

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Date August 1987

ITALY

Area 301,268 sq.km

Population 56.9 million (1983)

Parks and Reserves Legislation The new Constitution came into force on 1 January 1948. Article 116 of the Constitution provides for the establishment of five special statute autonomous regions and 15 ordinary statute autonomous regions. They have their own parliaments and governments with legislative and administrative functions peculiar to their region. The coordination of regional activities with national policies is the responsibility of a government commission. Article 9 of the Constitution stipulates that, amongst other responsibilities, the Republic shall protect the landscape and the historical and artistic heritage of the nation (Poore and Gryn-Ambroes, 1980).

With the creation of the Ministry of the Environment in July 1986 (Legge No. 349; *Gasetta Ufficiale* No. 162), there are hopes for the creation of national laws covering nature conservation and the protection of fauna, flora and biotopes (IUCN, 1987). However, a number of measures dealing with the natural environment have already been adopted by using laws which contain certain provisions suitable for conservation purposes, but which were designed to achieve different objectives (laws on fishing, hunting, protection of soil); by measures enacted by Parliament relating to specific environmental areas, such as those Decrees governing national parks; by use of specific regional measures also relating to particular environmental areas; by administrative decisions by Central Government relating to specific areas outside of national parks and as a result of international agreements (Commission of the European Communities, 1979).

The earlier national parks were created by separate legislative provisions between 1922-23 and 1934-35 to protect fauna and flora, to preserve geological formations, to safeguard the beauty of the landscape and, with one exception (Gran Paradiso), to promote tourism (IUCN, 1987). Thus each park has its own constitution, amended and completed by enabling regulations which define the individual institutions which exist in that protected area (Abruzzo National Park Royal Decree No. 257, 11 January 1923 and Law No. 1511 of 12 July 1923; Gran Paradiso National Park Royal Decree Law No. 1584 3 December 1922; Stelvio National Park Law No. 740 25 April 1935; Circeo National Park Law No. 285 25 January 1934 and Calabria National Park law No. 503 2 April 1968) (Saussey, 1980). The result of this individualistic approach is that there is no one statute covering the different categories of protected areas and with the exception of Gran Paradiso and Calabria, the ambiguity between conservation and tourism objectives has contributed to the development of conflicts. The most serious of these are due to incongruous residential development, uncontrolled access to the parks and the development of facilities (Commission of the European Communities, 1979).

In addition to the national park legislation, some protection is given under a law administered by the Ministry of Culture and Environmental Heritage, responsible for "beauties of nature". This has been utilised effectively by nature conservation organisations to control developments in areas bordering national parks (Poore and Gryn-Ambroes, 1980). The necessary legal instrument for establishing a protected area is most frequently promulgated by the central government and after requisite studies have been completed, consultations are held with one or more of the following: government departments; national nature conservancy council; the public; professional and scientific bodies and local bodies. Sometimes consultations are limited to the various government services. However, in the inter-war period the national parks were created without any prior consultation with the local authorities and populations and without adequate compensation, and as a result neither the national parks nor the laws which created them have ever been respected (Poore and Gryn-Ambroes, 1980; Saussey, 1980) and are likely to harbour future problems (IUCN, 1987). Any modification of a protected area may only result from an action taken in the same form and by the same authority as for its designation.

The main categories of protected area are nature reserves, national parks and regional parks and natural parks. *National Park* land is generally in the ownership of local authorities or private individuals (Poore and Gryn-Ambroes, 1980). In the 1970's the national parks were enlarged by Presidential decisions made on recommendations of the Ministry of Agriculture and Forests under existing laws (Poore and Gryn-Ambroes, 1980).

The Hunting Laws are extremely weak (Duffey, 1982) and under Law No. 968 hunting was declared illegal in national parks, but may be authorized by special permit, or for stock control. Poaching fines are very high (five times the value of the animal, for example, 5M lira, the equivalent of US\$3,000, for an ibex) (Poore and Gryn-Ambroes, 1980). As in the case of Abruzzo National Park a buffer zone around national parks may be established under Article 2 of the establishment Act and hunting is prohibited under Article 14 of the 1923 regulations (Poore and Gryn-Ambroes, 1980). The legal requirements for building construction vary from park to park, and in some depend on regional building laws and local communities authorisation, in others are controlled by the park authorities (Saussey, 1980). The control on building schemes outside of urban areas is provided by Act No. 1497 of 29 June 1939 on "Protezione delle Bellezze Naturali" administered by the Cultural and Environmental Heritage Ministry and by the regional authorities. All proposals are referred to the relevant local authorities or "soprintendenze" (Poore and Gryn-Ambroes, 1980). Access to national parks is open to the public and has resulted in high numbers of visitors (300,000 in Stelvio and 500,000 in Gran Paradiso) (Poore and Gryn-Ambroes, 1980). Apparently, up to the 1980s, there has been no formal cooperation between Gran Paradiso National Park and its cross border neighbour, Vanoise National Park in France (Poore and Gryn-Ambroes, 1980).

The absence of a general conservation law has been aggravated by regionalisation (cf. the creation of the new Ministry of the Environment in 1986). The Presidential Decree 616 of 24 July 1977 transferred to the ordinary statute regions the administration of agriculture, forestry, hunting, fishing in inland waters, and the protection of nature, nature reserves and nature parks (IUCN, 1987). More recently some of the responsibilities for national parks have also been devolved. National parks and nature reserves of national importance have remained under central control (Poore and Gryn-Ambroes, 1980; IUCN, 1987). The L'Azienda di Stato per le Foreste Demaniali has been abolished and state forest lands outside national parks and nature reserves has been transferred to the regions. The Decree 616 confirmed the physical unity of protected areas but the definitions of the relevant regulations and the division of responsibility between the State, region and the "communita montana" was dealt with in a Republican law of 31 December 1979 (Poore and Gryn-Ambroes, 1980). However, the Decree 616 confirmed the right of the central authorities to designate new areas as national parks and nature reserves, provided they are of inter-regional interest.

In special statute regions (Valle d'Aosta, Trentino-Alto Adige, Sicily, Sardinia Friuli-Venezia Giulia) these matters are governed by regional constitutions and legislation (Poore and Gryn-Ambroes, 1980). In some regions there are regional laws on the protection of nature (Lombardy) (Franmarin, 1985).

Nature reserves lack basic legislation, with the first reserve set up in 1959 by the Ministry of Agriculture and Forests. It was not until 1968 that nature reserves became establishable under distinctive legislation (Poore and Gryn-Ambroes, 1980). All nature reserves up to 1977, operated by the Azienda, subsequently have legal status. The nature reserves follow a classification typology adapted by the Council of Europe: fully protected (integral reserves); strictly administered; partial (zoological and anthropological); special (special natural sites, forestry areas and animal population area); and biogenetic reserves. Most nature reserves are set up by the Forestry Agency, which by 1980 had established 101 reserves in State forests including six in national parks with a total area of 55,316ha. Five of these are wetlands. Many nature reserves were established on state land by orders of a ministerial decree. Those on private property were established by Parliamentary authorisation, by the regions or on the initiative of the owners. After the Decree 616 the establishment of nature reserves required the passing of new enabling legislation (Poore and Gryn-Ambroes, 1980). Other nature reserves have been established under authorisation of special statute regions and by universities (such as Pavia and Comerio). Visitors to nature reserves need permits.

Regional legislation provides for the establishment of *regional nature parks*, (also termed recreational parks) by regional or provincial mandate and at times, solely with the autonomous decisions of the public body responsible for the territory (Pavan, 1985). These areas are established for recreation purposes and tend to safeguard only the important landscape features and local traditional land use practices (Commission of the European Communities, 1979).

There are four "protected zones of marine life" and proposed marine nature reserves and *marine national parks* are envisaged by the law 979 of 31.2.1982 "Disposition for the Defence of the Sea", but do not give surface areas. At present marine protected areas are established on the basis of special texts, utilizing four methods (Pavan, 1985): (1) state concessions (for example, Miramare Marine Park was created by a concession granted by the harbour master under Article 36 of the Navigational Code); (2) recourse to fishing laws on the basis of law No. 963 of 14 July 1965 and at the decision of the Minister for the Navy; (3) on the basis of regional laws, since most regions have now adopted legislative covering parks and reserves; and (4) incorporation of areas within Ramsar sites by Order of the Minister of Agriculture and Forests (Seven Orders in 1977 and 1978).

Exceptionally, private bodies may initiate the creation of a nature reserve. For example, Montecristo Island which was a royal hunting preserve, becoming (as a result of the activities of a hunting association) a managed nature reserve (1971) and following consultation between ministry and scientific bodies, a biological monitoring area organized by WWF.

The World Heritage Convention was ratified on 23 June 1978. The Wetlands Convention was signed subject to ratification on 10 January 1975 and ratified 14 December 1976, with further sites added 10 March 1978, 28 March 1979, 14 May 1979, 2 August 1979, 19 September 1980, 21 July 1981, 4 September 1981, 3 May 1982 and 5 December 1984 (IUCN, 1987).

Parks and Reserves Administration and Management The country is administratively divided into regions, provinces and municipalities. Prior to the 1977 Presidential Decree on regionalisation, the responsibility for nature conservation and protected areas rested with the Ministry of Agriculture and Forests (though the Ministry of Culture and Environmental Heritage had also an interest) through its State Forest Administration (*Azienda di Stato per le Foreste*) and its National Parks and Conservation Division which has a staff of nine (IUCN, 1987). Much of their power will be devolved to the regions pending new legislation. However, the State Forest Administration's structure for dealing with national parks and nature reserves was still in place in 1979, although it itself had been abolished in 1977. This remnant was administered (under Ministerial orders) by an acting director responsible for the National Park and Nature Reserve division. The *Azienda* was specifically responsible for three national parks (Circeo, Stelvio and Calabria) (Poore and Gryn-Ambroes, 1980).

The lack of administrative unity has resulted in various authorities sharing the management of the areas, such as local communities, water and forest planning agencies which are all more responsive to short term economic arguments resulting in a lack of protective measures (IUCN, 1987).

The national parks have been undergoing regionalisation for more than 10 years (1984) in an attempt to ensure more local representation on the managing committees of the parks (Franmarin, 1984). The process of regionalisation has caused the administrative split of Stelvio National Park between central administration and Trentino-Alto Adige regional administration and Gran Paradiso is now effectively a regional park in all but name. Despite the split in administration in some national parks the State Forestry Agency manages Stelvio, Circeo and Calabria National Parks and appoints their directors. They have specific advisory commissions composed of representatives of ministries, local communities, institution and others. The Directors of Gran Paradiso and Abruzzo National Parks are appointed by an independent body which acts as the park executive council. Under their establishing Acts, the executive councils have sole responsibility for administration and management. Its membership consists of scientists, local community members and representatives of ministries (Poore and Gryn-Ambroes, 1980; IUCN, 1987).

Italy

Only some 25% of national park land is state-owned and there apparently has always been a shortage of government money to run these areas, despite increasing numbers of visitors and management needs. The Forest Service management is considered to be the most ineffectual. Commercial activities, including agriculture and forestry, still continue in the national parks with forestry plans prepared by the Forest Service and the level of exploitation varying from park to park (IUCN, 1987).

There is pressure to reintroduce hunting into the national parks; poaching is frequent and some regions (Trento and Bolzano) issue excessive numbers of hunting permits. Fishing is permitted, as is fruit and fungi collection. Some parks have closed roads, whilst others have developed new ones and winter sport facilities are also present. Stelvio National Park has produced a zonation plan; another is proposed for Abruzzo. The responsibility for research lies with the National Research Council.

The budgets for national parks are fixed by law and in the case of Abruzzo and Gran Paradiso can only be changed with Parliament's consent. Those of Stelvio and Circeo are augmented by the Azienda. The total budgets in 1975 and 1976 (in 1000 lira) for the national parks was 1,180, but in the case of Gran Paradiso a heavy proportion goes towards employing the 60-65 park wardens. Each national park has two to eight executive and administrative staff and between seven and 65 wardens (Poore and Gryn-Ambroes, 1980).

Nature reserves are established and managed by the state, the regions or privately. State nature reserves were administered by the Azienda but after its abolishment in 1977 a provisional arrangement was continued, and most are now administered by the local bodies. Seven reserves in Carso Triestino are theoretically administered by a special autonomous executive. All other reserves have the same officials responsible for both reserves and state forests, however, all major management decisions were taken by the Azienda and by the Minister. Human activity in nature reserves is generally strictly controlled and apart from traditional forms of utilisation all other developments are forbidden.

No specific authority is responsible for research or nature conservation in reserves and most of the work is carried out on contract. The budget is allocated by the Ministry of Agriculture with 1,765 (1000 lira) funded in 1975 and 1976 (Poore and Gryn-Ambroes, 1980). By 1984 there were 252 nature reserves (144,391ha), with 147 administered by the Ministry of Agriculture and Forests and 105 by the regions or by special Public Administration Offices. Universities have also set up ten reserves totalling 7,000ha. The greatest progress in establishing reserves, has occurred in the state forests, for example in northern Italy the regional forestry department has created 15 reserves and six regional parks. Private reserves and wildlife refuges and protection oases can be set up privately by voluntary bodies and by universities. WWF-Italia are the most active environmental body which manages wildlife habitats. Others include Italia Nostra, Pro Natura and Chronos 1991. They are, however, not coordinated nor cooperate with the government, but this seems to be changing with the creation of the new Ministry of the Environment. There is no nationally accepted definition of a natural park but they are solely established by the regions (Poore and Gryn-Ambroes, 1980).

Of the marine protected areas, Montecristo reserve is administered by the Ministry of Agriculture in liaison with the Natural Research Council, with which it forms a joint management committee for directing scientific work on the island. Similarly at Miramare Marine Park a private body collaborates with a public utility and together enforce regulations.

Addresses

- Ministero dell'Ambiente, Piazza Venezia, 00187 Rome
- Ministry of Agriculture and Forestry, Direzione Generale per l'Economia Montana e le Foreste, Division 11, 5. via Caducci 00100 Rome (00187 Rome)
- Comitato Parchi Nazionali e Riserve Analoghe, Viale delle Medaglie d'Oro, 141, 00136 Rome
- Commissione per la Conservazione della Natura, e delle sue Risorse del Consiglio Nazionale, delle Rich Ricerche, 7, Piazzola delle Scienze, 00158 Rome.
- WWF-Italia, Via P.A. Micheli 50, 00197 Rome

Additional Information Up to 1958, protected areas in Italy only numbered the original four national parks with a fifth added that year (Pavan, 1985). Each existing national park was much enlarged in 1978, but despite this the total was still below 1% of total surface area (Franmarin, 1984). In 1980, of a total of 248,000ha in four national parks, 60,000 belonged to the state or regions and the remaining 76% to local authorities or private individuals. Even in Gran Paradiso, often considered the best example, only about 20% belonged to the park's executive council or was rented by it (Poore and Gryn-Ambroes, 1980).

The enlargement process referred to above began in 1975-77 with Circeo National Park increased by 850ha and in 1979 by 100ha. In 1976 Abruzzo was enlarged by 10,000ha, in 1977 Stelvio by 40,000ha and in 1977 Gran Paradiso by 2,000ha. There are also moves to achieve "mutual cooperation" between the French Vanoise National Park and Gran Paradiso National Park.

Only four national parks are considered to have adequate staff and management, with, in 1971, public expenditure running at 500 million lira annually increasing to 1,000 million in 1977 and 8,000 million by 1980. In 1971 proposals were published for the creation of six new national parks and various other categories of protected area including 41 nature reserves and 28 regional natural parks (Duffey, 1982).

With regionalisation came an effort to protect 10% of Italy (at present there is 4,500 sq.km protected, which is 1.5% of the territory). The 10% was envisaged as being composed of 3% in four existing and eight new national parks and the 7% in regional parks and reserves. An annual management budget of US\$30 million was proposed (equivalent to only 1/10th of the smallest regional authority's budget)(Franmarin, 1984). However, there is much local opposition, and existing management controls have been lifted. Local authorities continue to promote tourism, and allow public works (highways and ski lifts) to be developed. Local opposition to new national parks has almost completely stopped all new establishment. The problem is believed to be that local authorities are much more susceptible to vested interests like hunters, timber enterprises and tourism development (Franmarin, 1984).

At the time of accession to Ramsar, a list of 18 wetlands was constructed, totalling 11,898ha and since then a further five areas have been added covering 7,340ha. Surveys to assess the importance of wetlands are continuing whilst the Natural Research Council has carried out work on the establishment of marine parks and protected areas (Augier, 1985). It has been estimated that there are some 1,238 areas of conservation interest in Italy covering some 14% of the territory (Pavan, 1985). Even in the heavily industrialized Lombardia region, a survey identified 109 zones of conservation interest covering 453,691ha. 9% of the region is in protection categories with 67 nature reserves (7,946ha-0.33%) and the 12 regional parks (207,540ha-8.70%). For 1985 20 billion lira had been set aside for the management of the regional parks. During 1981-84 over 1.1 billion lira were spent acquiring areas for nature reserves and during the same period 6.6 billion lira on regional park acquisition (Franmarin, 1985).

The ICBP study for the EEC Birds Directive listed 120 sites with a further 26 sites proposed as Special Protection Areas whilst for the Council of Europe ICBP identified 129 sites (ICBP, 1985). The EEC biotope study listed a total of 742 sites as being of importance for nature conservation (ICBP, 1982). Voluntary bodies such as Italia Nostra, the Italian Botanical Society and the Consiglio Nazionale delle Ricerche have all made efforts to promote nature conservation, including compiling inventories for areas needing protection (Poore and Gryn-Ambroes, 1980).

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Protected Landscapes

	(hectares)
<i>Unspecified areas</i>	
Alpi Apuane	
Capanne di Marcarolo	
Diecimere	
Gruppo di Tessa	
	Subtotal
<i>National Parks</i>	
Circeo	8,400 *
Stelvio	137,000
	Subtotal 145,400
<i>Nature Reserves</i>	
Fusine	45
<i>Nature Parks</i>	
Adamello Brenta Reg	43,600
Alpe Veglia	39,300
Alta Valle Pesio	2,690
Alta Valle Sesia Reg	
Cansiglio	25,300
Castelfusano Reg	
Lago di Alviano Reg	
Maremma	7,800

Orsiera Rocciavre Reg	
Paneveggio-Pale S. Martino Reg	15,800
Portofino Reg	1,200
Prescudin	1,647
Puez Geissler	9,400
Rieserferner	15,000
Sarntaler Alpen	29,800
Schlern	6,400
Texelgruppe	33,000
Valle del Ticino Reg	120,000
Subtotal	350,937

Marine Parks

Santa Maria di Castellabate

Parks

Groane Reg	3,000
Nord Milano Reg	600
Po Delta Regional	30,000
Subtotal	33,600

Circeo National Park**Management Category** V (Protected Landscape) & IX (Biosphere Reserve)**Biogeographical Province** 2.17.06 (Mediterranean Sclerophyll)

Geographical Location The reserve is bordered on the east by the Sisto River and on the west by coastal lakes. The Circeo Biosphere Reserve is part of Circeo National Park, which is in the Latina Province in the commune of Sabaudia, 90km south of Rome. 41°13'-41°23'N, 0°23'-0°40'E.

Date and History of Establishment Established in 1934 as a Protected Forest and in January 1977 as a Biosphere Reserve. The site is covered under regulations governing national parks and (in part) as areas designated as strict reserves.

Area Protected Forest 8,400ha (Biosphere Reserve 3,260ha). The national park area was increased by 850ha in 1975-77 and by a further 100ha in 1979.

Land Tenure State Forest Administration (Azienda di Stato per la Foreste)**Altitude** 0-54m

Physical Features The protected area consists of a calcareous headland which overlooks the Tyrrhenian sea. It includes the last remaining section of an ancient lowland forest, four coastal lakes and sand dunes along 30km of sea coast. The soil of the wooded plain which constitutes the forest substratum is sandy. The yellow and reddish sands are mobile on the surface but cemented below; these layers are therefore impermeable and result in permanent flooded depressions (ponds), which vary in size from season to season. The soils are podzolic, very poor in nutritive elements, and much leached at surface levels. Zannone island has recently been included in the park.

Climate Annual rainfall of 937mm (Cerasella Station) or 856mm (Pantalone Station) with 105 and 82 days of rain respectively. Average annual temperature are 15.5°C and 20°C respectively; the average annual minimum is 10.9°C-11.5°C.

Italy

Vegetation The forest vegetation varies according to the different microclimatic conditions in the reserve. Where no artificial plantations have been introduced, vegetation mainly consists an association of Italian oak *Q. frainetto* and Turkey oak *Q. cerris*, with *Fraxinus excelsior*, *Carpinus betulus* and *Ostrya carpinifolia*. A vegetation transitional towards the Mediterranean - which has become more marked since the clearances of 1933 - includes *Quercus ilex* and *Q. ruber*, with an undergrowth of *Erica arborea*, *Phillyrea latifolia*, *Pistacia lentiscus*, *Crataegus monogyna* and *Rubus fruticosus*. In the flooded depressions or ponds and during winter flooding in the Pontine marshes, the vegetation is mostly *Fraxinus oxycarpa*, *Salix cinerea*, *Quercus pedunculata* and *Alnus glutinosa* (Società Botanico Italiano, 1975). The southern slopes of Mt Circeo are essentially arid, rocky habitats with predominantly sclerophyllous vegetation including the protected dwarf fan palm *Chamaerops humilis* together with *Centaurea circae*. The northern slopes of Mt Circeo are more humid with an evergreen forest dominated by oak *Quercus ilex* with mixed deciduous trees (Società Botanico Italiano, 1975). The forests of Sabaudia are dominated by large deciduous oak species including Turkey oak *Quercus cerris*, farnetto oak *Q. frainetto*, and pedunculate oak *Q. pedunculata*. The undergrowth contains *Erica arborea*, *Phillyrea latifolia*, *Pistacia lentiscus*, *Crataegus monogyna* and *Rubus fruticosus*. Coastal dune vegetation includes the Phoenician juniper *Juniperus phoenicea*, cade *J. macrocarpa* and sea daffodil *Pancratium maritimum* (Società Botanico Italiano, 1975).

Fauna The faunal species present on the site are representative of an ancient "pontina" plain with marshes and include otter, crested porcupine, boar, fox, badger (*Lutra lutra*, *Hystrix cristata*, *Sus scrofa*, *Vulpes vulpes*, *Meles meles*, *Mustela putorius* and *M. nivalis*). Roe deer *Capreolus capreolus* are being reared in enclosures for reintroduction into the park. They became extinct in the area when the marshes were drained in the 1930s. Up to 230 different species of birds have been recorded in the forest and the lakes. *Picus viridis* and *Dendrocopos major* are of interest; they form a population isolated from the rest of the Italian populations of these species. Other birds include peregrine *Falco peregrinus* and black-winged stilt *Himantopus himantopus*. The brackish coastal lakes support abundant fish populations including eel *Anguilla anguilla*, grey mullet *Mugil cephalus* and thicklip grey mullet *M. chelo* (Allavana, 1978).

Cultural Heritage Zannone island has recently been included in the park, it contains interesting prehistoric grottoes and Roman structures.

Local Human Population No information

Visitors and Visitor Facilities The site is a major recreation area for visitors from nearby Rome.

Scientific Research and Facilities There are numerous possibilities for research, including soil science studies, management projects, reconstitution of habitats and studies of fauna.

Conservation Management The forest is one of the last remnants of the great Pontine Forest, famous for its landscape of marshy woods and its malaria. From the Roman era on, man has attempted to drain the marshes and fight malaria. He has also changed the composition of the forest, especially by introducing species of *Eucalyptus* and *Pinus pinea*. Today, an attempt is being made to restore the former vegetation (Duffey, 1982).

Management Problems A vegetational degradation has resulted from the wholesale clearances of 1933. The delicate coastal dunes structures are being degraded by summer visitors following the construction of an asphalt road along their length. Its close proximity to Rome means that the park is subject to considerable human pressure leading to degradation of the vegetation and subsequent substrate erosion. Also, pollution of the coastal lakes by local industry is a problem. Some parts of the park have been irretrievably damaged by irrational speculative building (Duffey, 1982).

Staff Director appointed by the Azienda and 80 other staff engaged in protection and maintenance of the park and reserve (MAB, 1977)

Budget Total level of budget is unknown but it is augmented by the Azienda

Local Administration State Forest Administration who appoints the director. Via Carlo Alberto 53, Sabaudia, Latina

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Date September 1987

NORWAY

Area 324,218 sq.km. Spitsbergen 61,230 sq.km.

Population 4,134,353 (1984); Spitsbergen 3,457 (1983)

Parks and Reserves Legislation The first Nature Conservation Act entered into force in 1910, followed by another Nature Conservation Act in 1954. The 1954 legislation was replaced on 19 June 1970 by the Nature Conservation Act (No. 63) and remains the legal basis and main legal instrument for setting aside and applying protection to all conservation areas. This Act declares nature a national asset which is administered for its long term preservation and which should only be utilized as part of a long-term comprehensive administration of resources. It gives protection to flora, fauna and natural areas, including geological features which are covered in paragraph 1, Norde-Lang (1985). Conservation legislation is geared to be long-term in operation and Clause 18 gives owners and users of natural resources the right to comment upon activities proposed by specific governmental or provincial agencies, whilst the Ministry of Environment can place the resources under preliminary protection. The Department of Environment Protection is obliged to prevent all development and construction work, pollution and any kind of encroachment. Access is unrestricted, regardless of land ownership, in line with traditional Scandinavian practices. At present the Nature Conservation Act is used for planning control but a new Planning Act (proposed by the Ministry of Environment) is under consideration (1980) and will protect all natural resources unless special permission is given to alter their character. Legislation for flora and fauna protection outside of national parks is weaker than inside but is now covered under a new Wildlife Act (1982).

National Park (Nasjonal park) The establishment of national parks is carried out under general regulations set out in a Royal Decree (October 1967) which defined these as areas of national value with no or little known human disturbance, in state ownership reserved to "preserve large unspoiled or essentially unspoiled or singular or beautiful tracks" (Poore, and Gryn-Ambrocs, 1980). The first national parks were established in 1962 and the 1970 Nature Conservation Act laid down strict rules governing permitted activities within them (Waycott, 1983). All national parks so far created are on state-owned land but neighbouring privately-owned lands "of the same kind" may be included in a national park. Specific regulations are drawn up for each site and are signed by the King. These vary from national park to national park but have the following common elements: domestic animal husbandry and grazing is forbidden (but reindeer in some areas is permitted) as if the presence of domestic animals and pets, forestry is prohibited; the areas are open to the public, although parts may be closed from time to time, and access is by foot only; no payment or permits are required; no tourism development is allowed nor organized visits (although the most developed facilities at present at Rondane), sport fishing is restricted to special permit, hunting of certain species is allowed under permit, as is firewood and berry collection. All commercial and industrial activities are excluded.

Protected Landscape Area (Landskapvernrområde) are state or private lands reserved to preserve singular or beautiful natural or cultural lands. They are similar to national parks except that traditional farming, grazing and restricted forestry activities are allowed under control.

Nature Reserve (Natur-reservat) these are state or private areas "which have unspoilt or virtually unspoilt nature or constitute special types of nature and which have special importance for science or education or which stand out by virtue of their unusual character". No human interference is allowed (with a few exceptions). A series of nature reserves are established on the basis of inventories of "key elements" and a system of representative ecological areas is also being devised as part of a Nordic country project.

Nature Monuments (naturminne) are "geological, botanical and zoological features of scientific or historic interests or which are unusual" together with "areas around the feature". Areas may also be protected which are "of special importance as the resort of a number of (protected animal) species".

Bird Sanctuaries and large *Conservation Areas* were established on Svalbard pursuant to Part 4 of the Svalbard Act of July 17, 1925 (No. 11) of Article 2 of the Treaty concerning Spitsbergen of February 9, 1920, by Royal Decrees 1 June and 11 October 1973. Regulations prohibit technical interference, construction, mining, oil drilling, quarrying including offshore waters, dumping of waste, and give full protection to the flora and fauna. The Government may in consultation with the Ministry grant dispensations (Ministry of Environment, 1981).

Plant Sanctuary Two such sites were established in Svalbard on 26 February 1932.

Prominent relevant legislation includes the Building and Planning Act (1963) which deals with land use planning (physical planning) at the national, provincial and community level and specifies that nature conservation interest must be considered in planning activities "to guide local planners and to harmonize plans among sectors". County plans give attention to conservation problems and co-ordinate local plans of the community. Other legislation includes the Forest Management Act (1863), the Forest Protection Act (1909) and the Forest Production and Protection Act (1985). A new forestry law requires conservation to be taken into account and high conservation areas to be protected. The Shore Planning Act (1971) succeeds a temporary law passed in 1965 which prohibits house building within 100m of the seashore and makes all construction along coastal and inland waters conform to land utilization plans. Other legislation already enacted or under consideration provides for the protection of 200 watercourses from hydroelectric development and for restricting the use of off-road or cross-country vehicles. Other peripheral legislation includes the Open-Air Recreation Act (197) which deals with the creation and maintenance of recreation areas and gives the public access rights to forests and open lands, the Act for the Protection of Ancient Monuments (1951), which safeguards areas around natural monuments.

There are two regional conventions; the Agreement on the Conservation of Polar Bears, ratified 1975 and the Convention on the Conservation of European Wildlife and Natural Habitats (Bern) signed 1979.

The World Heritage Convention was ratified on 12 May 1977. No natural sites have been accepted, but three sites (Vistenfjord-Vega-Lovund, Kong Karlsland and Hardang-ervidda) have been placed on the tentative list.

The Convention Instrument of the Ramsar Convention was deposited on 9 July 1974 and deposited its Paris protocol Instrument on 3 December 1982, designating 14 wetlands covering 17,545ha. The Bonn Convention on the Conservation of Migratory Species of Wild Animals was ratified in 1985. One site is a biosphere reserve, designated in 1976.

Parks and Reserves Administration and Management The conservation movement originated in 1904, but little was achieved until the 1960s when the first part of Nature Conservation Inspector was created in 1960. Prior to this a State Nature Conservation Council was established in 1955. In 1965 the Administration of Outdoor Recreation and Nature Conservation was established within the Ministry of Local Government and Labour. In 1972 the Ministry of Environment was created with responsibility for regional and urban planning for the co-ordinated planning and management of water and land resources, for pollution control and noise abatement, problems of waste disposal, conservation of nature and recreation areas, management of game and fresh-water fish and international co-operation. It also has responsibility for long-term management of the country's natural resources (Norderhang, 1985). This Ministry is the central organization for nature conservation, and consists of five departments: the General Co-ordination Department, the Department of Regional Planning, the Department of Pollution Control, the Department of Natural Resources and the Department of Nature Conservation and Open-Air Recreation. The latter has responsibility for, amongst other things, protected areas and the administration of the provisions of the Nature Conservation Act of 1970. It is divided into the First Nature Conservation Division (a staff of 10; 9 university graduates and one lawyer responsible for protection and conservation in pursuance of the Nature Conservation Act); the Second Nature Conservation Division (a staff of 8; 1 lawyer, 1 forester, 1 civil engineer, 1 agronomist, 1 sociologist and 3 others); the Third Nature Conservation Division; the First Open-Air Recreation Division; the Second Open-Air Recreation Division; the Division of Shore Planning and Administration, Wildlife and

Freshwater Fish Division and Management Section. The First Nature Conservation Division is responsible for all matters related to the establishment and administration of protected areas, inventory and survey analyses, the application of the Nature Conservation Act to species protection, nature conservation on Svalbard, international relations and acts as the Secretariat of the Council for the Conservation of Nature. Matters of importance are referred to the Minister, who also appoints two high level inspectors for nature conservation, one for North and Central Norway and one for South Norway. At a local level, each of the 20 counties has an advisor for nature conservation and open-air recreation, apart from other responsibilities concerned with planning. Wardens are appointed locally or by the appropriate state directorates (Directorate for State Forests). Ten state agencies are affiliated to the Ministry, those dealing with nature are : the National Council for Conservation of Nature, (acting under Section 17 of the Nature Conservation Act, acts as advisor to the Department of Nature Conservation and Open-Air Recreation. It has a Chairman and six members, at least two of whom have to have natural science qualifications, appointed by the King for a four-year term), the Directorate for Wildlife and Freshwater Fish and the Norwegian Polar Institute. At the same time a committee within the Norwegian Parliament was given responsibility for environmental issues. The Ministry of Agriculture and the Ministry of Industry consult, where appropriate, with the Ministry of the Environment whilst all major development decisions are taken by Parliament, administered by the Ministry of Industry. In 1982 the Ministry of Environment had a full-time staff of 190 with about 1,000 full-time employees in affiliated institutions. The budget for the Ministry (in 1978) was 517 Mkr (68.8M\$) rising to 739 Mkr (in 1982) (1094.5M\$) but included affiliated institutions and for the Department of Nature Conservation and Open-Air Recreation (in 1978) was 28.5 MKr (3.77M\$). The latter figure includes wardening, boundary demarcation, wages, compensations and operations. The Department's budget includes 8.6 Mkr (1.12M\$) for land acquisition and compensation, but most is used for recreation provision. Technical staff are funded by the Department's budget whilst subordinate members are officially part of the Ministry. Research (inventories, surveys, studies) are funded by the Ministry, and carried out by contracted universities and institute specialists. The Ministry takes all major management decisions, advice being given by the management authority of the area. On the ground management is the responsibility of the county advisor in the Directorate for State Forests. Management plans are being worked out for nature reserves, and with few exceptions the policy is one of non-intervention, management is passive and limited to activities connected with public use.

Addresses

- ° Ministry of Environment (Miljøverndepartementet) Myntgaten, P.O. Box 8013 - Dep. Oslo 1.
- ° Norges Naturvernforbund (Norwegian Society for the Conservation of Nature) Postboks 8268, Hammersborg, Oslo 1.

Additional Information Much of the country is wilderness, but there are widespread threats from the exploitation of rivers, lakes and waterfalls for hydroelectric power (Waycott, 1983), the latter being placed into extensive tunnel systems. Barely 3% of the land is cultivated, 30% is forested and 50% lies above the tree line. Seaboard of about 2,500 km excluding inside the Arctic Circle.

The major voluntary society is the Norwegian Union for Nature Protection (*Naturvern forbund*) established in 1964 which has 36,000 members in 19 local associations. It is completely independent although partially supported by government funds, and was the most important force in Norwegian nature conservation until the National Council for Nature Conservation was established in 1955. There is a traditional right to enter all land regardless of ownership. The population density is 12.7/sq.km. in Spitsbergen. The Spitsbergen conference held in 1914 in Oslo discussed nature conservation in Svalbard and a proposal was constructed to establish a large conservation area in North Spitsbergen. In the 1960s the Norwegian Polar Research Institute reactivated the interest and in 1066 a first "study of present problems related to conservation and wildlife management in Svalbard" was completed. In 1967 an inter-ministerial task force was organized to propose practical conservation measures. In 1968 a draft plan for national parks and nature reserves was prepared. Further help came from the interpretation of Article 3 and Article 8 of the Svalbard Treaty of 1920 (commercial and

economic activities) in relation to Article 2 (nature conservation in Svalbard). In 1973 a total of 1,259 oil claims had been issued in Spitzbergen, of which 668 were located in areas of high conservation value (Ministry of Environment, 1982).

Protected area establishment started in 1880, when A. E. Nordenshrold suggested that national parks be established in the Nordic countries and in 1902 the first proposal for a national park was presented by W. Reusch, to be followed by other proposals by the Norwegian Conservation Society and the Norwegian Tourist Society. The establishment of the park system started later than in other Nordic countries (1962) and even later in the Arctic (planned in 1966 and implemented in 1973). The first nationwide plan for national parks was prepared by the National Council for Nature Conservation in 1964 and was presented to Parliament (this was two years after the first national park was established). It covered 16 areas (630,000ha or 2% of the country's surface) although originally this was to be 8 national parks and 8 nature parks; the latter exclusively protective, the former for public recreation. In 1962 the Council initiated a systematic nationwide inventory of important habitats, indigenous forest areas of high conservation interest and important botanical and ornithological habitats. The national park plan was well-received by Parliament and adopted in 1967 as the basis for the establishment of national parks in the country, and has now, in principle, been fully implemented. Work on a second, follow-up strategy has been started. It is suggested that the integrity of national parks has never been infringed. Because access to national parks is difficult there is at present no over use. No zonation system has been developed inside national parks or nature reserves, but parks may be closed to public access (seasonally or permanently). No buffer-zones exist around national parks but in some areas national parks are adjoined by landscape protected areas or state forests. The first national park was established in 1962. By 1985 there were 15 national parks covering 961,300ha or 2.97% of the country's surface area. In Spitsbergen there were 3 national parks and 2 nature reserves covering 3,500,00ha or 50% of Spitsbergen. Figures for 1982 give 305 nature reserves covering 24,600ha (0.08%), 30 protected landscape areas covering 144,300ha (0.42%), 255 nature monuments, and 54 other reserves covering 9,200ha (0.1%) and by 1954 to 398 covering 50,200ha. There are also 110 specially protected areas for plants and animals. These areas are called *Artsfredninger*, where one or more species are protected but not their biotopes. The total area protected amounted to 1.79% in 1979 and 3.12% in 1984 (COE, 1984). The Ministry is considering designating additional protected landscape areas as buffer-zones around national parks. There is a view that national parks should not be restricted to state owned land (as proposed in the 1964 plan) since this excludes the possibility of having a coastal park, that there should be no recreation facilities located inside areas, nor that there should be hunting or grazing within landscape parks, nor should forestry activities take place. To improve recreational facilities 200,00ha of land has been purchased as public recreation areas, including continuous stretches of islands and peninsulas on the southern coast, the so-called Archipelozo Park (Ministry of Environment, 1982a). On mainland Norway the national parks system is far from complete, with most parks located on state land in the mountainous regions. In 1980, a 13-member government-appointed committee chaired by the President if the Norwegian Parliament completed a report on national conservation perspectives in Norway (Protection of Norwegian Nature St. meld Nr. 68 (1980-81) *Vern av norsk natur*) based on the World Conservation Strategy and resulted in a subsequent report to Parliament in 1981, with a proposal for a national conservation policy plan. The 1980 report suggested the need for a new national park policy resulting in the Ministry of Environment asking the National Council to organize a study on the future of national parks. This is due to include a critical review of existing parks in relation to the biogeographic zoning and a review of areas where new national parks could be located. The most serious shortcomings have been identified as the coastal areas (in general) and the lowland regions of southern Norway. Some 40-50 potential areas (May 1985) are under consideration which will result in a 100% increase in protected areas and cover 6% of the total area. There are, however, legal, political and practical problems. Nature reserves are not much publicized, few are marked on maps as part of conservation authority policy. Similarly little information is provided on national parks. Protective measures in accordance with the Nature Conservation Act have resulted in county conservation plans (19 counties) where new County Environmental Protection Departments were established on 1 September 1982 responsible through the County Governor to the Ministry of Environment, and are responsible, amongst other things, for nature conservation and open-air recreation. These plans are prepared for certain types of areas, for example, wetlands, deciduous forests, mires, seabird colonies. (Loss of bog areas

average 100 sq.km./year, being drained from 1966 to 1976, with 4,000 sq.km. reclaimed in 1976 and 70-75 sq. km. drained annually in recent years. (OE, 1984). Plans are based on comprehensive surveys and each plan is thoroughly reviewed by all involved parties, comments are sent to the Ministry of Environment, with the government deciding if an areas should be protected or not.

Similar plans are to be prepared for quaternary geological phenomena, rare minerals, fossil sites, bird cliffs, lakes and marsh reserves. It is expected that 100-150 new nature reserves will be established annually. Landscape areas of historical and cultural values are also to be protected, through regional planning systems. The Ministry of Environment is co-ordinating with the relevant Norwegian Research Council to launch research to further develop guidelines for the long-term management of protected areas (Ministry of Environment, 1982). The establishment of nature monuments is of low priority in the Ministry due to the disproportionate amount of work required to protect small areas.

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Protected Landscapes

<i>Landscape Protected Areas</i>	(hectares)
Auesoya	67
Auskarnes	7
Austrattli	71
Bastoy	210
Berge	29
Birisjoen	340
Bokemoa	14
Brannsletta	1,880
Dovre	5,700
Eikefj. dalen	900
Favnvassdalen	1,390
Femundsmarka	7,000
Fjosanger	8
Fritzoehus	165
Froan	4,000
Froylandsvt.	70
Gardsjoen	2,000
Gaulosen	2
Grytdalen	1,600
Havnehagen	13
Hestad	3

Norway

Hosensand	4
Indre Vassfaret	4,200
Innerdalen	7,300
Jaerstrendene	1,608 *
Jomfruland	52
Kalkheia	21
Kolsas/Daeliv.	500
Listeid	52
Lyngaland	37
Mosvatn/Austfjellet	30,600
Nedre Hassel	11
Oksevatnet	550
Osterdalen	2,700
Osthagen	3
Ovre Rod	36
Rambjora	31
Reisa	8,000
Romerike	500
S.Jeloy	450
Saevareidberg	25
Sandfjorden	430
Skaupsjoen/Hardangerjokulen	55,900
Skipsfjorddalen	4,200
Storm.-Fagerb	28
Storsoy	20
Strandaa/Os	1,670
Straumen	520
Tranby	44
Ultvedt	38
Uradalen	183
Utladalen	30,000
Vaeret	500
Valbrekke	14
Vassfaret & Vidalen	20,000
Veoy	100
Vidmyr-Hovden	5,900
Vingen	500

Jaerstrendene LPA
(includes the Jaeren wetland system RAMSAR site)

Management Category V (Protected Landscape)

Biogeographical Province 2.03.03 (West Eurasian Taiga)

Geographical Location Located on the south-west Norwegian coast, 10km west of Stavanger. It is represented by three main sections; the Randaberg coastline; the Rott-Hastein Archipelago; and the Sola-Ogna coastline (Klepp, Sola, Ha and Randaberg kommunes in Rogaland Fylke- county). The protected area extends as a narrow 70km long coastal strip north-south from Randaberg next to Stavanger, via Sola, Orre and Kvasheim to Ogn. 58°30'-58°53'N, 5°30'-5°40'E.

Date and History of Establishment The Jaerne shores were declared a landscape protected area in the Kongelig Resolusjon of 2 September 1977. These protected areas are similar to national parks, except that traditional farming, grazing and restricted forestry activities are allowed under control. The general regulations placed on the area prohibit all encroachments, notably changing or influencing its character. The area is subject to zoning, with special

protection areas for bird life, vegetation and/or geological features (Eldoy, 1981). Bird life protection areas have been established at the Hastein-Rott archipelago and on the Reve-Orre coastal strip (Eldoy, 1981). The Jaeren wetland system was designated as a RAMSAR site in July, 1985.

Area 1,608ha (including 400ha of the RAMSAR site)

Land Tenure Mostly privately owned

Altitude 0 to over 4m.

Physical Features The protected area consists of gently undulating and low-lying coastal terrain typical of south-west Norway. The topography and terrain range from sandy to pebble and rock beaches through various aged coastal sand dune types, to cliffs and low hills of morainic deposits (IUCN/CMC, 1987). The southern section of the park from Oгна to Obrestad, Hå and Kvasshheim, is typified by gently sloping pebble and boulder beaches which graduate further north into the mixed sand and shingle shores of Revtangen and the sandy beaches of Orre. Sand dunes (both fixed and shifting types) of 1-4m stretch along the coast, as represented at Sola and Orre (IUCN-CMC, 1987). The north of the park around Randaberg and Hastein Island largely consists of low-lying Cambro-Silurian deposits (Eldoy, 1981).

Climate Snowfalls are common throughout the winter period.

Vegetation The park has important coastal associations of shingle, dune and marsh plant communities. All the dune areas are typified by dominant associations of sand couch *Agropyron junceiforme* and marram grass *Ammophila arenaria*, along with orchids such as *Epipactis helleborine* on the older fixed dunes (Carp, 1980; Eldoy, 1981; IUCN-CMC, 1987). On the more stable substrates near the beach are *Plantago maritima*, *Armeria maritima*, *Crambe maritima* and *Saxifraga tridactylites* (Eldoy, 1981). The shoreline also includes *Suaeda maritima*, *Atriplex hastata*, *Salsola kali*, *Salicornia europaea* and *Honkenya peploides*. The climbing corydalis *Corydalis elaviculata* and the bulbous corydalis *C. colida* are localised in Norway to this region (Eldoy, 1981; IUCN-CMC, 1987). Reed *Phragmites communis* and sedge *Scirpus* spp. are wide-spread in most lakes, and willow *Salix* scrub is also common (IUCN-CMC, 1987).

Fauna The Jaeren region is important for passage and wintering waterfowl. More than 10,000 birds are regularly seen in winter. Several threatened species breed or in rest in the area and more than 250 species have been recorded. Large numbers of ducks use the area in autumn and winter, with mallard *Anas platyrhynchos*, shelduck *Tadorna tadorna* and eider *Somateria mollissima* being the most common species. Thousands of arctic waders rest in the area, especially during autumn migration. Common birds of the park include purple sandpiper, shag, oyster catcher, turnstone, lapwing and kittiwake (*Calidris maritima*, *Phalacrocorax aristotelis*, *Haematopus ostralegus*, *Arenaria interpres*, *Vanellus vanellus* and *Rissa tridactyla*) (Eldoy, 1981).

Cultural Heritage The entire Jaeren coastline "have the marks of human activity from time immemorial", as illustrated by the numerous burial mounds in the region including the boat-shaped burial site at Hå (Eldoy, 1981). Jaerstrendene has numerous traditional stone buildings, including the old long boat houses in the Bo/Randaberg area (Eldoy, 1981).

Local Human Population The Jaerstrendene LPA is sparsely populated with small isolated communities. The economy is based on fishing and livestock grazing (Eldoy, 1981).

Visitors and Visitor Facilities The park has largely been established for its landscape importance, but visitor recreation is also catered for. There are visitor information boards, car parking facilities, nature trails, hiking routes along old public cart tracks and numerous sites of cultural interest. Museums and accommodation exist in the nearby larger towns, whilst camping and caravanning are permitted in the area (Eldoy, 1981).

Scientific Research and Facilities Ornithological studies and bird ringing have been undertaken by the Stavanger Museum Ornithological Station since 1937. Over 10,000 birds have been ringed since that date (Eldoy, 1981). Other wildlife studies have been undertaken by the Institutt for naturforvaltning since 1977. Cultural research and surveys have been carried out by Stavanger Museum and Stavanger Archaeological Museum.

Conservation Management Jaeren is the most important nesting and wintering area for waterfowl in south-west Norway. A number of different conservation objectives combine in the Jaerstrendene LPA to make the area unique both on a national and international scale. The protected area is encircled by an agricultural area of great importance and intensive human activity, and demands highly labour-intensive management and care. Information and supervision become vital prerequisites for the implementation of conservation in such areas. Managing the landscape protected area involves various measures to repair damage done to the sand dunes and prevent further dune erosion. Remedies are applied to stop the shifting sand, including a marram grass planting programme and laying of straw onto eroded pathways (Eldoy, 1981). Through the years considerable flotsam and jetsam has been washed up onto the shores, and removing this waste material is an important part of the general management. Other routine management includes the prevention of farmers dumping rocks from their fields onto the shores. As compensation, specific locations have been allotted to rock disposal (such as for use in boat harbour construction).

Management Problems Pollution has intensified growth of aquatic vegetation in the Jaeren lakes and ponds. Pollution has also resulted in more or less yearly blooms of blue-green algae, some of which are toxic. The effects of pollution on the bird life in the area is not yet known (IUCN-CMC, 1987).

Staff No information

Budget No information

Local Administration No information

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Date August 1987

POLAND

Area 311,700 sq.km.

Population 35,040,000 (1978); 37,187,000 (UN, 1985)

Parks and Reserves Legislation Specific nature protection and hunting legislation dates back to the 15th century while the protection of specific natural objects are covered by a number of legislative acts starting with the decree of 1918, followed by the government ordinances of 1919 (Monitor Polski Nr. 208, poz. 2) and 1925, and culminating in the laws of 1934 (Dz.U.R.P. nr. 31, poz. 274 of 10 marca Ustawa o ochronie przyrody) and 1949 (Nr. 25, poz. 180. Ustawa z dnia 7 kwietnia 1949r. o ochronie przyrody), the last amended in 1972 (Amendment of 1972 nr. 49 poz. 317) and in 1975 (Amendment of 1975 nr. 17, poz. 94). The major piece of legislation is the Law on Nature Conservation of 7 April 1949 which governs the organization of nature conservation in general and introduced three protected area categories: national parks, nature reserves and natural monuments. This law governs the creation and management of these three types of area. Two further type of protected area: landscape parks and areas of protected landscape began to be created in the 1970s. Landscape parks are created according to Article 3 Section 1 of the law of 1983 concerning People's Councils and Local Government (Dz.U. nr. 41. poz. 185) and Article 41 of the law of 1980 concerning Protection and Management of the Environment (Dz.U. nr. 3, poz. 6). The first national park (Bialowieza) was created by Council of Ministers' decree in December 1947. Where any proposed developments are likely to damage designated areas the state authorities are obliged to seek the advice of the State Council for Nature Conservation and to inform the Ministry for Conservation of the Environment and Natural Resources of such actions. The 1952 National Constitution has been specially amended to include sections dealing with nature conservation (Article 8) and the protection and rational development of the natural environment (Article 12, part 2). In 1979 the State Council for Nature Conservation and the then Department of Nature Protection in the Ministry of Forestry prepared an outline draft of a new Nature Protection Law. This project, however, was discontinued and the new draft law was not passed. Currently there is a move to link the law of 1949 on nature protection with the law of 1980 on environmental conservation into one unified text and simultaneously to redraft the individual laws. The Law on the Protection and Management of the Environment 1980 (Dz.U. nr. 3, poz. 6) is a general act, passed in January 1981, to regulate natural resource use in the national planning context and to control pollution levels and apply protection of the landscape in general terms.

The protected area classifications are:-

National park (park narodowy): the law on Nature Protection of 1934 (Article 9) defined these as "landscape especially beautiful and rich in natural values ... for areas not less than 300 hectares". Current legislation defines them as areas over 500ha protected for their unique natural values, for their floral and faunal components and their overall landscape features. They are created by decree of the Council of Ministers based on the recommendations of the Ministry for Conservation of the Environment and Natural Resources and expert advice from the State Council for Nature Conservation (PROP). The national parks are zoned into strict protection areas and partial protection areas, the former has total elimination of all human activities, the latter allows for active conservation management of selected elements. Additionally several national parks have buffer zones designated around them. Each national park has a Reserve Management Plan, a Forest Management Plan, a Scientific Management Plan, and a Spatial Management Plan (the latter is compulsory according to the 1949 Law).

Nature reserve (rezerwat przyrody): these are areas with a strict protection remit; they are of varying sizes with protection given either to the complete ecosystem or to one or more of its components, and use for scientific and educational purposes. Reserves are created under the 1949 Law, by decree of the Ministry for Conservation of the Environment and Natural Resources (*Ministerstwo Ochrony Srodowiska; Zasobow Naturalnych*), and are classified into nine basic types. These are:- forest reserves, floristic reserves, steppe vegetation reserves,

halophytic reserves, peatbog reserves, water reserves, faunal reserves, inanimate reserves and landscape reserves. They are administered by the forestry authorities in the sub-forest district in which they occur while management plans are prepared by the Voivodship Conservator for Nature. Reserves are divided for management purposes into strict reserves and partial (partially protected) reserves. The former are used exclusively for research, the latter are subjected to controlled management activities.

Landscape Park (park krajobrazowy) also termed "nature park": this category combines nature conservation with the needs of recreation and tourism ...'areas of exceptional natural values. ... with a predominance of natural landscape ... regarded as a non-intervention zone for the development of industry and urban agglomerations and for large recreation centres'. These areas are created by regional authorities (Voivodship People's Council) but only a few have their own administration. A management plan is required which defines tourist carrying capacities, forestry and agricultural exploitation, the prohibition of mineral and raw resource exploitation, industrial development and urban construction. Often a "protective belt" is planned around them usually further surrounded by an area of protected landscape. A Co-ordinating Committee, created by the regional chief executive (*voivoda*), enforces the orders, restriction and prohibitions and works within the limits of the Spatial Management Plan for the region.

Area of protected landscape (obszar chronionego krajobrazu): these are more extensive territories than landscape parks and have landscape features characteristic of a given region, often with cultural features as well, and are envisaged as major areas for recreation and tourism development. Economic activities (agriculture, forestry, industry) are not subject to serious limitations, but have to conform to certain standards. The areas are delimited in Spatial Management Plans and included in regional voivodship plans. They are created and administered by the voivodship authorities.

Natural monument (pomnik przyrody): these are mostly single objects, such as trees, cliffs, erratic blocks, rock outcrops and so on. They are declared by the voivodship authorities and protected by them against any activity which would change their status.

The World Heritage Convention was ratified in June 1976 with one natural site (Białowicza NP) designated; the Convention on Wetlands of International Importance Especially as Waterfowl Habitat was acceded to on 22 November 1977 with one site listed. On 3 January 1984 four more sites were added. There are four Biosphere Reserves, designated in 1976.

Parks and Reserves Administration and Management The first administrative body dealing with nature conservation - the Temporary State Commission for Nature Protection - was created in 1919 by Order of the Minister of Religious Persuasions and Public Enlightenment and was transformed in 1925 into the State Commission for Nature Protection (PROP) (*Panstwowa Rada Ochrony Przyrody*). The Decrees of 1936 (Dz.U.R.P. nr. 94, poz. 660) and 1937 (Dz.U.R.P. nr. 27, poz. 195) created a Permanent Department within PROP and five regional Nature Protection Committees. The major activity prior to 1945 was the establishment of national parks and nature reserves. The Law on Nature Conservation of 1949 was followed by a Council of Ministers' Order of 1950 (Dz.U. nr. 13, poz. 127) creating the State Council for Nature Conservation (PROP) and in 1969 (Dz.U. nr.12, poz. 88) by the formation of Conservators of Nature offices in each of the administrative regions (voivodships) of the country. Under Article 9 of the 1949 Law nature conservation became the responsibility of a Chief Conservator of Nature within the Ministry of Forestry and Timber Industry, but in the 1970s a separate Ministry, the Ministry of Administration, Regional Economy and Environmental Protection (*Ministerstwo Administracji, Gospodarki Tererowej i Ochrony Srodowiska*) took over the overall control of environmental protection and spatial planning functions. In November 1985 a new law (Dz.U. nr. 50, poz. 262) created the new Ministry for Conservation of the Environment and Natural Resources (*Ministerstwo Ochrony Srodowiska i Zasobow Naturalnych*) which deals with all aspects of environmental protection (air, water, solid wastes, soils), water management, geology and nature conservation and all matters governed by the law on Nature Conservation of 7 April 1949, except the administration of national parks. The Chief Conservator for Nature, is also a Vice-Minister whilst there is a separate Director, who is in charge of the Ministry's Department of Nature Conservation and

Soil Management (*Departament Ochrony Przyrody i Powierzchni Ziemi*). This section employs specialists in nature conservation and maintains the central register for national parks, nature reserves and landscape parks. The Ministry implements state policies covering the entire fields of environmental conservation, nature protection and management of natural resources, however, spatial planning is now within the responsibility of the Ministry of Construction and Municipal Economy (*Ministerstwo Budownictwa i Gospodarki Komunalnej*). The Ministry for Conservation of the Environment has, however, only executive control over national parks deciding overall principles of protection and management. Administratively the complete national park system is managed by the Ministry of Agriculture, Forestry and Food Economy (*Ministerstwo Rolnictwa, Lesnictwa i Gospodarki Żywnościowej*) and specifically by its Department of Forestry and National Parks (*Departament Lesnictwa i Parków Narodowych*). The State Council for Nature Conservation is the official advisory body on nature conservation matters. Its Chairman is the Minister for Conservation of the Environment. The Council gives advice and expert opinions on all projects concerning the creation of national parks, landscape parks and nature reserves and also presents its own initiatives. The State Council consists of a Secretariat, and seven Permanent Commissions, including the Commission on National Parks and Nature Reserves, the Commission on the Protection of Inanimate Nature and the Commission on the Protection and Management of the Landscape. The Commission on National Parks and Nature Reserves co-ordinates closely with the councils of specific national parks, with the Voivodship Conservators of Nature and with the Academy of Science's Nature Protection Research Centre (*Zakład Ochrony Przyrody i Zasobów Naturalnych*, PAN) and the Forestry Research Institute (*Instytut Badawczy Lesnictwa - Zakład Ochrony Przyrody*). The Commission is responsible for the preparation of documentation (or its review) prior to the creation of new national parks and nature reserves and for programmes of protected areas systems as well as research and management.

Addresses

- ° Ministerstwo Ochrony Środowiska i Zasobów Naturalnych, ulica Wawelska 52/54, 02-067 Warsaw.
- ° Ministerstwo Rolnictwa, Lesnictwa i Gospodarki Żywnościowej, ulica Wspólna 30, 00-522 Warsaw.
- ° Państwowa Rada Ochrony Przyrody, Wawelska 52/54, 02-067 Warsaw.

Additional Information The first programme for the creation of a network of reserves was elaborated at the beginning of the 20th century and by 1918 there were 39 small nature reserves totalling 1,469ha. This number increased to 180 covering 28,478 by 1937. In addition, by 1936 six national parks were created totalling 10,276ha but none were given legal recognition. The total area protected (1986) amounted to 2,477,100ha which is 7.95% of the surface area of the country. According to the development plan for nature conservation the total area of national parks will amount to 232,000ha by 1990 (125,700ha in 1984) by the addition of four new parks, while nature reserves should increase by 600 sites by 1990 giving a total area of 180,000ha (99,778ha in 1984). The total protected area is projected as being 8,734,426ha or 27.9% of the surface area of the country. In the 1980s only one national park had created a buffer zone, only four had legally satisfied their Spatial Management Plans and five others were in the process of ratification. The major threats to national parks are: a combination of uncontrolled tourism, aerial pollution, water pollution and unsuitable forms of economic development. The number of tourists had reached an annual total of 9 million. There are proposals for national parks to be zoned to provide areas for recreation, communications and other uses. The 1949 Law envisaged wide social and community involvement in nature protection and resulted in the creation of the voluntary Citizen Nature Conservation Guards (*Straż Ochrony Przyrody*), which is composed of the Nature Conservation League (*Liga Ochrony Przyrody*) (founded in 1928 and now with 1,600,000 members), the Polish Tourist Society, the Polish Hunters Society, the Polish Anglers Society and the Alpine Club.

As of December 1984 there were 14 national parks (125,684ha), 872 nature reserves (99,778ha), 24 landscape parks (535,368ha) and 111 areas of protected landscape (1,685,083ha). A survey in 1983 suggested that two-thirds of the surface area of Poland's forests is in a state of disaster and industrial pollution has directly damaged 654,000ha of woodland. In 1982 the Academy of Sciences published a "State of the Environment" report (nine volumes), and in 1985 four areas

Poland

were declared "ecological disaster" areas and 23 as of "high ecological risk". The National Spatial Management Plan until the year 1996 identified 27 regions (11% of the surface area of the country) as ecologically damaged, nine national parks and six landscape parks as severely threatened and 23 health resort areas as threatened.

References

- ° Karpowicz, Z.J. (1987). *The Polish Park System*. Unpublished PhD thesis. University of Birmingham.
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Protected Landscapes

	(hectares)
<i>Landscape Parks</i>	
Bolimowski PK	25,900
Brodnicki PK	22,240 *
Chelmski PK	23,500
Dolina Slupi PK	120,210
Drawski PK	63,642
Gor Stolowych PK	13,600 *
Gostyninsko-Wloclawski PK	51,344
Inski PK	51,843 *
Kaszubski PK	34,544
Kazimierski PK	38,670
Kozienicki PK	45,535 *
Ksiazanski PK	4,500 *
Lagowski PK	10,070
Lasy Janowskie PK	62,950 *
Mazowiecki PK	5,510
Mazurski PK	69,219
Mierzeja Wislana PK	22,390
Nadmorski PK	27,610 *
Narwianski PK	47,915
Poleski PK	27,500
Pszczewski PK	57,587
Snieznicki PK	28,800
Sobiborski PK	19,000 *
Strzelecki PK	10,300
Suwalski PK	14,901
Szczecinski PK	22,383
Trojmiejski PK	33,104
Tucholski PK	52,929 *
Wdzydzki PK	17,650 *
Wigierski PK	21,301
Wzniesienie Elblaskie PK	33,292
Zaleczanski PK	14,278 *
Zespol Jurajskich PK	246,276
Zespol Parkow Ponidzia PK	82,647 *
Zywiecki PK	57,660
Subtotal	1,480,800

Brodnicki PK

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05. (Middle European Forest)

Geographical Location Situated in the voivodship of Torun in the communities of Biskupiec Pomorski, Bobrow, Jablonowo Pomorskie, Kurzetnik and Zbiczo on the south-western edge of the Mazurian Lake District and to the east of the river Vistula valley, some 60km north-east of Torun and 10km due north of Brodnica, centred on a tributary of the river Drweca, the Skarlanka. 54°45'N. 19°25'E.

Date and History of Establishment The area was created by order of the Voivodship People's Council (Nr. V/32/85) on 29 March 1985. It was originally proposed by the Commission for Landscape Protection on 15 February 1984.

Area 22,240ha, including a buffer zone of 11,778ha

Land Tenure The agricultural land is privately owned in the form of small plots and holdings.

Altitude No information.

Physical Features The soils are mostly poor and infertile and the area is centred on the tributary of the river Drweca and a series of lakes. The terrain is varied and largely the result of the Baltic Ice Age period. The largest lakes include Parteczyny Wielkie (324ha), Sosno (198ha), Lakorek (162ha), Glowinskie (131ha), Zbiczna (128ha) and Ciche (110ha). The waters are still pollutant free.

Climate No information.

Vegetation Forests cover 8,995ha, agricultural land 11,455ha and water areas 1,790ha. The forests form a complex of habitats and are noteworthy as the junction of a number of floristic boundaries. Here are the extreme limits of the field maple *Acer campestre*, sycamore *Acer pseudoplatanus*, beech *Fagus sylvatica*, and rowan *Sorbus aucuparia*. Overall there is a rich flora with the peatland reserves having relict oligotrophic floral species and emergent lakeside vegetation. The reserve Wyspa na Jeziorze Parteczyny Wielkie is the site location for lady's slipper orchid *Cypripedium calceolus*, while Okonek reserve has *Oxycoccus microcarpus*. Mielwo reserve consists of an 150 year-old mixed woodland of beech *Fagus sylvatica*, pine *Pinus sylvestris* and oak *Quercus robur*; the beech reaching here its eastern limit, while Retno reserve has a dominant hornbeam *Carpinus betulus* canopy.

Fauna The larger mammals are represented by wild boar *Sus scrofa*, red deer *Cervus elaphus* and fallow deer *Dama dama*. There are significant concentrations of water birds, with the most important water body being Jezioro Sumowko which has 22 breeding species, one of which has over 5% of the Polish population present here.

Cultural Heritage In the park there are numerous examples of Middle Age structures and earthworks as well as examples of traditional rural buildings of the 18th and 19th centuries. There are also a large number of martyrdom sites from World War II, including the village of Pokrzydowo where 70 people were murdered as well as sites near Retno, Gorale and Nowej Wsi.

Local Human Population Density of population is 21 persons per square kilometre and the park area is dominated by the presence of isolated small settlements within the forests, for example, Kon, Zarosle and Karas. The dominant form of agricultural land use is in the form of small-holdings. There are no industrial plants of any size located in the area.

Visitors and Visitor Facilities Within the park there are five small scale recreation tourist centres with some overnight capacity, centred on the lakes Debno, Glowinskie, Lakorek, Parteczyny Male and Parteczyny Wielkie. Larger tourist centres are located in the buffer zone. The most attractive forest trail is the water-trail along the Skarlanka river.

Scientific Research and Facilities No information.

Conservation Management The landscape park is completely surrounded by an area of protected landscape which acts as a protective zone, whilst in the park itself there are six nature reserves, two of which are strictly protected, both being peatland reserves - Zurawie Bagno covering 6ha and created in 1958 and Streszek covering 5ha and created in 1963. The remaining reserves consist of three floristic (Wyspa na Jeziorze Porteciny Wielkie, created in 1958 and less than one hectare in size; Okonek created in 1958 and covering 9ha; and Retno) and one landscape reserve - Mielwo created in 1958 and covering 6ha. There are also 8 natural monuments. Within the park and its buffer zone there are restrictions of activities damaging to the environment and the proposed removal of all incompatible forms of exploitation as well as the re-cultivation of degraded areas. Approximately 35% of the forest area is closed to game hunting. The area is included in the voivodship spatial management plans for a system of protected areas.

Management Problems No information.

Staff No information.

Budget No information.

Local Administration No information.

References

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Date August 1987

Gorach Stolowych PK

Management Category V (Protected Landscape)

Biogeographical Province 2.32.12 (Central European Highlands)

Geographical Location Situated on the Polish-Czechoslovakian border in south-west Poland in the voivodship of Walbrzych, some 40km due south of that town, and 20km due west of Klodzko. 50°25'N, 16°10'E

Date and History of Establishment The area was created in 1981 under the Voivodship People's Council order Nr. 35/81 of 28 October.

Area 13,600ha including a buffer zone of 3,950ha.

Land Tenure The forests are state-owned whilst the agricultural lands are largely in private ownership.

Altitude The highest point is 919m at Szczeliniec Wielki.

Physical Features The mountains (17km x 4km) consisting of sandstone have been eroded in places forming pinnacles and clusters of outcrops, the largest group of which are called the Skalne Grzyby. This is the only site in Poland which exhibits plate built mountains. The weathering of the rocks has given rise to a number of unusually shaped rock clusters which are concentrated on the north-eastern slopes of the Gor Stolowych near Pasterki, Radkowa and Wambierzyc, on the south-eastern slopes near Batorowa, Zlotna i Lezna and on the peaks of the various mountains, such as Szczeline Wielki (919m), Szczelin Maly (896m), Skalniaku i Blednych Skalach (915m) and Naroznik (861m). The area acts as an important source of drinking water for the settlements of Kudowy, Polanicy, Klodzko, Nowa Ruda and Scinawki.

The total capacity of the reservoir is 46,600m³ per day with an extraction rate of 387m³/per day per km². There are also water sources containing mineral elements which supply the health resorts of Kudowy, Duszniak and Polanica. The average density of the water courses networks is 1.25 km per km², with the lowest values recorded in the central part of the mountains which contain the spring sources, but with the development here of waterfalls and canyons (for example, at Posna, Czerma, Darnkowski Potok and Kamienny Potok). Two-thirds of the area is in the Odra river watershed, one-third in the Lada river watershed.

Climate The Sudeten mountain chain is characterised by having three climatic strata vertically identified: peak, slope and base of slope. The peak stratum has on average annual temperatures below 2.5°C, winds averaging at 7m per second, high degree of cloud cover and low recorded sunlight. The slope stratum has average annual temperature from 2.5°C to 5.0°C, winds 4-7m per second, low cloud cover and high recorded sunlight. The lowest stratum has average annual temperatures above 5°C, little wind (4m per second), a tendency for temperature inversion, higher cloud cover and lower recorded sunlight.

Vegetation Forests cover 12,509ha, agricultural land 1,052ha and water bodies, 39ha. The site has high altitude peatbogs and fir-pine *Abies-Pinus* forests. The forests cover 64% of the park area, with agricultural land, in the form chiefly of meadows, pasture and low productivity arable areas, dominant along the boundaries. The forests were placed under a commercial regime and extensively felled and replanted with norway spruce *Picea abies* at the turn of the century. At present spruce accounts for over 80% of the woodland cover. Areas of original natural forest cover still exist along the slopes of the upper mountains in the form of beech *Fagus sylvatica* woods, especially near Rogowej Kopy, Darnkowskiego Potoku and Posna. There are remnants of ancient pine forest and small patches of natural spruce and poorly developed beech, typical of the Sudeten mountains. Amongst the 510 species of trees, scrubs and plants recorded in the park, 24 are under complete protection and some are classified as very rare in Poland. The nature reserves have bog pine, mezureum, ivy, lousewort, globeflower, gentian, arnica, Martagon lily (*Pinus mughus*, *Daphne mezereum*, *Hedera helix*, *Pedicularis sudetica*, *Trollius europaeus*, *Gentiana* sp., *Arnica montana*, *Lilium martagon*), and the orchids *Orchis latifolia* and *Leucorchis* sp. and 13 other protected species. Partially protected species include *Primula* sp, *Digitatis purpurea*, *Veratrum Lobelianum* and *Convallaria majalis*. The only station for Irish saxifrage *Saxifraga rosacea* in the Sudeten mountains is found at Rogowej Kopy. There is also a very rich flora of mosses and liverworts with 272 species and 122 species respectively having been recorded.

Fauna Little has been systematically studied of the fauna of the Park. Mammals, however, include hare, fallow deer, red deer, wild boar, fox, pine marten and badger (*Lepus capensis*, *Dama dama*, *Cervus elaphus*, *Sus scrofa*, *Vulpes vulpes*, *Martes martes* and *Meles meles*). In the inter-war years there were records of forest, common and edible dormice *Dryomys nitedula*, *Muscardinus avellanarius* and *Glis glis*, respectively. Breeding birds include partridge *Perdix perdix*, pheasant *Phasianus colchicus*, black grouse *Lyrurus tetrix*, pygmy owl *Glaucidium passerinum*, eagle owl *Bubo bubo*, black stork *Ciconia nigra*, goshawk *Accipiter gentilis*, sparrowhawk *Accipiter nisus*, kestrel *Falco tinnunculus*, dipper *Cinclus cinclus*, grey wagtail *Motacilla cinerea*, nutcracker *Nucifraga caryocatactes* and bullfinch *Pyrrhula pyrrhula*. In previous years there were records of capercaillie *Tetrao urogallus*.

Cultural Heritage The dominant role in the local economy of the health centres (located around the park) in providing recuperative services is now changing under the influence of industrial development and tourism.

Local Human Population Within the Park there are five villages and a further ten around the park's boundaries, the largest being Kudowa-Zdroj and Polanica-Zdroj, both tourist and spa towns. The area has suffered depopulation and several villages have been abandoned.

Visitors and Visitor Facilities There is a special educational trail designed to view the geological structures, in addition to five separate tourist trails. A number of health resorts are located around the park - Kudowa, Duszniak and Polanica, as well as tourist centres such as Radkow, Wambierzyce, Zlotno, Kulin, Lewin Klodzki, Pasterka and Czerma. However, the

spa towns are increasingly being taken over by industry and tourism. For example, in Kudowie 62% of the working population are now employed in industry, while in Polanicy 42% work in this function (the same amount as are employed in spa and tourist activities combined).

Scientific Research and Facilities The weathering aspects of the sandstone has been researched by geologists and geomorphologists, with special emphasis on the differential resistance to wear shown by the layered rocks. Research has also concentrated on the Szezelin Wielki area where the influence of underground waterflows on the washout and movement of rock layers has been studied. Most recently evidence has been produced to suggest rock movements as a result of vibrations in the strata.

Conservation Management The site contains three nature reserves, two landscape reserves and one peatbog strict reserve. The landscape ones are Szczeliniec Wielki (50ha) and Bledne Skaly (23ha); the peatbog reserve is Wielkie Torfowisko Batorowskie (39ha). Three further nature reserves are planned. The Park lies within an area of protected landscape which is demarcated along forest edges and partly along the international highway E-12. A planning document prepared by Dr Pender suggests the establishment of four further reserves. One is aimed at protecting meadowland near Lezyc, one in a beech-plane *Fagus-Platanus* wooded area, one in natural Sudeten forest and one consisting of a steep-sloped natural pine forest. There are suggestions that the area may be declared a national park.

Management Problems The trails in the Park are heavily utilised and in the central parts of the mountain this pressure is becoming a threat. Szczeliniec Wielki and the Bledne Skaly are visited daily by 1,000-2,000 people. The five separate trails converge at the tourist centre of Kartow through which also passes the landscape road "The 100-Bends Trail". A further attraction to the area is the reservoir, just beyond the park boundary, at Radkowie. The increased industrialisation of the area has led to pollution standards being broken: at levels twice the permitted in Kudowie (83.6 tons per km² per year), 2.5 times in Densznikach (101 tons per km²) and 5.5 times in Polanicy (222 tons per km²). Levels of SO₂, NO and fluorides are above permitted figures, as is the level of noise (23-26 dBA in Polanicy). Building development is expanding in line with industrial and tourism increases. The increase in urbanised populations, increase in motor traffic as well as chemical use in agriculture and forestry is having a serious effect on the park, with noticeable forest dieback and invasions of insect pests. There is continued exploitation of sandstone and stone quarries at Radkow, development of factory farms, the asphaltting of forest roads and the construction of a ski-lift.

Staff No information.

Budget No information.

Local Administration No information.

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Date August 1987

Inski PK

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05 (Middle European Forest)

Geographical Location Situated in the voivodship of Szczecin in the Inski Lake District some 50km due east of Szczecin and immediately adjacent to the town of Insko. 53°27'N, 15°32'E.

Date and History of Establishment The area was created by order of the Voivodship People's Council (Nr. IX/55/81) on 4 November 1981 and came into force on 1 January 1982.

Area 51,843ha including a protective buffer zone of 35,280ha.

Land Tenure No information

Altitude No information

Physical Features The park occupies the watershed and origin of a number of rivers the majority of which flow to the west. There are at least seven large lakes, the largest being the Visala Lake.

Climate No information

Vegetation Forests cover 12,719ha, agricultural lands 28,720ha and water areas 2,862ha.

Fauna No information

Cultural Heritage An old water mill has been renovated from funds raised by the Hunter's Union. It is located at Ciemnik on the river Ira where it cascades off the Inski plateau.

Local Human Population The park lies adjacent to the town of Insko

Visitors and Visitor Facilities No information

Scientific Research and Facilities No information

Conservation Management The area is completely surrounded by a protective buffer zone which is contiguous with an extensive area of protected landscape stretching for some 60km to the south to the River Notec. In 1983 members of the Nature Conservation League, the Polish Hunter's Union together with forestry personnel, agricultural officials and local and regional government members formed a Society of Friends of the Inski Landscape Park. The aim of the park is fourfold: environmental protection; tourism; education; and the maintenance of the ecological balance in the surrounding areas. The Society is divided into five working groups: - the Group on Nature Protection; Group on Forestry and Agriculture; Group on Hunting and Water Management; Group on Spatial Planning and the Group on Propoganda and Tourism.

Management Problems No information

Staff No information

Budget No information

Local Administration No information

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Date August 1987

Kozienicki PK

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05 (Middle European Forest)

Poland

Geographical Location Situated in the voivodship of Radom between the town of Radom (8km to the south-west) and the River Vistula (10km to the north-east). Its northern boundary is formed by the river Radomka and is centred on the forested Puszcza Kozienicka. 51°35' N 21°35'E.

Date and History of Establishment The area was created by order of the Voivodship People's Council (Nr.XV/70/83) on 28 June 1983.

Area 45,535ha including a buffer zone of 30,437ha

Land Tenure Excluding the buffer zone the forests are largely state-owned and under the administration of the State Forest Offices in Kozienice, Zagodzón, Garbatka, Pionki and Jedlnia. The remaining 2,255ha are privately owned.

Altitude Between 100 and 200m

Physical Features The northern section of the protected area contains the most characteristic landscape for this region based on ancient sand dune terraces. The whole area is within the floodplain of the river Vistula and includes a number of its tributaries: the Radomka forms the northern boundary of the protected landscape and is considered to be the most natural of all the water courses in the site; and the Zagodzónka which flows through the central part of the forest. These streams originate in peatbogs.

Climate No information

Vegetation Forests cover 24,019ha, agricultural land 17,712ha and water areas 219ha. The forests are part of the Kozienicka Puszcza which in total consists of 28,035ha of woodland and represents the largest remaining block of natural forest cover in the Radom voivodship. Some 80% of the landscape park (excluding the buffer zone) is forest cover. In the northern sections the ancient sand dune terraces are covered by pine *Pinus sp.* forest alternating with peatbogs which take up some 10% of the total core area. Geobotanically the area has similarities with areas in the central uplands of Poland. It contains some species on the limits of their range, for example, fir *Abies sp.*, spruce *Picea sp.*, beech *Fagus sylvatica* and sycamore *Acer pseudoplatanus*. There are old records for Polish larch *Larix decidua var. polonica* and yew *Taxus baccata*. The nature reserves are largely covered by fir mixed with oak *Quercus sp.*, pine *Pinus sp.*, sycamore, beech, and maple, wych-elm, lime, birch, hornbeam and aspen (*Acer platanoides*, *Ulmus glabra*, *Tilia sp.*, *Betula sp.*, *Carpinus betulus* and *Populus tremula*). Species of note include *Lycopodium sp.*, *Allium ursinum*, *Galanthus nivalis*, *Trollius europaeus*, *Linnaea borealis* and a large number of orchids *Orchidaceae*.

Fauna No information

Cultural Heritage The forest area has a long history and in the 17th century was called the "Puszcza Radomska" and was given protection as a royal hunting ground. From 1607 it supplied venison and other game for the King's court. The village of Jedlnia is the location of a small one-storeyed castle which was used by the King Wladyslaw Jagiello and his court as a stop-over place between his two capitals of Krakow and Vilnius. Here in 1430 the "Statut Jedlenski" was issued. Timber from the forest was floated down the river Vistula and used in the construction of the Royal Castle in Warsaw as well as the Belveder.

Local Human Population There would appear to be only one settlement within the protected landscape, the village of Augustów. However, there are at least eight villages on the edge of the area as well as two towns (Kozienice, to the north-west and Pionki, to the south) and the city of Radom (population 206,000) some 5km to the south-west.

Visitors and Visitor Facilities There is a system of trails and paths which are designed for educational and recreation purposes. A recreation centre is being constructed at the Siezka lake and there are plans for the creation of a larger lake at Pacynie which would also be used for recreation. The Radomka river is already utilized for a number of water sports.

Scientific Research and Facilities No information

Conservation Management The area is completely surrounded by a protective buffer zone. Since the days of the Partitions (late 18th century) the forest has been government-owned and hence managed according to forestry plans and therefore has to a large extent avoided mass deforestation. A major feature of the management will be the need to maintain and extend the area of the forest covered by native species of trees, which are now largely restricted to the nature reserves. There are at present seven forest nature reserves: Zagodzón (established 1962, 65ha); Ponty (established 1978, 36ha); Brzezniczka (established 1980, 45ha); Pionki (established 1982, 83ha); Jedlnia (established 1982, 86ha); Ciszek (established 1982, 40ha) and Zalamanek (established 1982, 75ha). The majority of these were set up to give protection to associations of fir *Abies sp.* (the typical tree species for the protected landscape area). In addition, two landscape reserves were established in 1978 and 1980. A sewage treatment works is being constructed at Mlecznej which will help prevent water pollution in the lakes and rivers within the site.

Management Problems The major threat to the area is from industrial pollution most of which emanates from the power station and a complex of chemical factories situated on the edge of the protected landscape at Pionki. Other industrial concerns are located at Kozienice and Radom. There is some pressure from the expansion of urban areas.

Staff No information

Budget No information

Local Administration No information

References

° Zareba, R. (1984). Kozienicki Park Krajobrazowy. *Przyroda Polska*. No.11. Pp.18-19.

Date August 1987

Ksiazanski PK

Management Category V (Protected Landscape)

Biogeographical Province 2.32.12 (Central European Highlands)

Geographical Location Situated in the voivodship of Walbrzych in Lower Silesia in the Sudeten mountains some 5km due north of the town of Walbrzych and extending for 13km in a NW-SE axis between the towns of Szczawno-Zdroj to the south and Swiedodzice to the north. 50 40'N, 16 40'E

Date and History of Establishment The area was created by order of the Voivodship People's Council (Nr. 35/81) on 28 October 1981.

Area 4,500ha, including a buffer zone of 700ha.

Land Tenure The forests are State-owned; the agricultural lands are private

Altitude Highest point in the south-eastern part of the park reaches 480m.

Physical Features The park occupies a narrow (2-3km wide) forested ridge of the Middle Sudeten Range which in effect is the edge of the uplands separating the mountains from the Silesian plains for a distance of 120-150km. This ridge is deeply cut in places by streams and rivers originating in the mountains to form ravines. The park area exhibits some of the most interesting morphological features along the length of the ridge by being cut in the space of 10km by five steeply-sided valleys, namely by the rivers Lubiechowska Woda, Pelcznica,

Szczawnik, Solny Potok and Czyzynka. In cutting through the 2km ridge the rivers is forced to meander for up to 4km through ravines 50-80m deep. The sides are very steep, at times vertical, with the floor of the ravines narrowing to 20-30m. Often at the bottom the humidity is high and deeply shaded. The park can be divided into three sections according to their geological characteristics. A chief element in the sediments are inlays and deposits of limestone and marl which contain fossils of the Upper Devonian fauna. This is particularly typical of the eastern section of the park between the Witoszowski and Lubiechowski valleys. The south-eastern section, the highest part has a dense network of streams inflowing from the north into the Witoszowski river and the southernly entering streams of the Lubiechowski river, which are shallow and often dry, but is otherwise a gently undulating landscape. The central section is cut by very deep meandering ravines by rivers with a mountainous character. The steep rocky slopes with many gullies and gutters divide the terrain and often result in areas of boulder-strewn treeless patches (as, for example, at Szczawnik) reminiscent of a mountainous landscape. The northern section consists of rocks which are most resistant and is cut by the largest of the rivers- the Czyzynka -and a gently undulating landscape reaching a height of 447m (Waly).

Climate No information

Vegetation Forests cover 4,070ha (90% of the area), agricultural land 410ha and water areas 20ha. The deep cut dark ravines provide the right conditions for the growth of shade and humidity-loving plants and the occurrence of specific faunal elements. The forests are both dry and humid varieties of the lower subalpine forests whilst in the smaller streams there are elements of marshy woodland. The largest area is covered by mixed mountain forests. More rare are patches of lowland conifer forests and mountain alder forest. The three types are: 1. multi-specied mixed forest which includes sycamore, silver fir, oak, elm, lime (*Acer pseudoplatanus*, *Abies alba*, *Quercus* sp., *Ulmus* sp., *Tilia cordata*) and single examples of yew *Taxus baccata*. The shrub layers consist of rowan, ash, rose, red-berrid elder and meadowsweet (*Sorbus aucuparia*, *Fraxinus excelsior*, *Rosa* sp., *Sambucus racemosa* and *Filipendula* sp). The ground flora is dense and covers 50-80% of the area. 2. Sudeten beech forest which has beech, lime, norway spruce, sycamore, elm and yew (*Fagus sylvatica*, *Tilia* sp., *Picea abies*, *Acer pseudoplatanus*, *Ulmus* sp. and *Taxus baccata*). There is an almost complete absence of understorey with the ground flora consisting of sweet woodruff *Asperula odorata* and dog's mercury *Mercurialis perennis*. 3. mountain alder forest located in damper areas consisting of grey alder *Alnus incana*, willow *Salix* sp. and dense shrubs and grass. Isolated patches are also present of spruce forest *Picea abies* which have been artificially planted and cover a fair sized area and birch *Betula* sp. occurring especially on the northern slopes and the ridges. In the valleys there are meadows. A unique and separate biotope is present in the bottoms of the ravines and stream gulleys where a rich assembly of ferns and mosses occur, such as along the Pelcznicy river and the water reservoir in the valley of the Solnego Potoku. There are records for 273 species of flora including 44 species of trees and bushes. Within this total there are 24 mountainous species, 4 mountain forest species and 21 species at the limits of their range, and 17 species which are completely protected by law, some of the latter are quite numerous in the park, for example, on the ridge of the Pelcznicy. In the Szczawnika and Potoku Solnego valleys there are over 100 individual yew tees, some may be 400 years old and reach 275cm in circumference. There is also flowering ivy *Hedera helix*, mezereum *Daphne mezereum*, *Lilium martagon*, and the orchids *Platanthera bifolia* and *Listera cordata*.

Fauna The diversity of the morphology and microclimate of the area creates the ideal conditions for the development of a very rich fauna and in particular the invertebrate fauna. There are records for many species of molluscs including several endemics and approximately 170 species of Arachnids including 21 defined as rare. Amongst the butterflies recorded there are the rare *Papilio machaon* and *Apatura isis*. Other species present in the park but which are extinct in Silesia include *Lycaemidas idas*, *Lysandra mersites* and *Maculinea nausithos*. The Coleoptera fauna is rich and includes *Cerambyx scopolii* and *Clytus lama*. Amongst the Curculionidae present is *Liparus coronatus*. Of particular interest is the presence of the ichneumon *Ichneumon gravipectus*. Of the interesting amphibians and reptiles present it is worth noting the warty *Triturus cristatus* and alpine *Triturus alpestris* newts the fire salamander *Salamandra salamandra* and the tree frog *Hyla arborea* as well as the sand

lizard *Lacerta agilis*, slow-worm *Anguis fragilis*, grass snake *Natrix natrix* and the very rare smooth snake *Coronella austriaca*. The birds recorded include a large number of raptor species as well as those species requiring holes for nesting. For example, kestrel *Falco tinnunculus*, goshawk *Accipiter gentilis*, buzzard *Buteo buteo* and sparrowhawk *Accipiter nisus* breed and rarer species include nutcracker *Nucifraga caryocatactes*, stock dove *Columba oenas* and grey wagtail *Motacilla cinerea*. Mammals include two species of shrew *Microtus sp.*, wild boar *Sus scrofa*, fox *Vulpes vulpes*, fallow and red deer *Dama dama* and *Cervus elephas* and mouflon *Ovis aries*.

Cultural Heritage The park is rich in monuments and ruins. There are former fortification works, magnificent residences of the former land owners, a watchtower of the princes Bolek and Swidnicki and the castle at Ksiaz overlooking the ravine of the river Pelcznicy. This is the largest castle in Silesia, with 415 rooms and an area of 150,000 cubic metres. In addition there are castles from the Middle Ages, and other military and religious objects.

Local Human Population There is only one town, Ksiaz, and one village, Cisow within the park, but there are at least eleven small and large towns surrounding the area. The two major conurbations of Walbrzych and Swidnica are very close to the park, and a large proportion of Walbrzych's population of 718,000 use the area at weekends.

Visitors and Visitor Facilities Tourist attractions are mainly restricted to the historic monuments and buildings with activities centred on the Ksiaz castle.

Scientific Research and Facilities The exposed rock faces on the Lipiny mountain (near Mokrzyszowa Gornego) and the partially flooded quarry (Jezioro Daisy) have been studied for over 100 years for their fossil remains and the use of stratification for ageing deposits. This site has yielded numerous corals, Brachiopoda, Stromatopora, Lamellibranchiata, goniatites and others, thus allowing the Devonian fauna to be evaluated in detail.

Conservation Management The park is surrounded by a protective belt consisting of an area of protected landscape. The original concepts put forward by government advisory bodies saw the creation of several nature reserves and an area of protected landscapes with the development of tourism and the creation of a reservoir below Cisy in the river valley Czyzynki. However, in the early 1980s the programme was dropped and the landscape park created. Unfortunately, no spatial management plan for the park has been created and only some information boards have been erected.

Management Problems The forests continue to be utilized by the forestry authorities as commercial crops although in a temporary basis and near Ksiaz the forests are used by the Tourism and Social Administration "Ksiaz" whilst the agricultural land is used by its present owners. Some of the river courses contain many years worth of accumulated timber while the exact boundaries of the park have yet to be fixed. The regulations affecting the management of the park are at present not being enforced. There is uncontrolled tourist pressure especially at the central part and the nature reserve Soliczanka has been damaged by excessive trampling. In the northern part of the park a number of water extraction plants are being built endangering the water table in the area. In recent years there has been an explosive increase in the occurrence of honey fungus *Armillaria mellea* and most recently near Pelcznice outbreaks of beech aphids.

Staff Although indicated in the documents creating the landscape park, no director nor staff members have been appointed.

Budget No information

Local Administration No information

References

° Jonca, E. (1986). Ksiazanski Park Krajobrazowy. *Przyroda Polska*. No. 2. p.18-21.

Date August 1987

Lasy Janowskie PK

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05. (Middle European Forest)

Geographical Location Situated in voivodship of Tarnobrzeg in the south-eastern uplands of the country, some 55km south of Lublin, 65km north-east of Rzeszow and just south of Janow Lubelski. 50°32'N, 22°30'E.

Date and History of Establishment The area was created by Voivodship People's Council Order Nr. II/12/84 on 3 October 1984.

Area The park covers 62,950ha which includes a buffer zone of 39,550ha.

Land Tenure No information.

Altitude No information.

Physical Features No information.

Climate No information.

Vegetation Forests cover 33,780ha, agricultural lands 25,534ha and water bodies 510ha. The surrounding area is dominated by pine *Pinus sylvestris* woodland, interspersed with pockets of fir *Abies sp.*, and peat bogs, as well as a large number of lakes.

Fauna There is apparently a rich fauna recorded for the region. Birds include breeding crane *Grus grus*, lesser spotted eagle *Aquila pomarina* and short-toed eagle *Circaetus gallicus*. The populations of capercaillie *Tetrao urogallus* and of wolf *Canis lupus* represent 10% of their populations in the country.

Cultural Heritage The park is alternatively titled the "Partisan Park of National Significance" and is important for its role as the scene of partisan activity during World War II.

Local Human Population No information.

Visitors and Visitor Facilities No information.

Scientific Research and Facilities The Institute of Environmental Management in Warsaw in completing a project aimed at identifying areas needing protection which isolated the Lasow Janowskich and Puszcza Solska as requiring legal protection. The landscape park is due to be surrounded by an area of protected landscape - the Lipsko-Janowski APL as well as linked to another landscape park - Stawy. This project has been coordinated into the regional programme for environmental and water economy protection 1986-90 and outline plan till 2000, which was itself accepted.

Conservation Management To lessen the impact of the major communication routes which cross the area there are plans to build walkways under the roads, limit the speed of traffic and create belts of trees and bushes along the roads. A series of recommendations have been put forward to the forestry authorities (including the establishment of a number of reserves) and to the water authorities for the cleaning-up of the rivers Tanwi and Bukowa.

Management Problems The park lies within an area of intensive industrial development with large steel and engineering concerns located at Stalowej Woli, some 20km to the south-west of the park and only 5km from a proposed area of protected landscape. In addition to this the voivodship is one of the most significant with regard to agricultural production. There are five important communication routes through the area which act as ecological barriers.

Staff No information.

Budget No information.

Local Administration No information.

References

- ° Radziejowski, J. (1986). Obszary Chronionego Krajobrazu w Woj. Tarnobrzeskim. *Przyroda Polska*. No. 7. pp. 19-20.

Date August 1987

Nadmorski PK

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05. (Middle European Forest)

Geographical Location Situated in the voivodship of Gdansk on the Baltic coast, some 30km north of the city of Gdansk and including the entire Hel Peninsula (Mierzeja Helska) east of Wladyslawowo and approximately 40% of the Bay of Puck (Zaloka Pucka). It extends in a belt along the Baltic coastline for some 20km west of Wladyslawowo to the river Piasnicy. 54°45'N, 18°25'E.

Date and History of Establishment The area was created by order of the voivodship People's Council (Nr. IX/49/78) on 5 January 1978.

Area 27,610ha, including a buffer zone of 12,119ha.

Land Tenure Some 99% of forest cover is owned by the State, although the Ministry of Forestry is in control of less than 10% of the total area. The vast majority of agricultural land is State owned.

Altitude From sea level to 100m

Physical Features The park is characterised by the coastal sand dune systems and occasional stretches of cliffs and deep ravines, as well as by a large surface area of the Bay of Puck. The Hel Peninsula consists of sand dunes separating the open sea from the Bay. Soils vary tremendously but in the park are mainly clay, sands and gravels and are not much suited to agricultural production. The peninsula consists of sands (loose, wet and peaty). The Hel Peninsula has been created over time by the process of transportation of massive amounts of sand along the Baltic coastline, at first creating islands and then a 34km long peninsula. The accumulation of sand has resulted in the development of sand dunes. The Bay of Puck lies behind a narrow sand bar known as the "Ryfem Mew" and is an area of shallow (8m) water which warms up relatively fast, and is particularly clear and salt-laden.

Climate This is strongly influenced by the sea with winters being much milder than further inland. Temperature varies from an average low of -1.5°C in January to an average of 17°C in July. Summers are cooler along the coast with some 210 days of growing season. Average annual rainfall is between 550-600mm varying from 210 to 680mm. Rarely does the sea break through the peninsula, the last occurrence being in 1914.

Vegetation Forests cover 3,975ha, agricultural land 7,810ha and water areas 10,361ha. The forest cover is both pure pine *Pinus sylvestris* and mixed (with beech *Fagus sylvatica* being dominant) and including interesting Atlantic elements. The areas of steep cliffs are covered in mature beech forests with a rich ground flora, whilst the sand dunes are colonized by Scots pine *Pinus sylvestris* with an understorey of bilberry *Vaccinium myrtillus*. There are a number of peat bogs of the Atlantic type with species such as *Rubus chamaemorus* and *Myrica gale*. There are also communities of salt loving plants, particularly on the Hel Peninsula. The ground flora includes orchids (for example, *Listera ovata*) and the royal fern. The nature reserve

Przyladek Rozewski consists of 54m high cliffs covered in 120 year old beech *Fagus sylvatica* forest. Some of the trees are over 200 years old. Other tree species present include field maple, ash, rowan, birch, wild pear and Norway spruce (*Acer campestre*, *Fraxinus excelsior*, *Sorbus aucuparia*, *Betula pendula*, *Pyrus pyraeaster* and *Picea abies*). The shrub layer consists of hazel, willow, juniper, blackberry, guelder rose, raspberry and hawthorn (*Corylus avellana*, *Salix caprea*, *Salix sp.*, *Juniperus communis*, *Rubus sp.*, *Viburnum opulus*, *Rubus idaeus* and *Crataegus monogyna*). The cliff tops are covered in broom *Sarothamnus scoparius* and sea buckthorn *Hippophae rhamnoides*, some bushes reaching 2m. in height. Protected plants include *Lycopodium sp.*, ivy *Hedera heli* and a number of orchids. Behind the dune system there are extensive peat bogs such as the 2,000ha Bielawski bogs which represent the north-eastern limit of their distribution. The chief species is the cotton grass *Eriophorum sp.*, with cross-leaved heather *Erica tetralix*, bog myrtle *Myrica gale* and rarer species such as cloudberry *Rubus chamaemorus*, two species of *Sparganium*, beak sedge *Rhynchospor sp.* and pillwort *Pilularia sp.* The Bay of Puck has eel-grass *Zostera* beds at depths of 6-10m and other plants include *Chara baltica*, *Chara crinita*, *Chara aspersa* and *Tolypella nidifica*.

Fauna The Bay of Puck is an important area for many breeding and wintering bird species and is particularly well known as a migration spot with thousands of birds passing along the peninsula in spring and autumn. Until recently the smooth snake *Coronella austriaca* was reported from the Hel Peninsula. Some species recorded in the Bay of Puck are rarely encountered elsewhere, for example, *Cyathura carianata*, *Spahaeroma hokeri*, *Leptocheirus pilosus*, *Melita palmata*, *Talorchestra deshayotii* and *Cardium harniense*. Several unusual freshwater species are also present: *Piscicola geometra*, *Asellus aquatilis* and *Lymnea pregra*.

Cultural Heritage There are numerous architectural monuments of note and at Jastarni there is evidence of human occupation during the last 2,000 years. At Puck there are moraine boulders, the largest measuring 7.5m in circumference, locally known as the "Twelve Apostles" whilst near the town of Zarnowca at the western edge of the park there is a 20m circumference boulder which was chronicled in 1277 as the boulder marker of the Polish kingdom. Just outside Puck there is a 1.3km long avenue of lime trees which were, apparently, planted by the famous Polish King Jan III Sobieski which lead to the country villa of Rzucewie. At the village of Chlapowo near Rozewiem in 1859-1860 brown coal was exploited in a seam which ran to the cliff edge at this point. Also at Rozewiem there is a lighthouse which is a major tourist attraction and in Hel the original fishermen's cottages have been preserved and show a marked resemblance to Dutch buildings from the 18th century.

Local Human Population Within, or on the edge of, the park there are a number of fair-sized seaside towns, the largest being Wladyslawowo (9,000 inhabitants in 1976) followed by Jastarnia (4,500), Hel (3,800) and on the Bay of Puck, Puck. Average density (in 1978) was 269 persons per square kilometre.

Visitors and Visitor Facilities The Hel Peninsula is very popular with tourists, the beaches facing the Bay of Puck being the only south-facing ones in Poland, and subsequently there are a number of recreation centres along the coast (Chalupy, Kuznica, Jastarnia, Jurata and Hel). In total there are some 65 recreation centres; 38 in Wladyslawowo, 11 in Jastarni, 6 in Juracie, 4 in Karwi, 3 in Hel, 2 in Rewie and 1 in Debki having a capacity (in 1976) of 7,213 places. In addition there were 1,700 camping sites within the park and 400 in Wladyslawowo. There is a railway line (built in 1922) and a well surfaced road running the length of the coast which makes access that much easier and near Wladyslawowo there is the well known sports centre of Cetniewo.

Scientific Research and Facilities No information

Conservation Management The landscape park is protected on the inland side by an area of protected landscape (APL) with the zone extending seawards for 4km and including the whole of the Bay of Puck. With the landscape park there are three nature reserves, one of which is a strict nature reserve. One is a landscape reserve (Przyladek Rozewski, created in 1959, covering 12ha) and two faunal reserves (Moroszka Bielawskiego Blota, created in 1977 covering 8ha and Woskownica Bielawskiego Blota, also created in 1977, covering 33ha). The Sea

Administration personnel along with forest workers annually attempt to repair the damage caused to the sand dunes both by man and by natural causes. Previously thousands of migrating birds were killed by colliding with the lighthouse at Rozewic which has now been illuminated to prevent such massacres. A proposed nature reserve is to be declared in the Chlapowski Ravine which has exposed Tertiary deposits with floral remains.

Management Problems Due to the, at times, excessive tourist pressure on the Hel Peninsula, annually several dozen hectares of sand dunes are damaged. The peat bogs have to a major extent been damaged by local people who dig the peat for burning. The Gdansk based Non-Timber Forest Products Industry "Las" has planted large areas with non-native North American whortleberry bushes. On the edge of the park at the northern tip of the Zarnowiecki Lake there is an electricity powerstation which is intended to be converted into a nuclear power plant. There are fish processing plants in Wladyslawowo and Jastarni - their effect on the environment is not known.

Staff No information.

Budget No information.

Local Administration No information.

References

- ° Anon. (1978) *Nadmorski Park Krajobrazowy*. Urząd Wojewodzki w Gdansku.
- ° Sikora, A (1978) *Osobliwosci i Zabytki Przyrody Wojewodzwa Gdanskiego*, KAW Gdansk.

Date August 1987

Sobiborski PK

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05 (Middle European Forest)

Geographical Location Situated in the voivodship of Chelm just to the west of the river Bug and the Soviet border in the Polesie Lubelskie and the Wlodawa marshes, 10km south of Wlodawa and 30km north-east of Chelm. 51°27'N 23°30'E.

Date and History of Establishment The area was created by order of the Voivodship People's Council (Nr.XIII/89/83) on 23 March 1983 (on the same date that three other landscape parks were created in the Chelm voivodship, namely Poleski PK, Chelmski PK and Strzelecki Pk).

Area 19,000ha including a protective buffer zone of 9,000ha

Land Tenure A mixture of state-owned (most of the forests) and private (the majority of the agricultural lands)

Altitude 170m (highest point in the protective buffer zone is 187m)

Physical Features The area is a low-lying sandy and forested flood plain of the river Bug and its associated tributaries together forming a western extension of the Priwet Marshes. It consists of sand islands in an expanse of clay soils and the landscape is one of shallow expansive valleys and low undulating moraine uplifts. The landscape is typical of the Polesie lowlands characterized by infertile soils and waterlogged terrain.

Climate A continental climate predominates with long summer and winter periods (105 and 110 days respectively). The average annual temperature is 7° C. rising in July to an average of 18.5°C and falling in January to an average of -4°C. Annual average rainfall is 450mm.

Poland

Vegetation Forests cover 11,200ha, agricultural land 5,200ha and water bodies 660ha. The woodland is part of the larger Sobiborski Forest which is mixed, (with alder *Alnus glutinosus*), but with pine *Pinus sp.* dominant. The forests are generally waterlogged with small forest lakes. There are rare plant associations particularly surrounding the 14ha Plotycze Lake.

Fauna Larger mammals include wild boar *Sus scrofa*, fallow deer *Dama dama*, elk *Alces alces* and otter *Lutra lutra*. Wolves *Canis lupus* are also recorded regularly. There are a number of rare breeding bird species especially amongst the raptors with such species as lesser spotted eagle *Aquila pomarina*, short-toed eagle *Circaetus gallicus* and eagle owl *Bubo bubo*, as well as crane *Grus grus*. Of great interest is the large resident population of European pond terrapins *Emys orbicularis* with colonies present on the Koseniec Lake, Tarasinka river, Zlobek marshes, Orchowe Lake and six other sites.

Cultural Heritage The main feature of the area are the remains of the Sobibor World War II Nazi concentration camp where between March 1942 and October 1943 250,000 people were murdered. This camp was the scene in October 1943 of the only successful uprising staged in any camp in occupied Poland. The site today is woodland and its past history is commemorated with a simple monument.

Local Human Population Within the protected landscape there are three small villages - Sobibor, Zlobek and Orowa. The nearest town is Wlodawa with a population of 11,200. The 42ha Brudno Lake is used as a commercial fish farm and the non-forested areas are largely pastures and hay meadows.

Visitors and Visitor Facilities The area is remote and sparsely populated but is part of the Wlodawa-Leczynska Lake District which is becoming a popular water-based recreation and tourist destination. The nearest hotels and camping accommodations are at Wlodawa.

Scientific Research and Facilities During the years 1979 to 1984 the Ornithological Circle of the Forestry Institute SGGW-AR in Warsaw carried out research (with special reference to waterfowl populations and breeding raptors) in the area.

Conservation Management The protected landscape is surrounded by a protective buffer zone and by an area of protected landscape which is continuous with that surrounding the 27,500ha Poleski PK to the west. Within the protected landscape there is one peatbog nature reserve, Brudzieniec. There are plans to set aside a special fauna reserve for the protection of the European pond terrapin colony on the Koseniec Lake.

Management Problems There have been extensive drainage and agricultural intensification programmes in operation in the flooded meadowland and peatbogs further to the west, but this process has as yet not affected the protected landscape area. There is a railway line from Chelm to Wlodawa which runs along the eastern edge of the area and may be used for industrial purposes in view of the fact that there is an estimated 40 thousand million tons of coal deposits 900m below the surface. These are as yet unexploited. The major threat is the conversion of natural forest types to commercial operations and monocultures of pine *Pinus sp.*

Staff No information

Budget No information

Local Administration No information

References

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Date August 1987

Tucholski PK

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05 (Middle European Forest)

Geographical Location Situated in the voivodship of Bydgoszcz, part of the Bory Tucholski, to the west of the river Vistula and some 40km due north of Bydgoszcz and 90km south-west of Gdansk. The Park lies along and to the immediate east of the Brda river valley, with the nearest town being Tuchola. 53°45'N, 17°50'E.

Date and History of Establishment The area was created by order of the Voivodship People's Council (Nr. IX/71/85) on 9 December 1985, as "an area with enhanced protection of certain natural, landscape and cultural values". The Park and its buffer zone lie within 23 rural authorities in seven districts - Czernik, Chojnice, Cekcyn, Gostycyn, Lubiewo, Sliwice and Tuchola.

Area 52,929ha, including a buffer zone of 15,946ha.

Land Tenure No information.

Altitude No information.

Physical Features Situated in the central part of the Bory Tucholski, north-south along the Brda river valley in the Krainy Wielkopolsko-Pomorski. The Brda river is the major source of water supply to the town of Bydgoszcz (the ninth largest in Poland). Below the confluence of the river Bielska Struga, the rate of fall in the river increases significantly and the river valley becomes narrow, deeply cut and canyon-like near Pieklo, where the river contains boulders which break the surface of the river. Within the park boundary there are 35 lakes (covering 8,233ha) with a further 26 in the buffer zone (covering 648ha). There are scattered erratic boulders, one which attains a circumference of 7m.

Climate The climate is characteristic of the pine forest areas of northern Poland and is unaffected by urban and industrial pollutants.

Vegetation Forests cover 37,729ha, agricultural land 10,965ha and water bodies 1,471ha, (2.8% of the park area). Agricultural lands occupy 20.7%, but are mostly located in the buffer zone. Although 71.3% of the park is in forest cover only small areas of natural forest remain. Habitats which are in the most natural state include water, peat and marsh pioneer vegetation (on forested sand dunes), relict glacial species and steppe species. The flora is young and is diversified due to the positioning of the biogeographical position of the park. The forests consist of pine *Pinus sylvestris* and birch *Betula sp.* with an understorey of juniper *Juniper communis* and barberry *Barberis vulgaris*. Not so widespread are forest types such as mixed, dry and flooded woodlands and rarer types of woodland are found in river valleys and along lake shores. The richest are oak-lime-hornbeam *Quercus-Tilia-Carpinus* combination as well as alder *Alnus glutinosus* complexes. One of the nature reserves, Ustronie, consists of a hornbeam *Carpinus betulus* wood with service tree *Sorbus torminalis* mix. However, the dominant forest cover is a monoculture of pine *Pinus sp.* resulting from a 250 year period of commercial forestry operations, but nevertheless the area remains one of the largest continuous complexes of forest left in Poland.

Fauna The area has a rich faunal component including, amongst the birds, black stork *Ciconia nigra*, eagle owl *Bubo bubo* and osprey *Pandion haliaetus*. Mammals include red deer, fallow deer, wild boar, pine marten, fox, badger (*Cervus elaphus*, *Dama dama*, *Sus scrofa*, *Martes martes*, *Vulpes vulpes*, *Meles meles*) and others.

Poland

Cultural Heritage The opening of the park, which gives protection to the core of the forested Bory Tucholskie, was planned to coincide with the 750th anniversary celebrations of the Tucholi town and 50th anniversary of the death of a local artist Leon Wyczolkowski. The forest is crossed by the route taken by Napoleon on his march to Moscow. There are a number of ethnographic objects, such as the traditional rural buildings and a small country mansion (Janta-Polczynski) from the end of the 18th century, as well as the remains of earthworks from the Middle Ages.

Local Human Population Within the Park there is one village, Legbad, and seven others around the boundary as well as one town, Tucholas.

Visitors and Visitor Facilities The Bory Tucholskie have traditionally been a recreation-excursion area and are being promoted for particular types of tourism, such as canoeing. The park lies within the designated Eastern-Pomoranian tourist region defined in the national spatial management plans for tourism till 1990.

Scientific Research and Facilities No information.

Conservation Management The landscape Park is linked in a system with areas of protected landscape (APL) to other landscape parks such as the projected Chojnicki Landscape Park to the north, via the APL Jeziora Koronowski and Dolina Brdy, as well as links with the Vistula river valley and the Bydgosko-Torunski uplands. Within the landscape Park there are five nature reserves, two forest reserves (one peatbog and two lakes). There are plans to create two further reserves, one peatbog and one forest, as well as two large landscape parks, each projected to cover 1,500ha. As yet there is no formally adopted spatial management plan but the proposals are to have local tourist and recreation developments within the buffer zone surrounding the park with a carrying capacity fixed at 1,800-2,000 persons in the park per day in the summer and a further 2,000 in the buffer zone. Six areas have been delimited for intensive development of tourism infrastructure, four are in the buffer zone and one on the edge of the Park.

Management Problems The area has had over 250 years of man-influenced activity, and much of the broadleaved woodland has been removed and replaced by meadowlands and agricultural land or by monocultured plantations of pine. There is an increasing tendency for the construction of second (holiday) homes within the park, often illegally.

Staff No information.

Budget No information.

Local Administration The Park and its buffer zone are administered by the sub-forestry offices of Czersk, Rytel, Tuchola and Zamrzemica, all under the control of the OZLP (Forestry Office) in Torun.

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Date August 1987

Wdzydzki PK

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05 (Middle European Forest)

Geographical Location Situated in the Voivodship of Gdansk in the Kaszubian Lake District of the Pomeranian Lake Region, centred on the Wdzydzke Lake, 10km south of Koscierzyna and 60km south-west of Gdansk. It lies in the communes of Dziemiany-Lipusz, Koscierzyna and Stara Kiszewa. 55°55'N 17°50'E.

Date and History of Establishment The area was created by order of the Voivodship People's Council (Nr. XIX/83/83) on 15 June 1983.

Area 17,650ha

Land Tenure A mixture of state-owned forests and private agricultural holdings

Altitude 100-200m

Physical Features The area is centred around the Wdzydzke Lake, its rivers and on parts of the extensive Bory Tucholskie on outwash deposits laid down by the last Baltic glaciation. The main deposits are of Pomeranian sands overlaying clay formations. The other geomorphological features of the area are the post-glacial gullies with, for example, the Wdzydzke Lake lying at the junction of two such structures. Other gullies have resulted in the formation of lakes at Golun, Rodolne, Slupinko and Jelenic. Wdzydzke Lake is 14.2 sq.km. is area with a maximum depth of 68m.

Climate The area is characterized by a cool, late and predominately dry spring with sharp frosts lasting till early June. The summer is marked by high rainfall. The autumn is long and warm and the winters harsh with a heavy snow cover.

Vegetation Forests cover 11,170ha, agricultural land 3,920ha and water bodies 1,915ha. The area represents the north-western extent of the pine *Pinus sp.* dominated Bory Tucholskie with some 63% of the area covered by forests. Nearly 99% of the trees are pine, the remainder being birch *Betula sp.* with small patches of oak *Quercus sp.* and beech *Fagus sylvatica* which occur on the clay outliers. The richest flora is associated with the rivers and lakes.

Fauna Breeding bird species include the eagle owl *Bubo bubo*, 'white-tailed eagle *Haliaeetus albicilla*, crane *Grus grus* and capercaillie *Tetrao urogallus* while the peregrine *Falco peregrinus* occurs on passage only. Mammals recorded include red deer, roe deer, wild boar, fox and pine marten (*Cervus elaphus*, *Capreolus capreolus*, *Sus scrofa*, *Vulpes vulpes* and *Martes martes*). The beaver *Castor fiber* although previously present in the area has now disappeared. The most interesting species occurring is the European pond terrapin *Emys orbicularis*. There is also an endemic variety of the fish species *Salmo trutta* which is restricted to the Wdzydzke Lake.

Cultural Heritage Within the protected landscape there is a Kaszubian Ethnographic Park and the area as a whole has a major element of traditional architectural design and rural style buildings.

Local Human Population Within the protected landscape area there are six villages (Loryniec, Wszki, Wdzydze, Wdzydze Tucholskie, Wdzydze Kiszewska and Piechawiec) and just beyond its western boundary is the larger village of Dziemiany and to the south the town of Wiele. The area is sparsely populated with a density of 22 persons per square kilometre.

Visitors and Visitor Facilities There is a museum "Chata Kaszubska" in the village of Wdzydze Kiszewska (itself a typical fishing settlement) created in 1907 as well as many cultural and architectural monuments. The Kaszubian Ethnographic Park is situated between the Golun Lake and the road and covers 12.5ha. Here a skansen is to be constructed consisting of 40 or

Poland

so typical Kaszubian dwellings in a village layout of larger and smaller lanes and paths. It will include a blacksmith's workshop 165 years old, a minor gentry's house from the 18th century and an 18th century manor as well as working mills and a wooden church. It is intended that the skansen will be a living museum. The main recreation and tourist attractions are at present located in the northern and eastern sections of the park on the shores of Golun Lake.

Scientific Research and Facilities No information

Conservation Management The protected landscape has no protective buffer zone nor is it surrounded by an area of protected landscape. There are no nature reserves within the site. The voivodship authorities passed a decree on the 22 June 1976 (Nr. 2) which declared a zone of quiet extending for 500m around the edges of the Wdzydzke Lake. A spatial management plan has been prepared which envisages the creation of a protective buffer zone.

Management Problems In previous times the percentage of broadleaved woodland cover was greater than it is now, this reduction being caused by systematic felling and replacement by monocultured pine as part of a commercial forestry operation.

Staff No information

Budget No information

Local Administration Inspector of Forestry and Nature Protection, Environmental Conservation Directorate, Voivodship Committee, Gdansk

References

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Date August 1987

Zaleczanski PK

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05 (Middle European Forest)

Geographical Location Situated in the voivodship of Sieradz, on either side of the valley of the river Warta, between Dzialoszyn and Krzczow, 30km north-west of Czestochowa and 40km due south of Sieradz. The area lies at the northern end of the Jurajski Uplands and is contained in the communes of Wierzchlas, Putnow and Dzialoszyn. 51° 05' N 18° 20' E.

Date and History of Establishment The area was created by order of the Voivodship People's Council (Nr. XIII/50/78) on 5 January 1978.

Area 14,278ha including the protective buffer zone of 7,172ha

Land Tenure No information

Altitude 162m to the highest point at 246m

Physical Features The site occupies some of the most valuable sections of the Warta river valley and the limestone and karst features of the Jurajski Uplands. It is at this point that the river Warta creates a gap (40km long) between the Wielunskie Uplands and the Malopolskie Uplands marked by steep cliffs and terraces (up to 60m high). The relief of the area has been shaped by the Riss glaciation-Warta stage which has been remodelled by the last interglacial period and the Wurm glaciation. A major feature here are the limestone exposures and the cliffs as well as isolated limestone peaks (numbering eight in total) and limestone ridges. There are also post-glacial deposits with sand and gravel substrates, a number of erratic boulders and

at least 15 distinct caves and cave systems. The latter contain Pliocene fossils of over 100 species, 4-3 million years old. The river Warta which is mature in structure as exemplified by the presence of meanders, islands and ox-bows, has only tributary streams entering it from the west and south. On the east side of the river there is a lack of flowing water. Some of the side tributaries flow partially underground to emerge in the form of springs.

Climate The area experiences a favourable local climate.

Vegetation Forests cover 7,042ha, agricultural land 6,664ha and water bodies 256ha. The site is dominated by pine *Pinus sp.* and is noted for the occurrence of rare species. The total number of species recorded is 1,100 and includes the following protected species: ivy, club-moss, water lily, house leek, Martagon lily, alder buckthorn, wayfaring tree, Labrador tea, bearberry, helichrysum, lily of the valley (*Hedera helix*, *Lycopodium sp.*, *Nuphar luteum*, *Sempervivum tectorum*, *Lilium martagon*, *Frangula alnus*, *Viburnum opulus*, *Ledum palustre*, *Arctostaphylos sp.*, *Helichrysum arenarium*, *Convallaria majalis*) and *Cetraria islandica*. The main habitat types present are limestone outcrops, water areas including the river, peatbogs, grasslands (of the saxicolous and psammophilous variety) and forests. The latter are the most highly altered by man's activities with the remaining natural associations being characterized by the presence of oak *Quercus sp.*, alder *Alnus glutinosus*, ash *Fraxinus excelsior* and in the northern sectors by beech *Fagus sylvatica*, fir *Abies sp.* and spruce *Picea sp.*

Fauna There is a rich assemblage of species most notable being certain mollusc species (for example, *Pyramidula rupestris*) which are present here at their extreme northern limit, this also being true for the butterfly *Papilion sp.* Mammal species present include the hamster *Cricetus cricetus*, eastern hedgehog *Erinaceus concolor*, red deer *Cervus elaphus* and wild boar *Sus scrofa*. Of the 116 bird species recorded breeding birds include kingfisher, penduline tit, black grouse, hazel hen and black stork (*Alcedo atthis*, *Remiz pendulinus*, *Lyrurus tetrrix*, *Tetrastes bonasia* and *Ciconia nigra*). The rivers contain *Barbus sp.*, *Chondrostoma nasus* and *Squalius squalus*.

Cultural Heritage At least two tumuli have been identified and a settlement dating from Roman times. There are a number of ethnic wooden cottages and a wooden church at Bobrowinki, as well as water-mills in four separate places. Traces of primitive artifacts have been unearthed at a number of sites in the area.

Local Human Population Within the protected landscape there are nine villages the largest being Zalecze Wielkie and Bobrowniki. All but one of these is situated along the river Warta. The nearest sizable urban centre is Wielun, some 10km to the north-west. The area is sparsely populated with a density of 32 persons per square kilometre.

Visitors and Visitor Facilities The area is a major recreation and health resort locality largely due to the favourable climate. There is one tourist hotel in the area at Krzczow in the north and four educational-recreation centres. At present there are four sign-posted trails through the protected landscape two of which are long-distance footpaths - one tracing the Jujarski Uplands and the other the Warta Gorge. Canoeing takes place on the river and there are a number of view points. The area is used for ecological training by members of the Polish Pathfinder's Association which has its field station and training centre in the park.

Scientific Research and Facilities The Voivodship Nature Conservation Office in Sieradz in collaboration with the University of Lodz carried out a series of detailed inventories in the protected landscape between 1976 and 1981. This work also included research into the utilization of the area, the definition of its boundaries and its future economic development.

Conservation Management The site is completely surrounded by a protective buffer zone and contains two nature reserves, Dabrowa w Nizankowicach and the smaller Weze, as well as one natural monument. Ten other natural monuments are due to be placed under protection. A spatial management plan has been prepared.

Poland

Management Problems Mineral exploitation continues to take place in the protective buffer zone but is limited to local needs. This activity includes the extraction of limestone, gravel and sand.

Staff No information

Budget No information

Local Administration Director of Environment Protection Department, Voivodship Administrative Office, Sieradz.

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Date August 1987

Zespół Parków Poniżnia PK

Management Category V (Protected Landscape)

Biogeographical Province 2.11.05 (Middle European Forest)

Geographical Location Situated in the voivodship of Kielce in three separate but parallel belts, the largest extending some 35km along the river Nida between its confluence with the river Vistula in the south and Pinczow in the north. The area lies 50km north-east of Krakow and 40km due south of Kielce. 50° 20'N 20° 35'E

Date and History of Establishment No information

Area 82,647ha including the protective buffer zone of 42,772ha

Land Tenure The forests are state-owned whilst the agricultural areas are predominately private

Altitude Between 100 and 200m

Physical Features The area is at the junction of at least seven different physio-geographical units: Nida valley, Jedrzejowska plateau, Wodzislawski heights, Proszowice plateau, Polaniecka syncline, Pinczowski heights and the Suolecka syncline, resulting in a diverse landscape surface. The major feature is, however, the 2-4km wide valley of the river Nida, which strongly meanders, has extensive shoals, cliffs and ox-bows. The best remaining examples of natural landscape are in the sections between Chroberzem and Nieprowicami and between Wislica and Czarkowami. On the right-hand bank slopes of the valley there are extensive areas of loess deposits on the Proszowice plateau which is cut by deep ravines, gullies and dry valleys. In the centre of the area there are stratum of gypsum (a unique feature for the country as a whole) which form a bedrock for the karst overlays. This karst is most obvious in the Wislica-Aleksandrow-Skorocice-Busko and the Szaniec-Galow-Unikow-Stawiany belts. Here craters, caves, swallow-holes, pinnacles and underground lakes (such as at Sieslawicach) and blind valleys (such as at Aleksandrowie and Skorocicach) are present. The most characteristic features of the gypsum deposits is the occurrence of sulphur springs as at Buska

and Solca Zdroj. The karst landscape is interrupted by abruptly rising plateaux with steep sides (upto 100m high) and flat tablelands. In the south-east an extensive area is covered by glacial sands and clays interrupted by the Holocene deposits of the river Vistula.

Climate No information

Vegetation Forests cover 11,791ha (20% of the total area), agricultural land 63,674ha and water bodies 1,013ha. The most important woodland cover is that protecting the watersheds situated between Lubczy and Zlotej Pinczowsko and consisting largely of pine *Pinus sp.* and alder *Alnus glutinosus*. Other important forest communities include those of ancient woodland situated at Gary near Mlodzaw Polichna and Wola Chraberskie. Near Sadek there are remains of mixed oak *Quercus sp.* and pine forest. The chief element in the parks, however, are meadows which are located on the karst plateaux as well as in the valleys. The plant communities are unique for the country and are composed of *Carex sp.*, *Epipactis sp.*, *Lotus sp.*, *Eriophorum sp.*, *Orchidaceae* (of several species) and the moss *Ctenidium molluscum*. The most important flora is located on the karst and gypsum slopes of the valley where xerophytic associations occur including *Serratula lycopifolia* (the only station in Poland), *Lathyrus pannonicus* (the only station for this species in Poland), *Lathyrus latifolius*, *Ranunculus illyricus*, *Sisymbrium polymorphum*, *Arabis auriculata*, *Carlina onopordifolia* and *Reseda phyteumas*.

Fauna There is a rich entomological fauna especially on the xerothermic habitats where a number of southern warmth-loving species occur such as *Cicadetta adusta* and *Dorcadion scopoli* as well as rare *Diptera*, *Orthoptera*, *Hymenoptera* and butterflies many of which occur only here in the Nida valley. The avifauna is rich in breeding species especially amongst water and wetland birds and raptors and includes grey heron, black stork, white stork, bittern, short-eared owl, black-tailed godwit, redshank and snipe (*Ardea cinerea*, *Ciconia nigra*, *C. ciconia*, *Botaurus stellaris*, *Asio flammeus*, *Limosa limosa*, *Tringa totanus* and *Gallinago gallinago*). Of prime importance is the colony of recently established night herons *Nycticorax nycticorax*. Passage birds include the kingfisher *Alcedo atthis* and the red-crested pochard *Netta rufina*. Mammals include red deer *Cervus elaphus*, fallow deer *Dama dama*, wild boar *Sus scrofa* and fox *Vulpes vulpes*.

Cultural Heritage There are archaeological remains at Wislicy, Zlota Pinczowka, Swiniar and Szczawocyza. There are urban architectural monuments in five places, manorial estates in three places and rural architectural remains in a further three localities. Several original functioning wooden water mills remain and almost every crossroads has 18th and 19th century religious monuments.

Local Human Population The area is sparsely populated but contains seven villages and two small towns, Pincow and Busko-Zdroj.

Visitors and Visitor Facilities The medicinal value of the sulphur springs at Busko and Solca Zdroju are a major attraction as is the famous stud farm at Michalowic.

Scientific Research and Facilities The Voivodship Office of Nature Conservation at Kielce in collaboration with the Department of Spatial Planning and Environmental Protection of the Institute of Environment Management in Lublin has carried out detailed research on the establishment and management of the protected landscape.

Conservation Management This is the most recent of Poland's landscape parks to be created and there are plans to increase the area to 95,450ha including a protective buffer zone of 64,000ha. The area is completely surrounded by an area of protected landscape and contains at least 10 nature reserves (two botanical, one protecting halophytic species and seven steppe habitats). The most important parts of the xerophytic habitats are included in these reserves, the best example being in the Skorocice reserve which also exhibits gypsum outcrops.

Management Problems There are threats to the site from increased mechanization of agriculture and increased urbanization.

Poland

Staff No information

Budget No information

Local Administration Voivodship Nature Conservation Office in Kielce

References

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Date August 1987

SPAIN

Area 504,750 sq.km (including Balearic and Canary Islands)
492,592 sq.km (continental Spain)
497,477 sq.km (continental Spain and Balearic Islands)

Population 38.22 million (1983)
36.78 million (excluding Canary Islands)

Parks and Reserves Legislation The new Constitution came into force on 29 December 1978. This established a semi-federal system of regional administration with the autonomous community as its basic element. There are 17 autonomous communities, each having a Parliament and regional government (Poore and Gryn-Ambroes, 1980). The Constitution envisages much of the control which used to be central, being delegated to the regions. Article 45 Chapter III entitled "Guidelines for Social and Economic Policy" embodies principles of conservation including rational use of resources and protection and the restoration of the environment, and a link between regions and between the local populations (Poore and Gryn-Ambroes, 1980). The earliest environmental Decree dates back to 1837 when the General Directorate of Mountains was established (Poore and Gryn-Ambroes, 1980). In 1859, a Catalogue of Mountains for Public Utility was created; it listed a total of 6,755,280ha of land and these areas enjoyed legal protection with proper management (Rodriguez, 1985). The Mountains Directorate was extended to cover fishing and hunting in 1928 and was incorporated in 1931 into the Ministry of Agriculture (Poore and Gryn-Ambroes, 1980).

On 7 December 1916 a General Law of National Parks was passed and was completed by Royal Decree 23 February 1917 (Saussey, 1980), which allowed the creation of two national parks in 1918 (Duffey, 1982; Rodriguez, 1985). The first defined national parks were controlled by the Ministry of Works in agreement with the owners (Poore and Gryn-Ambroes, 1980). In total five national parks were created under this Act. This was followed by a law of 13 May 1933 governing the protection of sites of historical and archaeological interest (IUCN, 1987).

In the period between 1941 and 1971, some eight laws related to mountains and reforestation and five relating to hunting had been enacted (Poore and Gryn-Ambroes, 1980). The 1916 law remained valid until 1957 when a law of the mountains was drafted. The Act and its Regulations (1962) contain two chapters referring to national parks. These include details on protection, establishment by decree, conservation, expropriation, violation and finance (Rodriguez, 1985).

The 1957 Act also defined "natural sites of national interest" and "natural monuments of national interest". Such sites were to be promulgated by Ministerial decree (practised since 1920). In 1971 the institutional administration of the Ministry of Agriculture was amended by Decree 28 to establish a National Institute for Nature Conservation (ICONA).

In the period 1971-74, three more laws were enacted concerning forest fires and hunting reserves (included 2nd National Hunting Reserves Act (1973) and Hunting Reserves Regulations (1974)). On 15 May 1975 the National Areas Protection Law was passed with enabling Regulations on 4 March 1977. The existing protected areas were reclassified and given legal status. Regulations introduced on 4 March 1977 provided for protection of four categories of open space: *reserves of scientific interest*; *national parks*; *natural sites of national interest* and *natural parks* (the first three to be created by law, the last by the state or private parties by Decree). Precise protection measures were, however, not defined. Some clauses dealing with the creation of buffer zones, by expropriation of privately owned land, were not accepted.

The re-classification of national parks provided an opportunity to extend existing park areas (from some 90,000 to 156,000ha) but as a consequence required legal provisions with the Status of Bills to be submitted to the Cortes for approval. By 1985, eight of the nine national parks had been approved (Rodriguez, 1985).

The policy of the Directorate of Mountains over the last 100 years had provided a balance between constant afforestation, maximized production, adequate provision of pasture land, hunting, fishing and recreation (Poore and Gryn-Ambroes, 1980), but prior to the formation of ICONA there were apparently no laws specifically related to nature conservation (IUCN, 1987). The law of May 1975 remains today the legal instrument for the declaration and management of protected areas (Rodriguez, 1985). Proposed new areas have studies carried out, after which consultations are held with government services and with the national advisory body, this being the Inter-Ministerial Commission for the Environment. Public participation and consultation is allowed for in the legislation, when the protected area relates to the public (Art. 8.2). In the case of communal properties and certain mountainous regions called "montes de comun de vecinos" surveys are organised. The law also explicitly provides for the consultation of various professional organisations (corporations, farmers) as well as scientific bodies. For the declaration of *strict nature reserves* (on the orders of the Ministry of Agriculture) a report must be prepared by a higher scientific body attached to the Institute of Spain and other research centres (Art. 8.3).

Compensation may be direct (Art. 14) or by the participation of the local population in the benefits of the protected area, such as a share in the produce of the park. The law does provide tax exemption and relief to owners of land enclosed in protected areas. It has been proposed that protected areas crossed by national borders ought to have bipartite international commissions set up.

The May 1975 law forms the basis of operations and provides for Boards, planning and regional zoning. It establishes areas of protection classified by the competent authorities as specially protected non-urbanised ground where only traditional uses and exploitation compatible with the parks' objectives are allowed. New activities require the prior approval of the Board. There are also socio-economic influence zones set up around each national park in order to link the park with the local population, to maintain traditional activities, population levels, and rational use of resources (Rodriguez, 1985). The 1975 Law Article 12 provides for the creation of natural parks.

Natural sites of national interest are more concerned with landscape protection and traditional land use than with wildlife protection. At present there are no legal categories for managed nature reserves (Poore and Gryn-Ambroes, 1980). National hunting reserves are covered by the Hunting Reserves legislation (Act 37/1966, and Act 2/1973) as areas for the utilisation of wild fauna. Hunting is authorised in these areas, but control has been very strict and the legislation is aimed at habitat protection and game conservation (IUCN, 1987).

Faunal sanctuaries can be enacted under Article 11 and 12 of the Hunting Act and regulations, after proposals of the Ministry of Agriculture (Poore and Gryn-Ambroes, 1980) but in general the legislation omits effective protection of fauna and wetlands. Although wetlands are not specifically protected, a Wetlands Working Group, comprising ICONA, the Spanish Environmental Committee and others has been set up. The existing texts do not mention extension of protected areas to marine areas.

Two further Acts are envisaged: The Environmental Act and the Natural Heritage Conservation and Restoration Act. The former would give a basis to environmental policy guidelines, assistance to development policies, laws and regulations and for the creation of managed nature reserves; the latter would provide a legal basis for ICONA and for the implementation of its nature protection policies. Both these Bills were still in the drafting stage in 1985 (ICBP, 1985; Medina, 1977; ICONA, 1984).

The World Heritage Convention was acceded to on 4 May 1982. The Ramsar Wetlands Convention accession was on 4 May 1982 with extra sites added on 8 August 1983.

Parks and Reserves Administration and Management The body responsible for administration is the National Institute for the Conservation of Nature (ICONA). This body was set up in 1971 as an amendment to the Institutional Administration of the Ministry of Agriculture (Decree law 28 October 1971)(Poore and Gryn-Ambroes, 1980). Its functions include renewable resource use and maintenance of ecological balance, creation and administration of

national parks, sites of national interest, development and exploitation of inland fishing and hunting assets. Prior to 1971, nature conservation was administered by a series of bodies. In 1837 the responsibility was with the General Directorate of Mountains. In 1928 the Directorate in the Ministry of Public Works became responsible for fishing and hunting. In 1931, the Directorate of Mountains, Hunting and River Fishing became part of the Ministry of Agriculture where it remained until 1971. In 1939 the Ministry of Agriculture was reorganized and everything to do with river fishing, hunting and national parks became its responsibility (Poore and Gryn-Ambroes, 1980).

The ICONA (set up after pressure from a number of ecological groups) consists of a central service and provincial network. The central service comprises general Secretariat and four Divisions. Two of these are concerned with fire, ecology and administration and two with nature protection (National Forests) and renewable natural resources, respectively (Duffey, 1982). The latter is responsible for national parks, reserves, hunting grounds, fishing, protection of mountains, fauna and organisation of natural areas, and is itself divided into two services: game; and parks and reserves. The peripheral services are undertaken by 11 regional inspectorates and 50 provincial services. Each consists of a manager and a number of senior and middle grade technicians and a mobile corps (ICBP, 1985).

Prior to ICONA's establishment national parks were administered by the Forestry Administration. There was no management planning in national parks prior to the 1975 Act, activities being limited to maintenance and supervision. The Policy is now to gradually acquire lands constituting parks, or failing this to enter into use arrangements with the owners. Master plans are to be set up and developments regulated according to this. The plan is envisaged to cover a number of points including general organizational guidelines, carrying capacity standards, zonation plans, rules and sanctions, ecological research plan, environmental education and recreation, historical physical and administrative plans and a park resources study plan. The plans are valid for four years, after which time they may be revised. ICONA is responsible for plan preparations, followed by public approval and provisional acceptance by the Parks Board before the final approval by the Government.

Special plans help to implement rules and regulations of the Main Plan which must have the approval of the Board. Such plans include the elimination of exploitation processes from national parks, the formulation of management activities and research to maintain existing biological equilibrium and the organisation of visitor interpretation and education facilities (Rodriguez, 1985).

There are conservation managers in charge of each national park and natural area. Each manager has a team of up to ten specialist and outside researchers (Poore and Gryn-Ambroes, 1980). The Royal Decree establishing natural parks also directed ICONA to draw up formats for park plans (Poore and Gryn-Ambroes, 1980). To collaborate with ICONA, national parks have Boards whilst the natural parks have a Directory Commission in which all interests are represented (Rodriguez, 1985). The objectives of the national park board are numerous but include promotion of national park interests, financial administration, plan and management provision, annual report submission to the Director of ICONA, approval of special plans (Article 7), delegate functions to People's Commission and modify internal park regulations (Rodriguez, 1985).

For the socio-economic influence zone, a budget is proposed and the municipalities submit requirements. The Board identifies priorities, submits this to ICONA and releases the funds. Although the administration in national parks is centralized, local representation is still allowed but is limited to submitting opinions which have no legal means of enforcement (Saussey, 1980).

Individual compensation exists as indemnification when property is expropriated. This may consist of a payment in cash or may be rendered in its entirety (Article 14 per 1 and 3). Only a minimal percentage of lands in a natural state are on state property; a greater percentage belongs to the City Governments while the rest is private (Rodriguez, 1985).

With increased regionalisation, the balance of activities within the national organizations is likely to change to some extent and due to changes in the 1978 Constitution, 17 Autonomous Communities will be created with powers to propose new criteria for protected area designation (Rodriguez, 1985). However, it is envisaged that there will be a new "central entity" which will act towards coordination and cooperation, planning information and specialised support (ICONA, 1984).

The Autonomous Communities will be based on natural geographical regions and will be responsible for environmental protection, fishing, hunting, public monuments, tourism and recreation. The national parks are under central administration whilst natural parks may be established by regions without enactment of the Natural Heritage Conservation and Restoration Act. In the first instance and until such time as the Communities have trained staff and funds, the regional service of ICONA will continue to be responsible (Poore and Gryn-Ambroes, 1980). Marine protected areas come under the Ministry of Agriculture and are managed through ICONA. Protected areas established on state land are administered by ICONA but Article 10 does provide for a management body in each protected area.

Addresses

- ° National Institute for Nature Conservation, Instituto Nacional para la Conservacion de la Naturaleza (ICONA), Subdirección general de Recursos Naturales Renovables, Gran Vía de San Francisco 35, Madrid
- ° Spanish-WWF, Asociacion Defensa de la Naturaleza (ADENA), Santa Engarcia 6, Madrid
- ° Consejo Superior de Investigaciones Cientificas (CSIC), Serrano 117, Madrid
- ° Consejo de Pesca Continental Caza y Parques Nacionales, General Sanjurjo 47-30, Madrid 3

Additional Information Protected areas include five national parks (four more in the Canaries), 19 Natural Sites of National Interest, one Natural park and 36 National Game Reserves. According to ICONA (1984) the nine national parks cover 123,000ha, and the reserves and national game preserves 1,650,000ha.

The Superior Council for Scientific Investigations (CSIC) is the main state research organization, which has a scientific advisory committee for nature protection. It is also responsible for the biological station and integral reserves of the Marismas. Work on a National Inventory should cover 6% of the land area. Two regions have used this to set up a network of protected areas, and two more are nearing completion. These networks cover 184 sites in 16 provinces totalling 1,093,000ha. The second phase is aimed at covering the remaining 34 provinces. The target for the end of 1979 was 600 sites covering 3,000,000ha.

Public support for nature conservation is low although there have been notable exceptions (first European country to produce RDB on Lepidoptera). Voluntary bodies do exist such as the Spanish branch of WWF (ADENA), the Spanish Association for the Management of the Environment (AEORMA) and the Spanish National Ornithological Society all of which have some influence on policy and public opinion. A growing number of regional organizations are becoming involved in promoting protection such as the Liga per la Defensa del Patrimonio Natural (DEPANA) whilst WWF Spain provided the idea of creating mini reserves for plants as part of the WWF Plant Campaign.

A different approach was provided by the "European Association for Free Nature Reserves" in 1966. EUREL was originally created as a daughter organisation of WWF with the aim of establishment of a network of "free" nature reserves. These reserves do not infringe on the owners property rights and can be terminated at any time. There were 11 registered reserves in 1979 but by 1985 a further 13 new reserves had been established covering 1,612ha (ICBP, 1985).

Areas were also listed in the "List of Woodlands of Particular Value to the Public" under special control of the national government and managed by the Forest Service. However, between 1947 and 1973 as much as 2.1 million ha of native forest had been felled and replaced by 1.2 million ha of eucalyptus plantation (ICBP, 1985).

The possibility of enacting a series of protected marine areas, is being studied. ICONA has established two marine parks, one at Cabrera Island (administered by military authorities) and the other at Medas Island (local authority).

The problems encountered in creating a protected areas system are related to a number of factors. Traditional problems include defects in the legislation and institutional administration. The legislation occasionally gives rise to duplication, such that more than 30 agencies have jurisdiction over one or other aspects related to the environment and nature (Rodriguez, 1985). The small amount of state-owned land and land ownership in general is probably one of the major problems. Other factors are a large rural population, an agrarian economy, lack of qualified personnel and adequate funds. Increased demand for the use of protected areas has resulted in the creation of recreation zones.

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Protected Landscapes

	(hectares)
<i>Nature Parks</i>	
Cuenca Alta del Manzanares	4,304
Dehesa del Moncayo	1,389
Dels Aiguamolls de l'Emporda	4,784
Dunas de Corralejo & Islas de Lobos	2,482
Hayedo de Tejera Negra	1,391
Islas Cies	434

Spain

Lago de Sanabria	5,027
Lagunas de Ruidera	3,750
Monfrague	17,852
Monte Alhoya	746
Monte El Valle	1,900
Sierra Espuna	9,961
Torcal de Antequera	1,200
Subtotal	55,220

Hunting Reserves

Ancares Leoneses	38,300
Mampodre	29,238
Montes Universales	59,260
Riano	73,214
Saja	180,186
Sierra de la Culebra	65,891
Sierra de la Demanda	73,819
Sonsaz	68,106
Urbion	100,023
Vinamala	49,230 *
Subtotal	737,267

Reserva de Ordesa-Vinamala

Management Category V and IX (Protected Landscape and Biosphere Reserve)

Biogeographical Province 2.16.06 (Iberian Highlands)

Geographical Location The reserve is situated on the southern slopes of the Central Pyrenées adjacent to the French frontier (in the province of Huesca, north-east of Jaca). 42°30'-42°43'N, 0°07'-0°12'E.

Date and History of Establishment The Vinamala Reserve was established and protected under Law No. 37/1966. The fauna is under special protection and the hunting of the following species is prohibited: *Lagopus mutus* and *Capra pyrenaica* subsp. *pyrenaica*. The Ordesa National Park which lies within the Vinamala Reserve and is protected by Royal Decree of 16 August 1918, which established it as a national park. Regulations governing it were issued in the Official Gazette of the province no. 121 of 9 October 1918. Ordesa and Vinamala were accepted in January 1977 as a Biosphere Reserve.

Area Biosphere Reserve 51,396ha, including: National Park 15,709ha (expanded in 1978 from 2,046ha); Hunting Reserve 49,230ha

Land Tenure Mostly under public ownership

Altitude 875-3,941m

Physical Features Vinamala is extremely mountainous with an imposing massif formed by Hertzian folds which were subsequently modified by glacial action. The scenery is spectacular and unique. A number of rivers run through the reserve including the Ara, the Sia and the Quas Limpias. The Ordesa valley is a canyon with vertical walls, being the result of successive glaciations during the Quarternary period. The oldest rock formations are composed of granite and slate; at a later date great limestone masses were formed as in the case of Monte Perdido. It comprises the valley of the River Arazas, confluent with the River Ara at an altitude of about 1,000m. After 10km downstream from the confluence are a large number of waterfalls, being one of the principal attractions of the valley. The massif of Monte Perdido and the heads of the valleys of Ordesa, Aniscola, Escuain and Pineta have been recently included in the Park.

Climate The mean annual rainfall is 1400mm. Snow falls during the months of November to March, and rain in March, June, September and December.

Vegetation Distinct types of woodland depend upon the altitude. Up to 1,200m there are mixed woodlands consisting of beech *Fagus sylvatica* and some conifers, pine *Pinus sylvestris* being the predominant species, replaced by black mountain pine *Pinus uncinata* at high altitudes up to 2,200m. The highland meadows start here, reaching up to 2,800m. Other tree species are the ash *Fraxinus sp.*, large-leaved lime *Tilia grandifolia* and grey willow *Salix cinerea*. One of the most important bush species is the box *Buxus sempervirens*, which grows to a height of three metres. *Festuca rubra*, *F. eskiae*, *Agrostis tenuis* and *Trifolium montanum* are found in the upper zones (Ortuno and Pena, 1976).

Fauna The most representative species include: Spanish ibex *Capra pyrenaica* subsp. *pyrenaica* (20-25 individuals), chamois *Rupicapra rupicapra* subsp. *pyrenaica*, hare, stoat, pine marten, beech marten, weasel, otter, alpine marmot, edible dormouse, garden dormouse and Pyrenean desman (*Lepus europaeus*, *Mustela erminea*, *Martes martes*, *M. foïna*, *Mustela nivalis*, *Lutra lutra*, *Marmota marmota*, *Glis glis*, *Eliomys quercinus* and *Galemys pyrenaicus*) (Ortuno and Pena, 1976). Birds include rock ptarmigan, capercaillie, red-legged partridge, grey partridge, golden eagle, peregrine falcon, goshawk, short-toed eagle, booted eagle, and lammergeier (*Lagopus mutus*, *Tetrao urogallus*, *Alectoris rufa*, *Perdix perdix*, *Aquila chrysaetos*, *Falco peregrinus*, *Accipiter gentilis*, *Circus gallicus*, *Hieraetus pennatus* and *Gypaetus barbatus*). Also recorded are swift, chough, jay (*Apus apus*, *Pyrrhocorax pyrrhocorax*, *Garrulus glandarius*), a number of woodpecker species, short-toed treecreeper, rock nuthatch, rock sparrow, marsh tit, kingfisher (*Certhia brachydactyla*, *Sitta neumayer*, *Petronia petronia*, *Parus palustris*, *Alcedo atthis*) and the dipper *Cinclus cinclus* which frequent the watercourses (Ortuno and Pena, 1976).

Cultural Heritage The reserve is located in a remote and isolated part of Spain where the people speak Aragonese, Castilian and an additional local dialect. Contact with the outside world is limited which, combined with the austere environment, has given rise to a vivid folklore tradition that is highly influenced by fear of the devil and animalism. During the Civil War, the area was heavily garrisoned and there is still a tradition of small scale warfare arising from disputes of ownership (Ortuno and Pena, 1976).

Local Human Population There are several towns, such as Sallent, Lanuza, Panticosa and El Pueyo, within the reserve as well as local farming villages. The area has been settled for hundreds of years with cattle and sheep farming providing the principal means of support.

Visitors and Visitor Facilities Access to the reserve is limited by the terrain but adequate. There are numerous hotels and simpler forms of accommodation (Ortuno and Pena, 1976).

Scientific Research and Facilities There are inventories of fauna and flora, plus ongoing studies on the control and monitoring of fauna and vegetation as well as changes caused by public use. The creation of a support centre to assist with scientific field work and a basic laboratory for the collection, preparation and conservation of biological material, is foreseen (Fernandez Reyes, 1965; Ortuno and Pena 1976).

Conservation Management The entire area is largely the result of man's past activities, including livestock herding and forestry. There are various commons or "facieras" used for pasture land by neighbouring villages, including the area between the Tema and Ossau valleys and the Tema-Azun faceria. Access to certain areas is strictly controlled to avoid disturbing the chamois. The populations of ibex have been culled locally. The fauna is fully protected and hunting of all species is prohibited. The flora is also protected and the gathering of plants is prohibited on most of the mountains and municipal lands governed by the local government law and by the law on mountains. Four zones are recognised: managed reserve zone; intermediate zone; extensive use zone; and service zone. Only selected species are permitted to be hunted within the reserve (Ortuno and Pena, 1976).

Spain

Management Problems Electrical low-tension and high-tension lines, water pipelines for power stations, and the dams of Sarra and Arrieles lie within the reserve. It also includes the towns of Respumoso, Bachimana Alto and Bajo, as well as two railways. The Ana-Mari mine has a mining concession in the municipality of Lanuza. Great pressure is also caused by excessive demand for tourism in the highlands (Ortuno and Pena, 1976).

Staff Director of conservation, conservation manager, chief interpreter, forest technical engineer, chief of management, forest wardens

Budget 37,000,000 pesetas

Local Administration Servicio Provincial of ICONA, General de las Heras 8, Huesca

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Date August 1987

UNITED KINGDOM

Lake District National Park

Management Category V (Protected Landscape)

Biogeographical Province 2.8.5. (British Islands)

Geographical Location Lies in the administrative county of Cumbria in the north-west of England stretching from the coast of the Irish Sea eastwards to the Vale of Eden and the foothills of the Pennines, and is situated 15km north of Barrow-in-Furness and 15km south of Carlisle. The national park is 50km E-W by 55km N-S centred on 54°35'N and 03°00'W.

Date and History of Establishment The area was designated as a national park in 1951 under the National Parks and Access to the Countryside Act, 1949. In total, 17 separate and updating legislative acts affect the national park area, the major planning controls being governed by the Town and Country Planning Act, 1971; the Local Government Act, 1972; and the Local Government Planning and Land Act, 1980. Further protection is afforded by a series of special controls governing agricultural buildings and operations, road construction, forestry operations, the use of advertisements and other restrictions. Within the park boundary there are at present four National Nature Reserves and 79 Sites of Special Scientific Interest (SSSI) the latter designated under Section 23 of the National Parks and Access to the Countryside Act, 1949. Of the SSSIs 17 are over 200ha in size and there is one Local Nature Reserve managed by the Cumbria County Council. Esthwaite is on the UK Indicative List for Ramsar site designation but as of April 1987 was yet to be put forward. Six monuments are under State care under the terms of the Ancient Monuments and Archaeological Areas Act, 1979. Many buildings are listed by the Department of the Environment and in October 1986 there were 27 Grade I buildings (of outstanding national importance) and 1097 Grade II or Grade II* (of special importance). There are also 14 Conservation Areas in the park notified for villages or towns "of special architectural or historical interest". Historic landscapes (such as ancient field patterns) have as yet no statutory protection. The Wildlife and Countryside Act (1981) increased the effectiveness of protection of SSSIs, introduced Limestone Pavement Orders, obliged the National Park Authority to prepare maps of moor, heath, woodland and certain coastal features requiring conservation action and increased control over farm capital grants and other forms of loans.

Area The national park covers an area of 228,000ha.

Altitude From sea level on the Irish Sea coast to 978m at Scafell Pike, the highest mountain in England.

Land Tenure Some 41.3% of the national park area is in State or National Trust ownership. The National Park Authority owns 3.05%; the National Trust owns 22.27% and has an additional 2.11% under covenant; the Forestry Commission owns 4.02% and the North-West Water Authority owns 5.81%; the remainder is privately owned. The area coming under State and National Trust ownership is planned to increase in the future. Small areas of woodlands are owned by the National Park Authority in its role as the Lake District Special Planning Board as are areas of commonland. Because of its large land holdings and the inalienability of its properties, the National Trust is a particularly important land owner, whose primary function is the preservation of the countryside.

Physical Features The area is a varied and classic glaciated landscape consisting of mountains, glaciated valleys and lakes, with uninhabited peaks and moorlands contrasting with cultivated valleys and pastured lower hill slopes as well as coastal sand dunes in the west. The site consists of a compact block of mountains, the valleys each containing one or more lakes, 16 in all. The geology consists of a central dome of over 40 million year old Ordovician and Silurian rocks with Carboniferous limestone rocks and New Red Sandstone along the fringes creating a natural geographical and cultural unit quite distinct from the surrounding lowlands. The dome

itself consists of three bands of rocks, hard volcanic rocks, interbedded with and surrounded by softer sediments (in the north there are the Skiddaw Slates followed by the Borrowdale Volcanic Series, together creating the mountain peaks, and to the south the gentle, soil covered Silurian grits, flags and shale) through which radiate a number of valleys. These valleys exhibit the majority of the classic features of a glaciated landscape: U-shaped valleys, rocky spurs, corries, lakes, moraines, erratic boulders, drumlins and eskers. Most of the landscape features date from the time of the last glaciation about 12,000 years ago, although some moraines, screes and alluvial deltas are younger, being 10,700 years old.

Climate This is characteristic of the wind-exposed western seaboard of Western Europe, being cool and wet oceanic. Average monthly temperatures (at Ambleside, 76m) range from 3°C to 14°C. There are great differences in precipitation and cloud cover, with conditions on the peaks at times severe. Rainfall in the lowlands is 2000mm a year while in the central fells it rises to 4500mm a year. The north-east is drier, the south-west wetter, with most snow in the north and the east.

Vegetation Although the mountains are of no great height, nearly half the area rises above the climatic tree-line (at only 500-600m), and this area, little changed by man, is covered with semi-natural grassland, heath and moorland. The area still contains scattered ancient woodlands and very remarkable communities of oceanic bryophytes and lichens. Due to the high annual rainfall and the poor arable yield obtained, the moors and the grasslands of the fells and the valleys are only suitable for grazing, with sheep on the uplands and sheep and cattle in the lowlands. The wide expanses of acid grassland is dominated by *Agrostis canina*, *A. tenuis*, *Festuca ovina*, *F. rubra* and *Nardus stricta*, the heaths contain *Vaccinium myrtillus* and *Calluna vulgaris* being replaced in the wetter peat bogs by *Eriophorum angustifolium*, *E. vaginatum*, *Juncus squarrosus* and *Sphagnum* sp. At higher altitudes arctic-alpine plants appear, this habitat covering more than half the area of the park. The valleys have been altered to a large extent and the natural grasslands have been improved and fertilized although fragments of semi-natural plant communities remain as do patches of wetlands, heath and limestone pavements. Woodlands now consist of plantations of non-native conifers or native broad-leaved species such as *Quercus petraea*, *Q. robur*, *Fraxinus excelsior*, *Ulmus glabra*, *Corylus avellana*, *Fagus sylvatica*, *Sorbus aucuparia* and *Prunus avium*. The patches of original western oak woodland (such as at Borrowdale and Esthwaite) have *Quercus robur* and *Q. petraea* on the slopes and *Alnus glutinosa* and fen vegetation in the valley bottoms and contain a ground flora of *Primula vulgaris*, *Hyacinthoides non-scripta* and *Narcissus pseudonarcissus*. Borrowdale is notable for its rare Atlantic bryophytes and lichens, with Seatoller Wood containing 200 species, including one (*Ramonia* sp.) new to science. There are two endemic flowering plants present in the national park: *Euphrasia rivularis* and *Sorbus lancestrimensis*.

Fauna The breeding population of the peregrine falcon *Falco peregrinus* (V) numbers 72 pairs (in 1986) which is approximately 10% of the total British population and is the highest known breeding density of this species in the world. The park also contains England's only breeding pair of golden eagles *Aquila chrysaetos* and other raptors include *Accipiter gentilis*, *Circus cyaneus* and *Falco columbarius*. In addition 20% of the British population of the natterjack toad *Bufo calamita* is found here and 30% of all British macro-lepidoptera have been recorded at Roudsea Mosses, including *Erebia epiphron* and *Amathe alpicola*. The only mammal of note is the British subspecies of the red squirrel *Sciurus vulgaris leucourus*, but there are records of pine marten *Martes martes* and otter *Lutra lutra*.

Cultural Heritage The area contains a great concentration of prehistoric monuments from the Mesolithic period onwards. Some 600 sites alone are associated with the manufacture of neolithic axes, including quarries and production sites. The remains of earlier patterns of settlements and cultivations exist but generally the national park area exhibits a continuum of land settlement and rural construction, specifically so in the valleys. This harmony in the landscape has inspired much literature, painting and thinking (Wordsworth, Ruskin) as well as philosophy, nature appreciation and the origins of rock-climbing and tourism. The succession of peoples who have lived here have left a legacy of archaeological traces, vernacular architecture and attractive land use patterns. The clearance of the forests probably began about 5000 years ago with the coming of neolithic man. Bronze and iron-age remains include the megalithic monuments at Castlerigg Stone Circle. The Romans constructed a line of forts

from Ravenglass through Hardknott and Ambleside to Brougham and two of their roads cross the region. The Romans were followed by Anglian and Norse-Irish colonizers a period which gave rise to the present distribution of villages and hamlets. The Norman Conquest resulted in land, in the present day park area, being granted to abbeys and feudal ruling families which led to sheep pasturage and deforestation during the 12th and 13th centuries. The 16th century saw the strong development of a woollen industry depending on the local Herdwick sheep, which are still a feature of the Lake District. A mining industry also developed in this century using mainly ores of copper, lead and silver, and of plumbago in Borrowdale. The enclosure of the pastures, giving today's characteristic landscape took place largely in the late 18th century. Large mansion houses and landscaped gardens appeared in the 19th century and in 1786 the Lake District was used to develop and illustrate the theory of "picturesque". At present there are some 150 scheduled monuments, making the Lake District the second most important and richest area of archaeological remains (after Cornwall) in England. A number of famous people have lived in the Lake District notably the poets Coleridge, Southey and Wordsworth, collectively known as the Lake Poets. Turner, Constable, Gainsborough and others painted here. Lake Windermere had a number of "firsts" in scientific experimentation including the world's first launching of a plane off water which took place in 1912.

Local Human Population The area has been occupied by man for over 6000 years but has always been marginal for agriculture, supporting a pastoral economy and economic uses associated with its deciduous woods. Some 40,000 people (1981) live in the valleys, and the park area contains three market towns (Windermere, Keswick and Ambleside) with populations over 2,000 and 14 other settlements with populations of over 250. The area is crossed by several major roads. The National Park Authority and the Countryside Commission have policies dealing with the general economic conditions of the area, the population structure, housing, employment, schooling and rural transport.

Visitors and Visitor Facilities The Lake District has been visited by countless millions during the last 200 years and today at the height of the season visitors outnumber residents 6:1 (that is approximately 240,000 people). It is estimated that 12 million people visit the park each year of which 2.5 million spend one or more nights in the park. Travel in the Lake District increased in the late 18th century at which time the first guide book was written followed by others in 1840, 1855, 1867, 1886, 1902 and 1933. Tourism spread as roads improved and was given an added boost with the coming of the railway in 1847. Tourism is now the largest source of revenue to the people in the park valued at £150 million a year (to the Cumbrian region as a whole). Rock-climbing as a sport distinct from mountaineering was pioneered in the Lake District. There are seven permanent and two mobile information centres, a National Park Centre, at Brockhole, a youth and Schools Liaison Service, a full-time Ranger Service and a Weather Service. A variety of courses are organized as well as lectures and publications.

Scientific Research and Facilities Glacial theory formulated in the Alps was verified by the Rev. Buckland in 1850 using the Eamont valley as the case study area. Wray Castle (now Ferry House) on Lake Windermere is the Freshwater Biological Association Centre which has carried out extensive research on Esthwaite and Blelham Tarn, as well as on other lakes, tarns and running water. The vegetation and vegetational succession of Esthwaite North Fen have been recorded since 1848 and early land use history has been researched by the use of pollen data from the upland tarns.

Conservation Management The two statutory responsibilities of the National Park Authority are to preserve and enhance the natural beauty of the Lake District and to promote public enjoyment of the area in non damaging ways by the use of special provisions, development controls and by consultation. It is estimated that the most significant parts of the national park for conservation amount to 41% of the total area and that these are in State ownership or owned by the National Trust. The latter has declared 95% of its holdings "inalienable" thus requiring an act of parliament for the property to be taken out of Trust ownership. A number of special legal control measures and byelaws exist in addition to the planning acts. These control agricultural and forestry activities as well as caravan rallies and advertisement. The overall planning responsibility for the national park area rests with the National Park Authority (established in 1951) who are advised by the Countryside Commission. The National Trust manages its own property while the Nature Conservancy Council is responsible for the National

Nature Reserves (Roudsea Wood and Mosses, Rusland Moss, North Fen and Bleham Bog) and the Sites of Special Scientific Interest (SSSI), the latter numbering 79 sites and amounting to 14.2% of the park area. In total there are 1179 graded buildings and churches in the park area, a number likely to increase substantially in the near future after the completion of a survey by the Historic Buildings and Monuments Commission. Special categories of property under statutory control are: historic monuments and sites; listed buildings; conservation areas; historic landscapes; national nature reserves and SSSIs. The present means available for conservation are outlined in the National Park Plan Review and the key to the maintenance of the character of the park is that it must remain inhabited and used. Management is accomplished through ownership, planning controls and various incentives, but the fundamental problem is to safeguard the economic viability of the resident communities and to maintain the pattern of settlement. The National Park Authority works closely with farmers who must consult the Authority on improvement plans which are going to be grand-aided (most support to upland agriculture is via agricultural policies including the Less Favoured Areas Directive). The National Park Authority works to modify plans to make them environmentally friendly rather than to resist all forms of agricultural development. The National Park Authority prepares Structure Plans for the park and exercises control over any kind of development which requires planning permission. The first National Park Plan published in 1978 now in its second revision after a review in 1986, is the prime management document and is revised every five years. More detailed plans cover smaller areas and particular subjects such as the Joint Management Plan for Haweswater, the Windermere Management Plan and the Bassenwaite Management Plan. The National Park Plan is supplemented by "functional strategies" which are produced annually. Over half the park area is not included in special protection categories and is managed by the maintenance of the general pattern of land use. With regard to forestry a special agreement was negotiated in 1936 whereby coniferous afforestation is prohibited in the central parts of the park. In the 1970s the National Park Authority set up an Upland Management Service which repairs damage and maintains the footpath network. Special provisions cover three sites, Haweswater, Windermere and Bassenwaite which are zoned for particular kinds of recreation. Windermere is the only lake where powered boats are permitted. Natural shore lines are also protected. The National Trust is one of the largest landowners and has a separate strategy for the Lake District.

Management Problems The conditions which maintain the Lake District's landscape are fragile and depend upon a continuing and active land husbandry as well as upon a stable economic base and control of development. A third of the volume of the rainfall is drawn-off as water supply for urban agglomerations some distance from the park. Historically threats to the park have included the proposal in the 1870s to raise the level of Thirlmere to supply water to Manchester. The scheme was approved by Parliament in 1879 despite much local opposition. Other proposals included extensions to the railway, building two new railway lines, opening iron mines and closing footpaths, all of which resulted in 1883 in the formation of the Lake District Defence Society. The idea of bringing the Lake District into national ownership led to the creation of the National Trust in 1895. Current problems include: providing for the large numbers of visitors in an environmentally acceptable fashion; the threats posed by changing technologies in agriculture and forestry, and the development of road communications and water abstraction. The large numbers of tourists lead to congestion on the roads, pressure to provide more camping and caravan sites, footpath erosion and damage to the stone walls. Outside of "statutory sites" the National Park Authority has only indirect influence on the key activities of agriculture and forestry, largely being reliant on incentives, persuasion, education and practical assistance. In this regard it has been suggested that agricultural policies would benefit from better tuning to environmental objectives. Acid precipitation has been reported from the Lake District which has high deposition rates, sensitive geology and poorly buffered soils. Despite this there has been no marked change in the pH or alkalinity and rainfall acidity has remained constant for several decades. Upland streams do, however, undergo acid pulses during heavy rainfall and reports indicate subsequent losses of fish stocks from the rivers. Some tree species are also showing advanced tinsel syndrome.

Staff The staff of the National Park Agency exceeds 105. The National Park Authority, the National Trust and the Nature Conservancy Council have the authority to appoint rangers or wardens to protect their land areas.

Budget In 1986 this was £2,618,900 (compared to £457,000 in 1973/74) derived from central government (48.9%), Cumbria County Council (16.3% - half of which was recoverable from central government) and generated income (34.8%). There is an intention on the part of central government to increase their level of funding during the 1987-88 period by 13.7%. Other funds available for conservation come from the National Trust and the Nature Conservancy Council with the National Trust spending £2,000,000 in 1986. The Upland Management Service has a budget of over £250,000 per annum.

Local Administration

- Lake District National Park Authority (also known as the Lake District Special Planning Board), Bushier Walk, Kendal, Cumbria LA9 4RH
- National Trust, North West Regional Office, Rothay Holme, Rothay Road, Ambleside, Cumbria LA22 0EJ
- Nature Conservancy Council, Local Office, Blackwell, Bowness-on-Windermere, Windermere, Cumbria LA23 3JB
- Forestry Commission, North West England, Dee Hills Park, Chester, CH3 5AT
- North-West Water Authority, Dawson House, Liverpool Road, Great Sankey, Warrington, WA5 3LW

References There are some 74 major references dealing with the national park. These are listed in: Secretary of State for the Environment. (1987). *Nomination of the Lake District National Park in North West England for inclusion in the World Heritage List.*

Date May 1987

YUGOSLAVIA

Area 255,803 sq.km

Population 22,850,000 (1983 estimate)

Parks and Reserves Legislation Wildlife protection and legislation is organised on an autonomous republic level. One of the earliest legal measures for nature conservation, the Hunting Act of 1893, was introduced when the country was under the control of the Austro-Hungarian Empire. Current environmental protection was written into the Federal Constitution (Ustav Socialisticka Federativne Republike Jugoslavije) on 21 February 1974. Within the framework of the general legislation guidelines, the assembly of each republic and autonomous province enacts specific regulations concerning the protection of the environment (Singleton, 1985; IUCN, 1987).

The protected area legislation varies from one republic to another. In Montenegro protected areas are established by enactment of the conservation law of 6 August 1952, whilst in Croatia parks are designated by laws specific to each site. As an example of this difference in legislation, Plitvice National Park was established by the general act of 1954 whilst Mljet National Park was designated under the Mljet National Park law published in "Narodne novine" No. 49/60, 7 XII 1960. Nature reserves in Croatia have been declared under a decree for the Protection of Natural Rarity No. 221/48 and by proposals of the People's National Liberation Committee No. 05-5056/1 of 1961 (MAB, 1979).

Other republican laws are also general but are considered to cover protected area designation of both terrestrial and marine sites. Thus Law No. 5 passed on 13 January 1972 in Bosnia and Herzegovina resulted in the Executive Committee designation of Sutjeska National Park (IUCN, 1971; Baccar, 1977; Mestrovic, 1983). However, strict reserves are set up by a decision of the National Institute for the Protection of Historic Monuments and Natural Beauty of 3 June 1964. Natural reserve designation was enacted by a decision of the Institute for Protection of Cultural and Natural Monuments and Natural Rarities No. 683/54. Similarly in Slovenia, national parks are created by special decree under the National Parks Law (Uradni List No. 6 of 1959) and in Macedonia each national park is designated under site specific laws. Only regional parks may be established by regional legislation (IUCN, 1987).

The legal texts govern the range of activities that can be carried out within protected areas, whereby control is exercised over the scale of forestry, hunting, fishing and certain agricultural works. All activities in the nature reserves of Croatia are restricted by regional by-laws (Singleton, 1985).

The first *national parks* (Nacionalni Park) were proclaimed by the royal government in 1928. In addition to the areas currently designated as national parks, there are several other types of protected area including *natural* and *regional* parks, *strict nature reserves*, *protected landscapes* and horticultural gardens. Legislation also gives special protection to approximately 75 plant and 370 animal species (Duffey, 1982; Singleton, 1985; IUCN, 1987). By 1985 there were no specific laws on the creation of marine protected areas, however general texts on conservation allowed for the establishment of such sites (Singleton, 1985).

An example of the legal complexities of site designation can be seen for the Kotor World Heritage Park which was enacted by decision of three organisations; the Republic Institute for Protection of Nature of the Socialist Republic of Montenegro (under general decree No. 7/1968); Republic Institute for Protection of Cultural Monuments of the S.R. Montenegro; and the Town Assembly of Kotor (declaration of 14 June 1979). The World Heritage Convention was ratified on 26 May 1975 and accession to the Convention on Wetlands of International Importance on 28 March 1977 (with two sites listed). Two biosphere reserves were established between 1976 and 1977. The network of biosphere reserves were suggested as being linked in with programmes of the WHO in a joint effort to establish Environmental Specimen Banks (MAB, 1979).

Parks and Reserves Administration and Management The Federal Republic is composed of six socialist republics; Serbia, Croatia, Slovenia, Bosnia and Herzegovina, Macedonia and Montenegro, with two socialist autonomous provinces of Kosovo and Vojvodina within the framework of Serbia. Ecological affairs are based on a decentralised public authority structure in each autonomous republic. The republics and provinces each have the power to set up a council for the protection of the environment which is charged with the responsibility of co-ordinating the activities of the various environmental agencies. The councils are federated together in the Jugoslavenski Savez za Zastitu i Unapredivante Covekove Sredine (SAVEZ), which advises on conservation matters (Singleton, 1985).

In Bosnia and Herzegovina the national park system has its own authority whilst the nature reserves are administered by "Experimental Farms" belonging to the Ministry of Agricultural Economy. In Croatia most of the national parks are administered by the cultural section of the Secretariat for National Education, Culture and Physical Education with each park having its own administrative committee, usually its own administrative office and a special management plan. In the case of the Lokrum and Krka reserves, the town assemblies are responsible for management under jurisdiction from the urban plan (IUCN, 1971). In Montenegro, some national parks such as Biogradska Gora have a special controlling body, while others including Durmitor and Lovcen have administrative responsibility vested in the Nature Protection Institute of the Republic or in the Republic Secretariat for Education, Culture and Science, respectively. The management is carried out by a local self-management community who elaborate the plans (Singleton, 1985). In Slovenia, Triglav National Park is administered by a special commission attached to the Assembly of Radovljica Commune whilst reserves are dealt with by the Forestry Service. Finally, in Macedonia the Department of Agriculture and Silviculture is generally responsible, with each park having its own governing authority (IUCN, 1971; Singleton, 1985). Within the Kotor World Heritage Site management responsibility lies with the Community Assembly of Kotor Republic Institute for Protection of Monuments of Culture and the Republic Institute of Protection of Nature of Titograd.

Some natural resources are managed by specialised organisations for tourism, forestry and urbanisation. The structure and detailed arrangements for nature conservation are organized on a republic level with an institute for nature protection in each of the six republics (IUCN, 1987). The institutes are staffed by biologists, geographers and lawyers, with a director who maybe either a civil engineer or a forester (Godiel, 1981; Singleton, 1985). By law each national park must have its own administration, professional staff and funds for effective protection and the main thrust of the conservation effort is in the management of the country's national parks (Godiel, 1981). In some of these, commercial tourism is extensive, for example, at Triglav and at Plitvice National Parks. The latter had 800,000 visitors in 1986, and some 1300 staff employed in hotels, restaurants and at campsites (Duffey, 1982; Thorsell, pers. comm.).

The parks can also be managed by experimental farms or by local self-administered committees or bodies under the Ministry of National Education or under a nature conservancy institute.

Addresses

- Zavod SR Slovenije za varstvo naravne in kulturne, (Institute for the protection of monuments and the department of nature conservation), Plecnikov trg.2, 61000 Ljubljana, Slovenia
- Zavod za spomenisko varstvo, (Institute for the protection of monuments and the department of nature conservation), Rostovski trg 1, 62000, Maribor, Slovenia
- Republički zavod za zaštitu prirode, (Nature Conservancy), Ilica 44/11, 41000 Zagreb, Croatia
- Republički zavod za zaštitu prirode SR Srbije, (Nature Conservancy), III Bulevar 106, 11000 Beograd, Serbia
- Republički zavod za zaštitu prirode, (Nature Conservancy), Trg., Nikole Kovacevica 7, P.O. Box 2, 9100 Titograd, Montenegro
- Zavod za zaštitu spomenika kulture prirodnih rijetkosti i znamenitosti SR BiH, (Office for the protection of cultural monument, Department of Nature Conservation), Ul. 27 jula 11A, 71000 Sarajevo, Bosnia and Herzegovina

- Republički zavod za zaštitu prirodnih retkosti SR Makedonije, (Nature Conservancy), Rudera Boskovića bb, Karpus III, 91000 Skopje, Macedonia
- Pokrajinski zavod za zaštitu prirode, (Nature Conservancy), Petrovaradinska tvrđava, 21000 Novi Sad/Petrovasadin, Vojvodina, Serbia
- Pokrajinski zavod zaštitu prirode, (Nature Conservancy), ul. Miladina Popovka, 18 Pristina, Kosovo, Serbia

Additional Information Fishing and hunting have long been economically important activities in Yugoslavia, yet the relatively low population density has ensured the survival of a number of important ecosystems which have been destroyed over the centuries in other parts of Europe. Virgin forests exist in a number of localities and the mountain massifs are well represented by relatively undisturbed alpine communities of endemic flora. In contrast the majority of the larger wetland sites have been drained and put under cultivation or pasture since the end of the 1939-45 war. In several of the wetlands that survive, suitable habitats for breeding waterfowl are seriously degraded or polluted (Duffey, 1982; IUCN, 1987).

Some of the problems affecting the protected areas include the conflict of interests between tourism, conservation and economic development. Many of the park authorities have insufficient funds and have to rely on financial assistance from tourism, forestry, sporting and recreational activities, which are often in conflict with the ecological purposes for which they were established. The island of Mljet, for example, has suffered ecological damage from the sheer volume of tourists eroding soil and damaging vegetation. Sites which are near industrial complexes have also suffered from the lack of concern for environmental issues following the rapid industrial expansion of the early 1950's (Duffey, 1982; Singleton, 1985; IUCN, 1987).

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Yugoslavia

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Protected Landscapes

	(hectares)
<i>Unspecified areas</i>	
Fruska Gora	22,000
Glacicia	23,760
Mavrovo	73,088
Pelister	12,000
Resava	10,000
Subtotal	140,848
<i>National Parks</i>	
Djerdap	82,115
Kozara	3,375
Lovcen	2,400 *
Subtotal	87,890

Lovcen National Park

Management Category V (Protected landscape)

Biogeographical Province 2.17.6 (Mediterranean Sclerophyll)

Geographical Location Located west of the town of Cetinje in the Lovcen mountain area in Montenegro. 42°23'-42°25'N, 18°48'-18°52'E

Date and History of Establishment The area was created under the conservation law of 6 August 1952.

Area 2,400 ha

Land Tenure Associated ownership

Altitude 0-1,749m

Physical Features Lovcen mountain belongs to a south-east part of the Dinaric mountain area. It is a littoral mountain, the peak being Stirovnik (1749m) orientated in a north-west/south-east direction. Geologically Lovcen is composed of rock masses from the Mesozoic and Cainozoic eras, with Triassic and Jurassic limestone, marl limestones, dolomitic limestones and Cainozoic glacial and fluvio-glacial facies. A more extended area of the Lovcen mountain belongs to an anticline developed from Mesozoic limestone and dolomites under which is found an impervious series of clay-sand strata originating from the coastal syncline area. Due to its geological composition of karst and Carboniferous rocks, there are no permanent waterflows. Only in the period of maximum rainfall are temporary waterflows formed. Such examples include Ljubin Potok, which extends for a length of about 300m. The water filters into a permanent water well called Ivanova Korita. Under Jezerski Vrh there is a small glacier lake now in the final stages of succession (Besic, 1974; 1975).

Climate Due to the geographic location and relief, the moderate continental and mountain climatic conditions overlap with the mediterranean climate at Lovcen. The influence of the sea on the climate is reflected in high precipitation levels. For example, at Ivanova Korita average rainfall is 4207mm, the maximum occurring in November and December. Lovcen is also exposed to very strong winds: the south wind coming warm and damp from the sea, while the north wind is dry and cold.

Vegetation The flora of Lovcen is represented by approximately 1,200 plant species, of 475 genera and 95 families. These include a great number of endemic plants of the Balkans and Yugoslavia, among which are a few plants endemic to Lovcen, such as *Lamium lovcenticum*, *Berteroa gintlilii*, and *Endraianthus lovcenticus*. Other endemic species of a somewhat wider distribution but worthy of mention include *Petteria ramentacea*, *Moltkea petraca*, *Amphoricarpus neumayeri*, *Pinus heldrieichii*, *Taxus baccata*, *Viburnum maculatum*, *Centaruea nicolai*, *Dianthus nicolai* and *Ilex aquifolium*. Other protected species found in the Park include *Campanula hercegovina*. The Lovcen vegetation is stratified altitudinally, from the warm oak woods to the subalpine beech forests. A noteworthy vegetation type exists in the rocky areas and the steep sections of karst. The largest area of the park is covered by hop hornbeam and grass *Sesleria ostrietum*, then by a biocenosis of pubescent oak and hop hornbeam (*Quercus-Ostrietum carpiniifoliae* association), whilst at altitudes over 1,100m there is a zone of a mountain beech forest with *Sesleria autumnalis* (*Fagetum montanum seslerietosum* association), extended in smaller areas by a subalpine beech *Fagetum subalpinum* forest (Tomic-Stankovic, 1970; Duffey, 1982).

Fauna The main mammal species are rabbit *Lepus europaeus*, beech marten *Martes foina* and fox *Vulpes vulpes*. The European wolf *Canis lupus* and wild cat *Felis silvestris* are only rarely found within the park. The avifauna includes rock partridge *Alectoris graeca*, raven *Corvus corax* and lesser spotted woodpecker *Dendrocopus minor*. Raptor species are well represented with records of imperial eagle *Aquila heliaca*, buzzard *Buteo buteo*, griffon vulture *Gyps fulvus* and peregrine falcon *Falco peregrinus* (Duffey, 1982).

Cultural Heritage The area is the site of the mausoleum of Njegos, who was once the most celebrated ruler of Montenegro (Duffey, 1982).

Local Human Population No information

Visitors and Visitor Facilities The majority of tourists are drawn to the park area because of the mausoleum of Njegos which attracts up to 70,000 visitors per year. At Ivanova Korita there are mountain rest houses accommodating 200 people as well as alpine huts. The climate and the scenic surroundings provide excellent summer and winter sport and recreational tourism. The good quality ski grounds allow regular competitions to be held (Martinovic, n.d.).

Scientific Research and Facilities The Lovcen area, including the park, has long been the object of scientific investigations. Research has been carried out on the geomorphology, geology, hydrology, vegetation, flora, fauna and pedology.

Conservation Management The park is being managed for recreation as well as nature conservation.

Management Problems Forest fires are rare and wood-cutting is minimal and practised solely to promote wood growth and to achieve a better structure. The number of personnel employed and funds are, however, insufficient for park management purposes. The park has not been covered by a general zoning plan and for this reason certain parts have suffered damage from building construction and alteration of the park scenery (Vukovic, 1968).

Staff One professional employee (a secretary of the self-management community) and two guards (1980).

Budget The funds provided for the park are obtained from the self-management community members (amounted to 1,700,000 dinars in 1980).

Local Administration Secretariat for Education, Culture and Science, Secretary of the Self-Managed Community of Interest of the Lovcen National Park, 81250 Cetinje, Bajova No. 2.

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Date August 1987

ASIA

Japan is one of the few Asian countries to use the protected landscape category widely within its protected area legislation. Scenic areas of national importance can be defined as national parks, while sites of lesser importance, but of regional or local interest, are designated as quasi national parks or prefectural natural parks. Of these areas, the national parks, which include 27 areas covering over 2 million hectares (5.4% of the country) are dealt with below. Pressure from intensive multiple land use, and high human population densities, means that areas designated as protected landscapes are largely under mixed ownership, with almost a quarter of the land being privately owned. However, current Government policy is to acquire privately owned land in order to increase the overall level of protection afforded to these areas. Habitats protected range from primary forest and marine coral communities to secondary vegetation and entirely man-made environments. Park areas are zoned to ensure better protection of the landscape have within them areas that are zoned from natural to entirely man-made, a situation reflected by the internal designations of special protected areas merging onto quasi-national park areas. Nearly half of Hong Kong is covered by country parks of various sizes, which cover most of the high ground of both islands and the New Territories. These parks were established with a variety of aims, including recreation, protection of water supply and scenic beauty, and as areas for public education. However, as a result of the high population densities in the surrounding areas, potential threats to the areas are high. Comprehensive development plans are therefore drawn up for individual parks, which are zoned into three categories of area based on the objectives of conservation, recreation and education. Over most of the designated area development is of a low intensity, with hostels, campgrounds and other recreational facilities only in the less scenic areas. However, in certain parts more intensive recreational development is permitted (though only where the development will not encroach significantly upon the character of the park). In most other Asian countries the situation appears less clear, and areas are perhaps protected landscapes rather more because of their developmental history than by design. In the Indian subcontinent, a number of sites close to urban centres, and developed for protection of water catchment and/or tourism, clearly fall within category V designation (although this may not always appear obvious from local designations). In Pakistan, for example, the Margalla Hills immediately north of Islamabad were declared a "green area" by the Capital Development Authority in 1961, and has since been established as a national park. Much of the original forest has been removed and replaced by secondary scrub. Similarly, in Bangladesh there are a number of national parks, namely Bhawal, Himachari, Madhupur and Ramsagar, which would appear to be closer to protected landscapes than national parks as defined by IUCN/CNPPA. These sites are being developed largely for recreation and education, and except for Madupur (which has the best patch of sal forest in the country) tend to be poor in wildlife.

BANGLADESH

Area 144,000 sq.km

Population 94,650,000 (1983)

Parks and Reserves Legislation The Bangladesh Wildlife (Preservation) Order, 1973, promulgated under Presidential Order No. 23 on 27 March 1973 and subsequently enacted and amended as the Bangladesh Wildlife (Preservation) (Amendment) Act, 1973, provides for the establishment of national parks, wildlife sanctuaries and game reserves. A national park is defined as a comparatively large area of outstanding natural beauty, in which the protection of wildlife is paramount and to which the public may be allowed access for recreational and educational purposes. A wildlife sanctuary is an area closed to hunting and maintained as an undisturbed breeding ground, primarily for the protection of all natural resources, including vegetation, soil and water. A game reserve is an area in which the wildlife is protected but hunting is allowed on a permit basis. Under Article 23, cultivation, damage to vegetation, killing or capturing wild animals within a radius of 1.6km outside its boundary, and pollution of water is not allowed in either a national park or wildlife sanctuary. Entry or residence, introduction of exotic or domestic species of animals and lighting of fires is prohibited in wildlife sanctuaries, but not national parks. By contrast, firing of guns or other forms of disturbance to wild animals is prohibited in national parks, but not wildlife sanctuaries. No specific rules are detailed for game reserves. The Article makes provision, however, for the Government to relax any of these prohibitions for scientific, aesthetic or other exceptional reasons, and to alter the boundaries of protected areas (Olivier, 1979).

Bangladesh accepted the World Heritage Convention on 3 August 1983, but no sites have been inscribed to date.

Parks and Reserves Administration and Management Wildlife conservation, including the management of protected areas, is the responsibility of the Forest Directorate. In 1976 a Wildlife Circle was established within what was then known as the Forest Department, with specific responsibility for wildlife matters under the charge of a Conservator of Forests responsible directly to the Chief Conservator of Forests. A \$13.3 million scheme, entitled "Development of Wildlife Management and Game Reserves", was incorporated within the country's First Five Year Plan, but reduced to \$92,000 in the subsequent Two Year Approach Plan (Olivier, 1979). The Wildlife Circle was subsequently abolished in June 1983, allegedly in the interests of economy and following the recommendations of the Inam Commission. The post of Conservator of Forests (Administration and Wildlife) remains but the incumbent has many other administrative duties unrelated to wildlife. Following its general down-grading within the Forest Directorate, wildlife conservation has become the theoretical responsibility of the various divisional forest officers (Blower, 1985; Husain, 1986). Separate staff are deployed for protection purposes in a number of national parks and wildlife sanctuaries (Sarker and Fazlul Huq, 1985).

The Bangladesh Wildlife (Preservation)(Amendment) Act also provides for the establishment of a Wildlife Advisory Board, which was set up in 1976 under the chairmanship of the Minister of Agriculture. The Board is supposed to approve important wildlife management decisions and directives (Olivier, 1979). Although it still exists, it had not met for two years (Blower, 1985).

Addresses Chief Conservator of Forests (Administration and Wildlife), Bana Bhawan, Gulsham Road, Mohakhali, Dhaka 12

Additional Information The major forest types are mangrove, moist deciduous or sal *Shorea robusta* and evergreen. The entire flood plain of Bangladesh was well-vegetated, but much of the forest has disappeared in recent decades, due to mounting pressure from human populations, or been converted into plantations. Of the total land area, the remaining natural

forest was estimated to be 4,782 sq.km (3.3%) and that of scrub forest 9,260 sq.km (6.5%) in 1980 (Gittins and Akonda, 1982). Protected natural forest amounted to only 0.4% of the total land area and this has not been significantly improved since that survey.

Conservation efforts began in 1966, prior to independence, when the Government of Pakistan invited the World Wildlife Fund to assess its wildlife and recommend measures to arrest the deterioration. Two expeditions were mounted (Mountfort and Poore, 1967, 1968) and, the severity of the situation having been confirmed, the Government was urged to appoint its own Wildlife Enquiry Committee. The committee was established in 1968 and by 1970 had drafted a report. That part relating to East Pakistan was published as a separate report (Government of East Pakistan, 1971). Considerable progress was made with the establishment of several protected areas (Mountfort, 1969), research undertaken on the Sundarbans tiger population of East Pakistan (Hendrichs, 1975), and technical input from FAO (Grimwood, 1969). Then, in 1971, came the War of Liberation which inevitably disrupted subsequent progress. In spite of political instability, however, the Bangladesh Wildlife (Preservation) Order was promulgated in 1973 and an ambitious programme of wildlife management developed, followed by the formation of a Wildlife Circle. Economic constraints, however, have subsequently been responsible for the loss of much of this initiative.

The principal non-governmental conservation organisation within the country is The Society for Conservation of Nature and Environment (SCONE). One of its main areas of concern is environmental pollution, particularly in Dhaka (SCONE, n.d.).

There is no national wildlife conservation policy. In view of the fact that wildlife resources are vested largely in the reserved forests, their conservation tends to be diametrically opposed to forest management practices (Olivier, 1979). The existing system of protected areas is not comprehensive, having been established with little regard to ecological and other criteria, although some effort has been made to include representative samples of the major habitats. Some areas have not been clearly defined or officially gazetted and few, if any, are effectively managed and protected. Lack of personnel trained in wildlife conservation is a further handicap (Olivier, 1979; Gittins and Akonda, 1982; Khan, 1985). The very low priority apparently now accorded to wildlife conservation is reflected in the recent abolition of the Wildlife Circle, the reassignment of staff to normal duties, the lack of any separate financial provision within the Forest Directorate's budget and the now moribund Wildlife Advisory Board (Blower, 1985).

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Protected Landscapes

<i>National Parks</i>	(hectares)
Bhawal	5,022 *
Madhupur	8,436 *
Ramsagar	52
Subtotal	13,510

Bhawal National Park

Management Category V (Protected Landscape)

Biogeographical Province 4.03.01 (Bengalian Rainforest)

Geographical Location Lies in Dhaka Forest Division, about 40km north of the capital city of Dhaka. 24°01'N, 90°20'E

Date and History of Establishment Established and maintained as a national park since 1974 but not officially declared as such until 1982, under the Bangladesh Wildlife (Preservation) (Amendment) Act, 1973.

Area 5,022ha

Land Tenure Government

Altitude Up to 4.5m

Physical Features The topography is characterised by low hills which rise 3.0-4.5m above the surrounding paddy fields. These hills or ridges, locally known as "chaldas", are intersected by numerous depressions or "baidas". The soil is yellow-red, comprising sandy clay mixed with magniferous iron ores.

Climate Conditions are moderate, the coldest and hottest months being January (down to 10°C) and April (up to 37°C), respectively. The cold season lasts from November to January. Mean annual rainfall is 2,500mm, most of which falls in the monsoon between June and September.

Vegetation Most of the original sal *Shorea robusta* forest has been destroyed. It has been protected from further destruction and now, due to extensive regeneration, coppiced and seedling sal covers 90% of the area (Womersley, 1979; Sarker and Fazlul Huq, 1985).

Fauna Mammal diversity is low. Species include fox, jackal, small Indian civet, wild boar and rufous-tailed hare (*Vulpes bengalensis*, *Canis aureus*, *Viverricula indica*, *Sus scrofa* and *Lepus nigricollis*). The avifauna is similar to that found in Madhupur National Park (Sarker and Fazlul Huq, 1985).

Cultural Heritage No information

Local Human Population Some 2,000 people reside and cultivate land in the national park.

Bangladesh

Visitors and Visitor Facilities Public usage is intense, with 25,000 visitors recorded at weekends (Womersley, 1979). The national park is easily accessible throughout the year by road from Dhaka City. Accommodation includes four rest houses and two cottages. Recreational and educational facilities include some 25km of trails, an artificial lake, two ponds and two observation towers.

Scientific Research and Facilities A wildlife survey was carried out by the Forest Directorate in 1981 (Sarker and Fazlul Huq, 1985).

Conservation Management The national park is not an important wildlife conservation area but, being close to large urban areas, it is valued for recreational purposes. Recreational and educational facilities were improved and developed under the management of the Forest Directorate, but the scheme was subsequently discontinued. Forestry operations are limited to re-forestation of damaged areas (Olivier, 1979; Womersley, 1979; Sarker and Fazlul Huq, 1985).

Management Problems The original forest vegetation has been removed and wildlife severely depleted.

Staff No information

Budget No information

Local Administration No information

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Date May 1987

Madhupur National Park

Management Category V (Protected Landscape)

Biogeographical Province 4.03.01 (Bengalian Rainforest)

Geographical Location Situated in the Madhupur tract (Mymensingh Forest Division), some 160km north of the capital city of Dhaka and 32km south-west of Mymensingh Town. 24°45'N, 90°05'E

Date and History of Establishment First established as a national park in 1962 but not officially declared as such until 1982, under the Bangladesh Wildlife (Preservation) (Amendment) Act, 1973. Received special protection as early as 1959 under rules to regulate hunting, shooting and fishing issued under the provisions of the East Pakistan Private Forest Ordinance, 1959.

Area 8,436ha

Land Tenure Government

Altitude Rises to about 20m above sea level.

Physical Features The local topography is characterised by flat topped ridges, known locally as "chalas", intersected by numerous depressions or "baidas". Two small rivers, Banar and Bangshi, flow through the eastern and western portions of the park, respectively. The soil is yellow-red, comprising sandy clay mixed with magniferous iron ores.

Climate Conditions are moderate, with April the hottest month (maximum of 37°C) and January the coldest (minimum of 10°C). The cold season lasts from November to February. Mean annual rainfall is 2500mm, most of which falls between June and September.

Vegetation Some 40% of the forest cover comprises sal *Shorea robusta* in association with *Dillenia pentagyna*, *Lagerstroemia parviflora*, *Adina cardifolia*, *Miliusa velutina*, *Lansea grandis*, *Albizia* spp., *Bauhinia variegata*, *Spondius mangifera*, *Butea frondosa* and *Barringtonia acutangula*. Species commonly occurring in the undergrowth include *Eupatorium* sp., *Pennisetum setosum*, *Asparagus racemosus* and *Rauwolfia serpentina* (Sarker and Fazlul Huq, 1985). The sal forest is the best patch remaining in the country (Reza Khan, 1985).

Fauna The area used to be rich in wildlife but Indian rhinoceros *Rhinoceros unicornis* (E) disappeared in the last century. More recently, tiger *Panthera tigris* (E), leopard *Panthera pardus* (V), Indian elephant *Elephas maximus* (E), all species of deer occurring in Bangladesh, wild buffalo *Bubalus bubalis* (E), and peafowl *Pavo* sp. have become locally extinct (Reza Khan, 1985). Characteristic mammal species still remaining include rhesus macaque *Macaca mulatta*, capped langur *Presbytis pileatus* (one of the densest populations surviving in Bangladesh), jackal, fox, small Indian civet, wild boar, Irrawaddy squirrel, porcupine and rufous-tailed hare (*Canis aureus*, *Vulpes bengalensis*, *Viverricula indica*, *Sus scrofa*, *Callosciurus pygerythrus*, *Hystrix indica* and *Lepus nigricollis*) (Sarker and Fazlul Huq, 1985; Reza Khan, 1985). Some 200 species of birds are present (Reza Khan, 1985).

Cultural Heritage No information

Local Human Population The surrounding area is densely populated. Some 4,500 Garos (tribals) were allowed to settle inside the park (Mountfort, G. and Poore, D., 1968) but about 850 families have been resettled (Womersely, 1979).

Visitors and Visitor Facilities The park is easily accessible throughout the year and is bisected by an 8km long semi-metalled road. There are two rest houses and a youth hostel providing overnight accommodation. Picnic spots have been provided by the Forest Directorate. The zoo was last reported to be in a poor state (Olivier, 1979; Womersley, 1979). Visitor use is high, with many bus loads of holiday makers present on public holidays.

Scientific Research and Facilities A wildlife survey was carried out by the Forest Directorate in 1981 (Sarker and Fazlul Huq, 1985).

Conservation Management The forests of Madhupur were formerly rich in wildlife and were a favourite tiger-hunting area (Olivier, 1979). By 1967, however, the area had lost much of its value for wildlife, owing to considerable disturbance, but its potential for recreation and education was recognised (Mountfort and Poore, 1968). Subsequently, it was recommended that Madhupur be established as a "Class B" national park to provide "recreational and educational interest for the youth and people of urban areas" (Government of East Pakistan, 1971). In 1974-75 a programme was initiated to preserve the wildlife and to provide recreational and educational facilities for the local people and other visitors. With the establishment of the national park, all flat areas suitable for growing paddy were excised and 850 families of Garos were resettled (Womersely, 1979).

Plantations are being established in disturbed areas and an artificial lake created for migratory waterfowl (Sarker and Fazlul Huq, 1985). Madhupur warrants conservation priority over other areas of sal forest. It needs to be enlarged and brought under an effective wildlife management authority (Reza Khan, 1985).

Bangladesh

Management Problems The wildlife has been severely depleted. In 1979, the boundaries had not been defined and marked (Womersley, 1979), and Garo settlements within the national park imposed considerable disturbances (Olivier, 1979).

Staff No information

Budget No information

Local Administration No information

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Date May 1987

HONG KONG

Area 1,068 sq.km (Jim, 1987)

Population 5,588,000 in 1986 (Ismail, 1987)

Parks and Reserves Legislation Alarmed by the rapid rate of urbanisation threatening to destroy the countryside in the 1960s, it was proposed that forestry policies be revised and accommodate the recreational demands of an increasingly urban population (Daly, 1965). The concept of establishing a system of parks zoned for varying intensities of recreational use, as outlined in several reports (Daley 1964a, 1964b; Scott, 1964; Phillips and Marshall, 1965), was strongly endorsed in a review of the conservation of the countryside undertaken for the Department of Agriculture and Fisheries by IUCN (Talbot and Talbot, 1965). The government was further stimulated into action by a report on the civil disturbances of 1965-1966 pressing *inter alia* for recreational outlets for the young (Hong Kong Government, 1967). Following the establishment of a Provisional Council for the Use and Conservation of the Countryside in 1967, a number of recreational (country parks) and conservation (nature reserves) areas were proposed (Wholey, 1968). A pilot country park scheme was initiated in the Shing Mun Reservoir area in 1971 and, by June 1972, the first five-year country park development programme was approved. The Country Park Ordinance was enacted in March 1976, providing for the establishment of Country Parks and Special Areas under the responsibility of a Country Parks Authority. Whereas country parks may be developed for recreational purposes, public access to special areas is largely restricted and recreational facilities are not provided because of their high conservation value, be it geological, biological, archeological or historical. Tai Po Kan Nature Reserve, designated a Special Area, is exceptional, access for study and appropriate recreational activities being permitted. Institutional operations were accelerated under a crash programme (1977-1981) with the result that 21 country parks, covering nearly 40% (40,833ha) of the territory were established over a three-year period. Some 13 special areas have also been designated to date, all but two (Tai Po Kan Nature Reserve and Tung Lung Fort) of which are within country parks (Thrower, 1984; Jim, 1987). In addition over 46 sites of Special Scientific Interest have been identified for future conservation action (Ismail, 1987). Although not legally protected, their conservation value has to be considered in relation to planning applications. As yet, no coastal or marine reserves have been established.

Other legislation relevant to protected areas includes the Forests and Countryside Ordinance, which provides for the general protection and management of vegetation along with special protection to certain native plant species, and the Wild Animals Protection Ordinance under which access to the Mai Po Marshes and Yim Tso Ha Egretty, both SSSIs, is restricted (Ismail, 1987).

The United Kingdom extended its ratification of the Ramsar Convention to Hong Kong on 10 September 1979. Similarly, the United Kingdom ratification of the World Heritage Convention applies to Hong Kong. No sites have been inscribed under either convention.

Parks and Reserves Administration and Management Under the Country Parks Ordinance, the Country Parks Authority is headed by the Director of Agriculture and Fisheries, who is responsible for the protection, management and development of country parks and special areas. A Country Parks Board was appointed in August 1976 to advise the Authority on policy and programmes and to consider objections raised against the establishment of protected areas (Thrower, 1984; Jim, 1987).

The three main objectives of the Country Park Development Plan are to provide for conservation, recreation and education. Park management is based on a system of zonation providing for three categories of land use, namely: recreation zones, which are located in accessible areas subject to heavy visitor use; wilderness zones, which provide the scenic background to recreation zones; and conservation zones, which are sites of special scientific importance and to which access by visitors is not encouraged (Thrower, 1984). Now that most

potential sites have been established, the emphasis of the country park programme has shifted to maintaining and upgrading facilities, as well as encouraging countryside interpretation through provision of visitor centres, information boards and guided tours (Jim, 1987).

The Country Park programme has been financed in two stages. Initially funds were provided for the establishment of a protected area system, an operation lasting from 1976 to 1981. Subsequent expenditure follows standard government procedures and is based on five-year budgets, with detailed estimates of approved projects each year (Thrower, 1984).

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Additional Information Tropical rain forest covered the Hong Kong region up to a thousand years ago when there were few inhabitants, apart from aboriginal coastal traders and scattered garrisons of the Tiangs. Yoa tribesmen are reported to have lived in the forests and probably practised shifting cultivation. Later, in the Sung dynasty, the descendants of the Han began to settle in the valleys and were followed by the Hakka, or guest people, also predominantly farmers. Vast areas of forest were burnt to provide agricultural land and pasture, and to discourage the more dangerous wildlife (Marshall and Phillips, 1965). Remnants of the original forest cover are now restricted to ravines (Ismail, 1987). Native pines *Pinus massoniana* and exotics, notably the Australian Brisbane box *Tristania conferta*, have been widely planted in Hong Kong largely to protect the catchment areas of the many reservoirs constructed to meet the territory's water requirements. Many plantations were established in the late 1940s and early 1950s, following the devastation of much of the vegetation during the Japanese occupation in World War II (Thrower, 1984).

Pressure arising from the dense population and rapid economic growth threaten the territory's natural resources. Considerable industrial and residential expansion has taken place in the New Territories, until recent decades a rather isolated rural area. Such development have been conceived largely as isolated urban schemes with little integrated regional planning. The importance of developing a symbiotic relationship between urban and rural areas has hardly entered into official planning and policy-making (Dwyer, 1986). The very high population density and poor quality of the urban environment in Hong Kong makes the requirements for countryside recreation imperative for physical and mental health. The country park programme has been successful in encouraging and satisfying this demand but the ever-increasing visitor numbers are not being matched by a corresponding increase in the management resource base. Over the last decade (1975/76-1985/86) the number of visitors to country parks has risen from 2.0 to 9.46 million per year, representing an increase from 0.45 to 1.76 visits per capita per year. Concomitantly, the amount of litter collected annually has increased from 446 to 4,000 tonnes. Most popular sites are now heavily over-used, excessive trampling having decimated the grass cover.

Fires damaged some 5,415ha in 1985/86. Over the past 16 years the number of trees killed by fire (5.42 million) has exceed that planted (4.84 million). Besides effecting a more equitable spatial-temporal visitor distribution in future, low impact pursuits need to be encouraged to off-load some of the pressure on over-used areas. Drastic new management approaches are needed to contain the widespread damage from fire and litter (Jim, 1987).

Non-governmental conservation organisations includes the Hong Kong Bird Watching Society and Hong Kong Natural History Society. WWF-Hong Kong was incorporated as a registered charity in Hong Kong in 1981. Its main project to date has been the promotion and development of the Mai Po marshes as a nature reserve. Friends of the Earth Hong Kong, established in 1983, is mainly concerned with nuclear issues, water pollution and trees in urban areas. The Conservancy Association is an older society which has been involved in environmental education (Oldfield, 1987).

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Protected Landscapes

	(hectares)
<i>Country Parks</i>	
Aberdeen	423 *
Clear Water Bay	615 *
Kam Shan	337 *
Kiu Tsui	100 *
Lam Tsuen	1,520 *
Lantau North	2,220 *
Lantau South	5,640 *
Lion Rock	577 *
Ma On Shan	2,880 *
Pat Sin Leng	3,125 *
Plover Cove (and extension)	5,224 *
Pok Fu Lam	270 *
Sai Kung East	4,477 *
Sai Kung West	3,000 *
Shek O	710 *
Shing Mun	1,400 *
Tai Lam	5,330 *
Tai Mo Shan	1,440 *
Tai Tam (including Quarry Bay Extension)	1,585 *
Subtotal	40,873

**Aberdeen, Pok Fu Lam, Tai Tam (including Quarry Bay Extension)
and Shek O Country Parks**

Management Category V (Protected Landscape)

Biogeographical Province 4.06.01 (Chinese Rainforest)

Geographical Location Almost all land above 200m on Hong Kong Island is contained in its four country parks. 22°15'-22°17'N, 114°08'-114°09'E (Pok Fu Lam); 22°15'-22°16'N, 114°09'-114°11'E (Aberdeen); 22°13'-22°17'N, 114°11'-114°14'E (Tai Tam); 22°13'-22°16'N, 114°13'-114°15'E (Shek O)

Hong Kong

Date and History of Establishment Both Aberdeen and Tai Tam were designated as country parks on 28 October 1977. The latter was subsequently extended on 21 September 1979, at the same time as Pok Fu Lam and Shek O were established.

Area Aberdeen: 423ha
Pok Fu Lam: 270ha
Tai Tam: 1,315ha
Tai Tam Quarry Bay Extension: 270ha
Shek O: 710ha

Pok Fu Lam is contiguous with Aberdeen, which is separated from Tai Tam by the Wong Nai Chung Gap. The Chai Wan-Stanley road forms a common boundary between Tai Tam and Shek O.

Land Tenure Essentially public land

Altitude Ranges from sea level to the peak of Pak Ka Shan (Mt Parker) at 532m. Che Kei Shan (Victoria Peak) at 554m is the highest point on the island but it is within an enclave inside the park boundaries.

Physical Features For the most part, dark grey, fine-grained volcanic rocks form the mountainous backbone of Hong Kong Island. Only in the northern half of Tai Tam and the southern Cape d'Aguilar Peninsular are the underlying pink or grey, coarse-grained granites exposed. The three peaks over 500m (Che Kei Shan, Kei Lik Shan and Pak Ka Shan) are volcanic. Hong Kong granite is a first-class building stone and it is quarried just outside the northern boundary of Tai Tam Country Park between Jardine's Lookout and Mount Butler, and on the western coast of d'Aguilar Peninsular. Hillslopes are often steep and the valleys cut by the streams draining them are precipitous, rocky and V-shaped. The basic drainage pattern has been changed by the catchwater system, which encircles the hills and channels water into the reservoirs. Many millions of gallons which would otherwise water the lower reaches or flow into the sea are, by this means, collected and stored in a number of reservoirs for human consumption.

Climate Although Hong Kong lies just inside the tropics, the climate is temperate for nearly half the year. Mean annual rainfall ranges from around 1200mm to more than 3000mm, about 80% of which falls in summer. This is the longest season, lasting from May to September with hot, humid and usually wet weather. Temperatures range from about 24°C to 32°C. September is the month in which Hong Kong is most likely to be affected by tropical typhoons. These originate from near the Philippines and approach from a south-easterly direction. Winter, lasting from November until February, is cold and dry. Temperatures commonly range from about 13°C to 24°C but sometimes drop below freezing point on high ground (Thrower, 1984; Ismail, 1987). Shek O, in the extreme south-east, has a combination of lowest rainfall and greatest exposure to the cold, dry winter winds from the north-east, summer south-easterlies and the predominantly easterly typhoons. By contrast, Mt. Collinson is in the highest rainfall zone, sheltered from winter monsoon winds by Pottinger Peak and from southerly winds by Stanley Peninsula.

Vegetation The southern part of Shek O Country Park is covered by low, wind-pruned shrubland and grassland, with trees in the deeper valleys. The grasslands are dominated by duck-beak grass *Ischaemum* sp. and minireed *Arundinaria nepalensis*. By contrast, hillslopes from Pottinger Peak in the east to High West (Sai Ko Shan) in the west, are extensively forested. The most protected ravines and deeper valleys often contain dense subtropical rain-forest, typified by the presence of lianas. Most of the woodland is a mixture of native broad-leaved trees, pines *Pinus* spp. and introduced exotics, of which Brisbane Box *Tristania conferta* is probably the most common. Hundreds of thousands of trees were planted throughout the latter half of the 19th and the first half of the 20th centuries. These were mainly pines but also included gums *Eucalyptus* spp., bamboos (Gramineae), autumn maple *Bischoffia javanica*, cassia bark tree *Cinnamomum cassia*, camphor tree *C. camphora*, portia tree *Thespesia populnea*, China fir *Cunninghamia lanceolata*, Brisbane box, cork oak *Quercus suber* and many others. Their descendants may well have contributed to the

present woodland flora. The western valleys along Cape d'Aguilar Road contain some of the most interesting plants (and animals) in Hong Kong, reminiscent of the richness of the tropical forest which must once have existed over much wider areas (Thrower, 1984).

Fauna Most of the larger mammals are found in the woodlands of Mt Collinson and Pottinger Peak of Shek O Country Park. There is evidence of the presence of pangolin *Manis pentadactyla*, civet (Viveridae), barking deer *Muntiacus reevesi*, large bandicoot rat *Bandicota indica nemorivaga*, native rats *Rattus* spp., mice *Mus* spp. and shrews *Crocidura* spp. In 1974-1975 44 species of birds were recorded, the majority of which were winter visitors and passage migrants. Shek O is the only country park on Hong Kong Island where shore-birds, such as reef egret *Egretta sacra*, black-headed gull *Larus ridibundus*, Kentish plover *Charadrius alexandrinus* and sandpipers may be seen. Snakes, lizards and frogs are seen occasionally (Thrower, 1984).

The fauna of the other parks on the island has not been investigated as fully as that of Shek O, but observations suggest that it does not differ greatly. Pok Fu Lam, with its wooded valley, contains barking deer, and the introduced belly-banded squirrel *Calliosciurus flavimanus* has become quite common, particularly in the northern parts of Aberdeen Country Park. Rhesus macaques, possibly the remnants of the original indigenous monkey populations, were reported in Tai Tam in 1963. Barking deer, small Indian civet *Viverricula malaccensis*, Chinese ferret-badger *Melogale moschata*, Chinese porcupine *Hystrix hodgsoni* and house shrew *Suncus murinus* were seen in the Tai Tam area in the 1960s and signs of pangolins are evident (Thrower, 1984).

Pok Fu Lam, Aberdeen and Tai Tam reservoirs contain a variety of fish, including common carp *Cyprinus carpio*, goldfish *Carassius auratus*, tilapia *Sarotherodon mossambicus* and minnow *Hemiculter leucisculus*. Reeves' terrapin *Chinemys reevesii*, three-banded box terrapin *Cuora trifasciata* and the very rare Chinese soft-shelled turtle *Amyda* sp. have all been seen near Tai Tam Reservoir (Thrower, 1984).

Cultural Heritage There are many relics of the fall of Hong Kong to the Japanese during World War II, particularly in Aberdeen and Tai Tam country parks.

Local Human Population Large numbers of villages or extensive areas of farmed land have never existed on Hong Kong Island. The only villages shown on early maps of the 1840s are Little Hong Kong, Pok Fu Lam, Tai Tam Tuk, Shek O, Hok Han Wan and Shau Kei Wan. Those on the Cape d'Aguilar Peninsular are the only ones which still retain much village character. The modern trend has been for farmers to abandon their land and move to urban areas. In times of economic stress, however, there is often a return to the land, as happened in 1975 when parts of Pottinger Peak were illegally cleared by squatters to farm pigs and cultivate vegetables (Thrower, 1984).

Visitors and Visitor Facilities Recreation facilities include barbecue and picnic sites, and shelters. There is a visitor information centre in the south of Aberdeen Country Park. Self-guided trails, with explanatory booklets and marked points of interest along the route, have been set up in Shek O and Aberdeen country parks. Licensed freshwater fishing is permitted in the reservoirs (Thrower, 1984).

Scientific Research and Facilities No information

Conservation Management Not only are the parks vitally important as water catchment areas, but they provide a readily accessible recreational facility for the densely crowded urban areas of the north shore and the growing population of Aberdeen and Pok Fu Lam. The island has been the subject of various reforestation efforts. In the late 19th and early 20th centuries, the then Botanical and Afforestation Department was responsible for planting hundreds of thousands of trees on catchment areas. Subsequently, following the Japanese occupation and concomitant devastation of the vegetation, the Forestry Section of the Department of Agriculture and Fisheries has been concerned with the problem of restoring the forests (Thrower, 1984).

Hong Kong

Management Problems Cutting of fuelwood and grass-burning for the benefit of cattle are particular problems in the Cape d'Aguilar Peninsular of Shek O Country Park.

Staff No information

Budget No information

Local Administration No information

References

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- ° Thrower, S.L. (1984). *Hong Kong Country Parks*. Government Printer, Hong Kong. 216 pp.

Date August 1987

Clear Water Bay Country Park

Management Category V (Protected Landscape)

Biogeographical Province 4.06.01 (South Chinese Rainforest)

Geographical Location Lies south-east of Kowloon on Clear Water Bay Peninsula. The country park is split into eastern and western sections which lie either side of the Clear Water Bay Road. The boundaries do not extend as far as the beaches. 22°16'-22°19'N, 114°17'-114°19'E.

Date and History of Establishment 28 September 1979

Area 615ha

Land Tenure Essentially public land

Altitude Ranges from about sea level to High Junk Peak (Tiu Yue Yong) at 344m.

Physical Features The hills of Clear Water Bay Peninsula slope sharply down to the sea and most of the coastline consists of almost vertical cliffs. The peninsula is predominantly volcanic in origin and is one of the few places in Hong Kong where old lava flows are clearly identifiable. The summit of High Junk Peak in the western sector comprises precipitous cliffs of jointed volcanic rock formed by an acidic lava. This was deposited over an earlier flow of banded lava which, in turn, lies over a bed of welded tuff formed from volcanic ash and pebbles. Subsequent earth movements tilted the layers so that the welded tuff is exposed only on the western coast. In contrast to the craggy summit of High Junk Peak, the hills to the south-west have smooth, rounded tops and represent one of the few occurrences of intrusive rock (microgranite) on the peninsula. The rocks of Tin Ha Shan, at the southern extremity of the western sector, are largely of the same welded tuff which underlies the laval flows further north, and are estimated to be some 200m thick. The narrow neck of land separating Tin Ha Shan from the rest of the western sector is only about 60m above sea level and comprises weathered sands and boulders washed down from the hills on each side (Thrower, 1984).

Climate Although Hong Kong lies just inside the tropics, the climate is temperate for nearly half the year. Mean annual rainfall ranges from around 1200mm to more than 3000mm, about 80% of which falls in summer. This is the longest season, lasting from May to September with hot, humid and usually wet weather. Temperatures range from about 24°C to 32°C. September is the month in which Hong Kong is most likely to be affected by tropical typhoons. These originate from near the Philippines and approach from a south-easterly direction. Winter, lasting from November until February, is cold and dry. Temperatures

commonly range from about 13°C to 24°C but sometimes drop below freezing point on high ground and in the New Territories (Thrower, 1984; Ismail, 1987). Meteorological data are not available for Clear Water Bay Peninsula.

Vegetation The upper hillslopes are grassy and the downward extension of the grassland is dictated by the amount of past burning. High Junk Peak and the hill range to the north of it are well-wooded only on the lower eastern slopes. The forest is basically mixed oak *Quercus* spp., dwarf mountain pine *Baeckea frutescens*, and Chinese red pine *Pinus massoniana*, but with planted *Acacia confusa* and other introduced trees, particularly along Clear Water Bay Road.

The dominant grass of the upper slopes is duck-beak grass *Ischaemum* sp. Of secondary importance, but obvious in summer, are the white button-like flower heads of *Hedyotis uncinella* and the yellow spikes of the sulphur orchid *Habenaria linguella*.

The combination of grazing and the villagers' practice of burning the slopes to provide palatable young shoots for the cattle have been effective in maintaining the vegetation as grassland. The hills in the eastern section of the park appear similar. Here, the summits are grassy except where boulders afford protection for scrub species. Downhill, grassland may be succeeded by dwarf mountain pine scrub, while only the most protected valleys have tall scrub intermingled with occasional trees. Other scrubland species include rose myrtle *Rhodomyrtus tomentosa* and Hong Kong hawthorn *Raphiolepis indica* (Thrower, 1984; Anon., n.d.).

Fauna Little is known about the animal life of the Clear Water Bay Peninsula, particularly the areas of woodland along the eastern boundary of the western section of the park. Birds, such as bulbuls *Pycnonotus* spp., crested mynahs *Acridotheres cristatellus* and shrikes *Lanius* spp., are relatively common and the large white-rumped swift *Apus pacificus* is numerous (Thrower, 1984). Chinese francolin *Francolinus pintadeanus*, black kite *Milvus migrans* and tree sparrow *Passer montanus* are occasional. Chinese bulbul *Pycnonotus sinensis*, greater coucal *Centropus sinensis*, great tit *Parus major* and white eye *Zosterops japonica* can also be seen but these inhabit the denser patches of bush in the stream beds (Anon., n.d.).

Insects are abundant and the large areas of grassland support an interesting variety of grasshoppers, beetles and those moths and butterflies whose larvae are grass-eaters. The taller shrub patches and the woodlands are rich in butterflies and it is not unusual to see several dozen species in a few hours (Thrower, 1984).

Cultural Heritage On the coast behind Tai Miu Wan is situated the oldest Tin Hau Temple in Hong Kong and above it, on the hillside, is a large engraved rock which is an important work of art dating back to AD 1274 during the reign of Hsien-hsun in the southern Sung period. On a nearby island is Tung Lung Fort designated as a Special Area of Historic Interest.

Local Human Population No information

Visitors and Visitor Facilities The peninsula is very popular, major activities being swimming and hiking. There are regular bus and ferry services to the park and boats can be hired to visit the offshore islands. Visitor facilities include trails, and barbecue and picnic sites. There is an information centre at the park management centre.

Scientific Research and Facilities No information

Conservation Management Carried out in accordance with an approved park plan.

Management Problems Fire is a hazard. Visitor use is excessive in some areas, such as the most southerly hill near Clear Water Bay car park. Here, erosion is evident and the grassland consists of wasteland species such as wild oat *Chrysopogon aciculatus*, carpet grass *Axonopus compressus* and elephant's foot *Elephantopus scaber*. The coastal margins of Clear Water Bay Peninsula are in a state of rapid development. The north-western coast is destined to be an industrial area while, on the eastern coast, low-density housing development has been permitted in specified zones. The southern peninsula of Po Toi O is destined to become a

Hong Kong

country club complete with golf course and marina. Although these areas of development are all outside the country park boundary, they have an effect on the view. The country park forms a spectacular scenic background for the housing sites but the reverse is far from true (Thrower, 1984).

Staff Some 20 staff are engaged in protection and management duties.

Budget No information

Local Administration No information

References

- ° Anon. (n.d.). *Clear Water Bay Country Park and Tung Lung Fort Special Area*. Government Information Services, Hong Kong. Information leaflet.
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- ° Thrower, S.L. (1984). *Hong Kong Country Parks*. Government Printer, Hong Kong. 216 pp.

Date August 1987

Kam Shan Country Park

Management Category V (Protected Landscape)

Biogeographical Province 4.06.01. (South Chinese Rainforest)

Geographical Location Lies north-west of Kowloon. The park is bounded by Tai Po Road in the south-east. 22°21'-22°23'N, 114°08'-114°10'E.

Date and History of Establishment 24 June 1977

Area 337ha. Borders on Lion Rock Country Park (557ha) in the south-east, but not quite contiguous with Shing Mun Country Park (1,400ha) in the north.

Land Tenure Essentially public land

Altitude 300-420m

Physical Features Kam Shan consists of gently rolling hills, highest in the north-west and gradually sloping to the south-east. There are four reservoirs in the south of the park, more than in any other country park. These are: Kowloon (with a capacity of 1.58 million cu.m), Kowloon Byewash (0.85 million cu.m), Shek Lei Pui (0.53 million cu.m), and Reception (0.15 million cu.m). They form part of a single supply system connected by open channels and a tunnel to Kowloon (Thrower, 1984).

Underlying rocks are all part of an intrusive granite mass and correspond to three phases of intrusion. Sung Kong granite, the oldest, was followed by Cheung Chau granite (both within the period 163-35 million years b.p.), while Needle Hill granite was pushed up some 25 million years later. The grey, coarse-grained Sung Kong granite can be seen in the south of the park, in the vicinity of Tai Po Road and nearby reservoirs of Kowloon and Byewash. To the west and north of Byewash and covering the rest of the southern part of the park is Needle Hill granite, fine-grained with quartz, pink feldspar and black biotite. The northern part of the park is mostly of Cheung Chau granite with one area of Needle Hill granite along the western boundary. Cheung Chau granite is often cut by veins of white quartz and other minerals. The summits of Kam Shan and Ma Tsz Keng are formed of Needle Hill granite which, being fine-grained, is more resistant to weathering than coarse-grained rocks (Thrower, 1984).

Climate Mean annual rainfall is 2000-2200mm, being slightly lower in the western half than in the eastern (Thrower, 1984).

Vegetation With the exception of parts of Ma Tsz Keng, the park is covered with woodland, mainly mixed pine *Pinus* spp.-Brisbane box *Tristania conferta* but also stands of pine and native broad-leaved forest in some areas. Much of this woodland, including some of its native trees, is the result of afforestation begun in 1947. The tree canopy is mostly open, with a diverse and interesting scrub understory. In some areas this consists of native broad-leaved shrubs such as rose myrtle *Rhodomyrtus tomentosa*, *Acronychia pedunculata*, *Melastoma* spp., and downy holly *Ilex pubescens*. Where the soil is wetter and occasionally water-logged a sedge understory develops, dominated by Chinese scaly seed *Lepidosperma chinense*. Elsewhere there are patches of woodland with bamboo understory, consisting of either Chinese cane *Arundinaria sinica*, Hind's cane *A. hindsii* or white-shoot bamboo *Phyllostachys nidularia* (Thrower, 1984).

Fauna Kam Shan is the best country park in which to see mammals. Rhesus *Macaca mulatta* and long-tailed *M. fascicularis* (introduced in 1920) macaques are numerous and squirrels *Callosciurus flavimanus* can be seen around Shek Lei Pui Reservoir. Birds commonly seen include yellow-browed warbler, black kite, laughing thrushes, bulbuls, magpie, spotted dove, sparrow, crested mynah and whistling thrush (*Phylloscopus inornatus*, *Milvus migrans*, *Garrulax* spp., *Pycnonotus* spp., *Pica pica*, *Streptopelia chinensis*, *Passer montanus*, *Acridotheres cristatellus* and *Myiophonus caeruleus*). The reservoirs and streams support small populations of fish and the occasional small terrapin. The fish are mostly minnows *Hemiculter leucisculus*, common carp *Cyprinus carpio*, goldfish *Carassius auratus* and tilapia *Sarotherodon mossambicus*. The covered galleries of the termite *Odontotermes formosanus* often adorn the trunks of Brisbane box trees (Thrower, 1984).

Cultural Heritage There are a few old remnants of Gin Drinker's Line, a line of defensive positions built during World War II. A second line of defense was established on Kam Shan, behind the Shing Mun Redoubt, and this fell to the Japanese on 11 December 1941 (Thrower, 1984).

Local Human Population No information

Visitors and Visitor Facilities Kam Shan is one of the most popular and well-used of the country parks, due to its scenery of woodlands and water, central location and easy access. It receives many thousands of visitors each year. There is an extensive network of colour-coded footpaths, totalling 17km. Part of the MacLehose Trail runs through the centre of the park. Picnic and barbecue sites, and shelters are available. Licensed fishing is permitted on the reservoirs (Anon., n.d.; Thrower, 1984).

Scientific Research and Facilities No information

Conservation Management The whole of the park is important as a catchment area for its four reservoirs. Reafforestation has followed a deliberate policy but the introduction of large mammals (monkeys and squirrels) has largely been unplanned (Thrower, 1984). Management is carried out in accordance with the approved park plan.

Management Problems Many hectares of woodland are lost to fire each year, largely as a result of carelessness by visitors. Litter and erosion of footpaths are a constant problem (Thrower, 1984).

Staff Some 50 staff are engaged in protection and management duties.

Budget No information

Local Administration No information

Hong Kong

References

- ° Anon. (n.d.). *Kam Shan Country Park*. Government Printer, Hong Kong. Information leaflet.
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Date August 1987

Kiu Tsui Country Park

Management Category V (Protected Landscape)

Biogeographical Province 4.06.01 (South Chinese Rainforest)

Geographical Location Comprises eight islands, the largest of which is Kiu Tsui Chau (Sharp Island), that lie just south-east of Sai Kung in the New Territories. The others are Kiu Tau, Pak Sha Chau, Cham Tau Chau, Ham Luen Lok, Tuen Tau Chau and two small islands without names. All of Kiu Tsui Chau has been designated as a country park except for the southernmost peninsular and the coastline on the north-west. 22°21'-22°23'N, 114°17'-114°18'E

Date and History of Establishment 1 June 1979

Area 100ha

Land Tenure Essentially public land

Altitude Ranges from sea level to 136m.

Physical Features Port Shelter (Ngau Mei Hoi) is a submerged valley while Kiu Tsui Chau and the surrounding islets are the tops of hills which rise above the invading sea. Most of the coastline is rocky but there are four beaches in the middle region. For such a small area it has a remarkable and interesting variety of rocks, and even the islets differ considerably from one another. The oldest rocks are volcanic, and cover most of the area. They are largely banded acid lava deposits, as on Kiu Tsui Chau, and rhyolite. In many places the rocks have been twisted by later earth movements and contain almond-shaped cavities filled with quartz, chlorite or other minerals. The whole of the eastern coastline is formed of this volcanic rock. The northern coastal area consists of sedimentary layers, probably deposited by rivers with the intermittent addition of volcanic ash. The hard volcanic rocks form the high ridge running north-south behind Kiu Tsui village. Due to a difference in rock composition, the southernmost slopes of the ridge are the steepest. Here, the volcanic deposits meet another, more erodable rock of the intruded granite group (quartz monzonite), which extends in a narrow band (less than 500m wide) about halfway across the island. Quartz monzonite also outcrops on the north coast and forms the little unnamed islet opposite the coast at this point.

The rocks of the eastern coastline of Kiu Tsui Chau are formed from volcanic lavas but those of the western coast are of more varied origin. Lava deposits are found only in a small section in the north and around Hap Mun Bay in the south. Between these is the quartz monzonite around Kiu Tsui Village, flanked on both sides by rock composed of fine volcanic ash and forming a strip some 100m wide along the coast (Thrower, 1984).

Climate Although Hong Kong lies just inside the tropics, the climate is temperate for nearly half the year. Mean annual rainfall ranges from around 1200mm to more than 3000mm, about 80% of which falls in summer. This is the longest season, lasting from May to September with hot, humid and usually wet weather. Temperatures range from about 24°C to 32°C. September is the month in which Hong Kong is most likely to be affected by tropical typhoons. These originate from near the Philippines and approach from a south-easterly direction. Winter, lasting from November until February, is cold and dry. Temperatures

commonly range from about 13°C to 24°C but sometimes drop below freezing point on high ground and in the New Territories (Thrower, 1984; Ismail, 1987). Meteorological data are not available for Kiu Tsui Chau.

Vegetation The height and density of the vegetation covering Kiu Tsui Chau is indicative of many years of freedom from fire. The central highlands and the northern part of the island are covered with open pine *Pinus massoniana* woodland, which has a dense undergrowth of shrubs and lianas. No young pine trees or seedlings are growing up through the dense shrub layer, so broad-leaved trees may succeed the pines as they die. Young saplings of ivy tree *Schefflera octophylla*, figs *Ficus* spp. and other broad-leaved trees in the shrub layer give some indication of the structure of the future woodland if time and protection from fire allows succession to proceed. The shrub layer is diverse: in early summer the fragrant flowers of cape jasmine *Gardenia jasminoides* and the conspicuous white sepals of splash-of-white *Mussaenda pubescens* are common and many rarer flowers, such as *Uvaria microcarpa*, are found among the dense lianas. The closed canopy of the shrub layer cuts out most of the light at ground level. Hence, there is much bare soil and only those plants which can tolerate deep shade, such as lily turf *Liriope spicata* and hilo holly *Ardisia crenata*, can survive.

The western hillslopes have a denser covering of vegetation, probably as a result of protection from the predominantly easterly monsoon and typhoon winds, and the slight rainfall gradient from east to west. Pines on the western slopes form an almost closed canopy in many places while on the eastern slopes they are much more scattered. Where trees are sparse, the scrubland contains a high percentage of rose myrtle *Rhodomyrtus tomentosa* and dwarf mountain pine *Baeckea frutescens*.

The coastal margins have a narrow but very well-developed band of beach naupaka *Scaevola sericea*, Cuban bast *Hibiscus tiliaceus* and screw pine *Pandanus tectorius*. The herbs on sandy and boulder beaches are mainly beach grass *Zoysia sinica* or seashore dropseed *Sporobolus virginicus*, with occasional patches of beach morning glory *Ipomoea brasiliensis*, beach wedelia *Wedelia prostrata* and the rare Hainan naupaka *Scaevola hainanensis*. Around the stream mouths on the east coast is mangrove forest, with many-petaled mangrove *Bruguiera conjugata*, water pen *Kandelia kandel*, tung-flower mangrove *Aegiceras corniculatum*, and the mangrove associates such as false jasmine *Clerodendrum inerme* and milky mangrove *Excoecaria agallocha* (Thrower, 1984).

Fauna Woodland birds are numerous. In summer there are coucals *Centropus sinensis*, long-tailed tailor birds *Orthotomus sutorius*, crested *Pycnonotus jocosus* and Chinese bulbuls *P. sinensis*, black-faced laughing thrushes *Garrulax perspicillatus*, spotted doves *Streptopelia chinensis* and many more species. Along the beaches white-breasted kingfishers *Halcyon smyrnensis*, grey-rumped *Heteroscelus brevipes* and common sandpipers *Actitis hypoleucos* have been noted (Thrower, 1984).

Butterflies and moths are common, particularly where they are attracted to the flowers of the *Lantana camara*, which grows near beaches and around developed areas (Thrower, 1984).

Rocky shores, sandy shores and mangroves provide a good variety of coastal habitats, and the drift along the beaches on the eastern side yields an interesting harvest of shells, sea urchins and other marine plants and animals (Thrower, 1984). **CULTURAL HERITAGE** The presence of an old lime kiln, thought to be of a later type than the Tang kilns, is indicative of an earlier lime industry based on coral and shells (Thrower, 1984).

Cultural Heritage The presence of an old lime kiln, thought to be of a later type than the Tang kilns, is indicative of an earlier lime industry based on coral and shells (Thrower, 1984).

Local Human Population The villages in the west and south of Kiu Tsui Chau are excluded from the country park (Thrower, 1984).

Visitors and Visitor Facilities The beaches on Kiu Tsui Chau and Pak Sha Chau are accessible by kai-do from Sai Kung. Kiu Tsui Chau receives many visitors (Thrower, 1984).

Hong Kong

Scientific Research and Facilities No information

Conservation Management The vegetation on Kiu Tsui Chau provides a fine example of island flora with its well-developed coastal fringe plants and pine woodlands. With adequate protection from fire or cutting, the pine woodlands should be succeeded by broad-leaved woodland (Thrower, 1984).

Management Problems Litter, left by villagers and holiday visitors, is present almost everywhere. Around the coastline, particularly on the east coast, rubbish is deposited both by tides and by people using the area as a convenient dump.

Staff No information

Budget No information

Local Administration No information

References

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Date August 1987

Lam Tsuen Country Park

Management Category V (Protected Landscape)

Biogeographical Province 4.06.01

Geographical Location Lies north of Shek Kong in the centre of the New Territories. The park comprises two discrete units, namely Kai Keung Leng to the west and Tai To Yan to the east. These two hills rise up out of the Pat Heung and Lam Tsuen valleys, and are separated from each other by the Tsui Keng Valley, through which runs the Lam Kam Road. 22°26'-22°29'N, 114°03'-114°08'E

Date and History of Establishment 23 February 1979

Area 1,520ha

Land Tenure Mainly public land, ? with pockets of land on lease to local villagers

Altitude The highest peaks in the park are Kai Keung Leng at 572m and Tai To Yan at 565m.

Physical Features The two mountains of the park rise as volcanic ridges from the surrounding plains, which have been formed from material eroded from the hillslopes. The ridges have been formed by almost parallel north-east to south-west oriented folds and shaped by streams, depositing a ring of colluvium around their bases, particularly in the north-west.

Both mountains are composed of consolidated fragments of volcanic origin. Pak Tai To Yan consists almost entirely of fine tuff, a creamy-grey, fine-grained rock containing up to one-third of quartz crystals. Since it weathers very easily, outcrops and boulders are a common feature and the pitted marks of weathering are clearly seen on their surfaces. Running parallel to the fine tuff ridge of Kai Keung Leng is a band of coarse tuff about half a kilometre wide. This northern coarse tuff rock is almost black in colour and contains crystals of biotite, feldspar and quartz.

The only exposure of intrusive rock is found on the southern base of Tai To Yan, where an outcrop of Tai Po granodiorite extends from the Lam Kam Road to the 600m contour. This rock is dark grey and coarse-grained, often with islands of fine-grained rock. It weathers to form a deep rust-red clay (Thrower, 1984).

Climate Annual rainfall in the park increases steadily from 1800-2000mm on the north-west slopes of Kai Keung Leng to 2600mm on the south-east slopes of Tai To Yan. The moisture-laden south-east winds of summer drop their rain on the eastern slopes, the north-west slopes being in a partial rain shadow. This gradient of rainfall, along with aspect and exposure, accounts for much of the difference in vegetation of the two hills and the better growth on Tai To Yan (Thrower, 1984).

Vegetation The vegetation is influenced by the frequency of fires, few years passing without some hillslopes being burnt. Thus, both Kai Keung Leng and Tai To Yan are covered by extensive areas of grassland - the former almost entirely.

On Tai To Yan, streams have cut deep ravines, which provide a refuge for plants (and animals) from damage by fires. Strips and patches of ravine woodland remain on both the south-eastern and north-western faces. Some of these contain very interesting and rare plants, particularly ferns.

The grassland which covers the ridges and exposed slopes is of the common duck-beak *Ischaemum* spp. and minireed *Arundinaria nepalensis* type. The deep valleys contain broad-leaved tree species, which grade into pine woodland on the lower slopes.

Fauna Little is known about the sparse fauna of the park. The common grassland associates inhabit the larger part of the area but even they represent a depauperate fauna, as their populations are periodically depleted by fire. Only after regrowth of their food supply and recolonisation from outside burnt areas are populations re-established. As the Lam Tsuen Valley is noted for the rich bird life of its *fung shui* woods, it is likely that the ravine woodlands also shelter interesting birds. Butterflies such as common grass yellows *Eurema hecabe*, grass blues *Zizeeria* spp. and skippers (Hesperiidae) can usually be seen. Visitors, such as the common white *Artogeia canidia* and small white *A. rapae*, which breed on the vegetable crops of the valley, are common at lower altitudes.

Cultural Heritage Several large banyan trees are locally important as shrines. The Lunar New Year is the time when "lucky" papers are thrown into their branches to mellow in the sun and rain during subsequent months (Anon., n.d.).

Local Human Population No information

Visitors and Visitor Facilities Lam Tsuen is probably the least visited of all country parks, attracting mainly energetic walkers. Facilities include picnic places and barbecue sites close to public transport, shelters, a youth hostel, and management and information centres, all of which are located outside the park (Thrower, 1984).

Scientific Research and Facilities No information

Conservation Management Some wooded ravines have been designated as Sites of Special Scientific Interest on account of their rare flora.

Management Problems The two halves of Lam Tsuen Country Park are isolated highlands surrounded by wide, fertile valleys. Within the park boundaries, the major problems are burning, which maintains the vegetation as grassland, and erosion of footpaths (Thrower, 1984).

Staff No information

Budget No information

Local Administration No information

References

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- ° Thrower, S.L. (1984). *Hong Kong Country Parks*. Government Printer, Hong Kong. 216 pp.

Date August 1987

Lantau North Country Park and Lantau South Country Park

Management Category V (Protected Landscape)

Biogeographical Province 4.06.01 (South Chinese Rainforest)

Geographical Location Situated on Lantau Island which lies east of Hong Kong Island. Lantau North and South are contiguous with each other. 22°12'-22°17'N, 113°50'-113°59'E

Date and History of Establishment Lantau North was designated a country park on 18 August 1978 and Lantau South on 20 April 1978.

Area Lantau North is 2,220ha and Lantau South 5,640ha.

Land Tenure Essentially public land

Altitude Ranges from sea level to 934m (Lantau Peak).

Physical Features Lantau, with an area of about 14,400ha, is the largest of the Hong Kong islands and is almost completely rural. The mountains of Lantau have been formed by folding, major fold-lines producing the north-east to south-west orientated ridges. The cross-fold at Ngong Ping forms a ridge at right angles to the main line. In the central area, the variety of different volcanic rocks is indicative of a long and complex history of volcanic eruptions. In some places, thick lava flows have produced dark grey or greenish, banded, fine-grained rock with large crystals of white feldspar, smaller crystals of iron-stained quartz and black biotite. Outcrops of lava deposits occur at Ngong Ping and in the hills east and south of Keung Shan. Coarse and fine tuff (solid rock transformed from volcanic ash) cover the rest of central Lantau, in some places sandwiched between sedimentary rocks. Bands of breccia (rock fragments set in a fine-grained matrix) form cliffs or scarps on the north side of Lantau Peak (Fung Wong Shan), the south face of Sunset Peak (Tai Tung Shan) and on the hillslopes to the north of Shek Pik Reservoir. There have been a series of igneous intrusions into the overlying volcanic rocks, the oldest, Tai Po granodiorite, being exposed at Cheung Sha. Of almost equal age is the coarse-grained pink or grey Sung Kong granite exposed at Fan Lau, Lo Kei Wan and Shap Long. More recent is the Cheung Chau granite, medium-grained and light-grey to pink in colour, which comprises the whole of Chi Ma Wan Peninsula in the south-east. Lo Kei Wan Peninsula is formed of the younger quartz monzonite, a fine to medium-grained grey rock with crystals of pink and white feldspar.

Climate Although Hong Kong lies just inside the tropics, the climate is temperate for nearly half the year. Mean annual rainfall ranges from around 1200mm to more than 3000mm, about 80% of which falls in summer. This is the longest season, lasting from May to September with hot, humid and usually wet weather. Temperatures range from about 24°C to 32°C. September is the month in which Hong Kong is most likely to be affected by tropical typhoons. These originate from near the Philippines and approach from a south-easterly direction. Winter, lasting from November until February, is cold and dry. Temperatures commonly range from about 13°C to 24°C but sometimes drop below freezing point on high ground (Thrower, 1984; Ismail, 1987). Meteorological data are not available for Lantau Island.

Vegetation Much of Lantau Island consists of bare grassy hills and roadside plantations of *Acacia confusa*. The grasslands, maintained by burning, are dominated by duck-beak grass *Ischaemum* sp. with an undergrowth of small herbs and shrubs. The valleys contain a rich flora of trees, shrubs, bamboos and lianas, providing a refuge for many rare species which have disappeared from the frequently-burned hillslopes. Other rare and beautiful plants, such as cut-leaved begonia *Begonia laciniata* and Chinese wickstroemia *Wickstroemia chinensis*, grow on the summits of the ridges among rocks and boulders. The forested ravines on the northern slopes of Lantau and Sunset peaks are noted for their relic woodland floras which include *Amentotaxus argotaenia*, Malayan aspen *Exbucklandia populnea*, star anise *Illicium* sp. and members of the family Magnoliaceae. Most of the uncultivated valleys and lower hillslopes support a mixture of planted introduced trees and natives. Plantations around Shek Pik Reservoir and nearby hillsides comprise Brisbane box *Tristania conferta* and slash pine *Pinus elliottii*. On Chi Ma Wan Peninsula, southern slopes have an unusual woodland of horsetail tree *Casuarina equisetifolia* mixed with native pines. South of Keung Shan is Ng Yuen Garden, a Chinese-style garden developed and planted with ornamental trees by the late Mr Woo Quen-sung.

The coastal flora is typical, with beach naupaka *Scaevola sericea*, Cuban bast *Hibiscus tiliaceus* and portia tree *Thespesia populnea* behind the shore and mangroves near creek inlets. The century plant *Agave angustifolia*, an exotic of obscure origin with many local uses, is conspicuous along the coastal belt (Thrower, 1984).

Fauna The lack of extensive tracts of broad-leaved forest on Lantau Island suggests that faunal inhabitants of open pine woods, scrub and grassland will be most common. Also, the marine fauna is an important constituent, judging by the large variety of seashells and crabs found on the beaches and inlets. Of the birds, Chinese pipit *Anthus novaeseelandiae* and francolin *Francolinus pintadeanus* are common on the upper grassy slopes, and crested mynah *Acridotheres cristatellus* and black drongo *Dicrurus macrocerus* in the lowlands.

Among amphibians and reptiles, the Chinese big-headed terrapin *Platysternon m. megacephalum* and three-banded box terrapin *Cuora trifasciata* occur in mountain streams, and snakes in lowland streams. Rat snakes *Ptyas* spp., including the Indo-Chinese rat snake *P. korros*, have been seen in Keung Shan Valley.

Freshwater fish include carp (Cyprinidae) in the pools at Ng Yuen Gardens. The reservoir at Shek Pik would be expected to contain minnow *Hemiculter leucisculus* and common carp *Cyprinus carpio*, and possibly tilapia *Sarotherodon mossambicus*, snakehead *Ophiocephalus maculatus*, catfish *Clarius fuscus*, goby *Glossogobius giuris* and soft-finned carp *Osteochilus vittatus*.

Of the insects, butterflies are prominent, particularly in the south. Species commonly seen include swallow-tails (red Helen *Papilio helenus*), Paris peacock, common mormon, great mormon (*P. paris*, *P. polytes*, *P. memnon*), tigers (dark-veined *Danaus genutia* and blue *D. limniace*), mottled migrant, common mimes, great orange tip, six-rings, angled castor, skippers (Hesperiidae), common grass yellow and grass blues (*Catopsilia pyranthe*, *Chilasa clytia*, *Hebomoia glaucippe*, *Ypthima* spp., *Ariadne ariadne*, *Eurema hecabe* and *Zizeeria* spp.) (Thrower, 1984).

Cultural Heritage Lantau Island has a long history of human activity dating back to 4,000 BC, when coastal areas were inhabited by a group of middle-Neolithic tribes called Yueh. They made stone tools and pottery. Although primarily fisherfolk, they began to adopt an agricultural way of life. With subsequent influence from northerners during the late-Neolithic and Bronze ages (c. 2,400-400 BC) emerged a distinctive people and dialect that later became recognised as Cantonese.

Lime production, from shells and coral, became an important local industry during the period 300-900 AD. At the tip of Fan Lau Peninsula, in the south-west of the island, are the ruins of a fort apparently built in the Ming Dynasty some time before 1573. This, together with the fortification at Tung Chung on the north coast, was of strategic importance in relation to guarding Pearl River Estuary and the shipping lanes to Canton. In the 18th and 19th centuries, Lantau was constantly infested with pirates and opium smugglers (Thrower, 1984).

Local Human Population All of the island's 47 villages are excluded from the country parks.

Visitors and Visitor Facilities Lantau is popular on account of its peaceful rural atmosphere. Activities include walking, swimming, camping and fishing. It is accessible by ferry and there are bus services on the island. Picnic and barbecue sites cater for day-trippers. There are camp sites at Kau Ling Chung, Tai Long Wan, Lo Kei Wan, Nam Shan and Shap Long, and more are being planned. Accommodation is available at Ngong Ping and Mong Tung Wan youth hostels, some monasteries and coastal cottages, and a hotel in Pui O.

Scientific Research and Facilities No information

Conservation Management The relic woodlands on the northern slopes of Lantau and Sunset peaks have been designated as both Special Areas and Sites of Special Scientific Interest. Ng Yuen Garden is another designated SSSI. Management staff are responsible for providing, supervising and maintaining recreational facilities, litter collection, and the planting of trees and shrubs and their protection from fires (Anon., n.d.; Thrower, 1984).

A group of the Yi Long kilns were restored by the Country Parks Authority in 1979. Fan Lau Fort is under the care of the Antiquities and Monuments Office of the Urban Services Department, which intends to restore it and open it to the public (Thrower, 1984).

Management Problems Over the centuries, the vegetation has been cut for fuelling lime kilns and to meet local requirements for cooking and heating. In addition, until early this century, outsiders used to harvest the wood for charcoal, which was locally exported in junks. More recent impacts include the construction of Shek Pik Reservoir, which supplies water to Hong Kong Island, and extensions to the road system. Although there are no cities or large towns on the island, housing development has begun (Thrower, 1984). Fire and litter are a constant problem.

Staff The management staff, comprising operational teams and park rangers, total over 150 government personnel.

Budget No information

Local Administration No information

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Date August 1987

Lion Rock Country Park

Management Category V (Protected Landscape)

Biogeographical Province 4.06.01 (South Chinese Rainforest)

Geographical Location Situated astride the high rocky ridge between North Kowloon and Sha Tin. The Tai Po Road forms the western border of the park. 22°21'-22°22'N, 114°09'-114°12'E.

Date and History of Establishment 24 June 1977

Area 577ha. The park borders on Kam Shan Country Park (337ha) to the west and Ma On Shan Country Park (2,880ha) to the east.

Land Tenure Essentially public land

Altitude Lion Rock (Sz Tsz Shan) at 494m is the highest point in the park.

Physical Features The park is underlain entirely by granite and displays the prominent characteristics of this rock type: deep weathering, boulder-strewn hillsides, tors, massive landslips and ready erosion. The valley floors are filled with colluvium: the product of weathering and erosion of the hillslopes. There are three different types of granite each making up large areas of the park: coarse-grained grey Sung Kong granite; medium-grained pink Cheung Chau granite; and fine-grained pinkish-mauve Ma On Shan granite. The highest areas of Lion Rock and Beacon Hill are both associated with outcrops of the Ma On Shan granite, Lion Rock being surrounded by Sung Kong and Beacon Hill by Cheung Chau granite.

Climate Although Hong Kong lies just inside the tropics, the climate is temperate for nearly half the year. Mean annual rainfall ranges from around 1200mm to more than 3000mm, about 80% of which falls in summer. This is the longest season, lasting from May to September with hot, humid and usually wet weather. Temperatures range from about 24°C to 32°C. September is the month in which Hong Kong is most likely to be affected by tropical typhoons. These originate from near the Philippines and approach from a south-easterly direction. Winter, lasting from November until February, is cold and dry. Temperatures commonly range from about 13°C to 24°C but sometimes drop below freezing point on high ground and in the New Territories (Thrower, 1984; Ismail, 1987). Meteorological data are not available for Lion Rock Country Park.

Vegetation Some 348ha of the park are forest plantations. The upper south-facing slopes of Lion Rock and Beacon Hill are covered with grassland, held in succession by fires. Duck-beak grass *Ischaemum* spp. and mireed *Arundinaria nepalensis* dominate the slopes, with shrubs, pine *Pinus massoniana* and *Acacia confusa* in refuge sites. Lower down, planted groves of pine struggle against the poor rocky soil and frequent hill fires. Most of the north-facing slopes are well-wooded, with a mixture of broad-leaved trees, pine and acacia. Many of the slopes in the lee of Lion Rock are covered with tall *Gordonia axillaris* scrub. The forest on the Kowloon Hills, which form the north-western boundary of the park, is of a mixed oak-laurel composition with plantations of introduced gum *Eucalyptus* spp. and other myrtaceous trees. The wide range of native broad-leaved trees, climbers and shrubs makes this one of the most interesting accessible woodlands in Hong Kong (Thrower, 1984).

Fauna Little is known of the animals in the area, but the woodlands contain the common species of birds and insects expected in such habitat. Rhesus *Macaca mulatta* and long-tailed *M. fascicularis* macaques live in the woodlands on the western side of the park. Although in the 19th century the rhesus macaque was one of the native animals of Hong Kong, it became locally extinct and the present population is a re-introduction; the long-tailed macaque is native to South-east Asia but has also been introduced locally. Evidence from scats indicates that civets (Viveridae) are present. The summit of the low, pine-clad hill in the west of the park (Eagle's Nest) is a nesting site for both black kite *Milvus migrans* and crows *Corvus* spp. (Thrower, 1984).

Cultural Heritage Old stone pathways, built in the reign of Cheng Lung (1736-1796 AD) linked Kowloon to Sha Tin via Sha Tin Pass. Over a century ago, Sha Tin, on the eastern edge of the park, was famed for the quality of its incense from the heung tree *Aquilaria sinensis* grown on nearby hillsides. The remains of charcoal kilns indicate that the forests were cut down for charcoal production. Relics of the Gin Drinker's Line, a string of fortifications built in 1937 in anticipation of a Japanese attack, are present (Thrower, 1984).

Local Human Population No information

Visitors and Visitor Facilities The Lion Rock area has long been a favourite area for picnickers and hikers because of its scenic spots such as Lion Rock, Beacon Hill and the legendary Mong Fu Shek (Amah Rock). There is no road access within the park. Part of the MacLehose Trail runs east-west through the middle of the park. There is a nature trail around Eagle's Nest in the south-west, and a fitness trail along the north-western boundary. Picnic facilities are available but barbecue sites are limited because of the very serious risk of fires (Anon., n.d.; Thrower, 1984).

Scientific Research and Facilities No information

Conservation Management Part of the western area of the park has been set aside as a conservation area. In particular, the northern faces of Beacon Hill have been designated as a Site of Special Scientific Interest on account of the fine stands of mountain forest. In addition, much of the mountainous and rocky terrain has been zoned as a wilderness area. The old stone footpath, now leading from Wang Tau Hom over Sha Tin Pass, has been restored by the Agriculture and Fisheries Department. A park management centre has been established in the south-west corner of the park (Anon., n.d.; Thrower, 1984).

Management Problems Fires are a constant problem.

Staff Over 50 staff are engaged in the protection and management of the park.

Budget No information

Local Administration No information

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- ° Ismail, A. (1987). *Hong Kong 1987*. Government Printer, Hong Kong. 364 pp.
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Date August 1987

Ma On Shan Country Park

Management Category V (Protected Landscape)

Biogeographical Province 4.06.01 (South Chinese Rainforest)

Geographical Location Centrally situated in the neck of the Sai Kung Peninsular in the eastern New Territories. The park stretches from Kowloon Peak in the south along the range of Buffalo Hills and embraces Ma On Sha. The Hebe Haven Peninsular is an outlier of the park. 22°20'-22°25'N, 114°12'-114°17'E.

Date and History of Establishment 27 April 1979

Area 2,880ha. Lies adjacent to Sai Kung West Country Park (3,000ha) in the east and Lion Rock Country Park (557ha) in the west.

Land Tenure Essentially public land

Altitude Ranges from sea level to the peak of Ma On Shan at 702m.

Physical Features The high backbone of mountains running from Ngau Ngak Shan (The Hunch Back) south to Fei Ngo Shan (Kowloon Peak) and Shui Chuen O (Sugarloaf Peak) dominates the landscape. Most of the higher peaks are composed of hard volcanic rock, some originating as thick lava flow, some as tuff and the rest as a series of layers of old lava sandwiched between sedimentary rock. In the west of the park, overlying volcanic rocks have been eroded to expose the underlying granite, as in the case of Shui Chuen O, Ngau Au Shan (Stoker's Peak), Tsim Mei Fung (Heather Hill) and Nui Po Shan (Turret Hill), all of which are below 400m. The Ma On Shan iron deposit, which is excised from the park lies in the metamorphic zone at the junction of granite and volcanic rocks (Thrower, 1984).

Climate Although Hong Kong lies just inside the tropics, the climate is temperate for nearly half the year. Mean annual rainfall ranges from around 1200mm to more than 3000mm, about 80% of which falls in summer. This is the longest season, lasting from May to September with hot, humid and usually wet weather. Temperatures range from about 24°C to 32°C. September is the month in which Hong Kong is most likely to be affected by tropical typhoons. These originate from near the Philippines and approach from a south-easterly direction. Winter, lasting from November until February, is cold and dry. Temperatures commonly range from about 13°C to 24°C but sometimes drop below freezing point on high ground and in the New Territories (Thrower, 1984; Ismail, 1987). Meteorological data are not available for Ma On Shan Country Park.

Vegetation At least 75% of the park is grassland or low scrub, maintained by pine and largely dominated by duck-beak grass *Ischaemum* sp. and minireed *Arundinaria nepalensis*. In the upper valleys, where there is more moisture and protection than on the hilltops, winter *Miscanthus sinensis* and summer *M. floridulus* sword grass are dominant, grading into broad-leaved scrub lower down and on most sheltered areas. Although once forested, the shallow soil, exposure to prevailing winds and steep topography limit plant succession to low shrubs on the southern slopes. By contrast, tall scrub or woodland may develop on northern slopes where conditions are less severe. For example, native broad-leaved woodland covers the northern slopes of Ma On Shan and the Hunch Backs, among the most botanically interesting areas in the park on account of the diversity of trees (Thrower, 1984).

Fauna Wild boar *Sus scrofa*, barking deer *Muntiacus reevesi* and macaques *Macaca* spp. occurred in the area during the late 19th century but are no longer present. Disconcerting is the presence of feral goats in small groups, thought to have descended from animals which escaped from village herds. Native rats, notably Sladen's rat *Ratta koratensis* and chestnut spiny-haired rat *R. bukit huang*, are common in scrub (Thrower, 1984). Lay (1980) recorded 31 species of birds in the park, two thirds of which are residents. This list is very incomplete.

Of the invertebrates, grasshoppers, moths and butterflies are plentiful. The grass yellow *Eurema hecabe* and grass blues *Zizeeria* spp. are common. Butterflies such as Paris peacock *Papilio paris*, small leopard *Phalanta phalantha*, plum Judy *Abisara echerius* and dark brown bush brown *Mycalesis mineus* are quite common in the "fung shui" or holy groves (Thrower, 1984).

Cultural Heritage Hakka-speaking people settled in the upland valleys and plateaux because the more fertile lowlands of the New Territories were settled by the Cantonese. They formed small patrilineal villages and cultivated the land, growing rice, tea, indigo, peanuts and vegetables on terraces. These are now abandoned but remain a distinctive feature of the landscape. Stone vats used for extracting the dye from indigo are still in evidence, as are some of the old stone village paths, built by the Hakkas. In the 19th century the villages produced cloth from hemp *Boehmeria nivea*, native to both Hong Kong and South China. Indigo was grown until the end of World War I but hemp production ceased several years earlier (Thrower, 1984). Several villages have temples and other buildings of interest, including an old pagoda at Sai O (Anon., n.d.)

Local Human Population The park's human population has diminished during the later years of the 20th century and villages are now virtually deserted (Anon., n.d.; Thrower, 1984).

Visitors and Visitor Facilities Thousands of walkers visit the park each year. Hebe Haven Peninsular is notable for having one of the best beaches in the area - Trio Beach. Part of the MacLehose Trail runs through the middle of the park, with camp sites en route at Ngong Ping and Shui Lap Wo. Other facilities include picnic and barbecue sites, and shelters (Anon., n.d.; Thrower, 1984).

Scientific Research and Facilities Some ecological work was carried out by Lay (1980) in 1978-1980.

Conservation Management An area of scrub forest, with tall magnoliaceous trees and a recently-discovered gesneriad on the eastern slopes of Ma On Shan has been designated both as a Site of Special Scientific Interest and as a Special Area. There is a management centre at the north-eastern extremity of the park (Thrower, 1984).

Management Problems Trampling combined with grazing prevents grassland from reverting to scrub and forest in upland areas. Some over-used areas are showing signs of erosion, with loss of soil cover. Strip mining near Ma On Shan has resulted in much of the hillside collapsing and unsightly dumps of iron ore and sludge in the vicinity of the park. The lease of the mine expired in 1981 but it is not known if this has been renewed. Litter is a continual problem and fires are a constant risk (Anon., n.d.; Thrower, 1984).

Staff Some 40 staff are involved in protection and management duties.

Budget No information

Local Administration No information

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Date August 1987

Pat Sin Leng Country Park, Plover Cove Country Park (including Plover Cove Extension)

Management Category V (Protected Landscape)

Biogeographical Province 4.06.01 (Chinese Rainforest)

Geographical Location The two parks are contiguous to each other and lie north-east of Tai Po in the New Territories. Plover Cove Extension consists of seven islands, namely: Kat O Chau (Crooked Island) of 250ha, Tui Min Chau of less than 100ha, Ngo Mei Chau (Crescent Island) of less than 100ha, Wong Wan Chau (Double Island) of 218ha, Wu Yeung Chau of less than 100ha, Chek Chau of less than 100ha and Ping Chau of 111ha. Pat Sin Leng: 22°29'-22°32'N, 114°10'-114°14'E; Plover Cove (including the extension): 22°27'-22°33'N, 114°14'-114°24'E.

Date and History of Establishment Plover Cove was designated as a country park on 17 April 1978 and extended on 1 June 1979 to include seven offshore islands. Pat Sin Leng Country Park was established on 18 August 1978.

Area Pat Sin Leng: 3,125ha
 Plover Cove: 4,594ha
 Plover Cove Extension: 630ha

Land Tenure Essentially public land with pockets of private land near villages.

Altitude Ranges from sea level to over 550m in the Pat Sin Range.

Physical Features The Pat Sin Range rises dramatically from the north-west shores of Tolo Harbour. Its south face is steep, with crowning rocky cliffs, but on the northern side slopes gently down to Sha Tau Kok Hoi (Starling Inlet). Northern slopes consist of sedimentary rock which is overlain by volcanic deposits wherever they meet the fault line. In the north-west Kwai Tai Leng rises to 486m and in the west the border of Pat Sin Leng Country Park extends to Kau Lung Hang Shan (Cloudy Hill) at 440m. These two mountains and the steep southern slopes of the Pat Sin Range are folded mountains of volcanic origin. The volcanic rocks are mainly fine tuff: fine-grained, white, creamy-grey or pale green in colour, easily weathered, with the boulders and outcrops showing pitted, weathered surfaces. The sedimentary rocks, particularly the shales, are reddish in colour, ranging from pale pink through to a deep purple and the layers often reveal twisting and contortion by later earth movements. These rocks show all varieties of particle size from laminated shales of clay, through gritty sandstones, to conglomerates. Hard conglomerate caps the Pat Sin Range and forms the cliffs and scarps along the ridges (Thrower, 1984).

With the exception of Bluff Head peninsula, the rocks of Plover Cove Country Park are an eastward extension of those found in Pat Sin Leng. Along the north coast of Plover Cove Reservoir, a strip of volcanic rock forms the steeper southern face of a low range of hills which rise to over 300m. Conglomerate rock forms a resistant cap to the ridge. To the north, sedimentary rocks slope gently down to the sea or to meet the fault line where they are again overlain by volcanic deposits (Thrower, 1984).

The dividing line between Pat Sin Leng and Plover Cove country parks runs more or less along a fault, either side of which extensive deposits of colluvium have formed in the valleys. At Bluff Head, the lower sediments disappear under the Jurassic volcanics to the north. By contrast, the sedimentary rocks of the Pat Sin Range were laid down after the volcanic eruptions of the Jurassic period. The Bluff Head sediments were deposited in a river delta over sediments of an earlier age which, in turn, were laid down under a shallow sea. These marine deposits outcrop only at one small site along the coast south-west of Fung Wang Wat Bay and, from fossil evidence, are estimated to be 195 million years old. The north-eastern corner of Plover Cove is unique for its rock formations, from which the geological history of Hong Kong over the last 200 million years can be reconstructed (Thrower, 1984).

The most recent geological event in the area is the rise in sea level. The deeply indented east coast of Plover Cove Country Park is a typical example of a coastline comprising submerged river valleys. The seven offshore islands of Plover Cove Extension, which were once the tops of adjoining mountains, consist of the same volcanic and sedimentary rocks that are found on the nearby mainland. Kat O Chau and Ngo Mei Chau are both composed entirely of volcanic rocks, with sections originating from an acid lava on the seaward side and coarse tuffs on the landward side. Across the middle of Wong Wan Chau runs the same fault line which, on the mainland, extends from Sam A Chuen to Hok Tau, where the northern volcanic rocks have slipped forward to cover the sedimentary rocks to the south. Chek Chau shows the same geomorphology: volcanic deposits form the western half and sediments the eastern half. The rocks of Ping Chau consist of alternate layers of sedimentary and volcanic deposits. Once Ping Chau had risen above sea level, the land was eroded by wave action, forming platforms. Those at Ping Chau are well-developed and are probably the best examples of this form of erosion in Hong Kong. Plover Cove Reservoir, formed by enclosing a bay and a string of islands, was completed in 1968 as part of a scheme to supply Hong Kong with fresh water. The main dams were raised in 1973, increasing the storage capacity to 230 million cu.m. Tunnels link the reservoir to intake reservoirs at Hok Tau and Lau Shui Heung, and to the main north-south system at Tai Po Tau (Thrower, 1984).

Climate No information

Vegetation Much of the vegetation is "fire climax" grassland, but there are also patches of pine woodland, broad-leaved woodland and scrub which have escaped fire damage. While the rocky southern slopes of the Pat Sin Range and the hills of its easterly extension are generally covered with duck-beak *Ischaemum* minireed *Arundinaria nepalensis* grassland, there are many small forbs, such as gentian *Gentiana loureiri* and golden-eyed grass *Curculigo orchoides*. The streams at the foot of the range are lined with trees (often rose-apple *Syzygium jambos* and screw-pine *Pandanus tectorius*) and contain plants of the sweet-flag *Acorus gramineus*, famed in Chinese medicinal lore for its powers of conferring immortality. Over much of the northern area, grassland is intermingled with dwarf mountain pine *Baeckea frutescens* scrub on the ridge slopes and Chinese scaly seed *Lepidosperma chinense* scrub where conditions are marshy. The steep inaccessible valleys running northward from the main ridge-line contain patches of natural woodland (including a stand of China fir *Cunninghamia lanceolata*). The lower valleys are largely bare of trees but contain stands of broad-leaved scrub. There are a number of abandoned villages in this area with their old *fung shui* (holy groves), containing trees of an age seldom seen elsewhere in Hong Kong. These include camphor, lungnan, lychee, wampi (*Cinnamomum camphora*, *Euphoria longan*, *Litchi chinensis*, *Clausena lansium*) and rose-apple, in addition to native figs, bamboos and a wide variety of other trees (Thrower, 1984).

Behind the sandy shores of Mirs Bay, looking-glass trees *Heritiera littoralis*, naupaka *Scaevola* spp., Cuban bast *Hibiscus tiliaceus* and screw-pine are prominent. In many places, the shore-line is fringed by meadow made up largely of Chinese lawn-grass *Zoysia sinica* and sea-shore drop-seed *Sporobolus virginicus*. Beds of eel-grass *Zostera nana*, hitherto unrecorded in Hong Kong waters, have recently been discovered (Thrower, 1984).

The vegetation of the smaller offshore islands appears very similar to that of the grassy low hills of the northern Tolo Harbour coastline. The central parts of the larger islands, Ping Chau and Kat O Chau, are cultivated, while the marginal areas of Ping Chau are covered with low grass and scrub merging into a narrow band of coastal plants. Kat O Chau, with its woodland along the southern arm, has possibly the most interesting flora of all these islands. The most south-easterly peninsula has been planted with pine *Pinus massoniana*, Brisbane box *Tristania conferta* and *Acacia confusa* and interplanted with *Rhododendron* spp. shrubs. These have now all grown up to form an extensive and attractive woodland (Thrower, 1984).

Fauna The north-eastern quarter of the New Territories is one area where the native wild boar *Sus scrofa* is known to survive; seldom seen, their fondness for sweet potatoes makes them a nuisance to the local farmers. Wild animals from the mainland are most likely to be found in this border area. Herklotz (1951) recalls that one or two tigers *Felis tigris* were seen every winter, and in 1931 a leopard *Panthera pardus* was shot near Chung Pui (a village now abandoned and submerged by Plover Cove Reservoir). Barking deer *Muntiacus reevesi* are now rare, due to former hunting practices (Thrower, 1984).

Plover Cove Reservoir has the richest variety of fresh-water fish of all Hong Kong reservoirs. Some of these fish enter from feeder streams, some travel from Shum Chun Reservoir in China, and some are deliberately stocked by the Water Authority. Most likely to be caught by anglers are wild carp or minnow *Hemiculter leucisculus*, common carp *Cyprinus carpio*, goldfish *Carassius auratus*, tilapia *Sarotherodon mossambicus*, snakehead *Ophiocephalus maculatus*, catfish *Clarius fuscus*, goby *Glossogobius giuris* and soft-finned carp *Osteochilus vittatus* (Thrower, 1984).

The shallow waters of Sha Tau Kok Hoi and Yan Tong Hoi, surrounded by a protective barrier of islands, support a rich marine life. Although centuries of exploitation have destroyed the population of pearl oysters (Pteriidae), innumerable other species of shellfish, fish and coral remain. The beach grass meadow along these coasts shelters periwinkles and other marine snails as well as a variety of crabs, including fiddler crab *Uca* sp. Nearer the sea, several species of ghost crab *Ocypode* spp. congregate in large numbers as the tide recedes. In this zone are also surf clams. In the lower parts of the tidal range are crabs, moon shells, cockles, worms, shrimps, eels, sea urchins, starfish and innumerable other animals, many of which form

the food of coastal birds such as common sandpiper *Actitis hypoleucos* and plovers *Charadrius* spp. The horizontal wave-cut platforms along the coast of Ping Chau are outstanding for the wealth of marine fauna (and flora) to be found in their crevices and tidal pools at low tide (Thrower, 1984).

Cultural Heritage Pearl-fishing in the Tai Po Sea dates back to the Han Dynasty. Mirs Bay, also known as Pearl Pool, was noted for its abundance of pearl oysters. By the Ming Dynasty, however, the industry had died due to over-exploitation of pearls. Yan Tong Hoi (Double Haven) was a collecting centre for pearls, from where they were transported overland through Plover Cove and Pat Sin Leng to Tuen Mun for trans-shipment to Canton. During the Sung dynasty (960-1126 AD), Tangs settled in the Pat Sin Leng and Plover Cove areas. Such settlements may have been started by soldiers guarding the pearl road, who subsequently remained and cultivated the land. Thus, the present landscape, with the cultivation of *fung shui* woods around villages, has developed over the last 1,000 years. Many of these old villages now stand abandoned and former terraced paddies are reverting to grassland and scrub (Thrower, 1984).

Local Human Population There are a number of occupied villages within Pat Sin Leng and Plover Cove country parks, all of which are enclaves. Of the islands, Wong Wan Chau is sparsely inhabited, with three small villages, Pat O Chau has six villages and a population of 2,870, and Ping Chau has 1,350 inhabitants distributed among 10 villages. The other islands are uninhabited. Farming is the main occupation of islanders. The local fishing fleet is based at Kat O Chau (Thrower, 1984).

Visitors and Visitor Facilities Pat Sing Leng and Plover Cove, which are among the most visited country parks, receive hundreds of cyclists and thousands of picnickers at week-ends and during holidays. Facilities include picnic and barbecue sites, shelters and camp sites. Tai Mei Tok, on the southern boundary of Pat Sin Leng, has a visitor centre and is being developed as a centre for water sports. Fishing is permitted in Plover Cove Reservoir and, on the coast, boats can be hired. The Tolo Harbour ferry from Tai Po Kau serves some of the islands but others are accessible only by kai-do (local motor boats) in clear weather (Anon., n.d.; Thrower, 1984).

Scientific Research and Facilities No information

Conservation Management The northern shore of Tolo Harbour is geologically unique, being the site of Hong Kong's rarest fossils. The steep valleys on the northern side of the Pat Sin Range, with their patches of natural woodland, have been designated as a Special Area, as has the south-eastern peninsular of Kat O Chau on account of its outstanding natural beauty. The shallow waters of Sha Tau Kok Hoi and Yan Tong Hoi, which are rich in marine life, have been suggested as an ideal site for a marine conservation area. Just outside the northern boundary of Pat Sin Leng is the Yim Tso Ha egret, a site of Special Scientific Interest because of its importance as a nesting ground for several species including Swinhoe's egret *Egretta eulophotes* (V).

Management Problems Picnic sites and scenic points are marred by considerable quantities of litter (Anon., n.d.).

Staff No information

Budget No information

Local Administration No information

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Date August 1987

Sai Kung East Country Park, Sai Kung West Country Park

Management Category V (Protected landscape)

Biogeographical Province 4.06.01 (South Chinese Rainforest)

Geographical Location The parks lie adjacent to each other in the Sai Kung Peninsular of the eastern New Territories. The road running north-south from Hoi Ha to Tsak Yu Wu constitutes the common border.

Date and History of Establishment Both Sai Kung East and Sai Kung West were designated as country parks on 3 February 1978. 22°20'-22°29'N, 114°17'-114°24'E

Area Sai Kung East: 4,477ha
Sai Kung West: 3,000ha

Sai Kung West borders on Ma On Shan Country Park (2,880ha) in the west.

Land Tenure Essentially government land with pockets of private land around villages

Altitude Ranges from sea level to the peak of Shek Uk Shan at 481m

Physical Features The main north-east to south-west structural folding of Hong Kong is not obvious in the Sai Kung Peninsular, its central and southern parts being criss-crossed with numerous faults that have been eroded to form a sculptured pattern of low hills, mostly below 400m in height. The coastline is highly indented, forming deeply incut harbours and bays. It is a typical "ria" coast with low-lying valleys drowned by the rising sea level. In the northern part of the peninsular, between Kei Ling Ha Hoi (Three Fathoms Cove) and Tai Tan Hoi Hap (Long Harbour), erosion of Tai Lam Koi (Mt Hallowes) and Shek Uk Shan, coupled with the movement downhill of the eroded material, has filled the valleys with colluvium. The Sai Kung Peninsular is composed almost entirely of volcanic materials. Coarse tuff, dark grey and medium-grained, makes up almost the whole of the two northern peninsulars and an area in the south-west of the park from Tai Mong Tsai to Shek Hang. The great central band running from Kei Ling Ha Hoi (Three Fathoms Cove) to Leung Shuen Wan Chau (High Island) is composed of rhyolite (solidified acid lava), which is noted for its hexagonal columns 20-200cm in diameter. High Island Reservoir in the south of Sai Kung East was completed in 1971 and has a storage capacity of 272.5 million cu.m.

Climate The eastern part lies in the low rainfall zone, receiving less than 2000mm per year. Leung Shuen Wan Chau (High Island) and two peninsulars north of it (Sai Wan Shan and Mai Fan Teng) receive less than 1800mm. By contrast the western slopes of Fa Miu Shan receive over 2600mm per year, the whole of Sai Kung West Country Park being in the medium and high rainfall zones.

Vegetation There is an overall gradient in the vegetation from bare grassy hills along the east coast of the peninsular to wooded slopes extending down to Kei Ling Ha Hoi in the west. While bare grassy slopes can be attributed almost entirely to burning, the increase in cover of woody vegetation from east to west can be correlated with water supply and exposure.

Grass slopes are largely dominated by minireed *Arundinaria nepalensis* and duck-beak grass *Ischaemum* sp., together with spreading patches of false staghorn *Dicranopteris linearis*. Broad-leaved shrubs clothe the lower slopes of some hills and form narrow strips down the valleys of the eastern section. The woodlands, which are abundant westwards, are mostly of pine *Pinus massoniana* planted during the post-war period. Native broad-leaved trees such as ivy tree *Schefflera octoptylla*, mountain tallow *Sapium discolor*, figs *Ficus* spp. and laurels (Lauraceae) are gradually replacing the older pines. There are small stands of native woodland and also of "improved" native woodland constituting the fung shui (holy groves) of many villages. These two types of woodland, both rich in native species, contain some of the most interesting vegetation in the parks. The coastline vegetation consists largely of black grass *Zoysia sinica* nearest to the sea, behind which is scrub dominated by beach naupaka *Scaevola sericea* and Cuban bast *Hibiscus tiliaceus*. Native scrub takes over further inshore often with spiny date palm *Phoenix hanceana* and screw pine *Pandanus tectorinus* as prominent members of the community. Exotic horsetail trees *Casuarina equisetifolia* have been planted around some popular beach spots (Thrower, 1984).

Fauna Native mammals are seldom seen, the disappearance of the woodlands having removed much of their natural habitat. The masked palm civet *Paguma larvata* has been recorded and Chinese leopard cat *Felis bengalensis* and wild boar *Sus scrofa* are also known to be present. Birds are common, especially in the woodland. The most conspicuous are two open-country species: the rufous-backed shrike *Lanius schach* and crested mynah *Acridotheres cristatellus*. Among the invertebrates, termites *Odontotermes formosanus* are common in the woods, while the nests of the red tree ant *Oecophylla smaragdina* are found on broad-leaved trees. Most of the territory's more common butterflies can be seen (Thrower, 1984). The rocky shores, estuarine mangroves and sandy beaches of the peninsular's coastline provide a wide range of habitats for native animals, some details of which are given by Thrower (1984).

Cultural Heritage Settlements were first established predominantly by Hakka people at least 200-300 years ago. Of the 66 villages recorded in the Gazetteer of 1960, 52 are Hakka names, 10 are Cantonese and four are of mixed Hakka and Cantonese. Temples in some of the older villages are over 200 years old.

Local Human Population According to the Gazetteer of 1960, the population of the peninsular was about 3,000 at that time, with an average of 45 persons per village. Some of these villages have since been abandoned. Rice and vegetables are grown on terraces, hillsides are harvested for fuel and pastures burnt to promote the growth of young shoots for the benefit of cattle. New village houses are appearing in response to the demand for rented holiday accommodation (Anon., n.d.; Thrower, 1984).

Visitors and Visitor Facilities The construction of High Island Reservoir and its auxiliary roads has opened up the peninsular, which has become increasingly popular for outdoor recreation, particularly hiking and swimming. A new population is moving in around the margins of the park as luxury villas and weekend holiday homes are built. Part of the MacLehose Trail passes through the middle of the park and there is a network of footpaths. Facilities include shelters and picnic, barbecue and camp sites. There are youth hostels at Pak Sha O and Chek Keng. A holiday camp has been established at Pak Tam Chung. Special transport facilities are available for those wishing to visit more inaccessible parts of the park (Anon., n.d.; Thrower, 1984).

Scientific Research and Facilities No information

Conservation Management The Sai Kung Peninsular includes some of the finest scenery in Hong Kong. Prior to the construction of High Island Reservoir, it was one of the most isolated and undeveloped areas in the territory. With its easier accessibility and planned development under the Country Parks Authority, it has become one of the territory's most delightful areas for outdoor recreation. Along the Tai Mong Tsai Road and the north coast near Hoi Ha have been developed as "recreation areas". The latter area will be extended to the shores of High Island Reservoir (Anon., n.d.; Thrower, 1984).

Hong Kong

Much of the peninsular was reafforested in the late 1940s to early 1950s, largely with the co-operation of the village communities. Elsewhere, grasslands can be attributed to traditional burning practices, as well as accidental fires (Thrower, 1984).

Four park management centres have been built at Pak Tam Au, Hoi Ha, Kei Ling and Pak Tam Chung.

Management Problems Regular burning of grasslands is responsible for the impoverished hillside vegetation and patches of erosion. Litter is a continual problem, particularly at camp sites, which may also be eroded and charred.

Staff Over 100 staff are involved in protection and management duties.

Budget No information

Local Administration No information

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Date August 1987

Tai Lam Country Park, Tai Mo Shan Country Park, Shing Mun Country Park, and Tai Po Kau Nature Reserve

Management Category V (Protected Landscape)

Biogeographical Province 4.06.01 (Chinese Rainforest)

Geographical Location Located south of Yuon Long Plain, the four sites form a geological unit centred on Tai Mo Shan in the central part of the New Territories. 22°21'-22°26'N, 113°59'-114°07'E (Tai Lam); 22°23'-22°25'N, 114°07'-114°10'E (Tai Mo Shan); 22°25'-22°27'N, 114°07'-114°10'E (Shing Mun); 22°25'-22°26'N, 114°10'-114°12'E (Tai Po Kau)

Date and History of Establishment Shing Mun was designated as a country park on 24 June 1977 and both Tai Lam and Tai Mo Shan were established on 23 February 1979. Tai Po Kau was designated as a nature reserve on 13 May 1977.

Area Tai Lam: 5,330ha
Tai Mo Shan: 1,440ha
Shing Mun: 1,400ha
Tai Po Kau: 460ha

Tai Lam is contiguous with Tai Mo Shan, which in turn borders Shing Mun. Tai Po Kau is adjacent to Tai Mo Shan.

Land Tenure Mainly public land with some pockets on lease to villagers

Altitude Ranges from almost sea level to the summit of Tai Mo Shan which, at 958m, is the highest peak in Hong Kong.

Physical Features Tai Mo Shan is the summit of a range of north-east to south-west oriented hills. The broad valley of Tai Lam Chung separates this central range from a lower, parallel range to the west, while that of Sha Tin separates it from a parallel range to the east dominated by Ma On Shan. Tai Mo Shan Country Park is situated entirely in an area of volcanic origin;

Shing Mun is also largely of volcanic derivation with only the east bank of the Shing Mun Reservoir composed of Needle Hill granite; Tai Lam is of volcanic origin in the eastern part and granitic for the rest. The granites of Tai Lam vary in age from the oldest known in Hong Kong (Tai Po granodiorite) to the youngest (Needle Hill granite).

The highlands, centred on Tai Mo Shan, are composed mostly of coarse tuff with finer tuffs and lava deposits in marginal areas. Around, this, most extensively to the west, erosion of the surface volcanic rocks has exposed the underlying granite in Tai Lam Valley and also the hills to the west of it. To the north, west and south of the summit, the valleys contain large deposits of colluvium. It has been suggested that the rapid erosion of this material from the upper slopes was due to deforestation of Tai Mo Shan.

The Tai Lam Chung area is heavily faulted. The faults run either north-east to south-west or at right angles to this direction and dictate the drainage pattern which is rectilinear. Tai Lam Chung Reservoir, which has a capacity of about 20,500 million litres, also lies along a fault line. Started in 1952 and completed in 1957, it was the first reservoir to be built in post-war Hong Kong. The Shing Mun Reservoir, with a capacity of 26 million cu.m, was completed earlier in 1936. Peneplains are evident at about 150m, providing evidence of changes in sea-level in the relatively recent geological past. Tai Mo Shan is the major watershed in the central New Territories. The pattern of this river system is dendritic, as it is dictated by slope and not by faulting (Thrower, 1984).

Climate Although Hong Kong lies just inside the tropics, the climate is temperate for nearly half the year. Mean annual rainfall ranges from around 1200mm to more than 3000mm, about 80% of which falls in summer. This is the longest season, lasting from May to September with hot, humid and usually wet weather. Temperatures range from about 24°C to 32°C. September is the month in which Hong Kong is most likely to be affected by tropical typhoons. These originate from near the Philippines and approach from a south-easterly direction. Winter, lasting from November until February, is cold and dry. Temperatures commonly range from about 13°C to 24°C but sometimes drop below freezing point on high ground (Thrower, 1984; Ismail, 1987). Meteorological data are not available for Tai Lam, Tai Mo Shan, Shing Mun or Tai Po Kau.

Vegetation Much of the area is wooded, but there are few old trees because all available timber was used during the Japanese occupation in World War II. Thus, most of the forest consists of a mixture of native and introduced species planted since 1946. In addition, native broad-leaved trees have regenerated, particularly in the east. The vegetation changes from the predominantly pine *Pinus* spp. and mixed pine-Brisbane box *Tristania conferta* forest of the Tai Lam area in the west to the much more interesting and complex woodlands of Tai Po Kau. This pattern reflects the change from granite, with its poor and eroded soils, in the west to the volcanic areas of the Tai Mo Shan massif in the east (Thrower, 1984).

The middle and lower hillslopes of Tai Lam and Shing Mun valleys and Tai Po Kau are covered with pine forest, mixed broad-leaved and pine forest and occasional pure stands. Common native species such as camphor tree *Cinnamomum camphora*, ivy tree *Schefflera octophylla*, sweet gum *Liquidambar formosana* and monkeypod *Abarema clypearia* mingle with the introduced Brisbane box, *Acacia confusa*, horsetails *Casuarina equisetifolia* and gums *Eucalyptus* spp. Pine woods, both of the Chinese red pine *Pinus massoniana* and the American slash pine *P. elliotti*, occupy the middle of the upper slopes, but may extend right down to the water's edge, as on the east bank of Shing Mun Reservoir. In 1980 many of the woods dominated by open stands of Chinese red pine appeared to be in a state of active succession to broad-leaved woodland. The Shing Mun forest has some pure stands of paper-bark trees *Melaleuca leucadendron*, planted in low-lying areas because of its ability to thrive in waterlogged conditions. Tai Mo Shan itself is patchily covered with grassland and plantations of pine and Brisbane box. Rare and relic plants grow in secluded ravines and stream beds of its upper slopes, including the famous Grantham's camellia tree *Camellia granthamiana* which was first discovered in this area. Further west, the hills between Tai Mo Shan and Tai Lam are predominantly grassy, with scattered shrubs of *Eurya japonica* and small

bushy acacias. Grassland species include awned duck-beak *Ischaemum aristatum*, mireweed *Arundinaria nepalensis*, *Eulalia quadrinervis*, Hong Kong orange grass *Cymbopogon goeringii* var. *hongkongensis* and winter sword grass *Miscanthus sinensis*. The shallow valleys are dominated by tall stands of summer sword grass *M. floridulus*. The woodlands around Tai Lam are largely pine-box plantations, with some gums and other trees (Thrower, 1984). Barnes *et al.* (1981) recorded some 155 species of plants (excluding grasses, sedges and bamboos) at a number of sites in and around the area.

Fauna The woodlands of Tai Mo Shan, Shing Mun and Tai Po Kau are among the richest sites for the larger native mammals such as pangolin *Manis pendactyla*, Chinese porcupine *Hystrix hodgsoni*, wild boar *Sus scrofa*, civets (Viverridae), ferret badgers *Melogale moschata* and barking deer *Muntiacus reevesi*. Tai Po Kau is the home of the short-nosed fruit bat *Cynopterus sphinx* and small Japanese pipistrelle *Pipistrellus abramus* (Thrower, 1984).

The wide range of land habitats, from grassland to some of the finest forest in Hong Kong, supports a rich avifauna. Tai Po Kau is particularly noted for its woodland species. Thrower (1984) lists 38 common species, which is about half the number recorded from the area. Of all the woodland species, 56% are winter visitors or passage migrants. The number of resident birds is also considerable, both with respect to species and populations.

Among reptiles, clay turtle *Chinemys reevesi* and snapper turtle *Platysternum megacephalum* are most often reported from streams on Tai Mo Shan and in Tai Po Kau, along with three-banded box terrapin *Cuora trifasciata* and rarer Beale's terrapin *Clemmys bealei*. Lizards and snakes are frequently reported, both from Tai Po Kau and Tai Mo Shan, notably Indian skink (Scincidae), Chinese waterside skink *Tropidophorus sinicus*, common blind snake *Typhlina bramina*, white-spotted slug snake *Pareas margaritophorus*, rare Hampton's slug snake *P. hamptoni*, *Achalinus rufescens*, red mountain racer *Elapheprophyraea nigrofasciata*, *Oligodon cinereus*, red-necked keelback *Rhabdophis subminiata*, common rat snake *Pytas mucosus*, buff-striped keelback *Amphiesma stolata*, large-spotted cat snake *Boiga multimaculata*, Indian cobra *Naja naja*, king cobra *N. hannah*, mountain pit viper *Trimeresurus monticola* and white-lipped pit viper *T. albolabris* (Thrower, 1984).

Amphibians living in or near the mountain streams of the central highland area include: Hong Kong newt *Paramesotriton hongkongensis*, Hong Kong spiny frog *Rana paraspinosa*, Chinese spiny frog *R. spinosa*, Taipei frog *R. taipehensis*, green cascade frog *Amolops hongkongensis* and brown tree frog *Polypedates leucomystax* (Thrower, 1984).

Tai Po Kau forest is extremely rich in insects and is the only site in Hong Kong where scorpions *Homurus australasiae* have been collected. It is an excellent place to see common woodland butterflies, larger cicadas and many other interesting insects, including black bee fly *Ligyra tantalus*, which frequents woodland streams, and giant wood spider *Nephila maculata*. The woodlands of both Shing Mun and Tai Lam contain numerous nests of both black tree ant *Polyrachis dives* and red tree ant *Oecophylla smaragdina* (Thrower, 1984). Some 369 species of moth have been recorded from the Tai Mo Shan and Tai Kau areas (Barnes *et al.*, 1981).

Cultural Heritage In former centuries, there were upland villages on the slopes of Tai Mo Shan, now abandoned and lost under encroaching vegetation. In some of these, stone vats have been discovered along the stream banks. Presumably, these were containers in which the locally-grown indigo dye was extracted and clothes were dyed. A map compiled in 1903-1904 shows the village of Nam Fong To (at 450m) as the highest inhabited place. Upland rice was cultivated at this altitude and the natural resources of the mountain slopes were harvested by herb collectors, hunters and grass-cutters. As on Lantau, charcoal-burners have been responsible for the destruction of the woodland cover. From about 1850 to 1950, the streams of the south-western foothills provided water power for an industry based on imported incense wood. These watermills no longer exist. The stone pagoda mentioned in the 1688 Sun On District Gazetteer seems also to have disappeared from Tai Mo Shan, unless the entry refers to a tor in the shape of a pagoda. There are a number of monasteries and religious houses on the lower southern slopes, all of which were founded in the 20th century (Thrower, 1984).

Shing Mun and Tai Mo Shan were theatres of brief but intense wartime fighting. Four years before the Japanese invasion, a chain of concrete pill-boxes with connecting underground tunnels was built. Known as the Gin Drinker's Line, the section close to Shin Mun Reservoir (completed in 1936) was the most elaborate and it became known as the Shing Mun Redoubt (or stronghold). Taken by the Japanese in 1941, the Shing Mun Redoubt is one of the most interesting relics of Hong Kong's recent history (Thrower, 1984).

Local Human Population The villages have been deserted by all but a few old people and young children. Only five families remain in the formerly prosperous village of Tin Fu Tsai at the head of Tai Lam Chung Reservoir, where they breed pigs and cultivate vegetables (Anon., n.d.).

The construction of Shing Mun Reservoir prior to World War II involved the resettlement of eight Hakka villages inhabited by a total of 855 people. These villagers, who owned 73ha of agricultural land (of which 29ha were planted with pineapples) and had forestry rights to 478ha, were resettled at a total cost of about HK\$300,000 (Thrower, 1984).

Visitors and Visitor Facilities The MacLehose Trail, which attracts many walkers, runs through Tai Lam Country Park, and along the ridgelines bordering Tai Mo Shan and Shing Mun country parks and Tai Po Kau Nature Reserve. All of the parks are well-provided with picnic, barbecue and camping sites. There is a hostel just west of Tai Mo Shan summit. Licensed fishing is permitted in both Tai Lam Chung and Shing Mun reservoirs.

Scientific Research and Facilities An Oxford University expedition examined the relationship between moth and plant diversity in the Tai Mo Shan and Tai Po Kau areas in 1981 (Barnes *et al.*, 1981).

Conservation Management The whole area is the water catchment for the Tai Lam Chung and Shing Mun reservoirs. For this reason, it has been under the management of foresters of the Agriculture and Fisheries Department for many years. Reafforestation has been slow in areas of eroded granite and often retarded by frequent fires, as evident on the hills west of Tai Lam Chung Reservoir. Tai Po Kau has been designated a special area because of its woodlands which support a diverse flora and fauna. It is one of the best examples of managed amenity woodland, with the emphasis on ecological education rather than recreation (Barnes *et al.*, 1981; Thrower, 1984.)

Management Problems Much of the landscape has been altered due to land use practices during former centuries. Extensive reafforestation has been underway since 1946. Although present forests are very different from those covering the area before the advent of human settlement, they do contain some relics of the original flora. Forest fires and litter are persistent problems. In Shing Mun, for example, there were 21 fires affecting 208ha of vegetation in 1975-1976 (Anon., n.d.; Thrower, 1984)

Staff Over 100 staff are involved in management and protection duties. Labourers from Tai Lam prison occasionally help with forestry work, road works and construction of fire barriers.

Budget No information

Local Administration No information

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Hong Kong

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Date August 1987

JAPAN

Area 377,708 sq.km.

Population 120,007,812 (1985 estimate)

Parks and Reserves Legislation Japan is almost unique in possessing the natural protective role of its two religions, Shinto and Buddhism. Not only does Buddhism revere all forms of life, but the areas covered under the jurisdiction of shrines afford sacred protection to numerous forests and holy mountains. It was only after the restoration of the Meiji emperor in 1867 that Japan modelled its Government on that of western countries. The basis of modern conservation laws, the Imperial Game Law of 1892, ensured regulation of hunting preserves. Many rare or endangered "non game" classified species were listed as prohibited for hunting.

The first modern legislation whose primary purpose was the conservation of the natural environment was the National Parks Law passed by the Government Diet in 1931 (Law No.36/1931). The chief objective of this law is the preservation of the natural landscape on public and private land for public enjoyment and recreation. Twelve areas were designated between 1934-36, including coastal areas, and by 1987 there were 27 sites. The basis of the current laws on protected areas is the *Natural Parks Law* of 1957 (Law No.161 of 1 June 1957) and the *Nature Conservation Law* of 1972 (Law No.85 of 22 June 1972). The new natural parks system superceded the 1931 Law and provided a system of three categories of park with grades from nationally important sites (National Parks) through to regional (Quasi-National Parks) and local sites (Prefectural Natural Parks), each area being designated irrespective of land ownership. The 1957 act declares that the natural parks are national assets, designated areas of scenic beauty created to provide a cultural and recreational asset for the public.

In 1970 the law was revised to allow the creation of Marine Parks within natural park areas (16 May 1970). Ten Marine Parks were immediately designated and by 1987 the figure had risen to 23 in 10 National Parks and 13 Quasi-National Parks.

The Nature Conservation Law was enacted to provide a framework for all legal measures concerning the natural environment and nature conservation. It also ensures designation of areas for the protection of nature - Wilderness areas, Nature Conservation areas and Prefectural Nature Conservation areas. Fifty eight Articles are specified under the Law, including basic policies, designations and provisions.

A comprehensive series of protected area categories exist in Japan for nature conservation and recreation value. Designation of sites is through the Edicts of the Natural Park Law and Nature Conservation Law (Nature Conservation Bureau, 1985):

Natural Parks There are three orders of natural parks in Japan, National Parks, Quasi-National Parks and Prefectural Parks. All are regulated under the Natural Parks Law, being created to protect landscapes of scenic beauty, and through their promoted utilisation, to contribute to the health, recreation and culture of the people - Article 1 (Environment Agency, 1978; National Conservation Bureau, 1985). These park areas are designated irrespective of ownership. Restrictions and zonation of areas are in force to prevent or reduce actions which may damage the character of the landscape.

- a) **National Parks** (Kokuritsu koen) are designated landscape areas of national importance, "areas of the greatest scenic beauty". These areas may include both natural environments and entirely man-made landscapes under multiple ownership. All land within the parks is controlled by "park law" provisions and planning restrictions, irrespective of land ownership. Many of these nationally important protected landscapes are not discreet entities and may consist of a series of isolated blocks separated by many kilometres, yet still administered under a single park authority. Administration of the national parks focuses on i) restrictions of various actions that may harm the landscape, (ii) provision of facilities so as to increase park use.

Specific regulations are drawn up for the protection of each site and signed by the Director General of the Environment Agency. Zoning occurs to restrict activities harmful to the landscape of the park. The "ordinary areas" - buffer zones - restrict a number of activities including mineral mining and changes of waterlevel. Forestry is permitted and there is apparently no control on tourist development and few restrictions on commercial and industrial activities. The greatest protection is afforded in the "special protection areas" or core areas which are kept strictly free from any development and may include zones of "floral and faunal phenomena of particular interest, special topographical and geological features or scientific, historical or archaeological sites of particular significance". "Special areas" - intermediary areas - are zoned to allow certain kinds of development, including industry, yet within a priority for protecting the landscape (Classes I to III). As of 1981, National Parks were zoned with total figures of 70% special areas, 29.9% ordinary areas and 12% special protected areas. Restrictions common to all these sites include livestock grazing, fires, wood gathering, capturing wildlife, riding, tree planting and building construction. If any restricted and listed activities occur at the time of designation, then these must be registered but are permitted to remain in existence (Articles 17, 18-2, 20).

In addition to the above categories, there are also Marine Park areas designated within National Parks and Quasi-National Parks, established for the purpose of preserving the "marine natural scenic beauty". Restrictions are as for the other zones but also inhibit the collection or capture of fish, coral, seaweed, sea reclamation and discharge of polluted water.

- b) *Quasi-National Parks* (Kokutei koen) are landscape areas designated to protect landscapes of regional importance. These protected areas have lesser status than national parks and are selected and designated only at the request of a Prefectural Governor.

All planning controls and restrictions for national parks are applicable to this category of protected area. By 1985 there were 54 parks (Nature Conservation Bureau, 1985).

- c) *Prefectural Natural Parks* (Todofukenritsu shizen koen) are representative prefectural landscapes of local importance. Under the Natural Parks Law these areas are not permitted to have any "special protected areas" or "marine parks" within their boundaries. The total number of designated prefectural areas in 1985 was 297 (Nature Conservation Bureau, 1985).

State purchase of private land within National Parks and Quasi-National Parks has been undertaken since 1972 and 1975 respectively, especially in areas where thorough protective action cannot be taken if it remains in private hands.

Nature Reserves There are three categories of protected areas that preserve the original characteristics of an environment for nature conservation and are protected under the Nature Conservation Law of 1972.

- a) *Wilderness areas* are designated on land owned by central or local Government, where the natural environment has been preserved in areas with little or no human influence. Activities affecting the natural ecosystems of these Strict Nature Reserves are prohibited as a rule, as is entry for the general visitor.
- b) *Natural Conservation, and Prefectural Natural Conservation Areas* are designated in areas in which conservation of the environment is especially needed in the light of natural and social conditions. These areas include natural forests, alpine communities, coasts, swamps, marine areas and other unique natural features. They are divided into "special areas"; "wild animal and plant protection areas" where the capture and collection of designated wild animals and plants are prohibited; and "ordinary areas" where harmful acts must be notified but do occur (Nature Conservation Bureau, 1985).
- c) *Wildlife Protection Areas - Wildlife Refuges* are state or private land set up under the Wildlife Protection and Hunting Law of 1918, amended in 1978, to promote the protection and breeding of valuable wildlife species in danger of extinction and their habitats. Zonation occurs within these protected areas and includes educational areas

such as "wild bird forests" and also "fundamental wildlife protection areas". Restrictions include hunting, capture, land reclamation, tree felling and building construction. There are currently 2,706 of these wildlife protection areas (Environment Agency, 1975).

A final category of protected area is the *Natural monument and places of scenic beauty* designation. The Ministry of Education is empowered to designate as a place of scenic beauty or as a natural monument those gardens, valleys, mountains and animals, plants and minerals which have a high value from an academic or a visual view point. As at the end of 1981, 241 places of scenic beauty and 919 natural monuments have been designated (Environment Agency, 1982).

Voluntary Reserves A number of voluntary sanctuaries also exist in Japan. Five bird sanctuaries are managed by the Wild Bird Society of Japan and a dragonfly sanctuary is managed by the Tombo no kai Dragonfly Society.

Japan is signatory to various international conventions and agreements on conservation. It is one of the few Asian countries to have ratified the RAMSAR Wetlands Convention (17 June 1980) with two sites listed. Four sites were accepted as Biosphere Reserves in 1980. Japan has also acceded to the CITES Convention in 1980, TRAFFIC, USA-Japan Convention on Migratory Birds and similar agreements with China, Russia and Australia (signed 1972, 1973 and 1974). Japan is also party to the Antarctic Convention.

Parks and Reserves Administration and Management The protected landscapes of Japan are essentially governed under the Natural Parks Law and the Nature Conservation Law. The Environment Agency is in charge of executing this legal system, under the powers of the Director General, by coordinating related governmental agencies. The relevant Environment Agency departments include a) the Nature Conservation Council which consists of various committees on conservation of the natural environment, natural parks and wildlife protection and b) the Nature Conservation Bureau which is the main body administering National Parks.

The Nature Conservation Bureau consists of five divisions, those of planning and coordination, natural parks planning, conservation and management, recreational facilities and wildlife protection. Directly answerable to the divisions are the national park offices and ranger stations. In 1985, the parks were administered by 107 rangers located in the various parks with 30 ranger stations under 10 national park offices (Nature Conservation Bureau, 1985). Regulations for protection and facilities within the protected areas are planned by the Environment Agency and revised about every five years. Nature conservation areas and wildlife protection areas are established and managed either by the Environment Agency or Prefectural Governments concerned.

Addresses

- ° Marine Park Centre, Toranomon Denki Building, 2-8-1 Toanomom, Minato-ku, Tokyo.
- ° Nature Conservation Bureau, Environmental Agency, 1-2-2 Kasumigaseki, Chiyoda-ku, Tokyo (Tel: Tokyo 03 581 3351).
- ° Agency of Cultural Affairs, 3-2-2 Kasumigaseki, Chiyoda-ku, Tokyo.

Additional Information Japan has a particularly high degree of flora and fauna diversity. There are more than 3,800 islands clustered around the 4 main islands of Hokkaido, Honshu, Shikoku and Kyushu. This archipelago extends from the sea of Okhotsk near Russia, 2,800km southwards to the Ryukyu islands near Taiwan. It ranges from latitude 45° in the north to 21° in the south, with climates ranging from Siberian and Sub-arctic to Sub-tropical.

Forests cover 66.9% of the land area in Japan, of which 40% of the total is commercial plantation (Stewart-Smith, 1987). In Hokkaido, the natural forest is mostly coniferous; north-east Japan is dominated by deciduous broad-leaved woods of beech, oak, birch and chestnut; the south-west of Japan is dominated by broad-leaved evergreen forest and the southern Ryukyuan islands by tree ferns, Pandanaceae and mangroves. An alpine zone of scrub, grassland and rocky desert is present in the mountains of the north.

Japan

Japan is essentially a mountainous land with only 20% being flatlands, such as river valleys, coastal areas and plains. Hence the majority of the population inhabits only 3% of the country and as much as 80% of the population lives in urban areas.

Protected areas cover 14.1% of the total land area, of which 2.02 million hectares, 5.4% of the country area, are of national importance, national parks. By comparison, areas protected primarily for nature conservation total 93,180ha as Nature Conservation areas and Wilderness areas. Marine Park areas total 2,400ha. The protected landscape category adequately protects areas ranging from marine and coastal sites through primary forest to montane ecosystems.

The natural conservation strategy of Japan is based on the national survey on the environment undertaken in 1973, 1978, 1979 and 1983. The purpose of these studies has been to a) identify the present state of the natural environment, b) identify changes on a 5-year basis and c) utilise the survey results as basic information for environmental impact assessment and conservation programmes.

The leading non-Governmental nature conservation organisations in Japan include the Nature Conservation Society of Japan, plus the National Parks Association and the National Parks Beautification and Management Foundation. All promote research, public relations and nature tours. The Nature Conservation Society of Japan particularly concentrates on identifying wildlife and habitats in need of protection as well as funding ecological research. Other conservation bodies include the World Wildlife Fund Japan, Friends of the Earth Japan and the Wild Bird Society of Japan which has established a series of wild bird sanctuaries such as the Oi marshes, and features famous conservation campaigns such as for the Japanese crane.

In theory, the national park system in Japan adequately protects much of the country's landscape, but the pressure from lack of resources, staff, unwieldy park sizes and conflict from multi-land use is currently causing serious threat to the effectiveness of this designation.

Tourism has always been a major reason for creating the parks of Japan, and to-day 323 million people visit the national parks each year (828 million to all the natural park categories) (Nature Conservation Bureau, 1985). These figures alone represent at least one annual visit by every single person in Japan and represent some of the highest park visitor figures in the world. As a result of high visitor pressure, there is currently a major overloading of time spent controlling tourism. Tourism at present levels seriously affects the environment through erosion, pollution, demands on water resources (whilst staying at the park accommodation) and increasing the need for visitor facilities and other buildings (Sakurai, 1984).

Further difficulties of management result from parks being created in areas that cannot be adequately protected, even though legislation exists to prevent harmful activities, as is the case when they are located adjacent to major industrial complexes or where pollution originates beyond the park boundary - the Seto Naikai Inland Sea Park is a case in point. Park dimensions are often cumbersome, especially where they are composed of more than one discreet block requiring a greater input from an already overstretched park warden system. Parks composed of single blocks appear to have more adequate control with successfully defended buffer, restricted access and core area zonation.

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Protected Landscapes

<i>National Parks</i>	(hectares)
Akan	90,538 *
Ashizuri-Uwakai	10,967 *
Aso	72,492 *
Bandai-Asahi	189,582 *
Chichibu-Tama	121,600 *
Chubu-Sangaku	174,323 *
Daisen-oki	31,927 *
Daisetsuzan	230,894 *
Fuji-Hakone-Izu	122,686 *
Hakusan	47,683 *
Iriomote	12,506 *
Ise-Shima	55,549 *
Joshinetsu Kogen	189,028 *
Kirishima-Yaku	55,008 *
Minami Arupusu	35,752 *
Nikko	140,698 *
Ogasawara	6,433 *
Rikuchu-Kaigan	12,348 *
Rishiri-Rebun-Sarobetsu	21,222 *
Saikai	24,653 *
Sanin-Kaigan	8,996 *
Seto-Naikai	62,957 *
Shikotsu-Toya	98,332 *
Shiretoko	38,633 *
Towada-Hachimantai	85,409 *
Unzen-Amakusa	25,496 *
Yoshino-Kumano	58,546 *
Subtotal	2,024,258

Akan National Park

Management Category V (Protected Landscape)

Biogeographical Province 2.14.05 (Manchu-Japanese Mixed Forest)

Geographical Location The park is located in the eastern part of Hokkaido, 3km from Teshikaga in an area between Asahikawa and Shari. 43°46'N, 142°23'E.

Date and History of Establishment The area was designated as a National Park on 4 December 1934, under the Natural Parks law.

Area 90,538ha (1,402ha is Lake Kussharo)

Land Tenure No information

Altitude 500-1,503m

Physical Features The area is typified by the extinct twin volcanic peaks of Akan and Kussharo and the natural lakes of Lake Kussharo, Mashu, Akan and Panke. Mt. Me-Akan is the only active volcano and lakes in the area were formed in dammed basins of the volcano craters. Around Lake Akan are hot springs and small mud-ash basins. Lake Kussharo, with a perimeter of 57km, is reputed to be the largest caldera lake in the world (NCB, 1985).

Climate Subalpine climate which includes snow over the winter period (up to 40mm of snow waters per year). Average annual precipitation is 1200mm, whilst the mean minimum temperatures are in the region of -1°C.

Vegetation The subarctic flora of the region consists of vast tracts of conifer forests leading down to the lake fringes. Aquatic lake vegetation, includes the rare marimo *Cladophora sauteri* algae on Lake Akan. On Lake Kussharo the aquatic vegetation includes *Potamogeton crispus*, whilst fringing vegetation is represented by *Phragmites communis*, *Typha latifolia*, *Scirpus l. custris*, *Juncus setchuensis* and *Alnus japonica* (Scott, in prep.). Lake side woodland includes Azalea *Rhododendron* sp., birch *Betula* and red maple *Acer* sp. At higher altitudes are coniferous forests of pine *Pinus thundersii*, silver fir *Abies* sp., spruce *Picea*, and creeping pines *Pinus pumila*. The higher mountain slopes and many of the foothills are dominated by scree vegetation or open pasture (Sutherland and Britton, 1980).

Fauna The area is an extremely important nesting and feeding point for migratory birds. Up to 3,000 swans, including whistling swan *Cygnus columbianus* and whooper swan *C. cygnus* have been recorded at Lake Kussharo. Some 30,000 ducks visit the lake in mid-October (especially wigeon *Anas penelope*)(Scott, in prep.). Bird species recorded in the wooded habitats include white-tailed eagle *Haliaeetus albicilla*, osprey *Pandion haliaetus* and Siberian ruby throat *Erithacus calliope* (see Scott in prep. for bird species lists). Aquatic fauna includes rainbow trout *Salmo gairdneri*, lake salmon *Oncorhynchus* and pond smelt *Osmerus eperlanus*. Fish species in Lake Kussharo include *Hypomesus olidus*, *Cyprinus carpio* and *Ammodytes personatus* (see Scott in prep. for species lists).

Cultural Heritage The area is one of the centres of the Ainu culture. The Ainu way of life lingers on but is much endangered by the modern Japanese. Local legends abound and plants such as the marimo and also animals like the bear are even now revered. A lake monster "Kutchie" is supposed to haunt the waters of Lake Kussharo (Akan Tourist Board, n.d.; Sutherland and Britton, 1980).

Local Human Population No information

Visitors and Visitor Facilities Accommodation ranges from youth hostels and camp sites to modern hotels. Visitor centres are at Akan Kohan and Kawayu. Hot spring spas abound and other features include "hot sand" beaches at Lake Kussharo. Pleasure boats tour Lake Akan and angling is a common sport in the area. In winter there are skating and skiing facilities. Tourist festivals include the marimo fete on 10 October of every year. The traditional lifestyles of the Ainu people can be seen in the Ainu Kotan villages set up for the benefit of tourists (Sutherland and Britton, 1980).

Scientific Research and Facilities No information

Conservation Management In 1952 the marimo was designated a "special Natural Treasure" and subsequent projects include growing this plant in specially built tanks on Churusomshira island (Sutherland and Britton, 1980).

Management Problems In 1949 the marimo algae were severely endangered when the lake was used as a reservoir for electricity generation (Sutherland and Britton, 1980).

Staff No information

Budget No information

Local Administration No information

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Date July 1987

Ashizuru-Uwakai National Park (including 4 Marine Park areas: Tatsukushi, Okinoshima, Kashinishi and Uwakai)

Management Category V (Protected Landscape)

Biogeographical Province 2.02.02 (Japanese Evergreen Forest)

Geographical Location The Park is situated on the south-west promontory and coast of Shikoku Island, the smallest of the 4 main Japanese isles. The National Park extends from Ashizuri cape westward along the coast to Daido (Kochi Prefecture). A separate part of the Park continues along the coast (Ehime Prefecture) and includes the isles of Hiburi, Mai and Okino. 32°42'-33°20'N, 132°15'-133°01'E.

Date and History of Establishment Designated under Natural Parks Law of 10 November 1972 with development controlled by Art. 17, 18, 18-2 and 20. Special protection is afforded to six named families, one genus and three species of fish; three genera and 33 species of invertebrate; one genus and five species of seaweed. The Marine Park areas were designated variously when the Ashizuri area was a quasi National Park, on 1 July 1970. On the creation of the National Park, two further Marine Parks were designated (10 November 1972).

Area 10,967.5ha (107.3ha Marine Park Areas). Two zones exist: 83.8% (9,024.5ha) multiple-use land and 17.2% (1,882ha) wilderness area where the land is conserved for nature.

Land Tenure 3,880.9ha State land, 1,099.0ha public land, 5,925.7ha in private ownership.

Altitude Sea level to 1,065m (maximum depth of MPAs 20m)

Physical Features The Ashizuri promontory has many steep granite cliffs facing the Pacific Ocean and includes the Marine Park of Okinoshima. The Tatsukushi sector is an indented "ria" coast of shales and sandstones. The Daido coast has 140m granite cliffs with many caves and other erosional features. The western coast is also a "ria" formation with small inlets and islets, formed from the submergence of mountain valleys (includes Kashinishi and Uwakai Marine Parks). The Nametoko valley with its granite cliffs is famous for forests and waterfalls. The warm Kuroshio current influences the coastal and marine parks to give them a sub-tropical aspect. Water transparency is 20.25m. The coral reefs are located offshore in the Kuroshio waters (Marine Parks Centre, 1975; Sutherland and Britton, 1980).

Climate Temperatures vary from 27°C (August) to 8°C (January), with annual precipitation averaging 2545mm.

Vegetation The Park vegetation is dominated by a Palearctic flora and particularly broad-leaved sclerophyll forest. It occupies 3,350ha and consists of *Castanopsis cuspidata* var. *sieboldii*, *Quercus phylliraeoides*, *Q. acuta*, *Neolitsea thunbergii*, and *Camellia japonica* var. *spontanea* (IUCN, 1975). About 1,000ha consists of montane coniferous forest of fir *Abies firma*, red pine *Pinus densiflora*, hemlock *Tsuga sieboldii*, and Japanese cypress *Chamaecyparis obtusa*. Black pine *Pinus thunbergii* is particular common on the coast. Deciduous forest with beech *Fagus grenata* and *Firmiana platanifolia* occupies 310ha. There are also more open habitats with small communities of palms *Livistona subglobosa* and grasses such as *Sasa* spp., *Miscanthus sinensis* and *Arundo donax*. Several sub-tropical plants, including *Livistona*, *Chrysanthemum japonense* var. *ashijuriense*, *Mitrastemon yamamotoi* (Rafflesiaceae) and the large herbaceous fern *Angiopteris ligodiiifolia*, are at their northernmost limit in the Park and of biogeographical interest (IUCN, 1975; Sutherland and Britton, 1980). The marine flora is poor, mainly consisting of *Codium fragile*, *Sargassum serratefolium* and *Dictyopteris* (Marine Parks Centre, 1975).

Fauna Mammals include Japanese macaque *Macaca fuscata*, black bear *Selenarctos thibetanus japonicus*, raccoon dog *Nyctereutes procyonides viverrinus*, and rare Japanese otter *Lutra lutra whiteleyi* (Sutherland and Britton, 1980). Birds are represented by a large population of white-faced shearwater *Calonectris leucomelas*, copper pheasant *Syrnaticus soemmerringii scintillans*, ruddy kingfisher *Halycon coromanda major*, fairy pitta *Pitta brachyura nympha*, red-rumped swallow *Hirundo daurica japonica* and black paradise flycatcher *Terpsiphona atrocaudata* (IUCN, 1975). The marine fauna is composed of mixed sub-tropical and temperate elements, including fish such as the Apogonidae, Chaetodontidae and Ostracioidae. There is an abundance of scleractinian corals including large colonies of *Acropora*, especially at Okinoshima and well developed *Pavona decussata* at Tatsukushi. The Uwakai area has colourful alcyonarians such as *Nephthea chabroli*. Gorgonians include *Melithaea flabellifera* and *Anthoplexaura dimorpha*. Crinoids, starfish and sea-urchins are also present (Marine Parks Centre, 1975).

Cultural Heritage One of the most venerated Buddhist priests in Japanese history, Ku Kai, was born in north-east Shikoku (773 AD). To-day there are 88 holy places which commemorate Ku Kai on the Island (Sutherland and Britton, 1980).

Local Human Population Pearl oyster farms and crayfish nets are prevalent in the park fjords.

Visitors and Visitor Facilities 1.51 million visitors in 1972, 1.10 million of whom also visited the Marine Park Areas (Marine Parks Centre, 1975). Facilities include hotels, inns, picnic areas, access roads, nature trails, visitor centre, glass-bottomed boats at Tatsukushi and Awakai and an underwater coral observatory tower at Tatsukushi Marine Park. At Tatsukushi is an exhibition museum with 50,000 species of shell (Marine Parks Centre, 1975; Sutherland and Britton, 1980).

Scientific Research and Facilities Study of vegetation has been undertaken by the Environment Agency (1973).

Conservation Management The site has largely been designated for its scenic value.

Management Problems Cultivation, logging and hunting are at a fairly sustainable level but disturbance of soil and flora, particularly by plantation projects, is increasing. No contamination from freshwater drainage into the sea has yet been detected (IUCN, 1975).

Staff Total of 11 staff (ranger of the Environment Agency; 4 Prefectural officers, Kochi Prefectural Government; 6 patrol men, Kochi and Ehime Prefectural Governments) (IUCN, 1975).

Budget The park receives a share of the Environment Agency's annual subvention to National Parks (US\$700,000 in the mid 1970s); US\$13,500 was in the 1970s also provided annually by Kochi and Ehime Prefectural Governments (IUCN, 1975).

Local Administration Tosashimizu Ranger Office, Environmental Agency, Tosashimizu City, Kochi. Ashizuri Park Office, Kochi Prefecture, Tosashimizu City, Kochi.

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Date June 1987

Aso National Park

Management Category V (Protected Landscape)

Biogeographical Province 2.02.02 (Japanese Evergreen Forest)

Geographical Location The park is situated in the centre of Kyushu Island in the mountainous area of Mount Aso and Mount Yufudake. The nearest town is the resort of Beppu, within Kumamoto and Oita provinces. 33°18'N, 131°30'E.

Date and History of Establishment The National Park was created on 4 December 1934 under the Natural Parks law. All development within the park area is controlled under Articles 17, 18 and 20 of the law.

Area 72,492ha

Land Tenure No information

Altitude 936-1,592m

Japan

Physical Features The National Park consists of the central caldera volcanoes of Aso and the extinct Mt. Kiyu, as well as the Yufu tholoid volcanic zones in the north-east of the park. The ranges extend towards the hot spring resort of Beppu and are essentially surrounded by the agricultural plains of the Kurokawa river (NCB, 1985).

The caldera basin of Mount Aso is 16km East to West, 32km North to South and 80km in circumference. In the caldera centre is a group of five volcanic peaks amongst which Mt. Naka-dake (1,510m) is still active (other peaks are Neko-dake, Taka-dake (1,592m), Kishima-dake and Ebashi-dake). The eastern half of the volcano group is extremely rocky with many cliffs and precipices. Gorges include the Sensui-kyo chasm adjacent to Aso and the Takachiho gorge cut by the river Gokase. The north slope of Eboshi-dake is covered by gentle undulating and fertile grassy plains, Senri-ga-hama, of deep volcanic ash layers. On the southern slopes is a sandy volcanic ash plain, Suna-Senri. Over the millenia, the volcano has gradually eroded in successive upheavals followed by violent explosions and subsequent sinking. The present outer crater was formed approximately 130,000 years ago, although the area has been volcanically active for at least 30 million years. The first records of local eruptions were in 553 and 864 AD (Sutherland and Britton, 1980).

Climate Average annual temperatures approximate 15.9°C, with a mean minimum of 10.9°C. Annual rainfall figures average 1900mm.

Vegetation The National Park is essentially dominated by pastureland and alpine rocky slopes. Woodlands and scrub are restricted to a few areas such as the Kuju ridge where there are large tracts of deciduous broadleaf and *Rhododendron kiusianus* stands (Sutherland and Britton, 1980).

Fauna The fauna is essentially palearctic in origin, the avifauna including varied tit, copper pheasant, little cuckoo, Japanese bush warbler, quail, bullfinch and Japanese robin (*Parus varius*, *Phazianus soemmeffingii*, *Cuculus poliocephalus*, *Cettia diphone*, *Coturnix coturnix*, *Pyrrhula pyrrhula* and *Erithacus akahige*) (Kyushu Industrial and Transportation Company, 1963; for bird species list see Robinson, 1987). Japanese macaques *Macaca fuscata fuscata* have unusual hot spring bathing behaviour on the Takasaki hills (Sutherland and Britton, 1980; NCB, 1985).

Cultural Heritage No information

Local Human Population There are three main towns in the crater basin with a population of approximately 70,000 (Sutherland and Britton, 1980). The surrounding area includes ten hot spring resorts including Beppu. Much of the park itself is geared to traditional agriculture and livestock (horses and cattle) rearing. Farmers and hay-gatherers traditionally construct grass huts (Kusado-mari) in October when they migrate into the mountains to gather the hay for over-wintering livestock. Cultivated areas of bamboo and rice also abound (Sutherland and Britton, 1980).

Visitors and Visitor Facilities A railway line enters and almost totally circles the inside of the caldera. A toll road and cable cars rise to Mount Nakadake and sight-seeing tours are available throughout the park as are tourist trails and simple accommodation (NCB, 1985; Robinson, 1987).

Scientific Research and Facilities No information

Conservation Management The grassland areas of the park are repeatedly burnt to encourage spring herb growth (Sutherland and Britton, 1980).

Management Problems No information

Staff No information

Budget No information

Local Administration No information

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Date July 1987

Bandai-Asahi National Park

Management Category V (Protected Landscape)

Biogeographical Province 2.15.05 (Oriental Deciduous Forest)

Geographical Location The National Park is situated to the south-west of Sendai on central Honshu island. The nearest towns are at Yone Zawa, Shibata, Fukushima and Koriyama. The park consists of three separate blocks, those of the Asahi-Dewa Sanzan mountain range, Mount Iide and Mount Bandai - Lake Inawashiro. The entire park is located within Yamagata, Niigata and Fukushima prefectures. 37°57'N, 139°20'E.

Date and History of Establishment The National Park was created on 5 September 1950 under the Natural Parks law. Development is controlled under Articles 17,18, 18-2 and 20 of the law.

Area 189,582ha

Land Tenure No information

Altitude 100-2,128m

Physical Features The park is essentially a mountainous area dominated by the peaks of Mt. Gassan (1,980m), Mt. Iide (2,105m) and Mt. Azuma (2,024m). There are also a number of large lakes formed from damming of rivers by volcanic activity. Lake Inawashiro is the fourth largest lake in Japan. The Azumi volcanic zone is still active in the area around Mt. Issaiyo (Sutherland and Britton, 1980).

Climate Cold Siberian winds blowing from the Japan sea account for the deep snow that lies for much of the year. Average annual precipitation approximates 1000-1500mm.

Vegetation The vegetation in the park ranges from alpine mountain flora through to vast tracts of sub-alpine broadleaf forest. There are records of 110 varieties of alpine plants in the Asahi range including Japanese primrose, wild poppies and the rare Kuroyuri Japanese black lily (Sutherland and Britton, 1980). The heathland habitat is dominated by associations of *Miscanthus* grass which grades into cypress groves and forests of larch *Larix* and birch *Betula*. The Mt. Iide area is dominated by beech *Fagus* forests and many of the lakes are fringed by dense vegetation of *Azalea Rhododendron fauriae* and *Wisteria* spp. (Sutherland and Britton, 1980).

Fauna The fauna is little known but includes such species as black bear *Selenarctos thibetanus japonicus*, serow *Capricornis crispus*, macaque *Macaca fuscata fuscata* and various species of weasel, squirrel and flying squirrel (Sutherland and Britton, 1980; Robinson, 1987).

Japan

Cultural Heritage In the Asahi mountain range are the three holy mountains of Dewa Sanzan (Mounts Gassan, Yudono and Haguro). Rituals and pilgrimages are still practised by religious devotees. The area is also remembered for its volcanic eruptions. In 1888 up to 500 people lost their lives when Mount Bandai exploded after a 1,000 year dormancy period (Sutherland and Britton, 1980).

Local Human Population The majority of the population is settled below the mountain park boundary.

Visitors and Visitor Facilities The main activities in the park include hiking, mountaineering, pilgrimages and camping. Lake Inawashiro is a popular boating and camping resort. Toll roads give access to the slopes of Mount Bandai and ski facilities are available in the highlands (Sutherland and Britton, 1980; Robinson, 1987).

Scientific Research and Facilities No information

Conservation Management Mount Bandai is one of Japan's three most important bird habitats (Sutherland and Britton, 1980; Robinson, 1987), whilst Lake Inawashiro is listed as one of the 52 "very important" Japanese wetlands in the Draft Asia Wetlands Inventory (Scott, in prep.). Forestry exploitation is permitted within the park.

Management Problems No information

Staff No information

Budget No information

Local Administration No information

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Date July 1987

Chichibu-Tama National Park (Titibu-Tama)

Management Category V (Protected Landscape)

Biogeographical Province 2.02.02 (Japanese Evergreen Forest)

Geographical Location The park is located on Central Honshu island 50km north-west of Tokyo. The nearest main towns are Chichibu (10km) and Ome (2km). The park boundaries are found within the Nagano, Saitama, Gunma and Yamanashi prefectures as well as the Tokyo metropolitan district. 35°41'-36°02'N, 138°30'-139°14'E.

Date and History of Establishment The area was created as a national park on 10 July 1950: designated under the Natural Parks Law largely as a place of scenic beauty. Development is strictly controlled (Art. 17, 18 and 19 of Natural Parks Law). There are a series of zoned areas including core area "wilderness zones" and buffer zone "multiple use areas" where limited development is permitted.

Area 121,600ha (1,000ha special protected area)

Land Tenure 18,480ha state land, 64,070ha public land, 39,050ha private land.

Altitude 600-2,595m

Physical Features The park is located entirely within a mountainous area of Honshu. Within the boundaries there are over 20 mountain peaks all formed from paleozoic limestones, the oldest in Japan (Sutherland and Britton, 1980). The Chichibu and Tama mountain ranges reach a maximum altitude at Mount Kinpu (2,595m), Kokushi (2,592m) and Kobushi (2,483m) all within the extreme west of the park. These mountains are largely composed of diorite and granites. High rainfall levels over millions of years have resulted in steep eroded mountain sides and deep ravines such as Shoshenkyo gorge. The four main river systems originating in the mountains include those of Fuefuki, Tanba/Tama, Kawamata and Nakatsu/Arakawa. The topography of the park has traces of the scouring that occurred during the last Ice Age (IUCN, 1975; Sutherland and Britton, 1980; NCB, 1985).

Climate Temperatures vary from a mean for the hottest month of 20.6°C (August) to -1.8°C mean for the coldest month (January). Annual precipitation averages 1672mm. Snow falls during the mid-winter months.

Vegetation The palaeartic vegetation of the park varies from dense coniferous forests of Japanese cedar *Cryptomeria japonica* and cypress *Chamaecyparis obtusa*, in association with red pine *Pinus densiflora*, and the firs *Abies mariesii* and *A. veitchii*. Other species include spruce *Picea jezoensis* var. *hondoensis*, larch *Larix kaempferi* and dwarf or creeping pine *Pinus pumila*, along with hemlock *Tsuga diversifolia* and *Abies homolepis* var. *umbellata* (IUCN, 1975). The deciduous forests are typically composed of beech *Fagus crenata*, birch *Betula tauschii* and *B. ermanii* var. *communis*, water oak *Quercus crispula*, chestnut *Castanea crenata*, *Zelkova serrata*, horse-chestnut *Aesculus turbinata* and maple *Acer* (IUCN, 1975; Sutherland and Britton, 1980).

Fauna The rich woodland of the park is largely palaeartic in origin. Mammals include Asiatic black bear *Selenarctos thibetanus japonicus*, wild pig *Sus scrofa leucomystax*, Honshu sika *Cervus nippon centralis* and Japanese serow *Capricornis crispus* (Sutherland and Britton, 1980). The avifauna includes such species as Honshu copper pheasant *Syrnaticus semerlingii scintillans*, scops owl *Otus scops japonicus*, broad-billed roller *Eurystomus orientalis* and Japanese robin *Erithacus akahige* (IUCN, 1975; Sutherland and Britton, 1980).

Cultural Heritage An important shrine, Mitake, is reputed to have been founded some 1,200 years ago under the protection of the Tokugawashogunate. The treasure house contains many objects of national importance. A shrine festival, Hinode-matsuri, occurs in early May every year (Sutherland and Britton, 1980).

Local Human Population The foothills of the park are densely populated and the local people are largely dependent upon tourism and local agriculture for their livelihood. There are extensive terraced fields of buckwheat, rice and potatoes (Sutherland and Britton, 1980).

Visitors and Visitor Facilities The park has up to 8.39 million visitors a year largely due to its close proximity to Tokyo (IUCN, 1975). Access is extremely good and facilities include hotel, visitor centres, three museums, mountain and nature trails, mountain refuges, and camp and picnic sites. Most visitors come for outdoor activities such as hiking, boating and mountaineering, but visits to the shrines, man made lakes, Chichibu folk museum and Ohme railway museum are also popular (Sutherland and Britton, 1980).

Scientific Research and Facilities Investigations on the vegetation of the park area have been undertaken by the Environment Agency (IUCN, 1975).

Conservation Management No information

Japan

Management Problems Due to its close proximity to Tokyo the park is under pressure from a diversity of sources. Chief amongst the threats are the damming of two major rivers within the park (at Chichibu and Okutama) to provide hydro-electricity for the Tokyo area (IUCN, 1975). The cement factories are also having a major environmental impact on the park at the limestone quarries of Chichibu. The forests are exploited and the more remote areas are gradually being opened up with forest road construction (IUCN, 1975; Sutherland and Britton, 1980).

Staff 3 full-time staff (ranger employed by the Environment Agency; two officers of the Saitama Prefectural Government); one seasonal (warden, Nagano Prefectural Government) (IUCN, 1975).

Budget In the mid 1970s the budget consisted of a share of the annual allocation of US\$700,000 from the Environment Agency to the National Parks; plus US\$70,000 from Tokyo, Saitama, Yamanashi and Nagano Prefectural Governments (IUCN, 1975).

Local Administration Hikawa Ranger Office, Environmental Agency, Okutama town, Tokyo Prefecture, Japan.

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Date June 1987

Chubu Sangaku National Park (Northern Japan Alps)

Management Category V (Protected Landscape)

Biogeographical Province 2.02.02 (Japanese Evergreen Forest)

Geographical Location Chubu Sangaku is situated in north-central Honshu island in the Gifu, Nagano, Niigata and Toyama Prefectures. The park boundary starts 10km inland from the coast and follows the Hida mountain range down to Mount Norikura, 20-30km west of Matsumoto. 36°03'-37°54'N, 137°26'-137°52'E.

Date and History of Establishment The national park was created on 4 December 1934, and designated under the Natural Parks Law. Two zones exist, 62.6% (103,216.4ha) is a multiple use area, and 37.4% (63,551.6ha) is classed as a wilderness zone for wildlife protection.

Area 174,323ha (63,522ha special protected area)

Land Tenure 147,888ha state land, 12,870ha public land; 9010ha still in private ownership

Altitude 400-3,190m

Physical Features The tectonic mountain area of the "Japan Alps" (Hida range) comprises over 100 peaks including both active and extinct volcanoes and lava plateaus. The effects of past glacial erosion are very apparent, with snow-filled valleys, sheer cliff faces and such features as the 90km Kurobe gorge, to the west of Omachi, with its series of waterfalls surrounded by peaks of 2,500-3,000m. There are also the falls of Shomyo-no-taki which are 400m in height. The narrow V-shaped valleys of the Kamikochi valley, and elsewhere in the

park, were carved out by abundant rain and melting snow during the Japanese Ice Age. Hot springs are plentiful in the foothills as are numerous lakes such as at Taiso-ike, Myojin-ike and Sennin-ike (Sutherland and Britton, 1980).

Climate Temperatures range from 17.6°C (August) to -7.5°C (January); there is an annual average precipitation of 2703mm and snow is present until May.

Vegetation Primaeval forests of palearctic-type conifers clothe the mountain sides, mainly fir species *Abies homolepis*, *A. mariesii* and *A. veitchii*, as well as spruce *Picea jezoensis* var. *hondoensis*, Japanese cedar *Cryptomeria japonica*, hemlock *Tsuga diversifolia*, *Thuja standishii*, pine *Pinus parviflora* and *P. pumila*. and some larch *Larix kaempferi* (IUCN, 1975). Deciduous forests include water oak *Quercus crispula*, birch *Betula tauschii* and *B. ermanii* var. *communis*, beech *Fagus crenata* and Japanese judas or katsura *Cercidiphyllum japonicum*. Willow-like *Chosenia arbustiflora* (*bracteosa*) is also characteristic of the area. Alpine and sub-alpine vegetation above the tree line includes *Dryas octotala* var. *asiatica*, *Trollius japonicus*, *Orchis aristata* var. *immaculata*, *Platanthera makinoe*, *Gentiana algida*, *Veratrum stamineum* and *Empetrum nigrum* var. *asiatica* (IUCN, 1975). Raised bogs are also present at higher altitudes (Sutherland and Britton, 1980).

Fauna Characteristic species of mammal include Japanese macaque *Macaca fuscata fuscata*, Asiatic black bear *Selenarctos thibetanus japonicus* and rare Japanese serow *Capricornis crispus crispus* (Sutherland and Britton, 1980). Birds include a few golden eagles *Aquila chrysaetos japonica*, Hodgson's hawk eagle *Spizaetus nipalensis orientalis* and white throated needle-tailed swift *Chaetura caudacuta caudacuta*. Typical high montane and alpine species include ptarmigan *Lagopus mutus japonicus*, nutcracker *Nucifraga caryocatactes japonicus* and accentors *Prunella collaris erythopygia* and *P. r. rubida* (IUCN, 1975).

Cultural Heritage The mountain in the north of the park, Tateyama, was consecrated as sacred in 703 AD. It is one of only three sacred mountains in Japan, along with Nakuso and Fuji. An 8th century shrine is situated on the peak at Oyama. The mountain was first climbed professionally by Walter Weston, the father of Japanese mountaineering, in 1892. An annual ceremony to commemorate this British mountaineer is held at Weston Square, Kamikochi (Sutherland and Britton, 1980).

Local Human Population No information

Visitors and Visitor Facilities The park received 7.56 million visitors in 1972 (IUCN, 1975). Facilities in the park include hotels, inns, huts, campgrounds and picnic areas, an extensive network of nature and mountain trails, rock climbing and skiing facilities. There is access by mountain roads, cable cars and aerial tramways, as well as a visitor centre, national Vacation Village in the Norikura area and a mountaineering museum at Omachi town (Sutherland and Britton, 1980).

Scientific Research and Facilities Studies on the carrying capacity of the park have been undertaken by Professor Masami Eyama, Tokyo Agricultural University (IUCN, 1975). Studies of vegetation have been undertaken by the Environment Agency (NCB, 1985).

Conservation Management The park has largely been established for its recreational and scenic value and in the past the area has been protected by its sacred status.

Management Problems Environmental damage to the park includes several man-made lakes with hydroelectric barrages and installations. Lack of effective management has led to a seasonal overuse of tourist cars in the Kamikochi area.

Staff Eight full-time staff (a superintendent and five rangers from the Environment Agency plus two Toyama Prefectural officers); 39 seasonal staff (three patrol men, of the Niigata and Gifu Prefectures; 32 volunteer naturalists of the Toyama Prefecture; four naturalists of the National Park Association).

Japan

Budget In the 1970s the park received a share of the Environment Agency's annual subvention to National Parks (total US\$700,000), US\$68,500 annually from the Niigata, Toyama, Gifu and Nagano Prefectures and US\$2,000 from the National Parks Association (IUCN, 1975).

Local Administration Chubu Sangaku National Park Headquarters Office, Environmental Agency, Shimashima, Azumi Village, Nagano Prefecture, Japan. Ranger offices at Hirayu, Kamita Kara Village, and Tateyama Town; Ranger station at Azumi Village.

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Date June 1987

Daisen-oki National Park (including the Jodogaura, Shiro, Kuniga and the Shimane-Hanto Marine Parks)

Management Category V (Protected Landscape)

Biogeographical Province 2.02.02 (Japanese Evergreen Rainforest)

Geographical Location The park is situated in the northern section of the Chugoku district of Honshu Island. It consists of 6 separate parts; the Hiruzen highlands, part of Shimane peninsula (between Matsue and Mihonoseki, Izumo, Mount Sanbe and the two Oki Islands). 35°29'N, 133°04'E.

Date and History of Establishment The park was created on 1 February 1936 under the Natural Parks Law and was set up to protect the area for recreational use. The Marine Parks were established in 1972.

Area 31,927ha (the Marine Park Areas are 14.8ha, 7.3ha, 20.8ha and 7ha).

Land Tenure No information

Altitude 0-1,731m

Physical Features The park consists of volcanic origin rocks as typified by the extinct tholoid volcano of Mount Daisen (1,731m). Mt Sanbe (1,126m) is of importance for a rare type of alpine lake and is of further note for its steep rocky escarpments (Sutherland and Britton, 1980). The Shimane peninsula, lying parallel to the mainland, is joined to it at either end by sandbanks - at the western end by silt deposits laid down by the Hii and Kando rivers; at the eastern end by a sand spit, which is 3m wide and 20km long. The Oki Islands consist of the major island Dogo and a cluster of three smaller islands known as the "Dozen Group". The coastline is largely composed of igneous rock-like quartz porphyry (Marine Parks Centre, 1975). The park is variously affected by the Tsushima current systems.

Climate Average annual temperatures approximate 14.9°C, with mean for the coldest month of 8.7°C. Annual precipitation figures average 1990mm.

Vegetation On the coast the vegetation has been greatly altered by man. At higher altitudes are sub-alpine communities which include the nationally protected Kyaraboku yew *Taxus*, a dwarf endemic creeping tree. On the lower montane slopes are virgin forests of beech *Fagus crenata*, oaks *Quercus* sp. and maple *Acer*, as well as red pine *Pinus densifolia* (Sutherland and Britton, 1980). The natural vegetation of the peninsula also includes *Pinus* and *Quercus* (Sutherland and Britton, 1980; Robinson, 1987). The marine flora includes vast meadows of *Sargassum tortile*, *S. ringgoldianum*, *Eisenia bicyclis* and *Zostera marina* (Marine Parks Centre, 1975).

Fauna The wild life of the park includes bush warbler *Cettia diphone*, as well as numerous spring and autumn migratory species (see Robinson, 1987 for a bird list). The marine fauna is represented by such fish species as *Sebastes inermis*, *Girella punctata*, *Ditrema temmincki* and *Chromis notatus*. Other marine species include *Certonardoa semi-regularis*, *Melithaea flabellifera* and *Pseudo centrotus depressus* (Marine Parks Centre, 1975).

Cultural Heritage The park abounds in cultural heritage. One of the oldest Shinto shrines in Japan, the Izumo Taisha, is found on the Shimane peninsula near Matsue. It commemorates Okuninushi no Mikoto, the great God ruler of the Land. It is believed that here during the Tenth month of the lunar calendar all the Shinto gods congregate. The second oldest sanctuary in Japan is found at Mihonoseki, on the Shimane Peninsular, dedicated to seafarers. A famous 350 year old navigational pine tree still stands to this day. The Oki Islands in old times were used to exile important political prisoners (Sutherland and Britton, 1980).

Local Human Population The area surrounding the coast is well populated and centred in the towns of Hirata, Yonago and Matsue. Along the coastline itself are a number of fishing ports. Other industries include livestock rearing, tourism, forestry, rice agriculture and fruit orchards. Oki Island is renowned for its "shiitake" mushrooms and the sands from the iron-rich Hii river support a thriving swordsmith's craft (Sutherland and Britton, 1980).

Visitors and Visitor Facilities The Hiruzen highlands and the Oki Islands are popular for skiing, spas, mountaineering, camping, religious pilgrimages and boat excursions. Toll roads circuit the Daisen mountains and boats service the Oki Islands. Two glass-bottom boats are provided by a public corporation for tourist use (Marine Parks Centre, 1975). Accommodation is abundant in Matsue and other areas within easy reach of the park (Robinson, 1987).

Scientific Research and Facilities No information

Conservation Management No information

Management Problems No information

Staff No information

Budget No information

Local Administration No information

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Date June 1987

Daisetsuzan National Park

Management Category V (Protected Landscape)

Biogeographical Province 2.14.05 (Manchu-Japanese Mixed Forest)

Geographical Location The national park is located 100km to the east of Sapporo between Obihiro and Asahikawa, in the central part of Hokkaido. The park is approximately 60km by 55km in area. 43°13'-43°48'N, 142°19'-142°38'E.

Date and History of Establishment 4 December 1934 (designated by the Natural Park Law).

Area 230,894ha (inclusive of five special protected areas totalling 35,193ha; 84.3% (195,416.6ha) of the park is a multiple use area and 15.7% (36,512.4ha) is a wilderness area.

Land Tenure 224,794ha state land, 7,135ha public land

Altitude 300-2,290m

Physical Features Largest of all the Japanese National Parks, the area is called the "roof of Hokkaido" and consists of the Ishikari volcanic mountain range with three volcanic peaks including Mt. Tomuraushi, Mt. Asahi (2,290m) and Mt. Tokachi. The Ishikari highlands were formed from faulting and subsequent elevation thousands of years ago, which led to the formation of the Daisetsuzan range and plateau lands. The Daisetsuzan group consists of ten peaks and a great plateau formed by a volcanic crater of 2km diameter. The rivers within the park have many basalt gorges in their upper reaches (Sounkyo and Tenninkyo gorges have 200m cliffs with extensive exposures of rhyolite). Many hot springs occur in the piedmont zones around Shikaribetsu (Sutherland and Britton, 1980).

Climate Average temperatures vary from a mean of 20.4°C in August to a mean of -8.6°C in January; there is a mean total of 1,277mm of precipitation per year. Snow lasts until May/June.

Vegetation The vegetation of the park is essentially Palaearctic in character. Extensive coniferous forests on the mountain slopes rise to a high montane alpine flora with an arctic element. Forests are characterised by yezo spruce *Picea jezoensis*, red yezo spruce *P. glehnii*, white fir *Abies mayriana* and dwarf pine *Pinus pumila*. Deciduous forests consist of yezo water oak *Quercus crispula* var. *sachalinensis*, white birch *Betula tauschii*, *B. ermanii* var. *communis*, elm *Ulmus laciniata*, maple *Acer* sp., *Sorbaria* sp., and alder *Alnus maximowiczii* (IUCN, 1975). The montane area is rich in alpine species including dwarf shrub heath with *Empetrum nigrum* var. *japonicum*, *Rhododendron aureum*, *Gentiana nipponica*, *Prila cuneifolia*, *Phyllodoce caerulea* and *Therorhodon camschaticum* (IUCN, 1975; Sutherland and Britton, 1980).

Fauna Mammals include rare northern pika *Ochotona hyperborea yesoensis* in the alpine zone, Ezo chipmunk *Tamias sibiricus lineatus*, brown bear *Ursus arctos yesoensis*, Japanese macaque *Macaca fuscata fuscata* and uncommon Ezo sable *Martes zibellina brachyura* (IUCN, 1975). Birds include *Tridactylus inouei*, mountain-finch *Leucosticte arctoa brunneonucha*, grey bunting *Emberiza variabilis*, ruby throat *Luscinia c. calliope* as well as Kurile pine grosbeak *Pinicola enucleator urupensis* and red crowned crane *Grus japonensis*. Hazel grouse *Tetrastes banasia* is restricted to the alpine zone (Martins et al., 1980; Sutherland and Britton, 1980; Robinson, 1987).

Cultural Heritage Numerous Ainu legends refer to the spirits of the Daisetsuzan mountains.

Local Human Population The region is renowned for its state subsidised wine, rice, agriculture and forestry (Sutherland and Britton, 1980).

Visitors and Visitor Facilities There are estimates of 4.08 million tourists having visited the park in 1972 (IUCN, 1975). Facilities include hotels, inns, huts, campgrounds, picnic areas, mountain and nature trails and a "forest" museum. The area is particularly important for its ski resorts and hot spring resorts. Cable cars ascend the Kurodake peak and Mount Asahi from Yukomanbetsu (Robinson, 1987).

Scientific Research and Facilities Studies of vegetation have been undertaken by the Environment Agency (IUCN, 1975).

Conservation Management The area is one of the most important for alpine wildlife in the Japanese archipelago and is essentially managed for "conserving nature" (Sutherland and Britton, 1980). Management is made easier than for many of the other Japanese parks by the fact that it is a single entity and under 90% state ownership. The recreation areas and zones for logging and reforestation are restricted to the north-west and south-east periphery of the park. The main Daisetsuzan forests are completely protected from exploitation (IUCN, 1975; Ionescu *et al.*, 1985).

Management Problems Several hydroelectric barrages and installations have been built in the park (Sutherland and Britton, 1980).

Staff Two rangers (employed by the Environment Agency) and 21 seasonal patrol men (Hokkaido Prefectural Government) (IUCN, 1975).

Budget In the mid-1970s support came from the annual allocation by the Environment Agency to National Parks of US\$700,00. In addition US\$10,800 per annum came from Hokkaido Prefectural Government (IUCN, 1975).

Local Administration Yukomanbetsu Ranger Office, Environmental Agency, Yukomanbetsu, Higashikawa town, Hokkaido; Sounkyo Ranger Office, Environmental Agency, Sounkyo, Kamikawa town, Hokkaido.

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Date July 1987

Fuji-Hakone-Izu National Park

Management Category V (Protected Landscape)

Biogeographical Province 2.02.02. (Japanese Evergreen Forest)

Geographical Location The park is located on south central Honshu, west of Yokohama. The area consists of four main separate parts centred around Hakone and Gotenba. Fuji area: 35°14'-35°34'N, 138°32'-138°56'E; Hakone area: 35°10'-35°17'N, 138°57'-139°08'E; Izu peninsular area: 34°36'-35°10'N, 138°45'-139°09'E; Izu Seven Island area: Coshima, Toshima, Niiijima, Shikinejimo, Kozushima, Miyakejima, Mikurojima and Hachiojima 34°40'N, 139°00'E. 33°03'-34°48'N, 139°05'-139°51'E.

Japan

Date and History of Establishment The National Park was created on 1 February 1936, and designated by the Natural Parks Act (Protection of places of scenic beauty). All development is controlled within the Park under Articles 17, 18 and 20 of the Natural Parks Act. The park was enlarged in 1938, 1955 and 1964. Two zones exist 95.7% (117,042.7ha) multiple use areas and 4.3% (5,266.3ha) wilderness areas. The Izu islands were included within the park boundary in 1964 and immediately a zoning system was set up ("special protected areas" through to "normal" areas).

Area 122,686ha (7,951ha special protected area)

Land Tenure 21,958.7ha state land, 52,703.1ha public land; 47,647.2ha in private ownership

Altitude Sea level to 3,776m

Physical Features Mount Fuji, is the highest mountain in Japan (3,776m), and rises directly from the plains, dwarfing the surrounding foothills. The mountain is distinctly cone shaped and volcanic in origin, but has remained dormant since 1707 (the first recorded eruption was in 800 AD). Only one cone on the eastern rim shows any sign of activity at present, occasionally producing hot vapours. Landslides are common on the lower slopes, which are dotted with lava caves and scattered with magnetic rocks. The base of the mountain is marked by a number of lakes, and an interesting waterfall, Shiraito, which forms from an underground stream falling directly from an outlet in the cliff face. Mount Hakone (1,327m) 20-30km to the south-east is a highly eroded and worn down triple coned volcano. It is now extinct, but is rich in hot springs and possesses a caldera lake - Ashinoko (lake of reeds) on the plateau at 723m. This lake, which is 13 miles in circumference (7 sq.km) and 45m deep, is reported to never freeze. The rivers issuing from the lake are Hayakamo and Sukumo. The Amagi mountain range in the Izu peninsular (of which the coast and part of the mountain are in the park) was originally a volcanic island, but became joined to the mainland when the rocks of the area were uplifted and tilted. The highest area, Mt. Izu, is 1,407m high. The coast is lined with cliffs and has many marine caves. The Izu Island chain is a series of volcanic islands extending 185km southwards from Izu peninsular. One of the four active volcanoes, Miyake, has erupted 14 times since 1085 AD. Its most recent eruption was in 1983. The warm Kuroshio currents have a major influence on the environment of the Izu islands. Coral reefs occur at a number of locations, including the north-west coast of Miyake island (IUCN, 1975; Kangawa Prefectural Government, 1972; Sutherland and Britton, 1980; NCB, 1985).

Climate The climate varies from alpine in the mountains to subtropical warm temperate on the southern Izu isles. Annual temperatures vary from 22.9°C (Fuji-Hakone) and 27°C (Izu, Hachijo Islands) in August to 0.5°C (Fuji-Hakone) and 10.5°C (Izu, Hachijo Islands) in January. Annual precipitation is from 3231 to 3303mm, the Izu Islands being the wetter area (Miyake 3000mm). The temperature of the coastal waters around the Izu islands ranges from 14°C in February to 27°C in July. Snow falls on the mainland mountains during the winter period.

Vegetation The habitats of the park range from virgin forest to alpine vegetation above the tree line of 2,500m. Mount Fuji has virgin forests on its lower slopes, dominated by Japanese cedar *Cryptomeria japonica*, Japanese cypress *Chamaecyparis obtusa*, red pine *Pinus densiflora*, firs *Abies homolepis*, *A. veitchii*, hemlock *Tsuga diversifolia*, spruces *Picea polita*, *P. jezoensis* var. *hondoensis* and some larch *Larix kaempferi*. Deciduous forests include *Zelkova serrata*, wild cherry *Prunus serrulata* var. *spontanea*, *Cynoxylon japonica* and azaleas *Rhododendron japonicum*, *R. fauriae* (Kangawa Prefectural Govt., 1972; IUCN, 1975). The Izu peninsular has a flora similar to Hakone with its diversity of virgin forests of *Podocarpus macrophyllus*, Sewara cypress *Chamaecyparis pisifera*, black pine *Pinus thundersgii*, camphor tree *Cinnamomum camphora* and bamboo *Phyllostachys reticulata*. The Izu Seven Island area is represented by *P. thunbergii*, *Quercus glauca*, pasania *Castanopsis cuspidata* var. *sieboldi*, *Prunus lannesiana* var. *speciosa*, *Ilex crenata* var. *typica*, *Rhododendron tsusiophyllum*, *Camellia japonica* var. *spontanea* (Suzuki, 1956; Higuchi, 1973; IUCN, 1975; NCB, 1985). Colonising scrub species on recent lava flows include *Alnus sieboldiana* with *stachyurus praecox* var. *matsuzakii*, *Ficus erecta* and *Mallotus japonicus* (Moyer et al., 1975). Other typical species

are *Picea polita*, boxwood *Buxus microphylla* var. *japonica* and unique Ericaceous *Tsusiophyllum tanakae* (IUCN, 1975). Several of the islands are noted for the spider lily *Crinum asiaticum* communities as well as *Carici-Castanopsisietum sieboldii* associations of *Castanopsis* and *Machilus*. On Mt. Hakone, the caldera lake is found on a grassy plateau, with *Cryptomeria* beside the lake. 518 species of vascular plant have been recorded on Miyake island (Suzuki, 1956) of which 21 species or varieties are endemic to the Izu archipelago. More than 100 species of tropical marine algae have been found at Miyake-jima (Moyer *et al.*, 1985).

Fauna The largely palaeartic type of mammal fauna includes Japanese macaque *Macaca fuscata fuscata*, various bats Chiroptera, Japanese dormouse *Glirulus japonicus*, wild pig *Sus scrofa leucomystax*, and Honshu sika *Cervus nippon centralis*. The bird fauna within the park is very diverse. On the slopes of Mt. Fuji typical breeding species include Siberian bluechat *Tarsiger cyanurus*, nutcracker *Nucifraga caryocatactes* and eastern crowned willow warbler *Phylloscopus occipitalis* (Martin *et al.*, 1980; also see Robinson, 1987 for a species list). On the shore of Lake Ashi the most representative species are yellow-throated bunting *Emberiza elegans*, Latham's snipe *Gallinago hardwickii* and Japanese copper pheasant *Phasianus soemmerringii* (Martin, *et al.*, 1980). Other species include *Butastur indicus*, Japanese sparrowhawk *Accipiter gularis* (IUCN, 1975). The Izu islands are the chief breeding-site for Japanese auk or murrelet *Synthliboramphus wumizusume* (IUCN, 1975). The islands also possess Japanese woodpigeon *Columba janthina* (a scarce species with a very limited range), Pygmy woodpecker *Dendrocopos kizuki matsudairai*, paradise flycatcher *Terpsiphone atrocaudata* and Seven Islands thrush *Turdus celaeonops* (Ionescu *et al.*, 1985). The southern Izu islands are also the only known breeding area for Izu island thrush *Turdus celaeonops*, Ijima willow warbler *Phylloscopus ijimae* and one of the last sites for short-tailed albatross *Diomedea albatrus* (Martin *et al.*, 1980). The herpetofauna of the Izu isles though poor includes an endemic *Eumeces okadae*, and on the mainland also possess snake *Elaphe quadri virgata* (Moyer *et al.*, 1985). Miyake-jima is the northern most area for coral in Japan. Some 91 species from 44 genera of shallow water scleractinian corals have been identified. The dominant families are the Faviidae (23 species), Acroporidae (17 species) and Poritidae (ten species). (Moyer *et al.*, 1985). Reef fish include six endemic species (4 Callioymidae and two Soleidae) which are dependent upon a habitat of mixed coral and relatively coarse coral and volcanic sands and/or rubble (Moyer *et al.*, 1985). The fish fauna of the Izu archipelago is extremely diverse. There are 19 species of cardinal fish (Apogonidae), 35 species of damsel fish (Pomacentridae), 22 species of butterfly fish (Chaetodontidae) and 13 species of angel fish (Pomacanthidae). The endemic fish species include the garden eel *Gorgasia japonica* (IUCN, 1975; Moyer *et al.*, 1985; Wells pers. comm., 1987).

Cultural Heritage Mount Fuji is one of the three most sacred mountains of Japan. Its name is derived from *fuchi*, "fire", in the aboriginal Ainu language. The Sengen shrine built at its summit was constructed in 1604 and still represents the centre of the Fuji-ko cult for two million pilgrims. Other temples include the Saunji temple, built in 1521, the Hakone shrines of 757 AD and the 1293-1295 AD Buddha carved into the cliff-face at Shogin-ike near Mt. Futago (Sutherland and Britton, 1980).

Local Human Population The park has a fairly high resident human population, the densest areas being around Gotenbam Odawara, Ito and Numayu on the perimeter. The economy of the area is based upon tourism, forestry, agriculture and livestock rearing. Fishing is an important industry on the coasts and on the Izu islands. All of the main islands are inhabited (Sutherland and Britton, 1980).

Visitors and Visitor Facilities There were records of over 20.55 million visitors in 1972, the highest number of people visiting any national park in the world (IUCN, 1975; Sutherland and Britton, 1980). For this reason there is an enormous range of facilities including hotels, inns, camp and picnic grounds, mountain and nature trails, cable cars at Hakone, Hakone open air museum, visitor centres, Owakidani natural history museum, Tokaido historic craft museum, a botanic garden of native plants, sightseeing boats, aquariums, golf courses and ice rinks (Sutherland and Britton, 1980; Robinson, 1987). The major Seven Islands can be reached by sea or air from Tokyo. Fuji is officially open to the general public only during July and August to reduce tourist pressure. Oshima and Hachijo islands are popular resorts for deep sea

Japan

fishing, golf and horseback riding. The smaller islands are almost inaccessible to visitors except Miyake-jima - "bird" island which is visited for its avifauna (Sutherland and Britton, 1980; Robinson, 1987).

Scientific Research and Facilities A diversity of studies have been undertaken within the park such as vegetation surveys by the Environment Agency (1973), continuous meteorological observations at the Mt. Fuji weather station, environmental impact assessment of road construction, 1973-75, by the Nature Conservation Society on behalf of the Environment Agency and ornithological surveys by the Wild Bird Society of Japan (Higuchi, 1973). Studies of coral and the marine environment have been undertaken by the Tatsuo Tunaka Memorial Biological Station on Miyake islands (Moyer *et al.*, 1985).

Conservation Management Although set up largely for its recreational value the park is important for protecting the unique wildlife of the area. On the Izu archipelago are unique terrestrial and marine environments with at least 21 species or varieties of endemic plant, a further four species are common on the archipelago (but extinct on the main islands of Japan) and there is also a rare woodland association (*Castanopsis-Machilus* forest). There are two endemic bird species on the Izu archipelago (Izu island thrush and Ijima willow warbler), threatened Japanese wood pigeon and endangered short-tailed albatross. The area also has some of the highest bird population densities in Japan. The marine environment is also unique. Although at a temperate latitude the islands' marine flora and fauna are characterised by a predominantly tropical element. Miyake-jima represents the highest known latitude at which coral reef development has been recorded and in the area there are *at least* eight endemic species of reef fish (Moyer *et al.*, 1985). Proposals have been made for the establishment of a bird sanctuary and marine park on Miyake-jima. The bird sanctuary, proposed by the Wild Bird Society of Japan would be the first of a network in the country (Sutherland and Britton, 1980; Moyer *et al.*, 1985).

Management Problems The dense population of the region, ease of access and extreme pressure from tourists present many problems to the mainland park around Fuji-San. The Izu islands are also threatened. They are becoming increasingly affected by deforestation and re-afforestation by *Cryptomeria japonica*. In 1986 permission was granted for the construction of a military airport at the centre of a proposed bird sanctuary "wilderness area" on Miyake-jima. The impact upon the environment is believed to include disturbance of the endemic breeding birds and soil run off killing the fringing coral reefs. The permission for establishing the runway may seriously undermine the concept of the National Park system in Japan (Moyer *et al.*, 1985).

Staff In 1975 there were 33 full-time staff (a superintendent and seven rangers of the Environment Agency; 18 Prefectural officers of the Tokyo and Kanagawa Prefectural Governments; seven patrol men of the Kanagawa Prefectural Government); 18 seasonal staff (14 patrol men of the Shizuoka and Yamanashi Prefectural Governments; four naturalists of the Kanagawa Prefectural Government) (IUCN, 1975).

Budget In the 1970s the National Park received a share of the Environment Agency's annual subvention to National Parks (total US\$700,000) and US\$100,000 from the Tokyo, Kanagawa, Shizuoka and Yamanashi Prefectural Governments (IUCN, 1975).

Local Administration Fuji-Hakone-Izu National Park, Headquarters Office, Environment Agency, Kojiri, Hakone Town, Kanagawa Prefecture. Ranger offices at Funatsu, Summit of Mount Fuji, Namazu and Shimoda; Hakone Administrative office at Kojiri, Hakone Town; Forestry branch office at Yoshida.

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Date June 1987

Hakusan National Park

Management Category V (Protected Landscape), IX (Biosphere Reserve)

Biogeographical Province 2.02.02 (Japanese Evergreen Forest)

Geographical Location The site is located in Gifu, Ishikawa, Toyama and Fukui prefectures 30km south-east of Kanazawa and 100km north of Kyoto. The park is bounded by the Sho river on the east, the Tedoru river on the west and Ono basin and Kuzuryu upper stream in the south (North-central Honshu). 35°58'-36°22'N, 136°32'-136°53'E

Date and History of Establishment The National Park was created on 12 November 1962, and designated under the Natural Parks Law of 1957. Development is controlled by Articles 17, 18 and 20 of the Natural Parks Law. The core area, a "special protection area" (SPA) is surrounded by the peripheral buffer zones of the "special area" and "ordinary area". It was accepted as a Biosphere reserve in 1980.

Area 47,683ha (18,080ha core area (SPA)). Two zones: 62.3% (29,322ha) for multiple-use and 37.7% (18,080ha) as a wilderness zone.

Land Tenure 31,670ha state land, 1,372ha public land, 14,369ha in private ownership. Up to 14% of the core area is under private ownership compared with 31% in the buffer zone.

Altitude 170-2,702m

Physical Features The area consists mainly of highlands forming the backbone of the Hokuriku district. It is dominated by Mount Hakusan (2,702m), a tholoid volcano with 8 craters near the summit. The area is rich in lake and pond habitats. Senjaga lake in one of the summit craters is unique for being the sole lake in Honchu that is frozen all year round (Sutherland and Britton, 1980). The geology of the area is very complex and essentially

Japan

volcanic in origin. The land consists mainly of the Tedor layer, representative of the Jurassic period of the Mesozoic. The land also consists of such igneous rocks as hornblende andesite, pyroxene andesite and quartz trachyte (IUCN, 1975; Biosphere nomination, 1980; Sutherland and Britton, 1980).

Climate Temperatures at the foot of Mount Hakusan vary from 24.3°C in August to 0°C in January. The monthly minimum and maximum temperatures at Shiramine village are -3.3°C and 3.4°C in January and 28°C in July. Precipitation averages 3493mm per year, much of which is in the form of heavy snowfalls. The region has some of the highest snowfall figures in Japan, with up to 243cm per year.

Vegetation The park exhibits distinct altitude zonation of the vegetation ranging from warm temperate to alpine zones. Coniferous forests surround the base of the mountain dominated by firs *Abies mariesii* (of considerable age), *A. veitchii* and *A. homolepis*, pines *Pinus densiflora*, *P. parviflora* and Japanese cedar *Cryptomeria japonica* along the Tedor river. Deciduous forest or woodland of two types are also present. The cool temperate zone woodland comprises mainly beech *Fagus crenata*, water oak *Quercus crispula* and poplar *populus maximowiczii*. By comparison in the sub-alpine zone the communities are dominated by birch *Betula ermanii* var. *communis*, mixed with fir *Abies mariesii* and *Tsuga diversifolia*. *Rhododendron fauriae* and *Prunus nipponica* (IUCN, 1975). The alpine flora of the summits contains stands of creeping pine *Pinus pumila* and is rich in such species as *Primula hakusanensis*, *Geranium yezoense* var. *nipponicum*, *Anemone narcissiflora*, *Orchis aristata* var. *immaculata*, *Fritillaria camschatcensis* and *Veratrum stamineum* (IUCN, 1975). The non woodland steep alpine scree slopes and "snowslip" lands are refuge for the unique "Altherbosa" (Sutherland and Britton, 1980).

Fauna The rich mammal fauna in the park includes a large population of Japanese macaque *Macaca fuscata*, Asiatic black bear *Selenarctos thibetanus japonicus*, Honshu sika *Cervus nippon centralis* and Japanese serow *Capricornis crispus*. The avifauna includes golden eagle *Aquila chrysaetos japonica* (uncommon in Japan), Hodgson's hawk eagle *Spizaetus nipalensis orientalis* (a sub-species considered uncommon), white-throated needle-tailed swift *Chaetura caudacuta*, broad-billed roller *Eurystomus orientalis calonyx*, great spotted woodpecker *Dendrocopos major orientalis*, and montane or alpine species such as nutcracker *Nucifraga caryocatactes japonicus*, alpine accentor *Prunella collaris erythropygia* and *P. rubida*. Rock ptarmigan *Lagopus mutus* is believed to be extinct in the area (IUCN, 1975; NCB, 1985).

Cultural Heritage The Mount Hakusan is considered to be one of the three most sacred mountains of Japan.

Local Human Population There are no permanent habitations on the mountain itself but on the foothills are small villages of the traditional Gassho-zukuri style. The total population of the area in the mid 1970s was in the order of 30,000 (IUCN, 1975; Sutherland and Britton, 1980).

Visitors and Visitor Facilities There was an average of 460,000 visitors to the National Park in 1972 (IUCN, 1975). Tourist numbers here reflect the difficulty of access and limited facilities in the area. The facilities are essentially seasonal and include inns, huts, camp and picnic grounds, mountain and nature trails and visitor centres. Climbing is one of the most popular activities, and a specialised centre is present for their needs.

Scientific Research and Facilities Hakusan Nature Conservation Centre is located at Chugu hot springs, Yoshinodani, Ishikawa Prefecture. The ethology of Japanese macaque *Macaca fuscata fuscata* has been studied by the Primate Research Institute and Japan Monkey Centre (Kyoto University) since 1962. Studies have also been undertaken on serow *Capricornis crispus* as part of the IBP programme (1966-70) (IUCN, 1975). The Hakusan Nature Conservation Centre was established in 1974 to study aspects of botany, climatology, folklore and mammal ecology (Sutherland and Harris, 1980).

Conservation Management In the past the mountain was well protected by its sacred status. Currently access is still very difficult and few roads have been built within the park itself. The mountain is officially open only from mid July to mid August to restrict visitor numbers (Sutherland and Britton, 1980).

Management Problems Road construction for forestry (Sutherland and Britton, 1980)

Staff There is a total staff of at least 22 (a ranger employed by the Environment Agency; 16 employed by the local Prefectural offices and Ishikawa Prefectural Government; plus five patrol men of the Ishikawa and Fukui Prefectural Governments) (IUCN, 1975).

Budget In the 1970s the National Park received a share of the Environment Agency's annual subvention to National Parks (US\$700,000) in addition to US\$76,000 provided by Ishikawa, Gifu and Fukui Prefectural Governments (IUCN, 1975). By 1978 the budget had increased to 800,000 Yen.

Local Administration Ichinose Ranger Office, Hakusan National Park, Shiramine-mura, Ishikawa-gun, Ishikawa prefecture 920-25. (Summer).

Ichinose Ranger Office, Hakusan National Park, 8-34 Shiramine, Shiramine-mura, Ishikawa-gun, Ishikawa prefecture 920-25. (Winter).

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Date July 1987

Iriomote National Park (includes Yaeyama Marine Park, 4 Marine Park areas, and Sakiyama Bay Nature Conservation Area)

Management Category V (Protected Landscape)

Biogeographical Province 2.41.13 (Ryukyu Islands)

Geographical Location The park is located in the southernmost islands of the Ryukyu archipelago in the South China Sea, 1,200km south of mainland Japan (Okinawa prefecture). It consists of Iriomote island, the islands of Ishigaki, Kabama, Taketomi, Kuro and Aragusuku and the surrounding marine zone covering the central reefs. 24°12'-24°25'N, 123°40'-124°06'E

Date and History of Establishment The site is protected as a place of scenic beauty, the national park being created on 15 May 1972, under Articles 17 and 20 of the National Parks law. The greater part is designated as a wilderness area, but there are also multiple-use areas and a marine park area, Yaeyama (established 1 July, 1977). The Sakiyama Nature Conservation area, a strict marine reserve, was designated in 1983 under the Nature Conservation law of 1982. The national park includes four marine park areas between Iriomote and Ishigaki. There are also four conservation sites designated under the law for the protection of cultural properties and these include Hoshidate relict coconut palm grove, Nakagawa, Funauro and Otomi protected plant communities (Barber *et al.*, 1984). The Iriomote wild cat

Japan

has been designated as a "special natural monument". Proposed special areas total 9,980ha and proposed ordinary areas 34,626ha; currently the entire designated area is 12,506ha (Nature Conservation Bureau, 1985).

Area 12,506ha. Yaeyama Marine Park is 213.5ha. Sakiyama Bay Nature Conservation area covers 12.8ha.

Land Tenure 9,000ha state land; the remainder is partly public land and partly still privately-owned.

Altitude Sea level to 425m

Physical Features Iriomote is Japan's southernmost National Park. It consists of a number of sedimentary rock islands and surrounding coral reef and marine areas. The island of Iriomote, of tertiary sandstones and shales, is largely made up of low mountains of 300-400m. The soils are derived from sandstones which break down to form a very fine clay. Water resources on Iriomote include the Urauchi river which gives rise to the waterfalls of Mariyudo and Kanpira (IUCN, 1975; Barber *et al.*, 1984). An important feature of the park is a 20km long, 15km wide coral reef, stretching between Iriomote and Ishigaki islands. The reef, Shiraho, is the largest in Japan (IUCN, 1975, WWF-Japan, 1986).

Climate The islands are located within the tropical typhoon zone with temperatures varying from 28.7°C (July) to 17.4°C (January). There is a recorded 2630mm annual precipitation; the rainy season being in May/June, whilst the main wet season (November to February) is preceded by typhoon winds in September to November.

Vegetation The islands are thickly covered with broad-leaved evergreen subtropical forest in which *Quercus stenophylla*, pasania oak *Castanopsis cuspidata* var. *sieboldii*, *Neolitsea thunbergii*, *Distyllum racemosum* and *Pandanus tectorius* var. *liukuensis* are dominants and *Ptychosperma elegans* and *Nypa fruticans* palms are also characteristic (IUCN, 1975). Coastal mangrove forests fringe the islands and include *Avicennia marina*, *Rhizophora mucronata*, *Barringtonia racemosa*, *Bruguiera conjugata* and *Kandelia candel*. The humid area around the Mariyudo falls are rich in cycads and ferns. The marine zone between the shore and coral reefs include sea grass zones and algae zones. The seagrasses include *Cymodocea rotundata* and *Thalassia hemphillii* and the algae are dominated by *Caulerpa racemosa* and other green seaweeds (IUCN, 1975; Scott, in prep.).

Fauna Mammals include the rare flying fox *Pteropus dasymalus yayeyamae*, Iriomote wild cat *Mayailurus iriomotensis* (only discovered in 1965) and *Dugong dugong* (Imaizumi, 1974). The dugong is classified as vulnerable in the Red Data Book. More common mammals include Ryukyu dwarf boar *Sus scrofa ryukyuanus*. Birds include streaked shearwater *Calonectris leucomelas* (on Nakanouganjima), eastern reef heron *Egretta sacra*, cattle egret *Bubulcus ibis coromandus*, purple heron *Ardea purpurea manilensis*, crested serpent eagle *Spilornis cheela perplexus* (considered uncommon), Japanese fruit pigeon *Columba janthina stejnegeri* (also uncommon), pygmy woodpecker *Dendrocopos kizuki orii* and Ryukyu robin *Erithacus komadori subrufa* (Robinson, 1987). Other uncommon species include loggerhead turtle *Caretta caretta*, *Cuora flavomarginata* and "habu", a poisonous snake endemic to the Ryukyu and Amami islands (IUCN, 1975; Sutherland and Britton, 1980). Coral communities include 250 species, dominated by zones of *Acropora porites*, *Montipora foliosa* and *Heliopora*. Blue coral *Heliopora coerulea* is restricted to the 5km Shiraho reef. Associated reef fish include 102 species of 62 genera, including a new species of *Heliopora* coral dwelling goby fish, *Pleurosicya* (Muzik, 1985; Matsuda, 1986; Senou, 1986; Suzuki, 1986; Xasumoto, 1986).

Cultural Heritage Traditional fishing boats, *sabani*, are characteristic of the Iriomote archipelago (Sutherland and Britton, 1980).

Local Human Population The islands are sparsely populated. In the early 1980s there were 1,500 people on Iriomote (300 on Taketomi) (Sutherland and Britton, 1980). There is only one main road on Iriomote, along which the main settlements are distributed. Most of the inhabitants are involved in tourism, fishing or subsistence farming. The agriculture, of sugar cane growing and rearing of beef cattle, is largely subsidised by the Government. Rice is grown extensively (Sutherland and Britton, 1980; NCB, 1985).

Visitors and Visitor Facilities There were 30,000 visitors to the park in 1972. Access is by boat from Okinawa and hovercraft from Ishigaki Island, both of which are served by air from Japan's main islands. Tourism is currently low key in the form of day trippers from Ishigaki. Facilities are few in the areas outside of the park and include a few "pensions", small hotels, a camp site and inns on Taketomi Island. There are a number of visitor centres within the marine park area those of Taketomijima, Takidonguchi, Shimobishi and Kuroshima Kyanguchi (Sutherland and Britton, 1980; NCB, 1985; Robinson, 1987).

Scientific Research and Facilities There have been extensive studies of vegetation and coral ecology by the Marine Parks Centre and by the Environment Agency since 1972. Scientific facilities include the Yaeyama Marine Park Research Station on Kurishima. A number of studies have been undertaken on the ecology and status of the Iriomote wild cat since it was "discovered" in 1965 and in 1975 a breeding farm was established. In 1983 the Environment Agency started a three-year investigation to identify the wild cat's distribution for future effective protection (Barber *et al.*, 1984).

Conservation Management The National Park plan indicated that the main priority at Iriomote is the protection of the evergreen forest, coral and mangrove for the conservation of the different ecosystems (Anon., 1972). Park policy is to avoid encouraging high numbers of tourists and prohibits large scale tree felling. Of major importance is the protection of endemic Iriomote wild cat, found along the Urauchi river, of which there are estimates of only 30-40 individuals surviving, and also the protection of blue coral *Heliopora coerulea* noted in Appendix II of CITES and unique in Japan.

Management Problems The park is currently under threat from a diversity of different human activities. One of the greatest threats to the Park's water supply is the proposed construction of a dam on the river Shira (Barber *et al.*, 1984). Road construction is damaging and increasing pressure on the centre of Iriomote island. On 13 July 1985 the general assembly of Okinawa prefecture voted for the building of a new international airport on the main coral reefs off Ishigaki island just beyond the park limits (Muzik, 1985). The existing coral reefs throughout the park are also being seriously damaged by tourist trampling and boat anchors. Further damage has been caused by infestations of *Acanthaster planci* over the last decade (Muzik, 1985). In 1969 the IUCN requested that the Ryukyuan Government restrict the damaging local industry of felling primary forest. The industry was largely halted when the area was designated as a national park but extensive cattle grazing and timber felling for local needs are still adversely affecting the ecosystem (Barber *et al.*, 1984).

Staff There is a total of three staff (Superintendent, two rangers, Environment Agency) based in Ishigaki.

Budget The park receives a share of the annual allocation of the Environment Agency to National Parks (US\$700,000).

Local Administration Iriomote National Park Headquarters Office, Environmental Agency, Ishigaki City, Ishigaki, Okinawa Prefecture, Japan.

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Date July 1987

Ise-Shima National Park

Management Category V (Protected Landscape)

Biogeographical Province 2.02.02 (Japanese Evergreen Forest)

Geographical Location The park is located on the southern coast of Honchu island near Nagoya. The main town is Ise-shi next to the great Ise shrines on the Shima peninsula. The park is located in Mie prefecture and extends from the estuary mouth of the Isuzu river right around the coast, including the Toshijima archipelago, to the Gokasho bay west of Hamajima. A marine zone encircles the entire coastline. 34°29'N, 136°41'E.

Date and History of Establishment 20 November 1946

Area 55,549ha

Land Tenure No information

Altitude 0-529m

Physical Features The park consists of a very indented rias coastline, dotted with islets on the Pacific Ocean coast and a number of large bays. The highest point is Mt. Maeyama (529m) in the more hilly area of the Shima peninsula. At its foothills are some of the tributaries which form the Isuzu river. Its estuary opens into a myriad of small wooded islets. The coastal waters are warmed by the black current of the Pacific (Sutherland and Britton, 1980).

Climate Typhoons tend to occur about September and the total annual rainfall averages as much as 2000mm. Mean temperatures over the year are in the order of 16.3°C.

Vegetation The bays are dotted with pine *Pinus* sp. clad islands and the shores are covered with sub-tropical plants (Sutherland and Britton, 1980).

Fauna No information

Cultural Heritage In the park is the Ise shrine, the most ancient and sacred of the 80,000 Shinto shrines in Japan. It is here that Amaterasu Omikami, the sun goddess, from whom the Imperial family traditionally claim descent, is enshrined. The shrine was established around

the 4th century AD and the wooden shrine buildings razed to the ground and rebuilt every 20 years. The first renewal was carried out in 690 AD, yet the architecture has remained the same from that date onwards (Sutherland and Britton, 1980).

Local Human Population The population is centred in the larger towns and ports such as Toba, Ise-shi, Isobe and Kashikojima. A large proportion of the population is involved in the cultivation of pearls in the Toba area (Sutherland and Britton, 1980).

Visitors and Visitor Facilities The park is of national importance for its holy shrines centred around Ise-shi. At nearby Toba island 1.3 million tourists annually visit the Mikimoto working pearl farm and museum. There are a diversity of recreational facilities including boating, hiking and bathing. Hotels, hostels and youth hostels are available in the larger towns and easily reached by rail or road (Sutherland and Britton, 1980).

Scientific Research and Facilities No information

Conservation Management The park has largely been established to conserve the traditional landscape of the region.

Management Problems Pollution is threatening the pearl farms and presumably the other marine fauna and flora (Sutherland and Britton, 1980; NCB, 1985).

Staff No information

Budget No information

Local Administration No information

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Date July 1987

Joshinetsu Kogen National Park (includes Shiga Highlands Biosphere Reserve)

Management Category V (Protected Landscape) IX (Biosphere Reserve)

Biogeographical Province 2.15.05 (Oriental Deciduous Forest)

Geographical Location The park is located in the Togakushi and Shiga highlands of central Honchu, 20km north-east of Nagano (north-west of Tokyo). It consists of two parts, the larger is roughly crescent-shaped and runs from Mt Tanigawa near Numata in the east to Karuizawa in the south. The second part of the Park is located 20km to the west of the Shiga Park boundary and consists of the Togakushi highlands. 36°43'N, 138°30'E.

Date and History of Establishment The site was created as a National Park on 7 September 1949. The "special area" and the "ordinary area" constitute the buffer zone where timber production and tourist development is permitted.

Area 189,028ha (1,000ha of the park is a "special protection" core area in the Shigo highlands).

Land Tenure 70% of the Shiga area is state owned. The core area is 100% private land.

Altitude 800 - 2,542m

Japan

Physical Features The topography varies from smooth rolling highland to craggy and boulder-strewn volcanic terrain. The park covers a district where three volcanic zones converge (the Chokai, Nasu and Fuji chains) resulting in 70 volcanoes and 1,000 hot springs. Mt Asama at 2,542m is Japan's tallest active volcano. The Mt Shirane region consists of a group of green volcanic rocks called "green tuff" and other hypabyssal or plutonic rocks. Andesite is also present. The volcano last erupted in 1927 and 1932. The volcanic lake of Mt Shirane is reputed to be the most acid lake in the world with a pH of 0.8 (Sutherland and Britton, 1980; NCB, 1985).

Climate The annual mean temperature at Maruike (1,480m) is 5.3°C, ranging from -11.8°C (January) to 21.1°C (August). Annual precipitation averages 1900mm, with a snowfall season between November and April (maximum falls of 2.5mm have been recorded).

Vegetation A typical vertical zonation of vegetation occurs from barren rocky peaks above the tree level, descending through an alpine zone to deciduous woodland at low altitudes. The vegetation surrounding the volcanic peaks consists of the grass *Sasa albomarginata* and low shrubs of *Sorbus commixta* and *Rhododendron degronianum*. More xerophytic species are also found here including *Deschampsia flexuosa* and *Sasa kurilensis*. Pond and swamp vegetation includes moorland species such as *Andromeda polifolia*, *Inula ciliaris*, *Alnus* sp. and *Salix reinii* (IUCN, 1975; Robinson, 1987). At the height of 1,500m, virgin high altitude woodland communities include mixed conifers such as *Tsuga diversifolia* and *Abies mariesii* (NCB, 1985). At lower altitudes are broad-leaved forests of *Fagus crenata* mixed with birch *Betula ermani*, larch *Larix* sp. and azalea *Rhododendron* sp. (NCB, 1985). The woodland below 1,500m has been disturbed by man and is essentially secondary in origin. Birch dominates the former deforested areas at higher altitudes and the oak *Quercus mongolica* and *Betula platyphylla* in the lower forests (IUCN, 1975).

Fauna The diversity of fauna includes the forest living macaque *Macaca fuscata* and serow *Capricornis crispus*, 64 recorded species of breeding birds and the amphibian *Hynobius nigrescens* at its most southerly distribution (IUCN, 1975; Sutherland and Britton, 1980; NCB, 1985). Alpine insects include *Leucorrhinia dubia*, *Colias palaeno* and *Scopura longa* (IUCN, 1975).

Cultural Heritage Four Shinto shrines form a small circuit for pilgrims (Sutherland and Britton, 1980).

Local Human Population Since the turn of the century, the local communities have been becoming increasingly dependent upon the tourist industry (Sutherland and Britton, 1980).

Visitors and Visitor Facilities The park is widely used for recreation and has annual figures of more than 2 million visitors (IUCN, 1975). The principal visitor centres are at Karuizawa where there are international hotels, restaurants and the Ginza speciality/luxury shops. The park is fast becoming a vast leisure centre and includes a myriad of facilities to cater for all needs from helicopter rides to skiing, rock climbing and tennis to hot spring spas (Sutherland and Britton, 1980; Robinson, 1987).

Scientific Research and Facilities Scientific studies have been undertaken by Shinshu University since 1954. IBP research on the sub-arctic forests were undertaken in 1973 (IUCN, 1975). Research institute facilities were established in 1966, and include research buildings, lecture lodgings (40 researchers) and exhibition areas (IUCN, 1975).

Conservation Management The site is considered to be one of the best areas for mountain birds in Japan (Robinson, 1987). Timber production is permitted in the buffer zone area, whilst tourism is controlled to some extent by the introduction of a toll road system on the more popular routes within the park (Robinson, 1987).

Management Problems Threats to the park come from the building of villas and even overcrowding by summer visitors. The 28 ski slopes with their alpine vegetation are being adversely affected by heavy pressure in winter and mowing in summer to ensure dominance of a *Sasa* grass sward (NCB, 1985).

Staff Private landowners and one official assigned for protection duties (IUCN, 1975).

Budget 1,600,000 Yen were appropriated for the fiscal year 1978 (essentially for office running costs).

Local Administration Manza Ranger Office, Joshin'etsu Kogen Natural Park, Manza, Tsumagoi-mura, Agatsuma-gun, Gunma Prefecture, 377-15.

Shiga Kogen Range Office, Joshin'etsu Kogen Natural Park, Shiga Kogen, Yamanouchi-machi, Shimatokai-gun, Nagano Prefecture, 381-04.

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Date June 1987

Kirishima-Yaku National Park (including the Sakurajima and Sata-Misaki marine park areas and the Yaku virgin forests)

Management Category V (Protected landscape) also I (Yaku virgin forests) and IX (Yakushima Biosphere reserve)

Biogeographical Province 2.03.02 (Japanese Evergreen Forest)

Geographical Location The National Park is situated in the extreme south of Kyushu islands. It consists of Cape Sata on the Osumi peninsula, Mt. Kaimon on the Satsuma peninsula, Kagoshima-Sakurajima and Mt. Kirishima as well as Yaku island (Mt. Mikanoura). 31°50'-32°00'N, 130°55'-130°59'E; Sakurajima, Ibisuki and Sato areas (with Sakurajima Sata and Misake Satamisali Marine Park Areas): 30°59'-31°40'N, 130°31'-130°47'E; Yakushima area: 30°14'-30°23'N, 130°33'-130°59'E.

Date and History of Establishment The park was created on 16 March 1934, designated by Natural Parks Law. Zonation includes the special protection areas such as on Yaku isle, as well as buffer zones "special areas". Marine Park areas were established on 1 July 1970. The park was established as a place of scenic beauty where development is controlled under Articles 17, 18, 18-2 and 20 of the Natural Parks Law. Special protection is ensured for six families, 10 species of fish; four genera and 28 species of invertebrate; one genus, four species of seaweed. Yakushima island is protected as a "wilderness area" (IUCN, Category I) under the Nature Conservation Law of 1972.

Area 55,231ha (26.5ha Marine Park Area and at least 10,793ha Special Protected Area). Two zones are proposed: 78.6% (43,407.8ha) multiple-use areas; 21.4% (11,823.2ha) wilderness areas. Yakushima island has an area of 19,000ha of which 7,000ha is located within the core area.

Land Tenure 40,094ha state land, 4,394ha public land, 10,743ha private land.

Altitude Sea level to 1,935m (maximum depth of Marine Park Areas is 20m).

Physical Features The park is centred around the Kayoshima bay on Satsuma and Osumi peninsulas and the offshore island of Yakushima. The Kirishima sector is a mountain range with 23 volcanic peaks up to 1,700m and includes the dormant Mt. Karakumi (the highest peak at 1,700m), ten craters with lakes and other volcanic features such as hot springs at the base of the mountains. The triple-peaked Sakurajima (1,118m) is an active volcano in Kayoshima - Kinko bay, an island linked by a lava bridge to the mainland Osumi peninsula following an eruption on 12 January 1914 (this volcanic activity filled in a water channel 200m wide and 72m deep). The history of the Sakurajima volcano is well documented and the first of the 30 known eruptions was recorded in 708 AD. Other volcanoes include Mt. Kirishima (1,574m) and Mt. Kaimon (922m). Mt. Kaimon on the Satsuma peninsula is a dormant volcano with a caldera lake, Ikeda, which is the largest in Kyushu - circumference 24m. The mountainous Yaku island consists largely of basement clay slates, sandstones and quartzites. The centre of the island, of granite, rises to Mt. Miyanoura, at 1,935m, the highest peak in Kyushu district. Sakurajima Marine Park Area has a uniquely undulating sea-bed due to lava flows; Satamisaki Marine Park Area is off the Sata promontory of the Kyushu mainland, as area of granite rocks.

Climate Temperatures range from 27.5°C (August) at Yakushima to 4.8°C (January) at Kirishima. Annual precipitation figures are some of the highest in Japan with levels ranging from 2516mm (Kirishima) to 3852-10000mm (Yakushima). The warm Kurishio current influences the Marine Park Areas; water transparency is 10-16m, lowest at Sakurajima Marine Park Area.

Vegetation The vegetation of the park ranges from alpine grassland, high altitude mixed forest to broad-leaved evergreen forest and subtropical coastal vegetation. Kirishima has 600ha of Japanese fir *Abies firma* forest, mixed with some *Quercus acuta*, *Illicium religiosum* and uncommon *Malus spontanea*. There are also 1,600ha of *Pinus densiflora* and *Rhododendron kiusianum*, covering most of the island (IUCN, 1975). In the remaining 820ha *Quercus salicina*, *Cleyera japonica*, *Alpinia japonica* and some beech forest of *Fagus crenata* are found. Sakurajima has evergreen hardwood forests of *Quercus glauca* and *Neolitsea thunbergii*, with plantations of *Pinus densiflora*. Okikojima islet in the Marine Park Area is entirely forested with *Pinus thunbergii*. Yakushima is noted for one of the largest natural forests of Japan and its virgin forests of Japanese cedar *Cryptomeria japonica*. Many individual trees are estimated to be 3,000 years old and 2-3m in DBH (Sprague, 1986). These trees along with with *Distylium racemosum* and *Trochodendron aralioides* occupy 12,250ha at 1,000-1,400m. The area around Yakusugi is also extremely rich in epiphytic mosses and 300 of the known 700 species of pteridophyte in Japan have been recorded here (IUCN, 1975). A further 2,700ha of woodland consists of *Castanopsis cuspidata*, *Ficus wightiana* and *Distylium* sp., and 1,400ha of plantations of cedar and *Pinus thunbergii*. At the extreme southern peninsula of Cape Sata are communities of fan palm *Livistonia chinensis*. The island is of biogeographical interest with several endemic species of plant (Okutomi, 1968; IUCN, 1975; Sutherland and Britton, 1980; NCB, 1985; Sprague, 1986). Marine flora includes *Codium* sp., and flourishing *Padina arborescens* in the Sakurajima area (Marine Parks Centre, 1975).

Fauna Mammals of the park include Japanese dormouse *Glirulus japonicus* and wild pig *Sus scrofa leucomelas* are generally present. Species of biogeographical interest on Yakushima include endemic subspecies, Yakushima macaque *Macaca fuscata yakui* (at its southern limit in Japan), a sub-species of sika *Cervus nippon yakushimae* and reptile *Gekko yakushimensis* (IUCN, 1975; Sprague, 1986). Kirishima is rich in birds including: streaked shearwater *Calonectris leucomelas*, white-rumped copper pheasant *Phasianus soemeringii ijimae*, blue-winged pitta *Pitta brachyura* and paradise flycatcher *Terpsiphone atrocaudata* (Robinson, 1987). The insect fauna is also diversified with endemics such as *Chrysozephyrus ataxus yakushimaensis* (IUCN, 1975). The fish fauna includes both temperate and tropical varieties such as *Syngnathus schlegelii*, *Pomacentrus coelestris* and *Chasetodon collaris*. Schleractinian and alcyonarian corals are well developed including *Montipora cactus*, *Acropora* spp., *Pocillipora damicornis*, *Porites tenuis*, *Melithaea flabelliforme*, *M. flabellifera* and *Anthoplexaura dimorpha*. *Parasiganis actinostoloides* is gregarious in its development in Okikojima, Sakurajima Marine Park Area (Marine Parks Centre, 1975).

Cultural Heritage The area is rich in mythology. The Kojiki and Nippon Shoki chronicles recorded that it was here that Ninigino-mikoto, grandson of the sun-goddess, first descended to earth - he was the ancestor of the present Imperial family. Mausoleums of two generations of gods are found at Sendai, Kimotsuki and Aira. The present shrine of Ninigi-no-mikoto (Kirishima) was constructed in 1715 (Sutherland and Britton, 1980).

Local Human Population The human population density varies in proximity to the park. On the park boundary is the major city, Kagoshima, yet by comparison the mountains of Yaku are largely uninhabited and on Moejima there were just 138 islanders in 1964. The park fringes are intensively utilised for such agriculture as wet rice farming (Sutherland and Britton, 1980).

Visitors and Visitor Facilities The annual number of visitors to the park in the 1970s averaged 13.54 millions, of which 470,000 were visiting marine parks (Marine Parks Centre, 1975). Facilities include hotels, inns, camp and picnic grounds, ski slopes, mountain and nature trails, marine aquariums, visitor centres, boat excursions, hydrofoils and glass bottomed boats. Ibusuki has a National Vacation Village. A road and rail system circles the mountains. Yakushima can be reached by sea or air from Kagoshima. Yaku has an 40,000 visitors annually, mostly for mountain climbing (Sutherland and Britton, 1980; Robinson, 1987).

Scientific Research and Facilities Vegetation studies have been undertaken by the Environmental Agency (1973). There is a Meteorological Observatory on Mt. Kirishima run by Tokyo University. There have also been Kyoto University studies on the ecology of the Yaku macaque since 1975 (Furuichi, 1983; Maruhashi, 1982; Sprague, 1986).

Conservation Management The entire area is of importance for the diversity of ecosystems from volcanic ranges through coral reef areas to primary forests on the many islands. The core area of *Cryptomeria japonica* virgin forest at Yakushima is protected from exploitation and currently is little disturbed by tourism.

Management Problems The *Cryptomeria* of Yakushima are threatened by felling, which is permitted in the "ordinary zone" plantations (Sprague, 1986). Pesticides have also affected the flora and fauna of this area. Road construction for sightseeing is occurring at Mt. Kirishima and the low lying areas have various disturbances by man (Sutherland and Britton, 1980). No polluted freshwater drainage occurs from land to sea but waters at Sakurajima are turbid due to the substrate (Marine Parks Centre, 1975). A dam has been constructed on the Anbo river of Yaku island. The macaque population on Yakushima is a potential pest species, raiding the orange orchards, and up to 20% of the island's macaque population was estimated as being captured or killed in a three year period (Sprague, 1986).

Staff There is a total of at least eight staff: three full-time (ranger, Environment Agency, Prefectural Officer and patrol man, Kagoshima Prefectural Government), five seasonal (patrol men, Kagoshima Prefectural Government) (IUCN, 1975).

Budget In the 1970s the park received a share of US\$700,000 annual allocation by Environment Agency to National Parks, and US\$9,500 annually from Kagoshima Prefectural Government (IUCN, 1975).

Local Administration Kirishima-Yaku National Park, 2384-10 Anbo, Yakushima, Kumage-gun, Kagoshima Prefecture, 891-43.

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Date July 1987

Minami Arupusu (Southern Alps) National Park

Management Category V (Protected Landscape)

Biogeographical Province 2.02.02 (Japanese Evergreen Forest)

Geographical Location The park is situated 20km east of Kofu on Honshu island. It is found midway between Tokyo and Nagoya in the prefectures of Nagano, Shizuoka and Yamanashi. 35°42'N, 138°34'E.

Date and History of Establishment The National Park was created on 1 June 1964 and designated by the Natural Parks Law as a place of scenic beauty. All development is controlled by Articles 17, 18 and 20 of the Natural Parks Law.

Area 35,752ha (9,181ha special protected areas). Two zones exist 58.9% (21,071.2ha) as a multiple use area; 41.4% (14,727.6ha) as a wilderness or wildlife area.

Land Tenure No information

Altitude 1,200-3,192m

Physical Features The park consists of the Akaishi range, a mountainous area averaging 3,000m in altitude, and lying in a north-south direction. The Kofu basin and Fuji river valley separate the Southern Alps from Mount Fuji. The highest of the peaks within the park boundaries is Kitadake (3,192m) on Mount Shirane, the second highest mountain in Japan. The mountains are composed of granite, hornstone - tufa volcanic ash, sandstone and clayey slate. Water is abundant, the main rivers being the Norokawa at the foot of Kitadake and River Tenryu along the Ina valley (Sutherland and Britton, 1980).

Climate Records taken at the foot of Mount Notori show a temperature variation from 23.6°C (August) to 0.6°C (January) and an average annual precipitation of 2186mm. There are snow falls but these are only temporary.

Vegetation The Palaearctic vegetation of this mountain park ranges from mixed deciduous/coniferous forests at low altitudes to high alpine meadowland (Sutherland and Britton, 1980). The coniferous forest is composed mainly of firs (*Abies mariesii*, *A. homolepis*, *A. veitchii*), hemlock *Tsuga diversifolia*, red pine, pine (*Pinus densiflora*, *P. parviflora*), spruce *Picea jezoensis* var. *hondoensis*, Japanese cedar, cypress (*Cryptomeria japonica*, *Chamaecyparis obtusa*) and some larch *Larix kaempferi* (IUCN, 1975). Deciduous stands are composed largely of birch *Betula ermanii*, beech *Fagus crenata*, water oak *Quercus crispula* and

maple *Acer* spp. The high alpine zone supports creeping pine *Pinus pumila*, *Azalea* and such species as *Artemisia glomerata*, *Veronica nipponica*, *Polemonium nipponicum*, *Dryas octopetala*, *Sibbaldia procumbens*, *Fritillaria camschatcensis* and local varieties of *Ranunculus* and *Melandrium* spp. (IUCN, 1975; NCB, 1985)

Fauna The larger mammal fauna is represented by Japanese macaque *Macaca fuscata*, wild boar *Sus scrofa leucomystax*, Honshu sika *Cervus nippon centralis* and Japanese serow *Capricornis crispus* (IUCN, 1975; Sutherland and Britton, 1980). Birds include golden eagle *Aquila chrysaetos japonica*, Hodgson's hawk eagle *Spizaetus nipalensis orientalis*, ptarmigan *Lagopus mutus japonicus* (a local sub-species considered to be rare in Japan), nutcracker *Nucifraga caryocatactes japonicus*, wren *Troglodytes troglodytes tumigatus* and endemic Japanese robin *Erithacus akahige* (IUCN, 1975).

Cultural Heritage The area was once regarded as important for private art collections but much was destroyed in world war II bombing raids (Sutherland and Britton, 1980).

Local Human Population Agriculture and settlement areas are largely centred in the valleys around the township of Iida in the Tenryn. Rice is one of the main economies of the area (Sutherland and Britton, 1980).

Visitors and Visitor Facilities The park received 750,000 visitors in 1972 (IUCN, 1975). There is a distinct lack of facilities and these are restricted to huts, access roads and mountain trails. There is difficulty of access and lack of roads traversing the park. Activities are largely confined to hiking and mountaineering (Sutherland and Britton, 1980).

Scientific Research and Facilities Studies of vegetation have been undertaken by the Environment Agency (1973). There are no special scientific research facilities, although climatological data is collected at Notori (IUCN, 1975; Sutherland and Britton, 1980; NCB, 1985).

Conservation Management Difficulty of access has ensured the lack of exploitation and over-development of the park. Access along the new "Super Norokawa Forestry road" is restricted to forestry staff for much of the year. Tourists are allowed access over a few summer months (Sutherland and Britton, 1980).

Management Problems Currently there is considerable forest exploitation and forest road construction. The local authorities have considered proposals for villa development, ski resorts and golf links in the park (Sutherland and Britton, 1980). The construction of the "Super Norokawa Forestry road" had been halted by environmentalists for 5 years to study the environmental impact (completion was in 1979) (IUCN, 1975; NCB, 1985).

Staff There are at least two full-time staff (ranger of the Environment Agency, and an assistant warden from the Nagano Prefectural Government); four seasonal staff (patrol men funded by the Nagano and Yamanashi Prefectural Governments) (IUCN, 1975).

Budget In the 1970s the park received a share of the Environment Agency's annual subvention to National Parks (US\$700,000) in addition to US\$5,000 provided by Nagano and Yamanashi Prefectural Governments (IUCN, 1975).

Local Administration No information

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Date June 1987

Nikko National Park

Management Category V (Protected Landscape)

Biogeographical Province

Geographical Location The National Park is located on Central Honshu island, north of Tokyo, centred around Nikko town in a mountainous area west of Tochigi Prefecture. 36°39'-37°13'N, 139°09'-140°05'E

Date and History of Establishment 4 December 1934 (designated by the Natural Parks Law). Two zones exist: 93% (130,898.5ha) is a multiple use area and 7% (9,799.6ha) a wilderness area for wildlife protection.

Area 140,698ha (there are 14 special protected areas in a total of 9,805ha)

Land Tenure 74,824.2ha State land, 11,377.2ha public land, 54,496.7ha private land

Altitude 300-2,578m

Physical Features An area of volcanic mountains, the most important being Mt. Okushirane (2,577m), Mt. Nantai with the crater of an extinct volcano (2,484m), Mt Nasu and Mt Hiuchi. The area is largely a landscape of plateaux, rivers, waterfalls, lakes and dense forest. There are many hot springs as at Chuzenji, and 47 waterfalls including the Kegon Falls which flow from Lake Chuzenji. This lake is 15 miles in circumference and surrounded by forest and mountains. It was originally formed from the eruption of Mt Nantai many centuries ago.

Climate Temperatures range from 19°C (August) to -4°C (February); average annual precipitation 2,254mm. Snow falls in the mid-winter period are up to 2m deep.

Vegetation The vegetation at Nikko is typically Palearctic. The coniferous forests consist of the firs *Abies homolepis* and *A. mariesii*, spruce *Picea jezoensis* var. *hondoensis*, hemlock *Tsuga diversifolia*, pine *Pinus densiflora* and *P. pumila*, very old Japanese cedars *Cryptomeria japonica* and larch *Larix kaempferi*. There are also deciduous forests of birch *Betula tauschii* and *B. ermanii*, beech *Fagus crenata*, water oak *Quercus crispula*, elm *Ulmus davidiana* and azalea *Rhododendron japonicum*. The high altitude alpine vegetation includes *Arnica unalashcensis* var. *tschonoskyi*, *Potentilla matsumurea*, the avens *Sieversia pentapetala* var. *immaculata*. The raised bog flora of Kotoku includes *Andromeda polifolia*, *Gentiana thunbergii* var. *minor*, day lily *Hemerocallis middendorffii* var. *esculenta*, *Iris setosa*, *Drosera anglica*, the thistle *Cirsium homoletis* and arrow grass *Scheuchzeria palustris*. The moorland of Oze-ga-hara is rich in *Lylichiton camtschatcense* (IUCN, 1975).

Fauna The fauna is typified by the Japanese macaque *Macaca fuscata*, Asiatic black bear *Selenarctos thibetanus japonicus* and Honshu sika *Cervus nippon centralis*. The birds include green pheasant *Phasianus versicolor*, Honshu copper pheasant *Syrnaticus soemmerringii scintillans*, the finch *Leucosticte arctoa brunneonucha*, blue flycatcher *Muscicapa c. cyanomelana* and Japanese robin *Erithacus a. akahige*. Grey bunting *Emberiza variabilis* breed around Lake Ozenuma and on Mt Nasu where ruddy kingfisher *Halcyon coromanda* is common along forested streams (Martins et al., 1980).

Cultural Heritage Nikko is important for the Toshogu shrine (constructed 1617), built to commemorate Ieyasu Tokugawa, the founder of the Edo shogunate Government. This building and a complex of other temples and shrines, set amid sacred *Cryptomeria* groves, are some of the most important architectural structures in Japan. The Buddhist Rinnoji temple, constructed 1,100 years ago, is the oldest structure at Nikko. The festivals for the Toshogu shrine are celebrated on 17 May and 17 October every year when 1,000 "armed warriors" in the armour of the Edo period (17th century) process at Nikko. Pilgrimages are also made to the sacred shrine on the summit of Mt Nantai.

Local Human Population Local products include rice, wheat and barley, tobacco and the edible gourd "Kanpyo". The horses bred in this area are renowned.

Visitors and Visitor Facilities There were 2.8 million visits per year in the 1960s, rising to over 19 million visitors in 1972 (IUCN, 1975). The key reasons for visiting the Park include sightseeing the various temples and waterfalls around Nikko. The area is easily reached by car, bus or train from Tokyo. Facilities include numerous hotels, inns, mountain huts (at Oze), campgrounds, picnic areas, mountain and nature trails, skating and skiing areas, access roads, museum, visitor centre and the National Vacation Village (Nasu area). Cable cars and lifts permit tourists to see the waterfalls in comfort. There are also boating, fishing and swimming facilities at Lake Chuzenji. Skating competitions are held annually at Hosoo.

Scientific Research and Facilities Investigations of vegetation have been undertaken by the Environment Agency (1973).

Conservation Management Oze area has the highest moorland in Japan notable for blooms of "mizu-basho" *Lysichiton camtschcense* var. *japonicum* and other moorland plants.

Management Problems Several man-made lakes and hydroelectric barrages have been constructed in the park. Excessive visitor pressure in summer has a profound effect upon the Park ecosystem.

Staff 10 full-time staff (superintendent and 6 rangers from the Environment Agency, 3 prefectural officers from Tochigi prefecture); 11 seasonal (7 patrol men from Fukushima and Niigata prefectures, 4 naturalists from National Parks Association) (IUCN, 1975).

Budget In the 1970s there was support from annual allocation by the Environment Agency to the National Parks (total US\$700,000); also there was US\$48,000 per annum from Fukushima, Tochigi, Gumma and Niigata prefectures; US\$2,000 from National Parks Association of Japan (IUCN, 1975).

Local Administration Nikko National Park Headquarters Office, Environmental Agency, Honchoy, Nikko City, Tochigi Prefecture. Ranger Office at Oze Lakeside, Katashina Village, Ranger Station at Yumoto, Imaichi Forestry Branch Office, Imaichi City, Japan.

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Date June 1987

Ogasawara (Bonin Islands) National Park
(including Ogasawara marine park and its seven marine park areas)

Management Category V (Protected Landscape)

Biogeographical Province 2.41.13 (Ryukyu Islands)

Geographical Location The park is located at Ogasawara (Bonin Islands) and Kazan Retto (Volcano Islands), in the north-west Pacific, 1,000km south of Tokyo. The archipelago extends 300km from Mukojima in the north to Kitaokima in the extreme south. The park itself is divided into four isolated sections across the archipelago. They were transferred to the administration of Tokyo metropolitan area, following the end of the American occupation in 1968. They include Mukojima, Nishinoshima, Kitaiojima and Chichijima: 27°02'-27°10'N, 142°09'-142°14'E (to include Anijima Channel marine park area and Minamishima section marine park area); Hahajima: 26°33'-28°36'N, 142°07'-142°10'E (to include Hahajima section marine park area). (Iwojima: 24°14'-24°49'N, 141°16'-141°27'E is not included in the park although it is part of the archipelago.)

Date and History of Establishment The site was protected from 16 October 1972 under the Natural Parks Law as a place of scenic beauty, protected as a National Park. Development is controlled by Art. 17, 18, 18-2 and 20, Natural Parks Law. Special regulations exist to protect 24 families, 13 species of Osteichthyes (fish); 17 families, one genus and 29 species of invertebrates; 1 family, two genera and six species of seaweed. Ogasawara Marine Park was created on 16 October 1972 along with the National Park.

Area 6,433.7ha (463ha MPA). Two zones proposed 56.9% (3,831.1ha) wilderness and 40.4% (2,602.6ha) multiple-use. The Marine Park consists of 46.3ha.

Land Tenure 5,424ha state land, 1,009.7ha in private ownership.

Altitude Sea level to 918m (maximum depth of 20m in MPA)

Physical Features The park is part of two oceanic island groups, of largely tertiary period volcanic origin. Chichishima (6km by 3km) and Hahashima are composed of andesite and basalt, which forms steeply-eroded cliffs and rocky bays. The Minamishima section of Chichijima is coral-limestone, with karstic formations above and below sea level, while the Senjinawa section of Chichijima and Okuzure bay in Hahajima, are noted for their cliffs. Kita-Iwojima, in the southern Kazan group, is an emergent volcanic cone with solfataras. The volcano rises steeply to 804m. Coral reefs occur in a number of areas, centred around Minamijima.

Climate The park falls in an area between temperate and tropical zones. Temperatures vary from 28°C (winter mean) to 17°C (summer mean) and about 1600mm of annual rainfall. Surface water temperature averages 23.6°C, with transparency from 20-40m, and depths of 26.5m. Typhoons are prevalent from August to November.

Vegetation Sub-tropical rain forest covers most of the islands and includes several endemic elements. Vegetation is dominated by *Juniperus taxifolia*, *Pinus luchuensis*, *Morus boninensis*, *Schima mertensiana*, *Rhaphiolepis integerrima*, *Distylium lepidotum*, *Leucaena glauca*, *Hibiscus glaber* and *Pandanus boninensis* along with tree ferns *Cyathea spinulosa* and *C. mertensiana*. Other typical species are *Ardisia sieboldii*, *Pouteria obovata*, *Ochrosia nakaina* and *Livistona boninensis* (IUCN, 1975). Rarities include *Photinia wrightiana*, *Melanstoma tetramerum* and *Dendrocacalia crepidifolia*. Marine vegetation includes species of *Dictyopteris*, *Sargassum duplicatum*, *Caulerpa brachypus*, *Bryopsidaceae* spp., *Padina minor* and *Galaxaura fastigiata* (IUCN, 1975).

Fauna The fauna includes only a few native mammals such as flying fox *Pteropus dasymalus* (considered rare). Seabirds are numerous and include black-footed albatross *Diomedea nigripes*, wedge-tailed shearwater *Puffinus pacificus cuneatus*, Bulwer's petrel *Bulweria bulweri*, red-tailed tropic bird *Phaethon rubricauda rothschildi*, brown booby *Sula leucogaster plotus* and swift tern *Sterna bergii cristata*. Other interesting though scarce species are buzzard *Butes butes*, fruit pigeon *Columba janthina nitens*, Bonin honeyeater *Apalopteron familiare hahasima* and grey-capped greenfinch *Carduelis sinica kittlitzi* (IUCN, 1975; Robinson, 1987). Marine fauna includes many tropical fishes of the families Fistulariidae, Sygnathidae, Labridae, Scorpididae, Zanclidae and species including *Acanthurus olivaceus* and *Paracanthurus hepatus*. There are 40 recorded varieties of coral including scleractinians *Acropora leptocyathus*, *A. pyramidalis* and *Favia speciosa*; alcyonarians *Nephthea chabroli* and *Xenia* spp.; and gorgonarian *Melithaea flabellifera* (Marine Parks Centre, 1975).

Cultural Heritage The area was first settled in 1830 by a small group of British, Americans and Hawaiians on Chichijima but the island was annexed in 1876 by the Japanese. The Iwojima island was an important battleground in world war II (Sutherland and Britton, 1980).

Local Human Population In the late 1930s the island population was 7,700 but they were largely removed to Tokyo in the last war. When the islands were returned to Japan in 1968 only Chichijima was inhabited by 285 people, largely English speaking descendants of the early settlers. The local economy consists of sugar cane, fruit orchards and timber extraction (sandalwood, ironwood and rosewood) (Sutherland and Britton, 1980).

Visitors and Visitor Facilities There were estimates of up to 7,000 visitors to the National Park in 1973 (IUCN, 1975). Access to Chichijima is by ship from Tokyo (45 hours). There are few facilities and these are centred on the few small inns, guest houses and trails on Chichijima and Hahajima. Camping is forbidden (Robinson, 1987).

Scientific Research and Facilities Survey of islands have been undertaken by expeditions in July 1969 (IUCN, 1975), and studies of vegetation by the Environmental Agency.

Conservation Management The marine park areas and the national park itself have been designated to reduce the impact, and control the development of, recreation and tourism in the rural areas (IUCN, 1975; Marine Parks Centre, 1975; NCB, 1985).

Management Problems No information

Staff Total six staff (a ranger of the Environment Agency; two officers and three patrol men, appointed by Tokyo Prefectural Government) (IUCN, 1975).

Budget In the 1970s the park received a share of the Environment Agency's annual subvention to National Parks (US\$700,000) and US\$6,000 provided annually by Tokyo Prefectural Government (IUCN, 1975).

Local Administration Ogasawara Branch Office, Tokyo Prefectural Government, Omura, Chichijima, Tokyo Prefecture.

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Date June 1987

Rikuchu-Kaigan National Park (includes the Kesenuma Marine Park)

Management Category V (Protected Landscape)

Biogeographical Province 2.02.02 (Japanese Evergreen Forest)

Geographical Location Situated in north-west Honshu, as a 180km strip along the Pacific Ocean coastline, from Kuji in the north via Miyako to Kesenuma in the south. The largest town in the area is Morioka, 80km to the west by the Kitakami highlands. The park is located entirely within Iwate prefecture. 39°43'N, 141°08'E.

Date and History of Establishment The area was created as a national park on 2 May 1955 under the Natural Parks Law. Development within the park is controlled under Articles 17, 18 and 20. The Marine Park area was established on 22 January 1971.

Area 12,348ha (the Marine Park area totals 23.4ha).

Land Tenure No information

Altitude Sea level to over 200m

Physical Features The park consists of 180km of a highly indented and precipitous cliff coastline. The cliffs of Kitayamazaki are often 200m high, formed from Palaeozoic chalk and limestone strata, basalt and granite columns. The southern half of Iwate's coastline includes submerged valleys (ria) and fjordlike bays. The Rikuchu coast is bathed by both cold and warm currents in the Oyashio current system (Sutherland and Britton, 1980; NCB, 1985).

Climate Average rainfall figures approximate between 1000-1500mm, with a yearly mean temperature of 9°C. The average temperature for the coldest month is -0.3°C (January) and for the warmest month 24.6°C (July).

Vegetation The coastal forests include relict habitats of Japanese red pines *Pinus densiflora* and evergreen forests of tabunoki *Machilus thunbergii* in the southern part of the park (NCB, 1985). Many of the indented cliff habitats are capped by dense growths of red pine along with camphor trees *Cinnamomum camphora* and camellia *Camellia japonica* (Sutherland and Britton, 1980; NCB, 1985).

Fauna The coastline abounds in sea bird habitats. Species include black-tailed gull *Larus crassirostris*, streaked shearwater *Calonectris leucomelas*, Swinhoe's storm petrel *Oceanodroma monorhis* and fork-tailed storm petrel *O. furcata* (NCB, 1985). Fish include *Malichoeres peocilopterus* and *Cottus pollux* (Marine Parks Centre, 1975).

Cultural Heritage No information

Local Human Population Most of the population is centred in the coastal parts of Kuji and Miyako, as well as Kamaishi and Kesenuma, all areas excluded from the park. Fishing, sea urchin and oyster collecting are important local industries.

Visitors and Visitor Facilities Facilities include 14 glass bottom boats in the Oshima area. There are also boat sightseeing excursions which traverse the entire length of the Park (Marine Parks Centre, 1975).

Scientific Research and Facilities No information

Conservation Management The park has one of the few extensive areas of undeveloped coastline left in Japan (just over 50% of the coast in the country has been commercially developed) (Sutherland and Britton, 1980; NCB, 1985).

Management Problems No information

Staff No information

Budget No information

Local Administration No information

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Date July 1987

Rishiri-Rebun-Sarobetsu National Park

Management Category V (Protected Landscape)

Biogeographical Province 2.14.05 (Manchu Japanese Mixed Forest)

Geographical Location The park is located at the north-western edge of Hokkaido and includes Rishiri and Rebun islands (west of Wakkanai). 45°26'N, 141°43'E.

Date and History of Establishment Rishiri and Rebun islands were originally designated as a quasi-national park. On 20 September 1974, along with Sarobetsu Plain (45°05'N, 141°41'E), the site was created as a national park under the Natural Parks Law. The park consists of a 27km coastal strip on the Sarobetsu Plain from Bakkai to Wakkasakanai, the higher slopes of Rishiri island and most of Rebun island. Each of the three park areas has a series of protection zones and excludes urban areas of high population numbers.

Area 21,222ha

Land Tenure No information

Altitude 0-1,718m

Physical Features Rishiri island is an upthrust extinct conical volcano (1,718m) which was formed a few thousand years ago. Nearby Rebun island is of much older origin and low-lying (max. 490m). The Sarobetsu Plain consists of sand dunes, marshland and low-lying land of 3-7m (the highest point is Maruyama at 14m a.s.l.). The area is composed of peat bog covered by fertile river silt and has an abundance of ponds and lakes. Waterlogging occurs each year as a result of winter rains and melting spring snows (Sutherland and Britton, 1980; NCB, 1985).

Japan

Climate The subarctic climate is generally cooler than much of Japan. The Sarobetsu Plain is exceptional in having 122 frost-free days per year. Average temperatures are 5.6°C with a mean minimum of -1.1°C. Rainfall precipitation averages 1241mm per year, in addition to 40mm of snow.

Vegetation The park is situated in a biogeographic area rich in flora of alpine origin, showing affiliations to the vegetation of the Kurile islands, Siberia and Alaska (NCB, 1985). The habitats within the park range from pine forest through to marshes, lakes and peat bogs (NCB, 1985). The woodland communities are composed of pine *Pinus*, Japanese spruce *Picea*, elm *Ulmus* and oak *Quercus* (Sutherland and Britton, 1980). Typical lake vegetation communities, such as at Sarobetsu, include *Phragmites communis*, *Juncus setchuensis*, *Scirpus lacustris*, *Typha latifolia*, *Nuphar japonicum*, *Trapa natans* and *Potamogeton distinctus* (Scott, in prep.). Reibun has more than 200 varieties of alpine plants, including creeping pines *Pinus pumila*, crowfoot and pinks (Sutherland and Britton, 1980).

Fauna The largest mammals native to the islands are squirrels, field mice and shrews (foxes *Vulpes vulpes* and weasels *Mustela* sp. were introduced at the beginning of the century). In Sarobetsu there have been records of 23 mammal species, as well as such amphibians as *Hyla japonica*, *Rana chensinensis* and *Hynobius retardatus* (see Scott, in prep. for lists of other animal species). The Sarobetsu Plain is an important breeding site for a number of migratory waterfowl including mallard *Anas platyrhynchos*, falcated teal *A. falcata*, smew *Mergus albellus* and red-necked grebe *Podiceps grisegena*. Woodland and open countryside species are represented by snowy owl *Nyctea scandiaca*, gyrfalcon *Falco rusticolus* and stonechat *Emberiza aureola* (for bird species list see Robinson, 1987 and Scott, in prep.).

Cultural Heritage The area was a battleground for the Czarist navy and Japan's Tokugawa shogunate in 1807 (Sutherland and Britton, 1980).

Local Human Population The area is still a centre for the Ainu proto-caucasian people, although their culture has largely been destroyed since the Japanese arrived on Hokkaido 300 years ago. To-day the local economy of the Rishiri and Reibun islands is based on fishing and cattle breeding (NCB, 1985). In the Sarobetsu Plains commercial fishing and agriculture are permitted (Scott, in prep.).

Visitors and Visitor Facilities There is a diversity of facilities including three designated campsites on Rishiri and an exhibition hall of local history and crafts. Boats and aircraft service the two islands. (Sutherland and Britton, 1980; Robinson, 1987).

Scientific Research and Facilities No information

Conservation Management The Sarobetsu Plain embraces the largest wetland in Japan (8,129ha) and is fully protected as a reserve. It has been classed as one of the most important wetland sites in Japan (Scott, in prep.). The alpine plant communities on Reibun have additionally been protected as Natural Monuments (Sutherland and Britton, 1980).

Management Problems There are construction plans in existence to develop part of the area for dumping radioactive waste (Scott, in prep.).

Staff Park rangers are present on Rishiri (Sutherland and Britton, 1980).

Budget No information

Local Administration No information

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Date July 1987

Saikai National Park
(including Fukue and Wakamatsu Marine Parks)

Management Category V (Protected landscape)

Biogeographical Province 2.02.02 (Japanese Evergreen Forest)

Geographical Location The park is located in the Goto, Hirado and Kujukushima archipelagos, north-west of Kyushu, in the Nagasaki prefecture. 33°06'-33°26'N, 129°20'-129°26'E. (Kujukushima sector: 33°06'-33°26'N, 129°20'-129°26'E; Goto Island sector: 32°35'-33°18'N, 128°40'-129°16'E; Fukue MPA: 32°42'N, 128°50'E; Wakamatsu MPA 32°50'N, 129°20'E.)

Date and History of Establishment The national park was created on 16 March, 1955 under the National Parks Law (protection under Articles 17, 18, 18-2 and 20). The marine parks were designated on 16 October, 1972. There is special protection for three families and 24 species of invertebrate, one family, three genera and three species of seaweed. Two zones exist: 96.6% (23,500ha) is a multiple-use buffer-zone and 3.4% (124ha) is a wilderness area for conservation purposes.

Area 24,653ha (30.4ha marine park area)

Land Tenure 1,233ha state land, 4,769ha public land, 18,322ha in private ownership.

Altitude Sea level to 568m (maximum depth of MPA, 20m)

Physical Features The park consists of over 150 volcanic islands of varying size. They are characterised by inlets, high cliffs and rare cinder cone formations. Fukue marine park at Fukue Island and Wakamatsue marine park at Wakamatsue Island are affected by the warm waters of the Tsushima Current, a branch of the Kuroshio Current. They are islands of tuff and sandstone, the sea floor being sandy mud with stones and white tuffaceous sand respectively (Marine Parks Centre, 1975). The Kujukushima archipelago comprises a cluster of nearly 200 islets. The Goto archipelago consists largely of sedimentary rocks, sandstone, shale and conglomerate. Basalt, andesite and granite are also present. There are sheer 160m cliffs at Osezaki and Fukue Island and coral reefs at Fukue and Wakamatsue (Marine Parks Centre, 1975; Sutherland and Britton, 1980; NCB, 1985).

Climate Mild climate with temperatures varying from 28°C (August) to 5.8°C (January) at Kujukushima and precipitation of 2016-2076mm. Transparency in the coastal areas is 10-17m.

Vegetation The flora ranges from temperate palaeartic to subtropical species. The coniferous forest comprise red pine *Pinus densiflora*, black pine *P. thunbergii*, Japanese cedar *Cryptomeria japonica* and *Chamaecyparis obtusa*. Temperate rain forests consist of associations of *Myrica rubra*, *Quercus phylliraeoides*, pasania oak *Castanopsis cuspidata* var. *sieboldii*, *Cinnamomum camphora*, *Camellia japonica* var. *spontanea* and *Rhododendron metternichii* var. *typicum* (IUCN, 1975). Other typical species are *Ficus wightiana*, *Cycas revoluta* and betel-nut tree *Areca catechu* (IUCN, 1975; NCB, 1985). Marine vegetation includes algae such as *Codium* spp., *Halimeda* spp., *Sargassum* spp., *Padina arborescens*, *Dictyopteris* spp., and *Corallina* spp. (Marine Parks Centre, 1975).

Japan

Fauna The park is of interest for its Palaearctic fauna which includes Kyushu sika deer *Cervus nippon nippon* and birds such as eastern reef heron *Egretta s. sacra*, black-tailed gull *Larus crassirostris* and murrelet *Synthliboramphus antiquus* (IUCN, 1975). Marine fauna includes temperate and sub-tropical fish such as *Pomacentrus coelisticus*, *Amphiprion xanthurus*, *Pseudolabrus japonicus*, *Thalassoma cupido* and *Micocanthus strigatus*. Corals include scleractinians such as *Acropora* spp., *Porites tenuis* and *Favia speciosa*; alycyonarians *Nepthea chabrolii* and *Stereonephthya japonica* and gorgonians *Melithaea flabellifera*, *Anthoplexaura dimorpha* and *Antipathes japonica*. Other marine fauna include crinoids *Tropiometra afra*; sea-urchins *Toxopneustes pileolus*, sea-cucumbers *Holothuria pervicase* and sea-anemones such as *Parasicyonis actinostoloides* (Marine Parks Centre, 1975).

Cultural Heritage Hirado island is of special interest for its historic links with foreign trade. The port of Hirado was the main Japanese trading post for the Dutch and English in the 16-17th centuries (Sutherland and Britton, 1980).

Local Human Population The population of Goto archipelago are largely Christians and subsist on their deep sea fishing fleet and cattle-rearing industry (Sutherland and Britton, 1980).

Visitors and Visitor Facilities There were up to 4.58 million visitors in 1972, with 100,000 visiting the marine parks (IUCH, 1975; Marine Parks Centre, 1975). Facilities include hotels, inns, picnic grounds, access roads and ferries, sightseeing boats, an aquarium and historical museum at Hirado. Access to the islands is by ship from Nagasaki or Sasebo and by air from Nagasaki (Sutherland and Britton, 1980).

Scientific Research and Facilities Study of vegetation has been undertaken by the Environmental Agency.

Conservation Management No information

Management Problems The Kujukushima part of the park is hemmed in by built-up areas. Settlement occurs within Park boundaries and, as in the Gozo islands, cattle grazing is widespread (Sutherland and Britton, 1980).

Staff Total five (a ranger of the Environment Agency; four officers appointed by the Nagasaki Prefectural Government) (IUCN, 1975).

Budget In the 1970s the park received a share of the Environment Agency's annual subvention to National Parks (US\$700,00); in addition to US\$45,000 provided by Nagasaki Prefectural Government (IUCN, 1975).

Local Administration Kashimae ranger office, Environmental Agency, Kashimae Sasebo City, Nagasaki Prefecture. Branch offices at Kenppoku and Goto.

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Date June 1987

Sanin Kaigan National Park
(includes Toyooka, Takeno, Hamasaka and Uradome Marine Parks)

Management Category V (Protected landscape)

Biogeographical Province 2.02.02 (Japanese Evergreen Forest)

Geographical Location The park is located in western Honshu as a continuous 75km long sea coast between Amino (Kyoto prefecture) and the sand dunes near Tottori (Tottori prefecture). 35°32'-35°42'N, 134°13'-135°01'E.

Date and History of Establishment The park was created on 15 July 1963 by the Natural Parks Law. The Marine Park Areas were established on 22 January 1971. Development is controlled within the Park (Art. 17, 18, 18-2 and 20, Natural Parks Law) and priority is given to protection of the scenic beauty of the National Park. There is also special protection for four species of fish; 9 species of invertebrate; 16 genera and four species of seaweed. Zonation includes: 90% (8,003ha) as multiple-use areas; 10% (892.9ha) as wilderness area.

Area 8,996ha (46.5ha Marine protected area and 556ha special protected area for wildlife conservation)

Land Tenure 80.7ha state land, 2,878.4ha public land, 6,036.8ha private land.

Altitude Sea level to 567m (maximum depth of Marine Protected Areas 20m)

Physical Features The park consists of a 75km long seacoast of granite and basalt where erosion has resulted in 91 large and small islands and reefs, as well as 52 caves and arches, such as at Genbudo and Yoroi-no-Sode. The overall effect is a much indented cliff coastline, and includes the 16km circumference brackish Koyama lagoon by the town of Tottori. On the south-west are the Tottori sand dunes formed by the strong north-westerly Siberian wind. The sand dunes are 16km long and 2km wide, the largest in Japan (IUCN, 1975). The Marine Parks are influenced by the warm Tsushima current, a branch of the Kuroshio current. (Water transparency ranges from 15-25m). Hot springs are also located in the park and include those at Mamisaka. The sea bed is largely composed of tuff, granite and andesite (IUCN, 1975; Marine Parks Centre, 1975; Sutherland and Britton, 1980).

Climate Annual temperatures vary from 26.6°C (August) to 4.4°C (February). There is 2385mm annual rainfall and occasional snowfalls. Water temperature averages 18°C or more.

Vegetation The coastal woodland is dominated by black pine *Pinus thunbergii*, Neolitsea (*Machilus*) *thunbergii* and *Pittosporum tobira* (Sutherland and Britton, 1975; NCB, 1985). Marine vegetation is temperate with flourishing *Sargassum patens* and *S. serratifolium*, *Ulva pertusa*, *Dictyota dichotoma*, *Grateloupia filicina*, *Acrosorium flabellatum* and *Cladophora japonica* (Marine Parks Centre, 1975).

Fauna Characteristic species include Japanese macaque *Macaca fuscata*, Temminck's cormorant *Phalacrocorax filamentosus*, highly threatened local race of white stork *Ciconia ciconia boyciana* and red-rumped swallow *Hirundo daurica* (IUCN, 1975). The marine fauna includes temperate fish such as *Chromis notatus*, *Girella punctata*, *Pterogobius zonoleucus*, *Ditrema temmincki* and various Labridae. Invertebrates include sea anemones, starfish and sponges such as *Solanderia secunda*, *Euplexaura erecta*, *Aglaophenia whiteleggei* and *Comanthus japonica* (Marine Parks Centre, 1975).

Cultural Heritage Myths and legends of the ancient Izumo tribe persist in the Sanin Kaigon area (Sutherland and Britton, 1980).

Local Human Population Tottori is a market centre for timber, rice and fruit orchards, as well as being a renowned holiday resort. Nearby Kasumi is noted for its fishing industry.

Japan

Visitors and Visitor Facilities Annual visitation of 6.32 million people with up to 900,000 to the Marine Park Areas (IUCN, 1975). Facilities include hotels, inns, picnic grounds, nature trails, access roads, sightseeing boats, glass-bottomed boats (at Toyooka, Hamasaka and Uradome Kaiga Marine Park Area) sand dune skiing and a National Vacation Village. Other facilities include a Folk Art Museum at Tottori (Sutherland and Britton, 1980).

Scientific Research and Facilities Studies of vegetation have been undertaken by the Environment Agency (IUCN, 1975).

Conservation Management No information

Management Problems The coastal area and the Koyama and Togo lakes are extensively fished (Sutherland and Britton, 1980).

Staff There is a total of at least 11 staff, one full-time ranger (Environment Agency), 10 seasonal patrol men (Hyogo and Tottori Prefectural Governments) (IUCN, 1975).

Budget In the mid 1970s there was support from the annual allocation by the Environment Agency to the National Parks (US\$700,000); US\$9,000 per annum from Hyogo and Tottori Prefectural Governments (IUCN, 1975).

Local Administration Takeno Ranger Office, Environment Agency, Takeno Kaigan, Takeno, Hyogo.

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Date June 1987

Seto-naikai (Inland Sea) National Park

Management Category V (Protected Landscape)

Biogeographical Province 2.02.02 (Japanese Evergreen Forest)

Geographical Location The national park is located in the inland seas between the islands of western Honshu, Kyushu and northern Shikoku. It comprises a 400km coastal strip and islands in the straits of the Marima sea and Iyo sea (from Tokuyama in the west to Naruto, near Kobe, in the east). The park is located within the Hiroshima, Ehime, Kagawa, Okayama, Wakayama, Tamaguchi and part of the Hyogo prefectures. 33°16'-34°49'N, 130°57'-135°21'E

Date and History of Establishment The national park was created on 16 March 1934 and designated under the Natural Parks Law as a place of scenic beauty. Development is controlled within the park under Art. 17, 18 and 20 of the Natural Parks Law. The park was enlarged in 1950, 1956 and again in 1963.

Area 62,957ha (370ha SPA). Proposed: 93.3% (58,904ha) multiple-use areas, 6.7% (4,214ha) wilderness area.

Land Tenure 9,240ha state land, 17,356.6ha public land, 36,521.6ha private land.

Altitude Sea level to 932m

Physical Features The Inland Sea, entered by four straits between Honshu and Shikoku islands, extends 400km from east to west. It varies in width from 7km to 60km at its widest point and contains over 600 islands of volcanic origin. The coasts are deeply indented, geologically composed of granite rounded island hills and white quartz sand beaches. The sea is blue and clear, its straits and channels noted for rapid tides and whirlpools such as at Naruto Channel (Sutherland and Britton, 1980).

Climate The area is typified by generally mild temperatures ranging from 28°C to 5.8°C; average annual rainfall is 1147mm.

Vegetation The islands are dominated by coastal forests of black pine *Pinus thundergii* forests, interspersed with red pine *P. densiflora* and Japanese cedar *Cryptomeria japonica*. The virgin forest of Mt Misen on Miyajima has red and black pine mixed with *Abies firma*, *Tsuga sieboldii* and some *Quercus stenophylla* and *Symplocos pruniflora*. There is also temperate rain forest of camphor *Cinnamomum camphora*, oaks *Quercus glauca* and *Q. phylliraeoides*, pasania oak *Castanopsis japonica* var. *sieboldi*, *Camellia japonica* var. *spontanea*, cherry *Prunus yamasakura* and maple *Acer* spp. (IUCN, 1975).

Fauna Mammals in the park include Japanese macaque *Macaca fuscata* (c. 450) on Miyajima island, black finless porpoise *Neomeris phocaenoides* (considered uncommon), wild pig *Sus scrofa leucomystax* and Honshu sika *Cervus nippon centralis* (IUCN, 1975; Sutherland and Britton, 1980). Birds include as winter visitors red throated and pacific divers *Gavia stellata* and *G. pacifica*, and as common summer residents plumed egret *Egretta intermedia* and black-headed gull *Larus ridibundus sibiricus* (IUCN, 1975).

Cultural Heritage The park has been established partly for its scenic beauty and also for its historical associations. The area has much of historical interest, this having been the main route by which foreign traders first entered Japan. The area is also important for religious pilgrimages to such sites as the 12th century floating shrine, and is also renowned for the 12th century wars between the Minamoro and Taira clans and the 13th century pirate raids (Sutherland and Britton, 1980).

Local Human Population Awaji and Shodo are well populated whilst 25% of the other islands are uninhabited. Traditionally industry was represented by small fisheries but today there is a dominance of vast ship yards, petro-chemical plants and steel mills. Agriculture is varied and ranges from mandarin orange groves to terraced rice fields (Sutherland and Britton, 1980; NCB, 1985).

Visitors and Visitor Facilities There were an estimated 48.78 million visitors in 1972 (IUCN, 1975). Facilities in the park include hotels, inns, camp and picnic grounds, yacht harbour, nature trails, visitor centre, aquarium, marine museum and five National Vacation Villages. There are also cable cars as at Miyajima. The most popular site in the park is Miyajima isle with its floating shrine (Sutherland and Britton, 1980).

Scientific Research and Facilities Studies of vegetation have been undertaken by the Environment Agency (IUCN, 1975).

Japan

Conservation Management The park is largely managed for its scenic and recreational value, although important wildlife sites exist, such as Kin Kai and Lake Kosima (Scott, in prep.).

Management Problems Heavy industrial zones occur all along the coastline. The area is too close to major cities to be easily kept free of pollution pressures. Much of the park area adjoins unprotected industrial areas where chemical effluent and "red tide" pollution is widespread (Sutherland and Britton, 1980). Further difficulties of management occur through the extensive and discontinuous nature of the park boundaries.

Staff 25 full-time staff (superintendent and three rangers employed by the Environment Agency; five officers of the Hiroshima, Yamaguchi and Tokushima Prefectural Governments; 14 patrol men of the Hiroshima and Kagawa Prefectural Governments); 15 seasonal staff (patrol men of Hyogo, Okayama, Yamaguchi, Wakayama, Tokushima and Ehime Prefectural Governments) (IUCN, 1975).

Budget In the 1970s the park received a share of the annual allocation of US\$700,000 provided by the Environment Agency for National Parks, in addition to US\$100,000 per annum provided by the Prefectural Governments (IUCN, 1975).

Local Administration Seto-Naikai National Park Headquarters Office, Environmental Agency, c/o Kojima Branch Office, Kurashiki City, Kojima, Okayama Prefecture. Ranger Office at Yashima; Ranger Stations at Rokko, Ikuta-ku, Kobe Norosan, Kawajiri Town.

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Date June 1987

Shikotsu-Toya National Park

Management Category V (Protected Landscape)

Biogeographical Province 2.14.05 (Manchu-Japanese Mixed Forest)

Geographical Location Located to the south-west of Hokkaido island, west of Sapparo. The nearest towns are Kutchan, Noboribetsu and Sobetsu on the banks of Lakes Shikotsu and Kuttara. Two park outliers also occur, one at Showa Shinzan and the other at Mt. Yotei. 42°29'N, 141°10'E.

Date and History of Establishment The area was designated as a national park on 16 May 1949 under the Natural Parks law. Showa Shinzan was designated a Natural Monument in 1958 and incorporated in the National Park in 1972/73.

Area 98,332ha

Land Tenure No information

Altitude c. 0-1843m

Physical Features The area is a mountainous and lake land landscape dominated by a number of active volcanoes. Lake Shikotsu, 13km long and 51km wide is encircled by the active Mt. Eniwa and Mt. Tarumae. The lake is 500m deep. Lake Toya is a caldera lake surrounded by new volcanoes such as Mt. Usu and Showa Shinzan which have formed since 1910 and 1944 respectively. The spa water at Noboribeton with an output of 20,000 gallons/minute ranges in temperature from 45-95°C.

Climate Snow occurs in winter, whilst the average minimum temperature for the year is -1°C (January). Average annual rainfall figures are approximately 1200mm.

Vegetation Lakeside vegetation in the area includes *Phragmites communis*, *Miscanthus arenicola*, *Trapa natans*, *Scirpus lacustris* and *Nuphar japonicum* (Scott, in prep.). The new volcanic mountains are devoid of vegetation but their foothills are clothed in woodland of fir *Abies*, maple *Acer*, oak *Quercus* and azalea *Rhododendron*. Mt Yotei has more than 260 varieties of alpine plants on its slopes (Sutherland and Britton, 1980).

Fauna The entire region is favourable for migratory water birds, such as at Lake Shikotsu, and include numerous white-fronted geese *Anser albifrons*, bean goose *Anser fabulis* and whooper swan *Cygnus cygnus* (Sutherland and Britton, 1980; Scott, in prep.). Introduced fish include carp *Cyprinus carpio*, salmon trout *Salmo* sp., bullhead *Cottidae* and crayfish *Decapoda*, all of which have been stocked in Lake Shikotsu since 1900 (Sutherland and Britton, 1980).

Cultural Heritage No information

Local Human Population No information

Visitors and Visitor Facilities In the 1970s more than 12 million tourists visited the park annually (NCB, 1985). The chief attractions are the active volcanoes but there are also numerous hot spring spas, skiing facilities, climbing, angling and hiking activities and boat excursions. There is a forest museum and arboretum at Nakanoshima. Accommodation includes hotels, Japanese styled inns and camping facilities (Sutherland and Britton, 1980).

Scientific Research and Facilities No information

Conservation Management The park was established to become a major tourist and recreational area for Hokkaido. Management is largely orientated towards visitor control and protection of the landscape.

Management Problems No information

Staff No information

Budget No information

Local Administration No information

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Date July 1987

Shiretoko National Park

Management Category V (Protected Landscape)

Biogeographical Province 2.14.05 (Manchu-Japanese Mixed Forest)

Geographical Location The park is situated on the north-east corner of Hokkaido, extending from Utoro and Rausu to cover all the peninsular eastwards to Cape Shiretoko (40km long). 44°04'N, 145°12'E.

Date and History of Establishment The national park was created on 1 June 1964 under the Natural Parks law. Development within the park is controlled under Articles 17, 18 and 20.

Area 38,633ha

Land Tenure No information

Altitude 0-1,661m

Physical Features The rugged terrain of the Shiretoko park peninsula ranges from volcanic peaks to the upthrust coastal cliffs at Cape Shiretoko which drop 200m to the Okhotsk sea. The Shiretoko, Io and Rausu volcanic mountains form part of the Chishima volcanic zone, which runs through the Kurile archipelago to the centre of Hokkaido. Only Mount Io (1,563m) is active and records indicate that it erupts once every 60 years; most recent eruptions being in 1936. The coastal cliffs originated from molten lava spreading in sills through submerged sedimentary rocks; then volcanic activity beneath the ocean flow pushed the rock up to its present height. The volcanic plateaus between Shiretoko's mountain spine and its cliffs are located in natural hollows in the lava bed laid down 600,000 years ago. Narrow rivers, whose sources are in the local mountain ranges, fall in cascades over the cliff faces (Sutherland and Britton, 1980; Robinson, 1987).

Climate Mean annual temperatures of 6°C have been recorded with a mean minimum of -1°C. Precipitation averages 1200mm per year. Winter snows are deep.

Vegetation The woodlands include primaeval habitats of birch *Betula*, spruce *Picea*, oak *Quercus* and silver fir *Abies*. Cliff vegetation includes Hokkaido azalea *Rhododendron* sp., irises *Iris* sp., angelica *Angelica* sp. (Sutherland and Britton, 1980). The Shiretoko sumire *Viola* sp. is unique to Mount Io. The lake-marsh vegetation includes spatterdock, buckbean and skunk cabbage (Sutherland and Britton, 1980).

Fauna Mammals include fox *Vulpes*, deer *Cervus nippon*, hare and brown bear *Selenarctos thibetanus* (Sutherland and Britton, 1980). Sea bird colonies abound and include Temminck's cormorant, *Phalacrocorax filamentosus*, black-tailed gull *Larus crassirostris* and common guillemot *Uria aalge*. There are also rare white-tailed eagle *Haliaeetus albicilla* and large numbers of wintering Steller's sea eagle *Haliaeetus pelagicus* (between a few hundred to 2,000) (Sutherland and Britton, 1980; for species lists see Robinson, 1987). The river estuaries are haunts for salmon and trout.

Cultural Heritage No information

Local Human Population No real permanent habitations are found in the Park. Seasonal huts are occupied on the fore-shore for the annual Giant Kelp harvesting season (Sutherland and Britton, 1980).

Visitors and Visitor Facilities The area remains one of the least frequented and most remote parks in Japan. There is no tourist accommodation in the Park and only a few roads are available for visitor use. Accommodation is available at nearby Rausu and Utoro. Roads and tracks only cover 1/8 of the Park, entering 25km into the Park from Rausu and Utoro. The main attractions are the hot springs on the coast, the tourist boat trips and cruises around the peninsula, and visits to the Kamuiwakka falls (Robinson, 1987).

Scientific Research and Facilities No information

Conservation Management The legislation states that the park has been created to protect the landscape of the region. At present recreation is restricted to outdoor activities.

Management Problems Currently the park is one of the least developed in Japan and unless adequately controlled may be damaged by the increasing number of tourists (Robinson, 1987).

Staff Rangers are present at Rausu (Sutherland and Britton, 1987).

Budget No information

Local Administration No information

References

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Date July 1987

Towada-Hachimantai National Park

Management Category V (Protected Landscape)

Biogeographical Province 2.15.05 (Oriental Deciduous Forest)

Geographical Location The park is located in northern Honshu island between Sendai and Aomori. It lies 60km due south of Aomori. The nearest large towns are Hirosaki, Towada-shi and Morioka. The park consists of two separate areas, the northern sector around the caldera lake Towada and 50km south the southern park of the Hachimantai highlands.. The park is found in Aomori, Akita and Iwate prefectures. 40°34'N, 140°28'E.

Date and History of Establishment The park was created on 1 February 1936. The southern sector was added to the park in 1956.

Area 85,409ha

Land Tenure No information

Altitude Up to 2,041m

Physical Features The park is situated in the mountainous area of Tohoku. The northern sector includes the rolling volcanic plateau of Hakkoda, the highest peak being 1,585m. Its southern limit is bounded by the Oirase river and gorge which feed the caldera lake Towada (40km in circumference and 300m deep). The Hachimantai highlands have several craggy peaks and a number of hot springs and boiling "mud-pots" (Sutherland and Britton, 1980).

Climate Snow is not uncommon in winter and mean minimum temperatures for the year are in the region of -1°C. Precipitation averages 1200mm per year.

Vegetation The lowland woodland is characterised by extensive beech *Fagus* forests, mixed with pine *Pinus* sp. (Sutherland and Britton, 1980). At higher altitudes are open vegetation habitats of alpine species. (Sutherland and Britton, 1980)

Fauna No information

Japan

Cultural Heritage The Tohoku culture and the local festivals preserve dances, costumes and ceremonies long forgotten in other parts of Japan (Sutherland and Britton, 1980).

Local Human Population The population is mainly below the mountain park but small settlements cling to the shallower slopes. Many of the local people are engaged in cottage industries, such as cape making and lacquerwork. Local agriculture includes rice paddies and apple orchards. Forestry occurs on the higher slopes of the mountain (Sutherland and Britton, 1980).

Visitors and Visitor Facilities Most tourist amenities are centred around Lake Towada. Accommodation includes hotels, inns, lodging houses and hot-spring spas. Activities include visits to trout hatcheries, hikin, angling and climbing, and pleasure boat trips on Lake Towada. The winter ski sports are renowned (Sutherland and Britton, 1980).

Scientific Research and Facilities No information

Conservation Management The park authorities manage the combination of natural and man-made landscapes and encourage smaller craft industries.

Management Problems Commercial tree felling is of some concern (Sutherland and Britton, 1980).

Staff No information

Budget No information

Local Administration No information

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Date July 1987

Unzen-Amakusa National Park (including the Tomioka, Amakusa and Ushibuka marine park areas)

Management Category V (Protected landscape)

Biogeographical Province 2.02.02 (Japanese Evergreen Forest)

Geographical Location The park is located on the north-west coast of Kyushu Island in the Unzen area of Shimabara peninsula. It consists of three separate parts, that of Mount Unzen and the 120 islands of Amakusa archipelago (only parts of Shimo and Kami Islands). 32°40'-32°49'N, 130°10'-130°22'E; Amakusa area: 32°08'-32°36'N, 130°02'-130°28'E. Tomioka MPA: 32°C1'N, 130°01'E; Amakusa MPA 32°20'N, 129°58'E and Ushibuka MPA 32°09'N, 130°03'E.

Date and History of Establishment The Unzen area was created as a National Park on 16 March 1934; designated under the Natural Parks Law. The coasts of the Amakusa islands were added in 1956. The Marine Park Areas were established on 1 July 1970. The park is essentially a place of scenic beauty protected as National Park; development is controlled under Art. 17, 18, 18-2 and 20, Natural Parks La). Special protection is afforded to four families, six species of fish; five genera and 16 species of invertebrate Anthozoa; two genera and four species of seaweed.

Area 25,496.2ha (MPAs 51.7ha; SPA 608ha). Two zones are proposed: 96% (24,606.5ha) multiple-use areas, 4% (1,058.7ha) wilderness areas.

Land Tenure 8,706ha state land, 4,053 public land, 12,906ha private land.

Altitude Sea level to 1,360m (maximum depth of MPAs 20m)

Physical Features The park consists of Mt. Unzen (1,360m) an extinct tholoid volcano with 4 peaks over 1,000m. Hot springs are located throughout the area and there are also lakes and waterfalls on the mountain slopes. The Amakusa archipelago consists of indented coasts and outlying stacks. The islands are steep and rocky with boulder, shingle, sand and mud beaches. Tomioka is on the west of the famous "land-tide" island Tombro, and throughout the narrow straits of the Yatsushiro sea is the distinctive marine luminescence, the Shiranui. The Tsushima current (a branch of the Kuroshio) gives a sub-tropical aspect to the archipelago with its populations of corals (IUCN, 1975; Marine Parks Centre, 1975; Sutherland and Britton, 1980).

Climate Temperatures at Mt. Unzen range from between 23.7°C (August) and 1.5°C (January); there is a recorded 3030mm of annual precipitation. In Tombro temperatures are higher than at Unzen, ranging from 27.9°C (August) to 7.8°C (January), and an annual average rainfall of 2069mm.

Vegetation At low altitude Unzen possesses palaeartic forests of red pine *Pinus densiflora* and azalea *Rhododendron kaempferi* (6,000ha), as well as plantations of *Chamaecyparis obtusa*, *Cryptomeria japonica*, *Pinus densiflora* and *P. thunbergii*, (5,000ha) (IUCN, 1975) Large stands of azalea *Rhododendron* sp. cover the mountain sides and plateau such as at Ikenohara. At high altitudes on the Nita pass, are deciduous forests (1,300ha) consisting of dogwood *Cornus kousa*, *Acer sieboldianum*, *Ilex crenata* and *Rhododendron kiusianum* (IUCN, 1975). Marsh habitats at Genseinuma, near the pass to Mount Kinugasa, are haven for a protected "natural monument" species of *Iris* (IUCN, 1975; Sutherland and Britton, 1980). The Amakusa archipelago is forested mainly by oaks *Castanopsis cuspidata* var. *sieboldii*, *Quercus glauca* and *Q. serrata*. The presence of *Albizia glabrior* is of biogeographical interest. The marine flora comprises meadows of *Sargassum* spp, *Ecklonia kurome* and *Undaria pinnatifida*, with *Martensia denticulata*, *Amphiroa dilatata* and *Corallina pilulifera* (Marine Park Centre, 1975).

Fauna One of the few larger mammals of the Unzen sector include deer *Cervus nippon nippon* (Sutherland and Britton, 1980). Many birds migrate in spring to the region from the south. Birds include breeding populations of mandarin duck *Aix galericulata* and blue-winged pitta *Pitta brachyura*, grebes *Podiceps caspicus* and *P. cristatus*, and also shelduck *Tadorna tadorna* (IUCN, 1975; NCB, 1985). The area is also noted for an endemic insect *Epaphiopsis unzenensis*. The marine fauna includes sub-tropical fish such as *Pomacentrus coelisticus*, *Chaetodon collaris*, *Thalassoma cupido* and Ostracionidae. Scleractinian and alcyonarian corals include *Acropora* spp., *Montipora cactus*, *Pocillopora domicornis*, *Favia speciosa*, and *Nephtea chabroliei*. Ushibuka marine park has especially well developed *Antipathea japonica*, *Parasicyonis actinostoloides*, *Melihaea flabellifera* and *Anthoplexaura dimorpha* (Marine Park Centre, 1975).

Cultural Heritage The area is extremely rich in historical associations and is believed to be the cradle for the Buddhist culture in Japan (at Hachijuhachikasho). The area has strong association with the early Christians of the 17th century. During the persecution period Christians were thrown into the boiling hot waters of the Unzen spa and at nearby Shimabara Castle (now a history museum) - 35,000 people were massacred. On the Amakusa islands the local population largely kept their *Kakure kirishitan* hidden Christian traditions up to when Christianity became legal in 1905 (Sutherland and Britton, 1980).

Local Human Population The local economy is based on fishing, tea and rice agriculture and tourism. Fisheries are especially important at the port of Ushibuka on Shimo island. Also within the park area are the Miike coalfields, the largest in Japan (Sutherland and Britton, 1980).

Japan

Visitors and Visitor Facilities The park received 10.24 million visitors in 1972 with 150,000 visitors to the Marine Parks (IUCN, 1975; Marine Parks Centre, 1975). Facilities include hotels, inns, camp and picnic grounds, golf courses and nature trails. A major scenic route passes through the area. Hot spring baths and spas abound in the region of Unzen. The town is also rich in museums and numerous other recreational activities including a National Vacation Village. Access to the park is good and cable cars service Mt. Fugen. The Amakusa archipelago was first opened up to tourism in the 1960s with the construction of a series of bridges to the mainland. It is now a popular tourist resort and possesses a number of glass-bottomed boats, ferries and sightseeing boats (Sutherland and Britton, 1980; Marine Parks Centre, 1975).

Scientific Research and Facilities In 1968 a survey of Marine Park Areas was undertaken, followed in 1973 by the Environmental Agency's vegetation study (IUCN, 1975). A meteorological observatory is located on Mount Kinugusa (Myoken).

Conservation Management Unzen and Banff National Park in Canada have established a "sister park" relationship since May 1976.

Management Problems There is no freshwater drainage from the land to the sea. The Amakusa islands have long been protected by their remoteness, but in 1966 all was changed when the five Amakusa-Kyushu bridges were built to join the archipelago to the mainland. Subsequently tourism, industry and other developments have been extensive. Major threats to the area include coalfields, chemical and other industrial complexes, notably from the nitrogen fixation industry of Minamata (Sutherland and Britton, 1980).

Staff Total of eight staff (a ranger of the Environmental Agency; three officers of the Nagasaki Prefectural Government; four patrol men Nagasaki and Kumamoto Prefectural Governments) (IUCN, 1975).

Budget In the 1970s the park received a share of the annual allocation by the Environment Agency to National Parks (US\$700,000); US\$40,000 annually received from Nagasaki and Kumamoto Prefectural Governments (IUCN, 1975).

Local Administration Unzen Park Administrative Office, Nagasaki Prefecture, Unzen Hot Spring, Obama, Nagasaki (Ranger Office, Environmental Agency also at Obama).

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Date June 1987

Yoshino-Kumano National Park
(including the proposed Kumanada-Nikijima and Kushimoto Marine Parks
and Mt. Odaigahara and Mt. Omine Biosphere Reserve)

Management Category V (Protected Landscape) IX (Biosphere Reserve)

Biogeographical Province 2.02.02 (Japanese Evergreen Forest)

Geographical Location The park is located in the central part of Kii Peninsula of Honshu Island and includes the Omine mountain ridge, Mount Odaigahara and Osugi Valley, 12km NW of Owase. The park extends as a narrow 80km strip along the coast from Kushimoto in the south to Owase in the north, thence inland following the Kumano-Kitayama river (Doro gorge) to Mount Omine, Mount Odaigahara and Mount Shaka. A small outlier of Mount Yoshino is situated about 5km to the north of the main Park boundary. The Park is located in Yoshino and Kumano districts. 34°10'N, 136°0'E.

Date and History of Establishment The whole area was created under the National Parks Law of 1 February 1936. The Special Protected Area of the National Park, which the National Government bought from private owners to put under its protective administration, is designated as the "core area". The Special Area and Ordinary Areas of the park constitute a "buffer zone" where timber production is permitted to different extent depending on the condition of the area.

Area 58,546ha, of which 1,000ha is within the "core area". The Marine Parks total 14.4ha and 39.2ha (the Biosphere Reserve makes up 36,000ha).

Land Tenure The state owns 20% of the area; 20% is public land and 60% is in private ownership.

Altitude 200-1,915m

Physical Features The park consists of a diversity of terrains ranging from mountains, riverine gorges and coastal habitats. The steep-sloped mountains in the region of Mt. Omine range from 1,695 to 1,800m, and a 700ha plateau occurs at the top of Mt. Odaigahara (1,695m). There is evidence of extensive mountain upheaval and erosion. Cliffs of 800m consist of gray wacke, sandstones, shales, tuff-like hornstones, chert and green tuff of the Paleozoic and Mesozoic periods (Sutherland and Britton, 1980). The Osugi Valley is characterised by deep V-shape valleys, deep gorges and waterfalls, such as the 130m Nachi. A number of hot water springs exist along the Kumano River (Sutherland and Britton, 1980; Marine Parks Centre, 1975).

Climate This area has the most rainfall in Japan. At Odaigahara annual precipitation amounts to 4700mm (maximum in August). In 1923 one day of rainfall amounted to a record 1011mm. The mean monthly temperature is 5.1°C in January and 17.3°C in July.

Vegetation The vegetation of the park ranges from virgin forest to seashore vegetation and cliff flora. The mountains are typified by a narrow vertical zonation ranging from warm temperate communities in the foothills to sub-alpine virgin forests at the highest altitudes. Fir *Abies veitchii* is found in association with *Magnolia sieboldii* in the sub-alpine zone. Other evergreen communities include *Pseudotsuga japonica*, *Sciadopitys verticillata* and *Picea jezoensis hondoensis*. Chasmophytic vegetation includes *Sciadopitys verticillata* and *Rhododendron quinquefolium* (Sutherland and Britton, 1980; NCB, 1985).

Fauna The park is rich in larger mammals including serow *Capricornis crispus*, deer *Cervus nippon*, and bear *Selenarctos thibetanus* (Sutherland and Britton, 1980). Monkey *Macaca fuscata* is found in large numbers around Yakushima Island (Sutherland and Britton, 1980). There are records of more than 60 species of breeding bird (Sutherland and Britton, 1980). Characteristic warm water species include *Hynobius boulengeri*. Also found in the area is *Salvelinus pluvius*, characteristic of the cool water areas further north in Japan (this is its

Japan

most southern distribution). Within the park areas there are off-shore reefs of table coral *Dendronephthya habereri*, *Platygyra lamellina* and *Favia speciosa* (Marine Parks Centre, 1975). Fish include *Goniistius zonatus*, *Apogon semilineatus* and *Ditrema temminki* (Marine Parks Centre, 1975).

Cultural Heritage The mountains of the Park have long been refuge for persecuted people. In 1185 Minamoto no Yorishitsune sought refuge here from his shogun brother. Thence in the 14th century the Emperor Go-Daigo hid here during civil unrest (Sutherland and Britton, 1980). In Kumano are a number of early shrines to the deities of nature. The area has taken on great significance as both a Shinto and Buddhist holy place. Mt. Omine is too sacred to permit women. Pilgrims have been coming here for centuries, such as to the Yunomine medieval springs since AD 90. A boat festival in mid October commemorates just one of the gods of the region. Another festival at the Nachi waterfall shrine is dedicated to one of the main Shinto gods, Okuninushi no Mikato (Sutherland and Britton, 1980).

Local Human Population The area has for centuries been sparsely populated (Sutherland and Britton, 1980).

Visitors and Visitor Facilities Annually about 100,000 people visited the Park for recreational purposes in the mid 1970s (National Park Association, 1974). Lodges and hotels (total capacity 500 people) exist within the Park, but few other facilities. Even access to the Omine mountains is extremely limited. Rock climbing is the main activity apart from visits to the numerous Shinto shrines. Boat trips are available on the Kumano River and at Kushimoto there are glass bottom boats, an underwater observation tower and aquarium (Marine Parks Centre, 1975; Sutherland and Britton, 1980).

Scientific Research and Facilities The JIBP-CT(P) Committee of Japan was set up to classify plant communities and establish a basic theory on their protection. With the results it selected areas and supplementary sites for investigation (designated Mt. Odaigahara as a supplementary area for interdisciplinarily investigations on the IBP programmes). Meteorological observation started in 1898 when the observatory was established. Today there is an automatic robot observatory on the top of Mt. Odaigahara.

Conservation Management The park has been established to protect the landscape. Currently the majority of the countryside is unspoilt natural habitats. Timber extraction and tourism are encouraged.

Management Problems The construction of a toll road to Odaigaha in the park core area in 1961 has increased tourist pressure on the environment. A change in vegetation structure has already been noted. Access has also led to increased timber extraction which is permitted in all areas, except the Omine ridge (Nature Conservation Bureau, 1985). The construction of dams and man-made reservoirs in Osugi valley has resulted in concern for the effects upon the Park river systems and their drainage patterns (Sutherland and Britton, 1980).

Staff One official is assigned for area protection (Sutherland and Britton, 1980).

Budget 820,000 Yen was appropriated for the 1978 fiscal year, largely for administration.

Local Administration Mount Yoshinoyama Ranger Office, Yoshino-Kumano National Park, 2,673-1 Yoshinoyama, Yoshino-cho, Yoshino-gun, Nara Prefecture, 639-31.
Yoshino-Kumano National Park Office, 6521 Shingu, Shingu City, Wakayama Prefecture, 647.

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Date June 1987

PAKISTAN

Area 803,941 sq.km

Population 84,250,000 (1981)

Parks and Reserves Legislation Efforts to conserve wildlife and protect nature in Pakistan go back over a hundred years when early rulers first created game preserves to ensure viable populations of game species for hunting. The first written legislation that directly benefitted wildlife were the rules and regulations formulated in Sind under the Indian Forest Act in 1887 and later compiled under the name of Bombay Forest Manual. Under this legislation, forests were protected from grazing by livestock but hunting was not legally controlled. Hunting and other forms of resource exploitation were subsequently controlled within areas declared as reserved or protected forests under the Indian Forest Act, 1927, the title of which was changed to Pakistan Forest Act, 1927 following Pakistan's adoption of the act after partition in 1947. In practice, however, commercial forestry interests received preference over conservation needs (Ferguson, 1978; Rau, 1984).

Wildlife conservation legislation inherited from British India was superceded by the now obsolete West Pakistan Wildlife Protection Ordinance, 1959 and the West Pakistan Wildlife Protection Rules, 1960 issued under that ordinance. Apart from prohibiting the killing of certain species of fauna, this legislation made provision for the declaration of game sanctuaries, in which hunting was prohibited, and game reserves, in which hunting was controlled under license, but did not protect the habitat against settlement, cultivation, grazing and other forms of exploitation. Furthermore, both the West Pakistan Wildlife Protection Ordinance and the Pakistan Forest Act applied only to the settled areas of Pakistan (i.e. the flood plains of the Kabul and Indus rivers and all the land to the east of them); neither were applicable to the Special/Tribal Areas, which constitute most of mountainous half of the country to the west of the Indus and in which most of Pakistan's remaining wildlife is found (Grimwood, 1969).

A Wildlife Enquiry Committee was set up in 1968 to review the existing legislation, based on recommendations resulting from wildlife surveys carried out by World Wildlife Fund (Mountfort and Poore, 1967, 1968). Draft legislation prepared by this committee (Government of Pakistan, 1971) has been adopted, with minor modifications, at provincial level through the provision of various acts and an ordinance, namely: Sind Wildlife Protection Ordinance, 1972, Punjab Wildlife (Protection, Preservation, Conservation and Management) Act, 1974, Baluchistan Wildlife Protection Act, 1974, North-West Frontier Province Wildlife (Protection, Preservation, Conservation and Management) Act, 1975. Separate laws were passed for the Northern Areas, Azad State of Jammu and Kashmir and Federal Capital Territory of Islamabad. These are the Northern Areas Wildlife Preservation Act, 1975, Azad Jammu and Kashmir Wildlife Act, 1975 and the Islamabad Wildlife (Protection, Preservation, Conservation and Management) Ordinance, 1979 (Rau, 1984). This is the first time in the history of Pakistan's wildlife legislation that an attempt has been made to conserve habitat (although limited to protected areas) and species other than game species. All of these statutes provide for the creation and management of national parks, wildlife sanctuaries (synonymous with wildlife reserves in the Northern Areas Act), game reserves (synonymous with controlled hunting areas in the Northern Areas Act) and, in the case of the Punjab, NWFP and Islamabad legislation, private game reserves. A national park is a comparatively large area of outstanding scenic merit and natural interest, wherein the primary objective is to protect the landscape, flora and fauna in its natural state and to which the public are allowed access for purposes of recreation, education and research. A wildlife sanctuary is an area set aside as undisturbed breeding ground, primarily for the protection of all natural resources, to which public access is prohibited or regulated. Whereas settlement and grazing by domestic livestock is allowed in national parks (see Grimwood, 1972, for a discussion of the implications arising from this aspect of the legislation), such activities are prohibited within wildlife sanctuaries. A game reserve is an area wherein controlled hunting and shooting is permitted on a permit basis. A private game reserve, of which there is none at present, is an area of private land set aside by

its owner for the same purpose as a game reserve. Parts of areas protected under some statutes may be denotified under pressure for agricultural extension or land development (Government of Pakistan, 1971; Rao, 1984; Khan and Hussain, 1985).

The recent enactment of the Pakistan Environmental Protection Ordinance, 1983 affords protection to all forms of life and provides for the control of pollution and use of fertilizers and pesticides. Rao (1984) provides a full review of the wildlife legislation.

Pakistan ratified both the Convention Concerning the Protection of the World Cultural and Natural Heritage and the Convention on Wetlands of International Importance Especially as Waterfowl Habitat on 23 July 1976. It also participates in Unesco's Man and the Biosphere Programme and the South Asian Cooperative Environmental Programme.

Parks and Reserves Administration and Management Originally, the Game Department was responsible for administering the West Pakistan Wildlife Protection Ordinance up until 1967, when it was absorbed into the Forest Department (Grimwood, 1969). Following the recommendations of the Wildlife Enquiry Committee (Government of Pakistan, 1971), a National Council for Conservation of Wildlife was established on 7 July 1974 within the Forest Department, under the chairmanship of the Minister of Agriculture, Food and Cooperatives, to co-ordinate central and provincial government effort in the formulation and implementation of wildlife policies. The Inspector General of Forests is assisted by a Deputy Conservator of Forests (Parks and Wildlife), who acts as an adviser on wildlife but the actual management of wildlife is handled by the provincial forest (wildlife) departments. Sind, Punjab and Azad State of Jammu and Kashmir have separate wildlife departments but in North-West Frontier Province, Baluchistan and Northern Areas wildlife is administered by branches of the respective forest departments. In general, forest staff look after wildlife in reserved or protected forests while wildlife staff are concerned with protecting wildlife in other protected areas and elsewhere. Within the Capital Territory of Islamabad, the Directorate of Horticulture is responsible for the administration of protected areas. In addition, legal provision has been made for the creation of a wildlife management board, to approve wildlife policies and monitor development activities, in Punjab, Sind, North-West Frontier Province and Islamabad. Only Sind has an effectively operating wildlife management board, which is considered to be the most progressive wildlife organization in Pakistan. Boards exist in Baluchistan, Azad State of Jammu and Kashmir and Northern Areas but only in an advisory capacity. Provision has been made for the appointment of honorary officers to help implement wildlife legislation in all areas except Baluchistan and Islamabad. The idea was introduced first on Sind in the 1970s and has since been adopted in Punjab and ? Azad State of Jammu and Kashmir, with the appointment of local dignitaries as honorary game wardens invested with considerable legal power to help enforce the law within protected areas (Ferguson, 1978; National Council of Conservation of Wildlife, 1978; Roberts, 1983; Rao, 1984).

Addresses National Council for Conservation of Wildlife, Ministry of Food, Agriculture and Cooperatives, 485 Street 84, G-6/4 Islamabad

Additional Information Most of Pakistan's remaining wildlife is to be found in the mountainous country west of the Indus, where human pressure has not been as great as in the plains. The two regions of outstanding importance are the Himalayan and Karakoram massifs in the extreme north and the desert in the south-west of the country (Grimwood, 1969). Major irrigation systems, built to tap the water resources of the Indus and all of its tributaries to meet the demands of an increasing human populations, have resulted in the disappearance of extensive tracts of the original tropical thorn scrub, riverine swamp and forest in the plains (Roberts, 1977). Currently, only 2.7% of the country is forested (Mackinnon and Mackinnon, 1986). By contrast, in the west, where much more wildlife habitat remains, forests cover 11.8% of the land in North-West Frontier Province (Nawaz, 1985).

In 1966, the Government of Pakistan invited World Wildlife Fund to assess the wildlife situation in the country and recommend measures to arrest the deterioration (see Mountfort and Poore, 1967, 1968). Subsequently, between 1968 and 1971, various assistance was received from the Food and Agricultural Organization of the United Nations, which latterly included the appointment of an adviser to the Wildlife Enquiry Committee (see Grimwood, 1969, 1972).

In December 1983, an Environmental Council was created by presidential order and given the responsibility of preparing an environmental strategy for the country. At the same, IUCN initiated the development of a conservation strategy (Halle and Johnson, 1984).

The principal non-governmental organization involved with conservation is World Wildlife Fund - Pakistan. The World Pheasant Association (Pakistan) promotes research and management projects in pheasants.

Pakistan's sixth Five Year Plan is currently based too exclusively on economic criteria and does not give sufficient recognition to the management of natural resources (Halle and Johnson, 1984). Weak enforcement of the law is an overall constraint but also safeguards against habitat degradation within protected areas are inadequate. Protected areas have been created haphazardly, in the absence of any criteria for their selection, and boundaries are drawn without any ecological basis. Emphasis on the management of national parks has been given to the development of recreation facilities for tourists rather than nature conservation, as in the case of Lal Suhanra and Margalla Hills national parks. Protected and reserves forests continue to be managed under forest working plans after being designated national parks or wildlife sanctuaries, thereby undermining the purpose of their renatification. Hunting in game reserves is not controlled on a sustained yield basis but permits are issued arbitrarily and subject to local influence (Rao, 1974). The Government of Punjab, however, has recently restricted the number of shoots under an amendment to the Punjab Wildlife Act, (Khan and Hussain, 1985). Management categories need to be modified (see Grimwood, 1972), perhaps by the introduction of nature reserves and country parks to replace wildlife sanctuaries (Rao, 1984).

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Pakistan

Protected Landscapes

National Parks
Margalla Hills

(hectares)

14,786 *

Margalla Hills National Park

Management Category V (Protected Landscape)

Biogeographical Province 4.08.04 (Indus-Ganges Monsoon Forest)

Geographical Location Comprises the hill ranges immediately north of the Federal Capital of Islamabad. 33°48'N, 73°10'E.

Date and History of Establishment 1980. Prior to 1960, much of the area was reserved forest. Subsequently, it was declared a wildlife sanctuary under the West Pakistan Wildlife Protection Ordinance, 1959.

Area 14,786ha

Land Tenure Federal government. Land transferred to Capital Development Authority in 1961, when Islamabad was declared the capital of Pakistan, includes 4,794ha reserved forest, 3,315ha managed by the Military Farm Authorities and 3,636ha privately owned (Masud, 1979).

Altitude Ranges between 456m and 1,580m

Physical Features The topography is rugged, with numerous valleys and many steep and even precipitous slopes. The area is drained by the River Kurang and its tributaries, which flow into the River Soan. Rocks are Jurassic and Triassic in age, limestone being characteristic of the Margalla Range (though shales, clays and sandstones are also present). Soils are dark, with a high mineral content, and are capable of supporting good tree growth despite being shallow. Lying in the monsoon belt, the area experiences two rainy seasons. Winter rains last from January until March and summer rains from July until September. Climatic data are available from 1951 to 1965 for Rawalpindi, where the mean annual rainfall is 951mm and mean monthly maximum and minimum temperatures range from 16.9°C to 40.1°C and from 3.1°C to 24.7°C, respectively (Masud, 1979).

Climate No information

Vegetation The two distinct types of vegetation are subtropical dry semi-evergreen forest and subtropical pine forest. The former is dominated by phulai *Acacia modesta* and kao *Olea cuspidata*, associated with sanatha *Dodonaea viscosa*, granda *Carissa spinarum* and ber *Zizyphus jujuba*, and having an undergrowth of bhekar *Adhatoda vasica*, gunger *Sageratia oppositifolia*, mullah *Zizyphus nummularia* and khokhal *Myrsine africana*. About 50 species of grass are present, the most common being dhauloo, palwan, survala, maniara and loonder (*Chrysopogon montanus*, *Andropogon pertusus*, *Heteropogon contortus*, *Pennisetum orientale* and *Themeda anathena anthisteria*). Introduced ornamental tree species include: silver oak, gulenishtar, jackaranda, bottle brush, amaltas, sakar, chir (*Grevillea robusta*, *Erythrina suberosa*, *Jacaranda mimosaeifolia*, *Sterculia diversifolia*, *Cassia fistula*, *Ehretia laevis*, *Pinus roxburghii*), *Cassia glauca*, *Porgania glabra* and *Eucalyptus* sp.. Subtropical pine forest occurs above 1,000m, chir pine *Pinus roxburghii* being the characteristic canopy species with an undergrowth of *Myrsine africana*, *Woodfordia floribunda*, *Berberis lycium* and granda *Carissa spinarum*. Forests are well-stocked on cooler aspects but those on the hotter southern slopes with poor soils are sparse and mixed with scrub.

Fauna Margalla Hills are unique in Pakistan, being rich in Sinohimalayan fauna, some species (especially birds) of which are at the western extremity of their distribution. Larger mammals are known to include rhesus macaque, leopard, wild boar, Indian muntjac and goral (*Macaca mulatta*, *Panthera pardus* (V), *Sus scrofa*, *Munitacus muntjak* and *Nemorhaedus goral*). Noteworthy birds include white-eyed buzzard, lannar falcon, black-shouldered kite, kalij pheasant, black partridge, sirkeer cuckoo, jungle nightjar, long-tailed nightjar, lesser golden-backed woodpecker and lanceolated jay (*Butastur teesa*, *Falco biarmicus*, *Elanus caeruleus*, *Lophura leucomelana*, *Francolinus francolinus*, *Taccocua leschenaultii*, *Caprimulgus indicus*, *C. macrurus*, *Dinopium benghalense* and *Garrulus lanceolatus*). A list of mammals and birds believed to be found in the park is given in the master plan (Masud, 1979). Cheer pheasant *Catreus wallichi*, reared at Dhok Jewan and Jabri, are being released into the park. The reintroduction programme is being carried out by the World Pheasant Association in collaboration with the Capital Development Authority (Howman, 1985).

Cultural Heritage There are a number of historical and religious sites but their importance needs to be evaluated.

Local Human Population There are over a dozen villages within the park. In addition, the residents of Phulgran retain traditional rights to graze cattle in compartments 1 & 6 of Margalla Reserved Forest (Masud, 1979). Some farming families have been resettled (Roberts, 1984).

Visitors and Visitor Facilities Large numbers of residents of Islamabad and Rawalpindi, as well as foreigners, visit the park due to its proximity to the capital. A visitor centre is planned for Daman-E-Koh, providing lounge accommodation and an information service. Lodges, camping grounds and picnic sites are also planned and the provision of a chair lift may be considered.

Scientific Research and Facilities The wildlife was surveyed in December 1977 by WWF in collaboration with the National Council for Conservation of Wildlife.

Conservation Management In its report of 1971, the Wildlife Enquiry Committee recommended that the park should be established in the interests of the people of Islamabad. Specific objectives outlined in the master plan (Masud, 1979) include restoring the vegetation and wildlife to its previous condition, stopping erosion, conserving the water supply and meeting the increased demand for outdoor recreation through the development of proper visitor facilities. A system of zonation, based on areas of varying intensities of visitor use, has been proposed to facilitate management. This includes a 3,100ha enclosure, for captive breeding and reintroduction purposes, and wilderness areas (comprising 70% of the park area), in which development is permitted. It is proposed that the park be surrounded by a buffer zone of 8km, in which shooting is prohibited. Rawal Lake has been recommended for inclusion within the park.

Management Problems Being adjacent to Islamabad, the park is subject to a very high level of use by visitors. There is illegal grazing by the livestock of local inhabitants, who have not vacated the area despite being paid compensation. Large scale planting of ornamental trees has been undertaken by the Horticulture Directorate (Masud, 1979).

Staff Park director, four park rangers, 20 park watchers and four other staff proposed in 1979.

Budget No information

Local Administration No information

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AUSTRALIA

Mosely made a study of protected areas and environmental planning in Australia, and, as a part of this work, tried to relate the range of protection and planning control measures in "other protected areas" to IUCN Management Categories V through VIII. In doing this, Mosely found it convenient to separate protected landscapes in Australia into two sub-categories, those he called "landscape protection areas" (large stretches of protected countryside, most of which is likely to have been modified in some way by agriculture and settlement) and "landscape recreation areas" (usually land still in a natural state and publicly owned, with recreation being a primary management objective - sites are usually smaller than national parks). "Landscape protection areas", *sensu* Mosely, are largely protected by town and country planning legislation and it would seem that, despite calls, there is still no comprehensive legislative provision for a system of such areas in any state, and rather efforts have been made to protect individual areas as a result of local needs or pressures. Mosely draws particular attention to the "environmental protection zones" of New South Wales, which are established under guidelines drawn up by the Department of Environment and Planning, and administered by local authorities, but he also gives examples of landscape protection areas in Victoria, South and Western Australia. However, at this stage none of the areas which Mosely would describe as "landscape protection areas" appears in our lists. In discussing "landscape recreation areas", Mosely draws attention to the difficulty of classifying such sites within the IUCN categories, indicating that some commentators would classify these areas as multiple-use management areas, while noting that some of the sites were more like natural landmarks. He lists, however, five designations of protected areas in as many states. Each of these designations, with the exception of those in Tasmania, is defined in state-wide legislation (Wilson) and state-wide systems of areas in these categories are developing (Mosely) and (Wilson). All of these sites are listed in the attached draft list, provided they are over 1,000ha. In addition, we have listed the nature parks of the Northern Territory which Wilson defines as being intended for recreation in a natural environment. We have no areas for Tasmania listed, although Mosely (1984) indicates that a number of areas are established under the Crown Lands Act. It is in addition worth noting that the definition of "parks" in Victoria does cover both the recreation aspect and protection of areas which have had a "human effect on the environment".

AUSTRALIA

Area 7,686,855 sq.km

Population 15,450,000 (1983)

The information presented here is taken from Wilson (1984) *Nature Conservation Reserves in Australia*, an occasional publication of the Australian National Parks and Wildlife Service.

Parks and Reserves Legislation *Australian Capital Territory* The Nature Conservation Ordinance 1980 provides for the protection and conservation of wildlife, and for the reservation of areas for those purposes. The Minister may, by notice in the Commonwealth of Australia Gazette, declare an area in the Australian Capital Territory and Jervis Bay Territory to be a reserve. Similar provisions under the Public Parks Ordinance, 1928-66 provide for the declaration of public parks and recreation reserves, some of which are managed as nature reserves.

Two types of reserves are defined: nature reserve - land set aside primarily for conservation and also for compatible recreational use, and reserve - land set aside primarily for both conservation and compatible recreational use.

External Territories The National Parks and Wildlife Conservation Act, 1975 provides for the establishment of parks or reserves over land or sea areas where there is constitutionally a basis for Commonwealth action. These areas may be designated as national parks or some other designation and may only be revoked by a resolution of both Houses of Federal Parliament. Plans of management are required to be prepared and, after being subject to public comment and amendment, are considered by the responsible Minister and laid before both houses of Federal Parliament. Under the Norfolk Island National Park and Norfolk Island Botanic Garden Act, 1984, Norfolk Island National Park has been proclaimed.

Two types of reserves are defined: national parks - relatively large areas which contain representative samples of major natural regions, features or scenery of national or international significance where plant and animal species, geomorphological sites, and habitats are of special scientific, educational, and recreational interest, and national nature reserves - nationally significant areas set aside primarily for nature conservation.

New South Wales The National Parks and Wildlife Act, 1974 provides for national parks and nature reserves to be created by proclamation. Plans of management are prepared with regard to the objectives of conservation, study and appreciation of wildlife and natural features and to provide appreciation and enjoyment of the natural values of these areas. They are subject to public comment before adoption by the Minister for Environment and Planning. The Act establishes a National Parks and Wildlife Advisory Council to advise the Minister on the control and management of national parks and nature reserves. Advisory committees may also be established for each national park to make recommendations to the above Council, the Director or Superintendent of the respective national park. The Act also establishes specialist advisory committees to advise the Minister and the Director on Aboriginal relics.

Five types of areas are defined: national parks - relatively large areas set aside for their features or predominantly unspoiled natural landscape, flora and fauna, permanently dedicated for public enjoyment, education and inspiration, and protected from all interference other than essential management practices, so that their natural attributes are preserved; nature reserves - areas of special scientific interest containing wildlife or natural phenomena where management practices aim at maximising the value of the area for scientific investigation and educational purposes; State recreation areas - permanent reservations in the form of large regional parks established to provide recreational opportunities in an outdoor environment; historic sites - areas preserved as the sites of buildings, objects, monuments or landscapes of national importance, and Aboriginal areas - places of significance to Aborigines or sites containing relics of Aboriginal culture.

Australia

Northern Territory The Conservation Commission Act, 1980 established the Conservation Commission of the Northern Territory to promote the conservation and protection of the natural environment and establish and manage parks, reserves and sanctuaries and undertake other functions relating to soil and environmental conservation. The Commission is a corporation of eight members, two of whom are the Director of Conservation and his Deputy and another two members nominated by the Aboriginal Land Councils. Land is reserved under the provisions of the Territory Parks and Wildlife Conservation Act by the Administrator of the Northern Territory following receipt of a report from the Conservation Commission. This Act refers only to the creation of parks and reserves, allowing considerable flexibility in the interpretation of these terms. Accordingly, areas declared may range from small sites of specific interest to major national parks. All land is held by the Conservation Land Corporation as constituted under the Conservation Commission Act. Revocation of reserved land is by declaration by the Administrator following a resolution by the Northern Territory Legislative Assembly. Management plans are prepared by the Conservation Commission of the Northern Territory for areas under its control and are required under the Territory Parks and Wildlife Conservation Act. Kakadu National Park, Kakadu (Stage 2) National Park and Uluru (Ayers Rock-Mt Olga) National Park are proclaimed under the National Parks and Wildlife Act, 1975. Kakadu National Park is owned by Aboriginal people and leased to the Director of Australian National Parks and Wildlife Service (ANPWS). Management plans are prepared by ANPWS. The Cobourg Peninsula Aboriginal Land and Sanctuary Act, passed in 1981, established a major national park on Cobourg Peninsula, primarily owned and controlled by Aborigines.

Five types of areas are defined: national parks - large areas of unspoiled landscape reserved for public enjoyment, education and inspiration; conservation reserves - areas set aside for conservation of flora, fauna or for anthropological, natural or scientific values; nature parks - land reserved primarily for its suitability for public recreation and enjoyment in a natural environment; game reserves - set aside for maintenance of game which can be harvested under permit and historical reserves - areas set aside for their historical significance, even though they may be used for other purposes such as recreation.

Queensland National parks are established under the National Parks and Wildlife Act, 1975-84 to conserve areas of scenic, scientific or historic interest. They are permanently reserved and can be revoked only with the authority of Parliament, though under certain circumstances land can be excised by Order in Council for tourist purposes or for roads. The National Parks and Wildlife Act prescribes that the cardinal principle to be observed in the management of national parks shall be the permanent preservation to the greatest possible extent of their natural condition. Provision is made for declaration within national parks of special management zones, including primitive areas, primitive and recreation areas, recreation areas, scientific and historic areas. The Fauna Conservation Act, 1974-79 provides for fauna reserves and fauna refuges - the latter may be declared over land of any tenure with the agreement of the landholder. Fauna sanctuaries are also established under this Act to protect fauna but not habitat though, in general, a sanctuary is declared only if habitat protection is otherwise assured in the state of Queensland. All national parks and islands off the coast are fauna sanctuaries. Provision for the establishment of environmental parks and scientific purpose reserves (department and official purposes reserves) is contained in the Land Act, 1962-84 and in particular in the Land Amendment Act of 1973.

Five types of areas are defined: national parks - relatively large areas of natural landscape with a high level of diversity of flora and fauna and which may be of historic interest. They are permanently dedicated for public enjoyment and education and protected from all interference other than essential management practices to ensure that the natural attributes are preserved; environmental parks - natural or near natural areas, less outstanding in size or natural attributes than national parks, totally protected for public enjoyment; fauna reserves - areas of land held permanently in their natural state. They are undisturbed other than by naturally occurring processes and are closed to the public, and scientific purpose reserves - (department and official purpose reserves) may be used as a holding tenure where there is an impediment to immediate declaration of a national park or for land for administrative purposes such as office, visitor centre or residence.

South Australia The National Parks and Wildlife Act, 1972-81 provides for the establishment and management of reserves for public benefit and for the conservation of wildlife in a natural environment. The reserves comprise national parks, game reserves and recreation parks. They may be abolished or their boundaries altered by a proclamation of the Governor, subject to a resolution passed by both Houses of Parliament. Management plans for each reserve are prepared by the Minister in conjunction with comments and suggestions of the National Parks and Wildlife Reserves Advisory Committee and representations from the public. Objectives in the management of reserves include the preservation and management of wildlife, the preservation of features of geographical, natural or scenic interest and the encouragement of public use and enjoyment of the reserves. The management plan may also provide for the division of a reserve into zones which shall be kept and maintained under the conditions declared by the plan. The National Parks and Wildlife Reserves Advisory Committee, at the request of the Minister, can investigate and advise the Minister upon any matter referred to the Committee for advice. The Committee may also refer any matter affecting the administration of the Act to the Minister for consideration. Five members are appointed to the Committee by the Governor.

Five types of areas are defined: national parks - relatively large areas of natural landscape with a high level of diversity of flora and fauna and which may be of historic interest. They are permanently dedicated for public enjoyment and education and protected from all interference other than essential management practices to ensure that the natural attributes are preserved; environmental parks - natural or near natural areas, less outstanding in size or natural attributes than national parks, totally protected for public enjoyment; fauna reserves - areas of land held permanently in their natural state. They are undisturbed other than by naturally occurring processes and are closed to the public; fauna refuges - land declared to preserve habitat and protect fauna, and scientific purpose reserves (department and official purpose reserves) - may be used as a holding tenure where there is an impediment to immediate declaration of a national park or for land for administrative purposes such as office, visitor centre or residence.

Tasmania The National Parks and Wildlife Act, 1970 provides for the establishment of conservation areas by the Governor's proclamation. Conservation areas may include privately owned lands subject to the consent of the owners. Conservation areas that are crown land may be declared state reserves by Governor's proclamation but may not be revoked unless the Governor's draft proclamation is first approved by each House of Parliament. The proclamation may give a name to the state reserve including that if state reserve, national park, nature reserve, Historic Site or Aboriginal site. Other statutory powers, for example, to grant mining leases or forestry rights, do not apply in state reserves. Conservation areas may be named wildlife sanctuaries where wildlife and habitat are protected by regulations. Management plans can provide additional protection. National parks are generally outstanding natural areas greater than 4,000ha. Nature reserves comprise areas of significant natural features reserved for nature conservation and scientific study. Crown land conservation areas may also be declared game reserves where management is aimed at producing native or introduced game species which may be hunted in season. Management plans are required to be prepared in respect of all areas proclaimed under the Tasmanian National Parks and Wildlife Act. These are required to be publicly displayed and comment sought before being approved by the Governor. Where provision is made for use of a state reserve other than as provided for in the Act, the management plan required the approval of both Houses of Parliament.

Eight types of areas are defined - national parks - extensive areas for the conservation of natural ecosystems, enjoyment and study of the natural environment and public recreation/tourism; State reserves - generally small reserves set aside for scenic and recreational reasons and/or to protect geological sites; nature reserves - areas set aside because of the significance for nature conservation. Public use is not encouraged where this might be detrimental although provision may be made for appropriate tourism and recreational activities; Aboriginal sites - areas containing relics of Aboriginal people or known to be of significance to them. Degree of public use will depend on needs of site for protection; historic sites - areas of significance in terms of European exploration, settlement or use, with encouragement of tourism and recreational use; game reserves - essentially the same as nature reserves except that specific provisions are made for hunting and the maintenance of game populations;

Australia

conservation areas - large multiple use reserves set aside primarily to protect animals and their habitats and to provide for recreation and controlled use of resources, and muttonbird reserves - reserves where special provision is made for private and commercial muttonbirding.

Victoria Under the National Parks Act, 1975, provision is made for the establishment of national parks and other parks for the preservation and protection of the environment including indigenous flora and fauna and features of scenic, archeological, geological, historical or scientific interest. National parks and other parks may be established by parliamentary amendment of the appropriate schedules to the National Parks Act to include the name and description of the lands included in the park. Provision is also made in the Act for the National Parks Service to manage land not reserved in the Schedule to the Act. National parks comprise predominantly unspoilt landscapes and are of extensive size whereas other parks are usually of relatively less size or significance. The Act makes statutory provision for special works to be conducted in certain parks and provides the Director of National Parks with authority to manage parks generally. Under the Crown (Land) Reserves Act, 1978, state wildlife reserves may be established for the preservation or management of wildlife or wildlife habitat. State wildlife reserves may be further classified as state game reserves, state nature reserves and other classifications, such as state parks, by order of the Governor. Any proclamation or order made by the Governor may be similarly revoked or varied. State game reserves are specifically managed for waterbird conservation. State nature reserves are managed for non-game wildlife species and shooting is prohibited. State parks cater for general and specific species of flora and fauna as well as recreation and education within a natural environment. Under the Wildlife Act, 1975, the Director of the Fisheries and Wildlife Service is required to prepare as soon as practicable as plan of management for each wildlife reserve. The Minister may adopt or vary such plans.

Five types of areas are defined: national parks - crown land characterised by its predominantly unspoilt landscape, and its flora, fauna or other features, which is reserved and protected permanently for the benefit of the public; other parks - areas with scenic, historical, archaeological, biological or geological or other features of scientific interest that are worthy of preservation but, whether by reasons of the limited size of the areas or the limited significance of the features are not suitable for reservation as national parks, areas that demonstrate human effect on the environment whether through agricultural or pastoral pursuits or otherwise, areas in or adjacent to urban areas of natural beauty or interest or otherwise or pastoral pursuits or otherwise, areas of natural beauty or interest primarily for recreational and educational use but parts of which may be used for primary industry, hunting shooting, fishing or other uses appropriate to the areas, and areas in their natural state for scientific study or reference. Other parks are generally classified into coastal parks, historic parks, state parks and parks. Other areas include flora and fauna reserves and reserves; state game reserves and state nature reserves - defined as land reserved primarily for management and conservation of wildlife and any recreational use providing it doesn't conflict with the primary aim. State game reserves are wetlands open to duck hunting in season while state nature reserves are wetlands and drylands closed to hunting at all times, and State parks - primarily reserved for public recreation and the conservation of the natural environment.

Western Australia Under the Land Act, 1933, the Governor may reserve land for public purposes. Notice of such reservations is published in the Gazette. The Governor may also proclaim reserved areas as Class A, B or C. Class A reserves remain dedicated for the purpose declared in the proclamation until revoked by Act of Parliament. Class B reserves may be revoked by the Governor by notice in the Gazette, subject to the Minister for Lands presenting a report explaining the reasons for any revocation or alteration to both Houses of Parliament. Class C reserves may be revoked or altered by Gazette of a Ministerial Notice to that effect. The Land Act provides that the Governor may vest reserves in a private body, semi-government or government authority for specific purposes. In Western Australia, Class A, B or C reserves vested in the Western Australian Wildlife Authority or the Western Australian National Parks Authority are commonly reserved for the purposes of conservation of fauna or flora or both, national parks or any of these purposes plus some other purpose.

Three types of areas are defined: national parks - established to preserve for all time scenic beauty, wilderness, native wildlife, indigenous plant life and areas of scientific importance and to provide for the appreciation and enjoyment of those things by the public in such a manner and by such means as will leave them unimpaired for the future; reserves - usually small areas set aside for recreation and the conservation of flora and fauna, and nature reserves - defined by the Wildlife Conservation Act as land reserved for the conservation of flora and fauna.

Parks and Reserves Administration and Management Responsibility for nature conservation rests mainly with the States and Territories. The Council of Nature Conservation Ministers (CONCOM) provides a forum whereby it co-ordinates nature conservation activities. The Council meets once a year and is supported by a standing committee comprising the Directors of all Australian nature conservation authorities and a representative of the Commonwealth Scientific and Industrial Research Organisation (CSIRO).

Australian Capital Territory Nature reserves in the Australian Capital Territory are administered and managed by the ACT Parks and Conservation Service of the Department of Territories. These reserves include outstanding natural areas and some significant hills and rural parts of the National Capital Open Space System. Overall management objectives are to maintain natural ecosystems and landscapes and to protect sites of pre-historic significance for present and future generations of Australians and to provide opportunities for recreational, scientific and educational use and enjoyment of these resources consistent with their protection. The Minister may make regulations to protect reserves, govern their use and the conduct of the public in them, define the powers of rangers and impose penalties.

External Territories The Director of the Australian National Parks and Wildlife Service is responsible for the areas proclaimed under the National Parks and Wildlife Conservation Act, 1975. Areas proclaimed under this Act in the External Territories include Christmas Island National Park, Coringa-Herald National Nature Reserve (885,600ha), Lihou Reef National Nature Reserve (843,600ha) and Ashmore Reef National Nature Reserve (58,300ha). The latter three are predominantly marine areas. Since proclamation of Norfolk Island National Park the Norfolk Island Government has approached the Australian Government requesting the Australian National Parks and Wildlife Service to manage the national park.

New South Wales National parks, nature reserves, state recreation areas, Historic Sites and Aboriginal areas are managed by the National Parks and Wildlife Service established under the Act and responsible to the Minister for Environment and Planning.

Northern Territory A Director of Conservation, his Deputy and staff are public servants, employed for the purposes of carrying out the function of the Commission. The Commission administers the Territory Parks and Wildlife Conservation Act as well as legislation relating to forestry, bushfires, soil conservation, urban park development, environmental assessment and botanical services. Day to day management of Uluru National Park is managed by Australian National Parks and Wildlife Service staff and seconded Conservation Commission staff.

Queensland The National Parks and Wildlife Act 1975 provides for the establishment of a National Parks and Wildlife Service and for the appointment of a Director of National Parks and Wildlife to administer the Act, the environmental park provisions of the Land Act, the Fauna Conservation Act and the Native Plants Protection Act.

South Australia The Director of the National Parks and Wildlife Service is responsible to the Director General of the Department of the Environment and Planning. Both are responsible to the Minister for the management of reserves. The National Parks and Wildlife Service constitutes a division of the Department of Environment and Planning. All staff, including the Director, are public servants employed to carry out the functions of the National Parks and Wildlife Act.

Australia

Tasmania State reserves, game reserves and conservation areas are administered by the Tasmanian National Parks and Wildlife Service established under the Act. Whereas some conservation areas are administered by the Service as wildlife sanctuaries, there are in addition, approximately thirty-five conservation areas proclaimed where other government authorities or the owner of the lands are the managing authorities.

Victoria The National Parks Act established a Director of National Parks to administer national parks. He is assisted by a National Parks Service consisting of officers appointed under the Public Service Act. The National Parks Act also provides for the appointment of a National Parks Advisory Council to advise the responsible Minister on national park matters. A Director of Fisheries and Wildlife is appointed under the Public Service Act and, subject to the control of the Minister, administers the Wildlife Act 1975, including the management of state wildlife reserves.

Western Australia Under the Wildlife Conservation Act, 1950-80, the Western Australian Authority is established to advise in the conservation of fauna and flora, to carry out appropriate research and to manage nature reserves. Under the Land Act most areas reserved for the purpose of conservation of flora and fauna are vested in the Western Australian Wildlife Authority which may classify nature reserves or parts of such reserves for particular purposes such as hunting or limited access. The Wildlife Conservation Act is administered by the Conservator of Wildlife appointed under that Act who is responsible to the Director of the Department of Fisheries and Wildlife. Both are members of the Authority which consists of four ex officio and eight appointed members.

Under the National Parks Authority Act, 1976, the National Parks Authority of Western Australia was established to replace the former National Parks Board of Western Australia. The Authority manages areas vested in it, provides and maintains facilities for the enjoyment of natural areas by the public and undertakes other necessary functions for the management of national parks and reserves. It consists of a President nominated by the Minister, the Conservator of Forests, the Director of Fisheries and Wildlife, the Director of the Department of Tourism, the Surveyor-General and four persons representing the public nominated by the Minister. The National Parks Authority Act provides for the establishment of national parks comprising scenic, aesthetic, recreational, biological or other special features. The Act provides for the appointment of a Director to formulate policies for the care, control and management of national parks generally. The Director is subject to the provisions of the Public Service Act, 1904 and is responsible for the administration of the Authority and its staff.

Addresses

- Australian Capital Territory - ACT Parks and Conservation Service, Department of Territories, GPO Box 158, Canberra ACT 2601, Australia.
- External Territories - Australian National Parks and Wildlife Service, GPO Box 636, Canberra ACT 2601, and Construction House, 217 Northbourne Avenue, Turner ACT, Australia.
- New South Wales - National Parks and Wildlife Service, PO Box N189, Grosvenor Street Post Office, Sydney New South Wales 200, and 189-193 Kent Street, Sydney, New South Wales, Australia.
- Northern Territory - Conservation Commission of the Northern Territory, PO Box 1046, Alice Springs, Northern Territory 5750, and Gap Road, Alice Springs, Northern Territory, Australia.
- Queensland - National Parks and Wildlife Service, PO Box 190, North Quay, Queensland, and MLC Centre, 239 George Street, Brisbane, Queensland, Australia.
- South Australia - National Parks and Wildlife Service, PO Box 667, Adelaide, South Australia 5001, and 55 Grenfell Street, Adelaide, South Australia.
- Tasmania - National Parks and Wildlife Service, PO Box 210, Sandy Bay, Tasmania, and Magnet Court, Sandy Bay, Tasmania, Australia.
- Victoria - National Parks Service, Department of Conservation, Forests and Lands, 240 Victoria Parade, East Melbourne, Victoria 3002, and Fisheries and Wildlife Service, Department of Conservation, Forests and Lands, 250 Victoria Parade, East Melbourne, Victoria 3002, Australia.

° Western Australia - Western Australia Wildlife Authority, Department of Conservation and Land Management, 108 Adelaide Terrace, Perth, Western Australia 6000, and National Parks Authority of Western Australia, Department of Conservation and Land Management, Hackett Drive, Nedlands, Western Australia 6009.

Protected Landscapes

	(hectares)
<i>State Recreation Areas (New South Wales)</i>	
Booti Booti	1,146
Bournda	2,244
Bungonia	3,570
Burrondong	1,235
Burrinjuck	1,714
Davidson Park	1,215
Illawarra	1,150
Munmorah	1,008
Wyangala	2,013
<i>Nature Parks (Northern Territory)</i>	
Cutta Cutta Caves	1,499
Douglas Hot Springs	3,107
Ellery Creek Big Hole	1,766
Redbank	1,295
Ruby Gap	9,257
Trephina Gorge	1,771
<i>Environmental Parks (Queensland)</i>	
Goneaway	24,800
Mount Zamia	1,140
Townsville Town Common	3,248
Wilandspey	5,200
<i>Recreation Parks (South Australia)</i>	
Para Wirra	1,409
<i>Parks and Coastal Parks (Victoria)</i>	
Beechworth	1,130
Cape Schanck	1,080
Discovery Bay	8,530
Gippsland Lakes	16,500
Lake Albacutya	10,700
Lysterfield	1,151
Murray-Kulkyne	1,550
<i>State Parks (Victoria)</i>	
Cathedral Range	3,577
Chiltern	4,255
Coopracambra	14,500
Eildon	24,000
French Island	7,750
Holey Plains	10,450
Mount Samaria	7,600
Mount Worth	1,040
Nepean	1,151
Pink Lakes	50,700
Wabonga Plateau	21,200
Warby Range	3,320
<i>Other designations (Victoria)</i>	
Big Desert Wilderness	113,500

UNITED STATES AND CANADA

The United States has perhaps a greater range of protected area designations than any other country, with the possible exception of Australia. Of these, four federal-level designations stand out as protected landscape designations, National Recreation Areas, National Seashores, and National Lakeshores which come under the jurisdiction of the National Park Service, and National (Wild and) Scenic Rivers under a variety of jurisdictions. Such areas, however, include considerably less land than the systems of national parks and national wildlife refuges. According to the National Park Service (1979) national lakeshores and seashores are established to preserve the natural values of the areas, while at the same time providing opportunity for water-oriented recreation, and river protection is carried out for essentially the same reasons. Most of the National Recreation Areas are around impoundments, and have relatively high recreational use compared with national parks and equivalent areas. There is also much activity at the state level with a total of over 1800 state parks alone, covering in excess of 2.5 million hectares. It is likely that a number of sites are protected landscapes, particularly amongst the parks and recreation areas. Three areas in the United States can be presented as examples to demonstrate management and planning techniques which were being used to protect significant natural and cultural resources from inappropriate development. Of these sites the first is a National Seashore (Cape Cod). The second site is the Adirondak Park Agency, managed by the State of New York, and the third the Pinelands National Reserve, managed by a Commission representing state (New Jersey), federal and local interests. This latter site is perhaps an example of a range of such sites protected and managed by a variety of organisations and associations across the country, but for which we have little information. In Canada the picture is less clear. Those areas listed as category V are Canadian Heritage Rivers, and Cooperative Heritage Areas, both designations coming under the jurisdiction of Environment Canada, Parks. All four river sections currently designated as Heritage River are within declared national park reserves or within provincial parks, while of the eight other sites which have been nominated, only two are outside established protected areas (one of these being within a proposed provincial park). We currently have rather less information about Cooperative Heritage Areas. At a provincial/territory level a wide variety of sites exist which might qualify as protected landscape systems. Some of the Natural Environment Parks of Ontario might constitute protected landscapes, as one of the primary objectives of these sites is recreation. However, a number of the sites are very large and would seem more akin to national parks. Other designations in Ontario include Waterway Parks and Recreation Parks, and sites in either category might be classified as protected landscapes.

UNITED STATES OF AMERICA

Area 9,539,130 sq km.

Population 234,020,000 (1985)

Parks and Reserves Legislation Legislation exists at both the State and Federal levels. The major texts covering protected areas include: the Federal Land Policy and Management Act of 1976 (which requires the inventory, assessment and planning of all federal lands); the Fish and Wildlife Act of 1956; the Coastal Zone Management Act of 1972; the Endangered Species Act of 1973 (streamlined in 1982 and supplemented in 1983 by the International Environment Protection Act); the National Policy Act of 1969; and the Fish and Wildlife Improvement Act of 1978. More specific acts of the U.S. Congress which affect the conservation of areas include the Wilderness Act (16 USC 1131), Water Resources Planning Act of 1965 (42 USC 1962), Concessions Policy Act of 1965 (16 USC 20), and the Solid Waste Disposal Act of 20 October 1965 (PL 89-272). Other acts include the Marine Protection, Research and Sanctuaries Act which authorizes the Secretary of Commerce to designate ocean waters as marine sanctuaries. In the case of wetland protection the main legislative provisions are the Migratory Bird Conservation Act of 1929, the Migratory Bird Hunting and Conservation Stamp Act of 1934, the Pittman-Robertson Act of 1937 and the Land and Water Conservation Fund Act of 1965. The creation and expansion of conservation units in Alaska is governed by the Alaska National Interest Lands Conservation Act of 1980. Regulations published by the Department of Agriculture in 1983 called for the maintenance of habitats in order to sustain viable populations of flora and fauna. The controlling legislation for the activities of the Fish and Wildlife Service is the Fish and Wildlife Coordination Act of 1958 (16 USC 1531)(a supplement to the 1956 Act) and a number of international treaties.

The National Park Service was established by the Act of 25 August 1916 (39 Stat. 535). National parks and other categories of lands within the national park system are established by individual acts of Congress, except National Monuments which can be created by the President on federal lands, by proclamation under the authority of the Antiquities Act of 8 June 1906. State Parks and Reserves are established under separate state legislation.

The US ratified the Convention on Wetlands of International Importance especially as Waterfowl Habitats on 18 December 1986 listing four sites followed by two further sites in 1987. The World Heritage Convention was ratified on 7 December 1973 with, to date, ten sites listed.

Parks and Reserves Administration and Management Organizations involved in the protection of animal and plant resources and their habitats range from the large land-holding organizations of the US government, national non-government organizations, state government agencies to local societies. Some effort at coordination has been attempted but as yet no full scale national strategy exists to protect species and habitats. A third of the nation (nearly 300 million ha) is federal property within which are designated National Wildlife Refuges, National Parks and similar protected areas, National Forests, National Marine Sanctuaries and other federal lands. Responsibility for the protection of natural resources is divided among many jurisdictions. The Department of the Interior manages 70% of the federal lands through several agencies:

The National Park Service supervises 10% of the public lands through the National Park System for which it has both the administrative and regulatory authority as delegated to it by the Secretary of the Interior by the Act of 25 August 1916 and subsequent acts of Congress (as set forth in Title 16, Code of Federal Regulation). Three other federal-level designations come under its jurisdiction: National Recreation Areas, National Seashores and National Lakeshores. The overall aim of the park system is to conserve the natural heritage at the same time as allowing the use of these areas for public recreation. In addition, the Service designates National Natural Landmarks which are identified in order to encourage the protection of sites of significant geological and ecological character. In total the Park Service works on some 357

United States of America

sites which it directly administers and where the main tasks are inventorization and data collection. The 500 or so National Natural Landmarks designated since 1962 by the Secretary of the Interior on advise from the Service are listed in the National Registry of Natural Landmarks which is published regularly. Only a proportion of these are considered to be nationally significant and designation of a site does not change the ownership rights nor does it preclude the sites future development.

The Fish and Wildlife Service administers the National Wildlife Refuge System which according to statute aims at the preservation and management of some 36 million ha of habitat located in 417 wildlife refuges and 28 wetland management districts. These holdings amount to some 12% of federally-owned lands and protects the habitats of waterfowl, endangered species, big game and other fauna and flora.

The Bureau of Land Management has jurisdiction over 43% of federal lands which are largely open spaces used for livestock grazing and mineral extraction. In total the Bureau is responsible for over 20 million ha managed in part for natural science research and protection through its Natural History Resource Management Program. These areas are selected, established and managed in the form of 28 Research Natural Areas on 23,000ha and 40 other natural areas (including Outstanding Natural Areas and Primitive Areas) consisting of 328,000ha and an additional 1.2 million ha of natural areas with potential for protection.

The Department of Agriculture oversees 25% of public lands through the Forest Service whose property is used for (amongst other things) public recreation, watershed management and wilderness preservation. The categories of areas established include National Monuments, Wilderness Areas and National Forests. Some 25 million ha of the Forest Service lands have been set aside for protection of habitats in the form of modified management areas, such as roadside strips, scenic areas and gene conservation areas. National Wild and Scenic Rivers are managed by a number of agencies with examples of this category present in the land holdings of the USNPS, BLM and the USFS as well as at the state level. Finally, the Department of Energy has a programme for the study of ecosystems and establishes gene reservoirs.

All 50 States have programmes to protect flora, fauna and their habitats and establish parks and other protected areas; the first such programme began in 1951 although there is considerable variation State to State. However, the State-level systems are extensive as can be judged by the fact that in 1986 there were some 1800 State Parks covering some 2.5 million ha as well as a complete range of other categories such as state forests, state natural areas, state recreation areas, state historic areas and so on. Several States have cooperative agreements with such agencies as the Bureau of Land Management and the Forest Service.

A number of large, well-endowed, non-profit non-governmental organizations are engaged in habitat protection which parallels and supplements those of the federal and state governments. Of the larger NGOs, The Nature Conservancy owns and manages over 700 preserves; The National Audubon Society owns or leases 80 sanctuaries over 100,000ha in size; and The Society of American Foresters designated 500 natural areas which overlap with the Research Natural Areas network established under the federal government.

Marine sanctuaries have been established since 1972 by the National Marine Fisheries Service and biosphere reserves since 1974. The latter now has grown into a national network cover over 40 sites.

Addresses

- National Park Service, US Department of the Interior, Washington DC 20240.
- Fish and Wildlife Service, US Department of the Interior, Washington, DC, 20240.
- Bureau of Land Management, Washington, DC, 20240.
- Forest Service, US Department of Agriculture, PO Box 2417, Washington, DC.
- The Nature Conservancy, 1800 N. Kent St. Arlington. VA 22209.

Additional Information The federal land-holding agencies are participants in a programme to establish Research Natural Areas of which 442 have been designated, whose functions are the preservation and maintenance of genetic diversity. There is also a National Environmental Research Parks Programme which aims at characterizing ecosystems and mapping.

Protected Landscapes

	(hectares)
<i>National Lakeshores</i>	
Apostle Island	17,084
Indiana Dunes	5,073 *
Pictured Rocks	28,661
Sleeping Bear Dunes	28,775
<i>National Seashores</i>	
Assateague Island	16,038
Canaveral	23,321
Cape Cod	18,018 *
Cape Hatteras	12,270
Cape Lookout	11,493
Cumberland Island	14,924
Fire Island	7,834
Gulf Islands	57,084
Padre Island	54,196
Point Reyes	26,426
<i>National Recreation Areas</i>	
Amistad	
Bighorn Canyon	48,644
Chickasaw	
Curecanti	16,985
Cuyahoga Valley	12,950
Delaware Water Gap	28,340
Gateway	266
Glen Canyon	
Golden Gate	
Lake Chelan	25,047
Lake Mead	
Ross Lake	47,582
Whiskeytown Unit	
<i>Other areas</i>	
Appalachian National Scenic Trail	21,058
Buffalo National River	38,100
C & O Canal National Historic Park	50,161
Chaco Culture National Historic Park	13,760
Delaware National Scenic River	1,113
Devil's Tower National Monument	1,346
Jean Lafitte National Historic Park	3,480
Lower St Croix National Scenic River	3,512
New River Gorge National River	25,101
Obed Wild and Scenic River	2,125
Ozark National Scenic Riverways	32,209
Rio Grande Wild and Scenic River	3,885
St Croix National Scenic River	25,373

Information for three other sites follows, Pu'uhonua o Honaunau National Historic Park in Hawaii, Pinelands National Reserve, and the Adirondak Park.

New York State Adirondack Park

Management Category V (Protected Landscape)

Biogeographical Province 1.05.05 (Eastern forest)

Geographical Location The park is located in the north-eastern part of New York State some 80km north of Albany and 280km north of New York, centred on the Adirondack Mountains. 43°05' to 44°30'N and 73°40' to 75°15'W.

Date and History of Establishment The Adirondack Park Agency Act (NY Executive Law, Article 27 [1971]) is considered by many to be the most extensive effort by any State in the USA to regulate private land use in a portion of its jurisdiction by means of regional land use controls. The general purposes of the Act are (a) to establish a system of comprehensive land use controls that will protect, while encouraging the wise use of the unique scenic, aesthetic, wildlife, recreational, open-space, ecological and natural resources of the park; (b) to establish and promote the effective administration of land use controls that will protect the interest of the State of New York, not only because of its enormous State holdings within the park, but also for the preservation and use of the resources found on the park's non-State lands; and (c) to encourage the park's local governments to undertake comprehensive land use planning on a local scale and to adopt local land use programs that fit within the regional guidelines of the Act. The State-owned land is constitutionally to be "forever kept as wild forest lands" (N.Y. Constitution, Article VII No. 7, 1895).

Area 2,426,200ha; contains the largest wilderness preserve in the continental United States outside Alaska.

Land Tenure 1,011,750ha (40%) State owned; 1,416,450ha (60%) privately owned and devoted principally to forestry, agriculture and open-space recreation.

Altitude Maximum 1,628m.

Physical Features The western and southern Adirondacks are a gentle landscape of hills, lakes, ponds and streams. In the north-east are the 46 "high peaks", 42 of which are over 1,200m (including nine alpine summits), spread over 3,100 sq.km. The highest is Mt Marcy at 1,628m. These mountains are survivors of an ancient geologic formation; the erosion-resistant bedrock, accounting for the height of the mountains, is an estimated 1.2 billion years old. The Adirondacks contain the headwaters of, and most of five major basins: Lake Champlain, and the Hudson, Black, St Lawrence and Mohawk rivers. Within the park are 2,759 lakes and ponds and more than 2,413km of rivers fed by an estimated 48,270km of brooks and streams.

Climate No information

Vegetation The spruce/fir and beech/birch/maple associations reach their crowning glory in Adirondack forests. Thirty tree species are native to the park. In addition there are many species of flora and hundreds of species of shrubs, herbs and grasses.

Fauna Animal life includes 64 species of mammals, 297 species of birds (193 nesting), 35 species of reptiles and amphibians, and 82 species of fish. Mammals include white-tailed deer, black bear, fisher, moose and marten (*Odocoileus virginianus*, *Ursus americanus*, *Martes pennanti*, *Alces alces* and *Martes americana*). Birds include golden eagle *Aquila chrysaetos* and spruce grouse *Canachites canadensis*.

Cultural Heritage No information

Local Human Population 120,000 permanent and 200,000 seasonal residents in 104 towns and villages.

Visitor Facilities Approximately 9 million tourists per annum pass through the area. Finance for construction of two natural resource interpretive centres in the park was approved in 1985-86 by the State Legislature. Both facilities will be administered and operated by the Adirondack Park Agency. Each site will be operational by June 1989, with projected annual visitor use in excess of 340,000.

Scientific Research and Facilities No information

Conservation Management The Adirondack Park Land Use and Development Plan is a regional zoning plan wherein all of the non-State lands in the park are divided into 6 land use areas. The Plan describes the character of; sets forth the purposes, policies and objectives that will be served by a; lists primary and secondary compatible uses for, and details the overall intensity of development that the Act will allow in each land use area. All of these factors are responsible for driving a complex, comprehensive permit system administered by the Adirondack Park Agency (APA) for the majority of development and subdivision proposed in the park.

Land use areas are as follows: *Hamlet* areas represent existing settlements in the park, the growth and service centres, the commercial areas, and those with concentrated tourist development. *Moderate Intensity Use* (max. of 500 principal buildings per square mile or an average lot size of 0.53ha) areas are close to Hamlets where fairly intense future development, primarily residential, is possible because of the relatively deep soils and moderate slopes. *Low Intensity Use* (max. of 200 principal buildings per sq mile or an average lot size of 1.3ha) areas are easily accessible, reasonably close to hamlets, where there is a wide variability in development potential which is not limited by large areas of critical environmental importance. *Rural Use* (max. of 75 principal buildings per sq m or an average lot size of 3.44ha) areas are those where natural resource limitations, shallow soils, relatively severe slopes, critical wildlife habitats, proximity to scenic vistas or public lands, and distance from service areas require fairly strict limits on development. These areas are very important to the open space character of the park. Rural Use limitations are designed to prevent strip development along major travel corridors by placing residential development on relatively large lots or clustered on carefully selected and well-designed sites. *Resource Management* (max. of 15 principal buildings per sq m or an average lot size of 17.3ha) areas are those where natural conditions place severe limits on development. These areas are important primarily for forestry and agriculture, and their preservation for these activities is essential to the economy of the park. These areas are also vital for recreation and the preservation of the open space character of the park. Approximately 68% of the private land in the park has been classified Resource Management. *Industrial Use* areas are those where industry or mining operations existed when the APA Act was adopted or where new industry should be encouraged to locate.

With regard to State lands in the park, 15 tracts of Adirondack Forest Preserve are designated Wilderness (approx. 404,700ha). Buildings and access by motorised equipment are prohibited. The largest single category of land (approx. 526,110ha) is Wild Forest, where a variety of outdoor recreational activities are allowed, including the use of motorised vehicles in designated places. Other categories of State lands include: Primitive and Canoe areas, managed similarly to Wilderness areas; Intensive Use areas, such as public campgrounds, developed beaches and boat launching sites; and State Historic sites. The APA is responsible for developing and updating the Adirondack Park State Land Master Plan which establishes the policy for the management of the State-owned lands. This Master Plan was first adopted in 1972. The actual management of the State lands is carried out by the New York State Department of Environmental Conservation.

There are approx. 378,800ha of wetlands in the park covered by the Freshwater Wetlands Act [N.Y. Environmental Conservation Law, Article 24 (1975)], a statewide wetlands protection statute administered by the APA within the park. Agency permits are required for virtually all activities in a wetland and for many activities that may affect a wetland. Regulated activities include any form of pollution, pesticide use, or any draining, dredging or filling of a wetland, or any other activities which substantially impair the functions or benefits of a wetland. As

United States of America

part of this legislation, the N.Y. State Department of Environmental Conservation, in consultation with the Agency, is required to produce official maps of all jurisdictional wetlands in the park. Approx. 1/5 of this task is completed.

The Wild, Scenic and Recreational Rivers System Act [N.Y. Environmental Conservation Law, Article 15, (1972)] is a statewide statute for the protection of certain pristine rivers, also administered by the Agency for rivers flowing through private lands in the park. Ninety-five percent of the river mileage of New York designated part of the System is located in the park. Special permit regulations administered by the APA apply to new land use, subdivisions, and most projects within the corridors of designated Wild, Scenic or Recreational Rivers. That corridor is generally 1/4 mile from each shore of the river. Restricted activities for each designated river corridor are keyed to the land use classifications of the APA Act. Currently, there are approximately 1,930km of designated rivers in the park, with approximately 144km still under study for possible legislative designation as part of the System. In 1986 initial steps were taken to designate the park as a Biosphere Reserve.

Management Problems No information

Staff The Adirondack Park Agency is staffed with 45 full-time employees (including attorneys, planners, engineers, ecologists and cartographers) and 4 to 8 part-time or seasonal workers. It also operates a satellite office in the Lake George Basin. The Park Agency is an 11-member body including the Commissioner of the Department of the Environmental Conservation, the Secretary of State and the Commissioner of the Department of Commerce.

Budget US\$2,200,000 per annum approximately. In addition, it receives \$150,000-200,000 annually in local planning assistance to distribute among those local governments undertaking various planning initiatives. The two interpretive centres cost US\$5.7 million and the annual operating costs are estimated at US\$850,000.

Local Administration Adirondack Park Agency, P O Box 99, RAY BROOK, New York 12977.

References Datasheet provided by the Adirondack Park Agency (1987)

Date August 1987

Cape Cod National Seashore

Management Category V (Protected Landscape)

Biogeographical Province 1.05.05 (Eastern forest)

Geographical Location The site is situated on the eastern coast, over 40 miles south of Boston. It extends as a vast 30-50 mile long peninsula and spit enclosing the Cape Cod bay. The easternmost portion of Cape Cod is in Barnstable county, Massachusetts 41°38'-42°38'N; 70°01'W.

Date and History of Establishment Established on 7 August 1961

Area 18,018ha (11,190ha is upland; 6,828ha is tidal). A total figure of 20,000ha was cited by Polakowski (1986).

Land Tenure Federal government ownership (90%); town ownership (5%); private ownership (5%) (Polakowski, 1986).

Altitude Sea level to 54m

Physical Features The park topography consists of long spit and hook coastlines with cliffs, beaches, sand dunes, ponds, estuaries and low hills. The terrain was formed from late Pleistocene glacial drifts and Wisconsin deposits laid down in a north-south alignment during a glacial retreat. Characteristic glacial products include kettle ponds, knobs, glacial erratics and pamet rivers (Polakowski, 1986).

Climate No information

Vegetation There are 19 discrete vegetation types in the park of which six are herbaceous types. The communities include eelgrass *Zostera marina* and associated epiphytes, principally on stable, sandy mud of shallow bays and estuaries; saltmarsh (774 ha), dominated by saltmarsh cordgrass *Spartina alterniflora* and salt meadow grass *Spartina patens*; cattail marsh (194ha), dominated by narrow leaf cattail *Typha angustifolia* with associated pure stands of common reed *Phragmites communis*; beachgrass *Ammophila breviligulata* on primary and secondary dunes and migrating inland dunes (1,052ha); hairgrass *Deschampsia flexuosa* on more stable sand (293ha); mixed grass including grasses and rushes characteristic of abandoned fields, pastures and orchards (208ha); velvetgrass *Holcus lanatus* as meadows in pure stands or mixed with such species as linearleaf goldenrod *Solidago tenuifolia*.

There are six shrub types: bearberry *Arctostaphylos uva-ursi*, forming extensive heaths on poor, dry soils (275ha); bear oak scrub *Quercus ilicifolia*, on windswept sites near the sea (409ha); huckleberry *Gaylussacia boccata*, on slopes facing the sea but exposed to less salt (5ha); a dry shrub type of bayberry *Myrica pennsylvanica*, beach plum *Prunus maritima* and black cherry *Prunus serotina* on sites protected from salt spray (360ha); wet meadows of narrow meadowsweet *Spirea alba* and wrinkled goldenrod *Solidago rugosa* on moist to wet deep loams (59ha); and a shrub swamp consisting of highbush blueberry *Vaccinium corymbosum*, swamp azalea *Rhododendron viscosum* and sweet pepperbush *Clethra alnifolia* on wet, peaty soils (217ha).

The park is represented by seven tree communities: pinelands of pitch pine *Pinus rigida* on dry sandy soils (3,948 ha); oaklands dominated by white oak *Quercus alba* and black oak *Quercus velutina* on dry and well developed soils (1180ha); black locust *Robinia pseudoacacia*, an exotic shrub species dominant on abandoned fields (111 ha); beech forest, *Fagus grandifolia*; a climax vegetation type of mesic sites (12 ha); red maple, *Acer rubrum*, in former swamps of deep rich humus (66 ha); woodland of Atlantic white cedar, *Chamaecyparis thyoides*, in peaty swamps of standing water (4 ha); and Eastern red cedar *Juniperus virginiana*, dominant in old fields (70ha).

Fauna An estimate of 34 land mammal species occur within the reserve. These include white-tailed deer *Odocoileus virginianus*, New England cottontail *Sylvilagus transitionalis*, eastern gray squirrel *Sciurus carolinensis*, red fox *Vulpes fulva*, short-tailed weasel *Mustela frenata* and raccoon *Procyon lotor*. An estimated 11 species of marine mammals also occur, including finback whale *Balaenoptera physalus*, humpback whale *Megaptera novaengliae*, pilot whale *Globicephala ventricosa*, harbour seal *Phoca vitulina* and Atlantic white-sided dolphin *Lagenorhynchus acutus*.

Almost 400 bird species are recorded for the park and immediate environs, many of which are migrants on the Atlantic flyway. Common species include mocking bird *Mimus polyglottos*, herring gull *Larus argentatus*, black-capped chickadee *Parus atricapillus*, blue jay *Cyanocitta cristata*, least tern *Sterna albifrons*, great blue heron *Ardea herodias*, black duck *Anas rubripes*, marsh hawk *Circus cyaneus*, semipalmated plover *Charadrius semipalmatus*, sanderling *Crocethia alba* and catbird *Dumetella carolinensis*. Two threatened species occur as migrants, bald eagle *Haliaeetus leucocephalus* and peregrine falcon *Falco peregrinus*.

There are 21 species of reptiles and amphibians. Four sea turtles occur in the marine zone of the park.

United States of America

Cultural Heritage The long human settlement of Cape Cod is characterised by more than 100 historic structures, including the ancient "Cape Cod House". There are also remains of Indian settlements and relicts from the Pilgrim communities prior to their settlement at Plymouth 360 years ago. Along the coast are a number of famous shipwrecks, remnants from the whaling, fishing and salt industries as well as old sea rescue stations, lighthouses and a Marconi wireless station. A number of painters and writers of national recognition originate from this area.

Local Human Population The park boundary excludes densely populated towns, yet it still includes many private land-holdings. The permanent residential population of 20,000 increases threefold during the summer months (Polakowski, 1986).

Visitors and Visitor Facilities There are five million visits annually, mostly people entering by car (Polakowski, 1986). Facilities include camp colonies, cottages and other forms of accommodation. There are 4,000 oversand vehicles (dune buggies) registered each year, two environmental education camps (11,000 student days of programs each year) and information centres (Polakowski, 1986).

Scientific Research and Facilities Principle research subjects include water quality and impact assessments, studies on the effects of oversand vehicles (over 34 research publications deal with the effects of oversand vehicles on various coastal ecosystems), archaeological research, and coastal ecosystem processes. All studies are being undertaken by the National Park Service with university collaboration. Reference libraries and geology and biology laboratories are available for researchers at the park and at the University of Massachusetts, Amherst (Polakowski, 1986).

Conservation Management The site is totally protected, but existing residents are permitted to fish, hunt and gather berries. Cape Cod zoning prohibits the development of commercial and industrial districts whilst traditional uses of building for art studies, tourist accommodation, fisheries and shops are permitted. Regulations prohibit burning, timber cutting, filling or removal of land and dumping of wastes (Polakowski, 1986).

The reserve contains a "concentration of unique and sensitive ecosystems and a mixture of rural land uses and structures that are united by past events and management actions to produce a memorable and outstanding landscape character" (Polakowski, 1986). The site was established as a Greenline reserve park, recognising the area's cultural, natural, scenic and scientific values.

The objectives of the Cape Cod plan places an equal value on conservation and recreation, its purposes are to "conserve scenery, natural and historical resources, wildlife and to provide enjoyment of these facets and to leave them unimpaired for the enjoyment of future generations" (Polakowski, 1986).

The Cape Cod seashore advisory commission, representing the different seashore interest groups, acts as the main advisory group. Routine management is undertaken by the National Park Service. The park has been compartmentalised to consist of natural zones, historic zones, development zones and special use or core area zones.

Management Problems Some of the chief problems within the park include exploitation of tourists through uncontrolled commercialism, intensive cottage development and also inadequate traffic control and transportation; congestion pollutes the atmosphere, endangers lives and reduces the level of visitor enjoyment. Dune buggies cause destruction of the sand dunes and water supplies are limited due to inadequate ground water resources. There is trespassing on private land by off-road vehicles (Polakowski, 1986).

Resolving the various problems is made more difficult by the lack of co-operative planning and division of responsibilities amongst local and state governments (Polakowski, 1986).

Staff In the early 1980's 32 permanent full-time employees were augmented by approximately 140 seasonal staff (1980).

Budget In the fiscal year 1980, funds of approximately 1,541,000 US dollars were budgeted for administration, protection, interpretation and maintenance, plus an additional 62,200 dollars for administration of recreational facilities..

Local Administration Superintendent, Cape Cod National Seashore, South Wellfleet, Massachusetts, 02663.

References

The above text is developed from information provided by the National Park Service, and:

- ° Polakowski, K.J. (1986). Greenline reserves: A cooperative growth management approach for protecting significant rural landscapes. Invited paper, international conference on rural landscape management. Poland, June 16-23, 1986.

Date August 1987.

Indiana Dunes National Lakeshore

Management Category V (Protected Landscape)

Biogeographical Province 1.5.5 (Eastern Forest)

Geographical Location North-west Indiana, including portions of Lake, Porter and LaPorte counties bordering Lake Michigan. 37° 30'N, 87° 00'W

Date and History of Establishment 5 November 1966

Area 5,073ha

Land Tenure Federal state and private ownership

Altitude 176-214m

Physical Features Indiana Dunes National Lakeshore preserves an important remnant of what was once a vast and unique wetland resulting from the retreat of the last great continental glacier some 1,100 years ago. It contains 24km of Lake Michigan shoreline with warm shallow water. Immediately inland from the beaches, sand dunes rise to almost 61m in a series of blowouts, ridges and valleys and scattered between the dunes there are ponds, wetlands and bogs. The lakeshore preserves and exhibits remnants of the glacial origin and historic stages of Lake Michigan, and includes four separate, distinct shorelines.

Climate Humid Continental

Vegetation Nine terrestrial and four wetland communities exist within the Lakeshore. Terrestrial communities include open beach, foredunes, dune blowouts, initial successional dune forest, pine dune forest, black oak dunes, black oak savannah, prairie and climax forests. Wetland communities include marsh, peatland and ponds. Sand thistle *Cirsium pitcher* is the only plant listed in the Endangered Species Act known to exist here.

Fauna The badger *Taxidea taxus* is present and is provided legal protection under the Indiana Non-game and Endangered Species Conservation Act. No animals protected under the 1973 Federal Endangered Species Act are known to be permanent residents. However, it is possible that several species protected under this act are migrant visitors. These species include the Arctic peregrine falcon *Falco peregrinus ssp. tundrius*, American peregrine falcon *Falco peregrinus ssp. anatum*, Kirtland's warbler *Dendroica kirtlandii* and the Karner blue butterfly *Lycaedes melissa var. samuelis*. One area of the lakeshore is preserved as a nesting area for the great blue heron *Ardea herodias*.

United States of America

Cultural Heritage Cultural resources at Indiana Dunes include the Bailly Homestead, an 1820's French fur trading site, the working 19th century Chellburg farm and six of the 1933 Worlds Fair Century of Progress Homes, which were moved across Lake Michigan to their locations within the park boundaries in 1934. There are a number of known archeological sites in the park that have yet to be surveyed.

Local Human Population The Northern Illinois, Chicagoland area and Northwest Indiana area population is approximately 10 million. The economy is primarily industrial with Northwest Indiana being the number one steel producing area in the country. Agriculture plays a major role in the outlying regions with tourism becoming a growing industry.

Visitors and Visitor Facilities Two million visitors annually with a high percentage from the Northern Indiana, Illinois and Chicagoland area. There are three visitor centres: Tremont (main) Visitor Center; Bailly Visitor Center; West Beach Visitor Center; and one specialist unit the Paul H. Douglas Center for Environmental Education. The centres are open all year round except for Thanksgiving, Christmas and New Years.

Scientific Research and Facilities Air, water vegetative, historic, archeological and recreation research is ongoing or has occurred in the last few years. In particular the interdunal wetlands are used as an outdoor laboratory for scientific study and visitor enjoyment. These studies have been conducted by park staff, other national park service employees or private organisations. A staff of scientists and other support personnel are in permanent residence at the national lakeshore. A science office complete with laboratory, is provided for science staff.

Conservation Management The national lakeshore is divided into four management zones. The natural zone is the largest and encompasses 73.9% of the lakeshore; the historic zone includes 0.3%; the park development zone includes 2.0% and the remaining 23.8% is managed as a special use zone. Hunting is prohibited in the park, however fishing is permitted. The park's Cultural Resource Management Plan has been drafted for review and approval.

Management Problems The national lakeshore is surrounded by industrial, commercial and residential activities and as a result, numerous conflicts exist with or because of adjacent uses. Air and water problems are common. In a study of air pollution effects in ten protected areas of the Great Lakes region, it was found that this area, along with Guyahoga Valley National Recreation Area, was rated in most danger and that environmental alternations from sulphur dioxide and ozone as well as visibility reductions are most serious. Typical acid rain effects on vegetation and aquatic life and atmospheric haze have been measured and resource values are diminishing at a steady rate. Unless major reductions in pollutant loadings occur, there may be significant negative effects in the future. A more recent management problem is one of high lake levels and shoreline erosion impacting the beaches and some area historic structures.

Staff 85 permanent employees and 100 seasonal employees

Budget Approximately US\$3.8 million for fiscal year 1987

Local Administration Superintendent, Indiana Dunes National Lakeshore, National Park Service, 1100 North Mineral Springs Road, Porter, Indiana 46304.

References

Numerous published and unpublished materials are contained within the various lakeshore libraries.

° CNPPA Summary Status Report (1984). Threatened Protected Areas of the World.

Date August 1987

Pinelands National Reserve

Management Category V (Protected Landscape)

Biogeographical Province 1.05.05 (Eastern Forest)

Geographical Location Included in the Pinelands National Reserve are 11 major drainage basins including the Mullica and tributaries (Bass, Wading, Batsto and Oswego Rivers), Great Egg Harbor River, Forked River, Toms River, Rancocas Creek etc. Most Rivers flow into Atlantic barrier bays or Delaware Bay except for Rancocas which flows into Delaware River. 39°45'N; 74°45'W.

Date and History of Establishment Accepted as a Biosphere Reserve in 1983. Decrees protecting the area: Coastal Area Facility Review Act September 1973; Pinelands Environmental Council 1975; National Park and Recreation Act 1978; Government Byrne executive order #71 February 1979; NJ Legislature Pinelands Protection Act June 1979.

Area The reserve covers an area of 438,210ha, with a core zone (preservation area) of 148,928ha.

Land Tenure State wildlife areas - 6,062ha; state forests and parks - 45,400ha; county park - 6.8ha; federal wildlife refuge (Brigantine) - 8,097ha.

Altitude 0-100m

Physical Features The reserve is located on the Atlantic Outer Coastal Plain and is characterized by gently rolling landscape. The substrate consists of unconsolidated sands, clays and marls which form a podzol soil. The area has not been glaciated and there is no bedrock at or near the surface. The area contains the largest freshwater aquifer in the mid-Atlantic region. The mean winter temperature is 0-2°C; summer temperature 22-24°C. The mean annual precipitation is 1124mm.

Climate No information

Vegetation The total Pine Barrens flora has over 800 species of vascular plants, of which 580 are native, 270 introduced, five endemic and 71 endangered, threatened or undetermined. Habitat types seen include salt marsh, white cedar swamp, sphagnum bogs, cranberry bogs, upland pine-oak, pygmy pine plains and hardwood swamp. There is a species list available for the reserve.

Fauna Thirty-four species of mammals, 299 species of birds, 59 species of amphibians and reptiles and 91 species of fish (including peripheral species). There is a species list available for the reserve.

Cultural Heritage There are also a number of abandoned town sites representing 18th and 19th century business ventures.

Local Human Population Atlantic City to the east is the largest nearby town and Hammonton is an important local trade and agricultural centre. The reserve contains numerous small towns and villages scattered throughout including Chatsworth, Batsto and Greenbank.

Visitors and Visitor Facilities No information

Scientific Research and Facilities Fairly extensive research activity - both applied and basic - Rutgers University maintains a blueberry/cranberry experiment station and a marine station. USFS has conducted a number of forestry oriented studies over a long period of time, Brigantine has focused on wildlife studies. Much of the basic scientific knowledge of the Pine Barrens is summarised in Forman (1979). The Rutgers Division of Pinelands Research was recently (1981) established to help coordinate research efforts in the area. Research includes

United States of America

monitoring of water quality and forest fire management; climate, vegetation, hydrology and pollution studies. Field stations include: Lebanon USFS, Rutgers, Little Egg, Blueberry/Cranberry Station, Atlantic City, Chatsworth, Hammonton.

Conservation Management Comprehensive Management Plan exists. Article 5 outlines standards, article 6 outlines activities subject to management. A Land Capability map defines distribution of types. Coastal areas not subject to CMP but under jurisdiction of CAFRA.

Management Problems About 5% of the reserve is under agriculture (including indigenous blueberry and cranberry culture as well as row crops) and 9% is developed (residential, commercial, transportation arteries). Major areas preserved in national and state holding include Brigantine Wildlife Refuge, Lebanon State Forest, Wharton Tract and Bass River State Forest. Atlantic City and other coastal development areas are significant on the eastern boundary. Large retirement communities in several locations are also of significance.

Staff No information

Budget No information

Local Administration Pinelands Commission, State of NJ, PO Box 7, New Jersey 08064.

References

- ° Forman, R.T.T. (Ed.) (1979). *Pine Barrens: Ecosystem and Landscape*. Academic Press, NY.
- ° McCormick, J. (1970). *The Pine Barrens: A Preliminary Ecological Inventory*. NJ State Museum Report No. 2.
- ° New Jersey Pinelands Commission - Comprehensive Management Plan for the Pinelands National Reserve (National Parks and Recreation Act, 1978) and Pinelands Area (NJ Pinelands Protection Act, 1979). Pinelands Commission, State of NJ, New Lisbon, NJ 08064.

Date April 1983, revised September 1986 and September 1987

**Pu'uhonua o Honaunau National Historical Park
(formerly the City of Refuge National Historical park)**

Management Category V (Protected Landscape)

Biogeographical Province 5.03.13 (Hawaiian)

Geographical Location Pu'uhonua o Honaunau lies on the western slope of Mauna Loa, on the south shore of Honaunau Bay of western Hawaii island (County of Hawaii). 19°26'N, 155°55'W.

Date and History of Establishment The site was set aside as a National Historical Park by congress on 1 July 1961 (City of Refuge NHP) and renamed the Pu'uhonua o Honaunau NHP on 10 November 1978.

Area 73ha

Land Tenure Federal Government

Altitude Sea level

Physical Features The park consists of a generally flat coastal area comprising of lava formations, predominantly Pahoehoe and A'a types, with occasional pockets of soil material. The shoreline is flat with many small inlets and patches of sand, rubble and fringing coral reefs (Anon, 1981).

Climate The average annual temperature is 31°C and the minimum is 18°C, with a diurnal range of 6°C. The mean annual rainfall is 508mm, with a rainy season from May to September and hurricane season from June-December. Storms move through the area more frequently from December through February, bringing high seas, wind and rain from the west and south. Tsunami (tidal waves) occur infrequently in the Kona Coast.

Vegetation The coastal vegetation of Honaunau Bay is predominantly xerophytic scrub with some trees, characterised by ekoa *Leucaena leucocephala* thicket and uncleared opiuma/ekoia scrub forest. Common plants are passion flower, morning glory, sword fern, garden spurge, Madagascar periwinkle and klu (*Passiflora sp.*, *Ipomoea sp.*, *Nephrolepis sp.*, *Euphorbia hirta*, *Catharanthus roseus* and *Acacia farnesiana*). The grass present is mostly red top *Rhynchelytrum repens*, an introduced forage species. Shoreline trees include coconut *Cocos nucifera*, noni *Morinda citrifolia*, hala *Pandanus odoratissimus* and kou *Cordia subcordata*. The sedge *Fimbristylis cymosa* grows in pockets in the pahoehoe laca close to the sea, and another sedge, ahu'awa *Cyperus sp.*, grows around the brackish pools. The dominant grass is Bermuda grass *Cynodon dactylon* (Yen, 1971; Anon, 1981).

Fauna Introduced mammals are plentiful, with mongoose *Herpestes griseus*, house mouse *Mus musculus*, black rat *Rattus rattus* and brown rat *R. norvegicus*. Birds present are the kolea or Pacific golden plover *Pluvialis dominica*, akekeke or ruddy turnstone *Arenaria interpres* and the less abundant ulili or wandering tattler *Heteroscelus incanus*. Common but introduced birds are the turtle dove *Streptopelia sp.* and Brazilian cardinal *Caryothraustes sp.* Three species of geckos and three species of skinks are known from the park.

Of a total of 609 insect species recorded for the Kona district, only 150 species have been collected here (72 species are considered native). The ant species *Pheidole megacophala* is abundant and has caused the destruction of countless endemic species, especially beetles. The little silk-spinning embiid has been sighted in the park and is common in the drier lowlands. Leafhoppers collected in the park are endemic. Only one species of the many native damselflies has been collected at Honaunau. This species is common and often found from sea level up to the native forest on the hill slopes. Except for an endemic species of wood borer, all 23 species of beetles from the park area are non native. Cockroaches, flies and termites thrive in the warm humid climate (Bryan et al, 1957; Anon, 1981).

The corals consist of *Pocillopora meandrens* and *Porites pukoensis* communities (Anon, 1981).

Cultural Heritage The prime cultural features of the park include the Pu'uhonua sanctuary building, the temple of Hale o Keawe and Ki'ilae village. The park encompasses a restored traditional Hawaiian village and the spiritual sanctuary where defeated warriors or people who had broken sacred laws could be absolved and allowed a fresh start in the community. The Ki'ilae village was completely abandoned in 1926 (Anon, 1981).

Local Human Population The nearby village is still inhabited by indigenous Hawaiians who continue to practise traditional crafts and skills such as weaving mats and night fishing.

Visitors and Visitor Facilities There are 350,000 visitors annually entering the park. The heaviest period of use is usually midday and the pattern is generally an orientation talk, a pre-arranged tour of the palace grounds, demonstrations of traditional Hawaiian activities and visits to Hale o Keawe and the Place of Refuge. There are three visitor centres, museums and horse trails (Anon, 1981).

Scientific Research and Facilities A cooperative Park Studies Unit with assistance from the University of Hawaii, Manoa Campus, conducts some research. Researchers at the Mauka botanical gardens develop and grow native Hawaiian plants for re-introduction into the park (Anon, 1981).

Conservation Management The park has been established to "preserve through public ownership and as part of the American national park system the historical ruins as well as other nearby prehistoric features" (Anon, 1981).

With the aim to return the landscape to its late 18th century appearance, the authorities have embarked on a limited programme to clear exotic plants from around the ruins. By the early 1980's 23ha of land had been cleared of exotic plants such as ekoa *Leucaena glauca*, opiuma *Pithecellobium dulce*, christmasberry *Schinus terentifolia* and kiawe *Prosopis pallida* (Anon, 1981).

Administration of the park is coordinated by the National Park service and the US Department of the Interior. The park authorities work in close association with the Waimea Hawaiian Civic Club and the Hawaii Natural History Association (Anon, 1981).

Proposals exist to enlarge the park boundaries to include extensive marine areas (Anon, 1981).

Management Problems Coral damage has been caused by boats anchoring in the bay, reef fish have been gathered for trade to aquariums and exotic plants introduced into areas of native vegetation (Anon, 1981).

Staff In the early 1980's there were 10 permanent full-time staff and five permanent, part-time staff (Anon, 1981).

Budget US\$ 454,700 budgeted for fiscal year 1985 (see Anon, 1981 for information on the budget 1978-1981).

Local Administration Superintendent, Pu'uhoonua o Honaunau NHP, PO Box 129, Honaunau, Kona, Hawaii 96726 (also administers Pu'uukohota Heiau National Historic Site).

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Date August 1987

CANADA

Area 9,958,925 sq. km

Population 25,000,000

Parks and Reserves Legislation National parks and national marine parks (federal): the National Parks Act as amended in 1974. National wildlife areas and migratory bird sanctuaries: the Canada Wildlife Act, 1973 and the Migratory Birds Convention Act, 1970. Provincial and territorial parks, and ecological reserves: each province and territory has its own protected areas legislation. In general, natural resources in Canada are under provincial jurisdiction except in the territories where federal jurisdiction applies. As a result, the provincial governments play a key role in conservation. National parks have been established either on federal lands or through negotiated federal/provincial agreements to transfer administration and control over the resources.

Parks and Reserves Administration and Management Responsibility for the National Parks Act is vested in the Minister of the Environment and is undertaken by Environment Canada, Parks, which is headed by an Assistant Deputy Minister. Parks' head office is responsible for policy direction and new park establishment, while five regional offices direct the planning and operations of the existing 34 national parks. E.C. Parks' objective for National Parks is, "to protect for all time representative natural areas of Canadian significance in a system of national parks, and to encourage public understanding, appreciation and enjoyment of this natural heritage so as to leave it unimpaired for future generations". The Federal Provincial Parks Council (FPPC) coordinates information exchange activities between the national, provincial and territorial park agencies, and a classification system has been devised for the 2,097 parks listed by the FPPC in its 1985/1986 annual report.

Addresses

- Environment Canada, Parks, Les Terrasses de la Chaudière, Ottawa, Ontario, Canada K1A 1G2
- Regional Offices: Environment Canada, Parks.
 - Atlantic Region:
Environment Canada-Parks, Historic Properties, Upper Water Street, Halifax, Nova Scotia, B3J 1S9
 - Prairie and Northern Region:
Environment Canada-Parks, 457 Main Street, 4th Floor, Winnipeg, Manitoba, R3B 3E8
 - Western Region:
Environment Canada-Parks, P.O. Box 2989, Postal Station M, Rm. 520, 220-4th Avenue S.E., Calgary, Alberta, T2P 3H8
 - Région du Québec:
Environment Canada, Parcs, 3 rue Buada, Case postale 6060, Haute-Ville, Québec, G1R 4V7
 - Ontario Region:
Environment Canada-Parks, 111 Water Street East, Cornwall, Ontario, K6H 6S3

Additional Information Both natural resources and user research and studies are undertaken by Parks' researchers, as well as researchers from other government agencies, such as Canadian Wildlife Service, and from universities. Research is managed through a collection/research permit system. Facilities for park visitors are provided so that visitors can enjoy the natural values of the park but only where considered essential and after study has shown that the natural values will not be impaired. Visitation to E. C. Parks holdings in 1986 was around 25 million. Public use and appreciation is encouraged through interpretation programmes, personal experiences, publications and films.

Canada

Protected Landscapes

Unspecified areas

Niagara Escarpment *

Rideau Trent-Severn Waterways *

Niagara Escarpment

Management Category V (Protected Landscape)

Biogeographical Province 1.05.05 (Eastern forest)

Geographical Location Located in southern Ontario, stretching approximately 725km from Queenston on the Niagara River to the islands off the tip of the Bruce Peninsula. Major towns along its route are Niagara Falls, St. Catharines, Hamilton, Owen Sound, Wiarton and Tobermory. The Escarpment lies between 43°00'-45°18'N and 79°00'-81°42'W.

Date and History of Establishment With the passage of the Niagara Escarpment Planning Development Act in 1973, the Ontario Provincial Government established a planning process to ensure that the area would be protected. A final Niagara Escarpment Plan was approved in 1985. This plan provides a framework of objectives and policies aimed at striking a balance between development, preservation and enjoyment of the escarpment.

Area The area encompassed by the Niagara Escarpment Plan is approximately 1,900 sq.km. and there are 105 parks of varying sizes located along its length. Some land is still being acquired and the long-term goal of the Niagara Escarpment Land Acquisition Program is the completion of a 51,093ha parks system along the length of the Niagara Escarpment. The parks include the newly announced Bruce Peninsula National Park, which will be 270 sq.km., provincial parks, and Conservation Authority parks. The intent is to link all of these parks by the Bruce Trail, a hiking trail which runs the length of the Niagara Escarpment.

Land Tenure Land tenure is mixed, involving federal, provincial, municipal and private ownership. There are 8 counties or regions and 37 local municipalities affected by plan policies. The area included parkland owned by the Ministry of Natural Resources, Conservation Authorities, and several other public bodies.

Altitude The elevation of the Niagara Escarpment ranges from 100m in the Hamilton area to approximately 525m in the Collingwood area.

Physical Features The area encompassed by the Niagara Escarpment Plan is a mosaic of topographical features containing essentially undisturbed cliffs, forests and stream valleys, rolling glacial landforms, and a variety of other features. The Niagara Escarpment itself, despite its varied appearance, is a continuous geological and geomorphological landform. This is indicated by the continuous bedrock strata responsible for the Escarpment's formation, and in the topographic height of land these buried strata create. Because the bedrock is composed of many different rock formations the Escarpment face often has a terraced appearance due to differential rates of erosion. Numerous stream valleys further dissect the face, creating a highly irregular profile. In many places along its length, the rock is obscured or completely buried by glacial materials. The origin of the Escarpment dates back 400-450 million years.

Climate The Niagara Escarpment experiences four seasons. Temperatures range from -35°C in January to the occasional +36°C in July and August. Rainfall varies along the length of the Escarpment but is generally in the 70cm to 100 cm range per year. At the Queenstown end, the climate is more moderate. Annual snowfall ranges between 100cm and 300cm (from south to north).

Vegetation The Escarpment exhibits a botanical diversity that is unique to Canada running through two forest regions: the Deciduous (or Carolinian) and the Great Lakes - St. Lawrence. The trees are primarily deciduous, although conifers occur in places. Numerous rare species of orchids and ferns are found along the Niagara Escarpment with 43 species of orchid recorded in the Bruce Peninsula National Park. In the section between Guelph and Niagara Falls, there are seven excellent remnants of the Carolinian vegetation zone, one of the most threatened regions of Canada.

Fauna The Niagara Escarpment also possesses great faunal diversity. Common species include: white-tailed deer, beaver, mink, otter, porcupine, raccoon, fox and chipmunk (*Odocoileus virginianus*, *Castor canadensis*, *Mustela vison*, *Lutra canadensis*, *Erithizon dorsatum*, *Procyon lotor*, *Vulpes vulpes* and *Tamias sp.*). Less common are black bear *Ursus americanus*, lynx *Lynx lynx*, weasel *Mustela frenata* and coyote *Canis latrans*. Dozens of bird species are found along the Escarpment's length. Several kinds of snakes are also found. The endangered Eastern Massassauga rattlesnake *Sistrurus catenatus* is the only poisonous one, and is more commonly found on the Bruce Peninsula.

Cultural Heritage Numerous "ghost towns" are found along the length of the Niagara Escarpment, whilst some selected properties have been restored to their original condition. A monument to General Isaac Brock is located at Queenston Heights. The old Welland Canal is a noted historical site.

Local Human Population A great number of villages, towns, and cities are situated along and within close proximity of the Niagara Escarpment. Land use along the escarpment is a mosaic, ranging from fruit growing on the Niagara Peninsula, to beef production in Bruce County, and tourism on the Bruce Peninsula.

Visitors and Visitor Facilities The entire Niagara Escarpment offers outstanding and varied tourist potential and numerous parks along the escarpment provide many opportunities for recreation, ranging from wind surfing, to skiing, nature study, swimming, fishing, rappelling, hang gliding, camping and hiking. The Bruce Trail is an excellent hiking trail. Many of the Parks offer interpretive programs.

Scientific Research and Facilities There are three universities within or adjacent to the Escarpment Corridor. These are Brock, McMaster and Guelph. Annual government field surveys are made of environmentally sensitive areas by the Ontario Ministry of Natural Resources and various Conservation Authorities within the Corridor.

Conservation Management The purpose of the Niagara Escarpment Planning and Development Act, 1973, is "to provide for the maintenance of the Niagara Escarpment and land in its vicinity substantially as a continuous natural environment, and to ensure only such development occurs as is compatible with that natural environment". Specific objectives include : to protect unique ecological and historic area; to maintain and enhance the quality and character of natural streams and water supplies, to provide adequate opportunities for outdoor recreation; to maintain and enhance the open landscape character of the Niagara Escarpment in so far as possible, by such means as compatible farming or forestry and by preserving the natural scenery; to ensure that all new development is compatible with the purpose of the Act; to provide for adequate public access to the Niagara Escarpment and to support municipalities within the Niagara Escarpment Planning Area in their exercise of the planning functions conferred upon them by The Planning Act. The area of the Niagara Escarpment Plan has been allocated among seven land use designations: Escarpment Natural Area, Escarpment Protection Area, Escarpment Rural Area, Minor Urban Centre, Urban Area, Escarpment Recreation Area and Mineral Resources Area. Each designation sets forth specific objectives, criteria for designation, permitted use, and other relevant information.

Management Problems The Niagara Escarpment Plan arose in response to increasing threats to the Niagara Escarpment's natural environment. Primary concerns included aggregate mining and increasing urbanization. These and other land uses are now controlled more effectively. The southern end of the Escarpment passes close to the most intensively urbanized area of Canada, the Toronto-Hamilton-St. Catharines megalopolis, with the resulting development pressures.

Staff The Niagara Escarpment Commission and its staff are responsible for promoting the objectives set forth in the Niagara Escarpment Plan. The Commission itself consists of 17 members: a Chairman, eight members representing the public at large, and eight members who are either members or employees of county or regional councils of the Escarpment area. The Commission staff is comprised of a director, 3 managers, planners, planning technicians, a landscape architect, cartographers, an information assistant, and administration and support staff.

Budget The annual budget of the Niagara Escarpment Commission is \$1.8 million dollars. \$2.5 million have been committed annually for land acquisition for a period of 10 years. Other implementing authorities have an annual budget of \$700,000 allocated to Escarpment Plan implementation work.

Local Administration The Niagara Escarpment Commission's offices are at 232 Guelph Street, Georgetown, Ontario, Canada L7G 4B1.

References

- ° Niagara Escarpment Commission, 1983. *The Final Proposed Plan for the Niagara Escarpment*. Niagara Escarpment Commission: Georgetown, Ontario.
- ° Ontario Ministry of Natural Resources, 1976. *Significant Natural Areas Along the Niagara Escarpment*. Report on Nature Reserve candidates and other significant natural areas in the Niagara Escarpment Planning Area, Toronto, Ontario, Canada.

Date August 1987

Rideau Waterway and Heritage Canal Trent-Severn Waterway and Heritage Canal

Management Category V (Protected Landscape)

Biogeographical Province 1.05.05 (Eastern Forest)

Geographical Location Located within the southern portion of Ontario. The Trent-Severn portion is close to Toronto, and links Georgian Bay to Lake Ontario. The Rideau is close to Kingston and Ottawa, linking Lake Ontario to the Ottawa River. The waterways lie between 44°00'-45°24'N and 75°42'-79°48'W.

Date and History of Establishment The Rideau Canal was built between 1826 and 1831 as a critical link in the military supply route between Upper and Lower Canada. By the mid-19th century, the canal had become a busy commercial artery. It is also recognized as one of the best preserved 19th century canals still in active operation in the world. The Trent-Severn Canal was built between 1834 and 1920 and was an important route for the shipment of lumber and other goods. Today, recreation is the main use. In 1972, administration and control over the heritage canals was transferred to the Canadian Governments' agency responsible for National and Historic Parks - now called Environment Canada, Parks. Following a joint Canada/Ontario study, the two levels of government signed an agreement in 1975 called the Canada-Ontario Rideau, Trent, Severn Agreement (CORTS) to co-ordinate their activities towards achieving the goal of developing a distinctive environmental corridor.

Area The Rideau-Trent-Severn corridor is 680km long, ranging in width from 2-30km.

Land Tenure Land tenure is mixed in both corridors with 140 jurisdictions, departments and commissions being involved at all levels of government. There is also a great deal of private land involved with over 40,000ha of land publically owned.

Altitude The highest point in the waterway systems is at Balsam Lake with an elevation of 255m above sea level. The lowest elevation is at the Ottawa River with an elevation of 40m above sea level. However, hills along the corridor reach an elevation of 363m above sea level.

Physical Features The Rideau section contains 16 lakes along or directly accessible from the main channel. It also contains two rivers, the Rideau and the Cataract. The Trent-Severn section has 17 lakes along the main channel and four principal rivers - The Trent, Otonabee, Talbot, and Severn Rivers. The geology of the Rideau section varies from a plain of limestone or sandstone covered with shallow, poorly drained soil, to rocky Precambrian Shield areas where bedrock is a mixture of granites and metamorphic rocks, with a shallow soil cover. The geology of the Trent-Severn is characterized by the Precambrian and the Ordovician Era, with its limestone bedrock. The Canadian Shield is hilly and broken, contrasting with the flat limestone section.

Climate There are four pronounced seasons: winter, spring, summer and fall with minimum temperatures as low as -35°C and maximum temperatures as high as +34°C. Rainfall varies between 76-96cm annually and with between 162cm and 284cm of snowfall. Snow is on the ground 80 to 120 days but with over 200 days without snow cover.

Vegetation There is marked variation in the vegetation along the length of the corridor. The dominance of vegetation types is primarily determined by the presence of the Canadian Shield. Where the waterway runs through the Shield, the mixed deciduous forests characteristic of southern Ontario give way to coniferous forests. Wetlands, with their own vegetative association, occur along the waterway.

Fauna The fauna is characteristic of the Great Lakes - St. Lawrence Forest Region and includes: white-tailed deer, beaver, mink, otter, porcupine and raccoon (*Odocoileus virginianus*, *Castor canadensis*, *Mustela vison*, *Lutra canadensis*, *Erithizon dorsatum* and *Procyon lotor*). The endangered Eastern Massasauga rattlesnake *Sistrurus catenatus* occurs along the eastern shore of Georgian Bay.

Cultural Heritage Numerous archaeological and historic sites are found along the waterway corridor. These sites include Indian encampments and burial grounds, petroglyphs, settlers' homes, numerous dams and locks, defensible structures, and other features of the waterways' rich cultural heritage. The Rideau Canal is itself of national historic significance.

Local Human Population Numerous cities, towns and villages are situated along the length of the corridor and close to the most densely populated portion of Canada, and within a day's drive of about 60 million people in Canada and the U.S.A. In summer months, due to the waterway's great recreational appeal and the presence of many summer cottages along its length, the population swells dramatically. Local economies have a diverse base, ranging from livestock production to manufacturing and tourism.

Visitors and Visitor Facilities Today, the Rideau is an important recreational waterway for thousands of boaters, cottagers and other visitors. The waterway is easily accessible by car, boat, bus, and rail. The waterway is open for navigation from mid-May to mid-October. Different types of accommodation are available, including campgrounds, hotels and motels, and even staying on one's boat or yacht. Recreational facilities along the waterway are numerous and highly variable.

Scientific Research and Facilities Trent University in Peterborough, the University of Ottawa, Carleton University, and Queen's University in Kingston are within the waterway corridor. In addition research on water quality, fisheries and other concerns is carried out by relevant agencies.

Conservation Management The two heritage canals are now administered by Environment Canada, Parks. The management goal for the Rideau, Trent-Severn corridor is "To develop a distinctive environmental corridor wherein a wide variety of recreational opportunities are available to users in a safe, pleasant and interesting environment and where optimum recreational use is achieved for the greatest number of people without causing significant environmental damage". Specific objectives include maintaining or enhancing: clean air and water; adequate undeveloped open space; preservation and interpretation of the human and natural historical environment; an adequate number of public use areas; adequate commercial development; and satisfactory private development. The CORTS agreement resulted in the preparation of a set of co-ordinating policies to guide all levels of government and private sector activities towards the achievement of the CORTS goal and objectives. The policies call for action in the areas of pollution control, water management, land use, tourism and recreation, and heritage conservation. Major management activities are those undertaken to ensure safe and enjoyable use of the waterway corridor (lock operation and maintenance etc.), and environmental quality. Much co-ordination and co-operation occurs to implement the policies. Nearby significant protected areas are Georgian Bay Islands National Park (14.2 sq.km.), St. Lawrence Islands National Park (0.8 sq.km.) and Frontenac Provincial Park.

Management Problems Water pollution is a dominant concern. Encroachment on open space by poorly planned vacation and permanent home developments was and to some extent continues to be of concern. Major wetland wildlife areas and lake shorelines have been lost to cottage development in the past. A decrease in fish populations has been noted.

Staff Environment Canada, Parks devoted 170 and 240 person years in 1982-83 to the administration and management of the Rideau waterway and the Trent-Severn waterway respectively. Other agencies also provide staff for different aspects of the waterway corridors' management.

Budget Operating expenditures by Environment Canada, Parks alone in 1982-83 were \$10.9 million (Canadian). Capital expenditures by Environment Canada, Parks were \$2 million (Canadian). Expenditures of others involved in the management of the waterway corridor are not available.

Local Administration Rideau Canal, 12 Maple Avenue N, Smith's Fall, Ontario, Canada K7A 1Z5.
Trent-Severn Waterway, P.O. Box 567, Peterborough, Ontario, Canada K9J 6Z6.

References

- ° Canada-Ontario Rideau-Trent-Severn Study Committee (1975). *The Rideau Trent Severn: Yesterday, Today and Tomorrow*. Information Canada: Ottawa.
- ° Canada-Ontario-Rideau-Trent-Severn Waterway (1975). *CORTS Agreement*.
- ° CORTS (1982). *Canada-Ontario Policies for Rideau, Trent-Severn Corridor. Canada-Ontario*.
- ° Other pamphlets prepared by Environment Canada, Parks available through addresses above.

Date August 1987

LATIN AMERICA AND THE CARIBBEAN

Wetterberg *et al.* carried out an extensive survey of the protected areas of South America, covering aspects of legislation and administration, as well as listing and mapping all major areas. Of the 13 countries covered (including French Guiana), Wetterberg only identified six with Category V sites: Colombia, Ecuador, Paraguay, Peru, Uruguay and Venezuela. Specifically, these range from roadside parkways (Colombia) to watershed protection areas (Paraguay, Peru and Venezuela), and from historical/cultural sanctuaries (Peru, Uruguay) to recreation areas (Ecuador), although neither the parkways of Colombia nor the protection forests of Peru were included. Macchu Picchu Historical Sanctuary, which was listed by Wetterberg as Category V based on legislation, would appear to be *de facto* a Category II site (National Park). Also, although Wetterberg lists National Reserves in Argentina as Category IV (Managed Nature Reserves), it could be argued that these areas are closer to protected landscapes. On the edges of National Parks, they are generally areas still in private ownership "of interest for conservation of ecological systems, maintenance of protection zones for adjacent national parks, or for the creation of independent conservation zones when the conditions present prohibit establishment of a national park". Two sites in Panama *may* approximate protected landscapes, the Lago Gatun Recreation Park, and the Metropolitan Natural Park, both of which are fairly small natural areas close to population centres, and there are also a number of recreation areas in Costa Rica (although again these are relatively small). Two of Costa Rica's national parks (Barra Honda and Volcan Irazu) remain largely in private ownership, and are probably more akin to protected landscapes than national parks proper. Also, the protection forests and zones of Costa Rica set up to protect watersheds, may also function as protected landscapes, although the forestry legislation is unclear in both the definition and objectives of such designations. There appears to be one true protected landscape in the Caribbean islands, the 70,000ha regional nature park on Martinique. The protected landscape of this French "department" was created on the lines of the *parcs naturels* regionaux system of Mainland France, and under the same legislation, primarily to ensure continued survival of the traditional landscape. The area is perhaps unique in that it includes over half of the department (63.7%), more or less only excluding the main town and adjacent areas.

COSTA RICA

Area 50,900 sq.km

Population 2,450,226 (1984 provisional census)

Parks and Reserves Legislation Concern for nature conservation dates back to 1883, although the first national park was not declared until 1945. Legislation in 1955 proposed that the area within 2km of each volcanic crater be declared a national park while the first biological reserve (Cabo Blanco) was declared in 1963 and the first forest reserve (Rio Mancho) in 1964. The Forestry Law of 25 November 1969 and the modifications of it in the 24 August 1977 law establishing the National Park Service provide that national parks and reserves can be created by executive decree; once created the limits can be altered only by a Congressional Law. The National Park Service has the right to recommend the creation of new parks and reserves and expropriation of lands, set up and administer funds derived from entrance fees and special taxes, enter and inspect rural properties, seize vehicles and arms or equipment used for any illegal activities, in accordance with the provisions of these laws. The laws also define the responsibilities of the Park Service and general prohibitions against certain activities by visitors to the parks and reserves. The chief functions of the National Park Service is to maintain representative examples of biological units as ecosystems, maintain ecological and genetic diversity and protect scenic beauty. Separate additional legislation empowers the Ministry of the Economy to issue special bonds for payment of lands to be expropriated for parks and reserves. In 1982 the new Law of Wildlife Conservation was placed before the Legislative Assembly where it faced strong opposition from hunting clubs who were objecting against license controls and stiffer penalties for poaching. Wildland areas are generally forest zones which are legally protected or managed for a variety of purposes, ranging from resource exploitation to absolute protection, and including environmental recreation and education. There are however, no legally adopted national conservation objectives for managing wildlands. The recognised protected areas in Costa Rica range from cultural monuments to wildlife conservation areas. In 1982 there were 59 units in the wildlands system divided into seven main management classes: Biological Reserves (Reservas Biológicas); Anthropological Reserves (Reservas Antropológicas) (including Indian Reserves); National Parks (Parques Nacionales); Water Production Areas (including Protection Forests and Zones); National Forests (Reservas Forestales) (including Forest Reserves); Wildlife Refuges (Refugios de Vida Silvestre); National Monument and Cultural Monuments (Monumentos Nacionales) (USAID, 1982; FPN, 1985).

Parks and Reserves Administration and Management The National Park Service has existed since 24 August 1977 with equivalency to a General Directorate of the Ministry of Agriculture and Livestock (from 1969-1977 it was a Department within the General Forestry Directorate of the same Ministry). It has responsibility for 25 parks and reserves except for the Monteverde Cloud Forest Biological Reserve and Rafael Lucas Rodriguez National Wildlife Refuge (see individual sheets). The Department of Wildlife (DVS) was split in 1981 and reestablished within the Forestry Service (DGF). As a result of this move, the DGF has begun to allow wildlife research to be conducted in its forest reserves and its 200 or so forest guards may be in a position to more adequately enforce the wildlife laws. The DVS employs a staff of 11 and generally the Department is very positive to research. However, there is no official liaison between DVS and SPN due to the lack of a national wildlife policy (Rodriguez, 1983). Forestry law 4465 of 25 November 1969 defined national parks as "regions or areas... that for their scenic beauty or the national or international importance of their wildlife are to be set aside for the recreation and education of the public, for tourism or for scientific research" (Article 74). The SPN administers 13 national parks, seven biological reserves, four recreational areas, and one national monument; the DVS; two wildlife refuges and the DGF's Department of Forest Reserves; 11 forest reserves and seven biological reserves, four recreational areas, and one national monument; the DVS; two wildlife refuges and the DGF's Department of Forest Reserves; 11 forest reserves and seven protected zones. *National Monuments* are relatively small areas of lesser natural or historical value, or those which protect a particular resource of special importance. *Biological Reserves* are areas containing

ecosystems/species largely unaffected by man, where the ecological processes can follow their own courses with as little interference as possible with the primary objective being to protect natural phenomena for scientific research. One of the first international conservation treaties signed by Costa Rica was the "Convention on the protection of flora and fauna and beautiful scenery of the American countries" or 24 October 1940. The Convention on International Trade (CITES) was signed on 3 March 1973 and approved by legislative decree No. 5605 on 2 October 1974. Costa Rica adhered to the World Heritage listing in 23 August 1977 with one site inscribed in 1983 (Talamanca Fange-La Amistad Reserve) and created one biosphere reserve (Reserva de la Amistad) in 1982. National parks are the best known of all protected areas and are readily accepted by the public. The national parks continue to contain private property within their boundaries, and with few exceptions park management and protection are inadequate, with major conflicts arising with hunters, squatters, tourists and with forest fires. Half the national parks and the cultural monuments have general management and development plans and three national parks and one recreational area have an interpretation and environmental education programme. Each unit however, has an operations guide for management and development. Each biological reserve has an annual operations plan and some have management and development plans. Natural resource exploitation is prohibited. Other types of reserve also exist. The Servicio de Parques Nacionales, Ministry of Agriculture, does not have a fixed annual budget for each of the parks and reserves under its own administration. Rather the overall budget is adjusted to meet priorities throughout the year. For 1981 the approximate budget for the Park Services system was US\$1,720,602 for all normal operations and US\$75,000-100,000 from international donations for projects (WWF/IUCN and RENARE). Also, various other preinvestment planning funds, major bank loans and loans for other projects are underway. Of the 18 units in forest reserves and protection zones only two have management plans but an operational plan for all units was due to be completed in the 1980s. Forest areas are often merely estimated and assumed to be exploitable. Actual management does not exist in any of the units but some protection is given by the one to four forest guards present per site. The National Forest Directorate (also within the agriculture ministry) is responsible for the forest areas, while the Indian Reserves are more autonomous (though management is shared with the National Institute for Lands and Colonisation, and the National Council on Indian Affairs) (Boza, 1981; Rodriguez 1983; USAID, 1983).

Addresses

- ° Servicio de Parques Nacionales, Ministerio de Agricultura y Ganaderia, Apartado 10094, San José.
- ° Fundación de Parques Nacionales, Apdo 236, San José 1002.

Additional Information Costa Rica has the greatest proportion of its territory in parks and protective areas than any other Latin American country with tropical moist forest (Boza, 1981). Legally established wildlands occupy about 952,000ha, equivalent to 19% of the land area, whilst in total there are 1,138,000ha in all protective categories, accounting for 22% of the country. The Atlantic slope forests are seen as the most threatened, as a result of legal land colonisation schemes taking place there. The main cause of the very high deforestation rate (65,000ha/annum) is cattle raising and agriculture, with an estimated two million head of livestock in 1979. Logging accounts for only 2% of deforestation per annum. Of the protected areas only national parks, biological reserves, wildlife refuges and national monuments are considered to be anywhere near to being adequately protected. However, with the exception of the recently declared La Amistad National Park, all wildland units have been created without prior ecological and cadastral studies. The management objectives and categories, their geometric shapes and boundaries do not, in most cases, coincide with the areas as established. Many wildland units require boundary adjustments, management plans and the expropriation of private holdings. The Forestry Law (no. 4465) has several inadequacies, with protected zones not defined nor objectives specified. The 1979-1982 National Development Plan, however, did emphasize the need to reduce environmental deterioration. The impressive development in wildland protection and management during the early 1980's has occurred without the benefits of clear policies or guidelines and without a single administrative or legal agency. The government has yet to set legal conservation objectives or an administrative programme (Boza, 1981; USAID, 1982).

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Protected Landscapes

<i>National Parks</i>	(hectares)
Barra Honda	2,295 *
Cahuíta	1,700 *
Volcan Irazu	2,309 *
Subtotal	6,304

Barra Honda National Park

Management Category V (Protected Landscape)

Biogeographical Province 8.16.04 (Central American)

Geographical Location Located in Nicoya Peninsula, 12km north-east of Nicoya, in the Guanacaste Province. 10°8'-10°12'N, 85°20'-85°25'W.

Date and History of Establishment The national park was established on 20 August 1974, by law No. 5583, and its boundaries were fixed by executive decree No. 5558 on 5 October 1979.

Area 2,295ha

Land Tenure All the lands are private property and the area still lacks a survey to allow expropriation proceedings to begin.

Altitude 20-575m

Physical Features The park has several limestone-capped hills and they form a series of crescent-shaped ridges which reach a maximum height on Barra Honda Peak (423m). There is a vast network of limestone caves, varying from vertical shafts or pits, to dome-like chambers. The depth of the caves varies, the deepest being Santa Ana which descends to 240m. The show caves include those of Terciopelo (Fer-de-Lance), La Trampa (the trap) and Santa Ana, each with large number of stalagmites, stalactites and other cave formations. The southern tip of the mountain peak is represented by a flattened plateau. On the southern flank of the Barra Honda seasonal streams form a series of porous tufa-limestone cascades locally called "La Cascada" (the tufa deposits traverine at a rate of 5cm per year). The geology of the region is based on the Barra Honda limestone formations layed down in the Paleocene (70 million years ago). The lower section measures 100m thick and the upper section is about 200m thick. The lower part is formed of poorly stratified limestone whilst the upper is well-stratified in

Costa Rica

medium thick layers. The slopes of Barra Honda were formed by an elevation caused by the system of faults of the Nacaome River located to the west of the park (Boza and Mendoza, 1981). Other limestone features such as potholes and springs are also common.

Climate The dry season lasts about 6 months; annual rainfall is about 1800mm and mean annual temperature 28°C.

Vegetation The park vegetation corresponds to the tropical dry forest (moist province transition life zone in the Holdridge system). Most of the forest vegetation has been altered by man and only on the steeper slopes is the woodland well conserved. The natural vegetation is semi-deciduous, with broadleaf-evergreen and broadleaf-deciduous trees. Due to the presence of a distinct dry season, the dominant vegetation is coarse grass with low trees and shrubs in stands of varying density (actively promoted by man through livestock grazing and fire management). Climbing vines and epiphytes are numerous.

Fauna Due to previous and actual agricultural practices, the area does not have a very rich fauna. However, there are notable populations of mammals such as howler monkey *Alouatta palliata*, white-tailed deer *Odocoileus virginianus* and birds such as great curassow, black vulture, white-tailed hawk, bicoloured hawk and magpie-jay (*Crax rubra*, *Coragyps atratus*, *Accipiter bicolor*, *Buteo albicaudatus* and *Calocitta formosa*). Ocelot *Felis pardalis* and tiger cat *F. tigrina* have also been recorded by park staff. Several species of bats inhabit the caves and in Pozo Hediondo cave there are vast colonies of thousands of bats, their guano being many metres deep. Other abundant cave fauna includes several species of cricket, beetle, snail, blind salamander, rat, birds and blind fish (Boza and Mendoza, 1981).

Cultural Heritage At Nicoa, which is considered an ancient underground reservoir, pre-Columbian human remains, adornments and tools were discovered in 1970 by the Group of Speleology (Boza, 1986).

Local Human Population The local economy is based on cattle raising and some agriculture.

Visitors and Visitor Facilities The national park offers its visitors a wide system of paths which lead to the caverns, look-outs and tufa formations. In the early 1980s the Barra Honda caverns were being kept closed to the public until specialised personnel could assure the adequate conservation of these fragile ecosystems (Boza and Mendoza, 1981).

Scientific Research and Facilities Several studies have been done on the geology of the caves and limestone hills, commencing with the explorations by the Group of Speleology (Mountaineers Club of Costa Rica) in 1967 (Boza and Mendoza, 1981). To date 19 cave networks have been surveyed (Boza, 1986).

Conservation Management The park has been established for its recreational, cultural and conservation importance. To date the caverns are closed to the public but the rest of the park has been established with a complex network of footpaths and trails. The vegetation at the park has greatly suffered from the past effects of fire, grazing and agriculture but current management involves eliminating these factors leading to active scrub regeneration (Boza, 1986).

Management Problems There is considerable human disturbance throughout the park especially due to cattle grazing and other agriculture. The caves have remained fairly undisturbed, largely because of the lack of horizontal entrances but are currently under threat from uncontrolled tourist development.

Staff One superintendent, park rangers and labourers.

Budget No information

Local Administration Parque Nacional Barra Honda, Servicio de Parques Nacionales, Ministerio de Agricultura y Ganadería, San José.

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Date August 1987

Cahuita National Park

Management Category II (National Park)

Biogeographical Province 8.16.04 (Central American)

Geographical Location The park is 40km south of Puerto Limon and south of the town of Cahuita in south-eastern Limon province, Atlantic coast. 9°40'-9°48'N, 82°45'-82°50'W.

Date and History of Establishment 24 September 1970, by executive decree 1236-A.

Area Total 1,700ha (with 1,100ha of land, and 600ha marine).

Land Tenure The terrestrial part is mostly under private ownership; the government is expropriating lands.

Altitude Sea level to 10m

Physical Features The park follows the low Caribbean shoreline for approximately 10km. A fringing reef extends 6.5km along the coast 100-1,000m from the beach, varying in depth from 1m near the coast to 7m in some lagoon channels and to 15m on the reef front. The Punta Cahuita is formed on emergent ancient coral whilst the bedrock of the terrestrial sector is Pleistocene alluvial sandstone.

Climate The climate is hot and wet with annual rainfall close to 3500mm, mean annual temperature of about 25°C with a brief dry season in October and a second less rainy season between January and February. Water temperatures rose to 33-35°C in June 1983 as a result of El Niño.

Vegetation An almost undisturbed tropical moist forest association is found on the Point itself with the following tree species: *Prioria copaifera*, *Carapa guianensis*, *Anacardium excelsum* and *Calophyllum brasiliense*. In the old abandoned cocoa plantations *Cordia alliodora* and *Hura crepitans* are the dominant species. A pure stand of swamp palm *Raphia taedigera* occupies the southwest corner of the park and coconut palm *Cocos nucifera* lines the stretch of beach. Punta Cahuita is described as marshland, and the forest cover ranges from dry mixed forest, to mangrove swamp and littoral woodland. The marine vegetation includes areas of turtle grass *Thalassia testudinum*, situated close to the shore, and a total of 128 species of marine algae (Wellington, 1974).

Fauna Common mammals include the howler monkey *Alouatta palliata*, three-toed sloth *Bradypus tridactylus*, red squirrel *Sciurus granatensis* and the margay subspecies *Felis wiedii pirrensis* (V). Some of the bird species frequent in the area are the brown pelican, green ibis, great skua, bridled tern, sooty tern, green macaw, white-collared manakin, the long-tailed tyrant (*Pelecanus occidentalis*, *Mesembrinibus cayennensis*, *Catharata skua*, *Sterna, naethucus*, *S. fuscata*, *Ara amnbigua*, *Manacus candei*, *Colonia colonus*) and various species of ant-wrens *Myrmothercula* spp. Among the many reptile species represented here are one

Costa Rica

basilisk *Basiliscus vittatus* and the famous fer-de-lance *Bothrops asper*. The hawksbill turtle *Eretmochelys imbricata* and the leatherback *Dermochelys coriacea* nest in the area and the green turtle *Chelonia mydas* and Caribbean manatee *Trichechus manatus* are known to occur.

The fish population is described as very diverse. The Park contains the country's only extensive coral reef. The inner reef (c. 500m long) separated from the external reef (4km long) by a large lagoon, 100-1,000m wide, has its reef crest characterised by large colonies of *Acropora palmata*. The inner reef is dominated by *Porites porites*. The lagoon has small patch reefs (*Acropora palmata*, *Siderastrea siderea* and *Diploria strigosa*), dense growths of algae and at the shallow eastern end a very rich (20-25 species) assemblage of sponges. At depths of 9 to 15m there is a dense growth of a variety of corals. Closer to the reef edge brain corals predominate with squirrel and surgeon fish, lobsters, stinging and short-spined urchins and polychaete worms. Horny corals and snappers are common on the seaward face of the reef. Wellington (1974) found 35 species of stony coral. In addition, 20 species of octocorals have been reported. Crabs are abundant, both on the beach and in the freshwater streams. In total 44 species of crustacean and 140 species of molluscs have been recorded.

Cultural Heritage There is shipwreck, dating from the 18th century, located close to the mouth of the Perezoso River.

Local Human Population The local fishermen utilise the fish populations of the reef largely by hook and line techniques, netting being rarer, but diving for lobsters is still permitted. Spear fishing is prohibited.

Visitors and Visitor Facilities Recreational activities are centred on the bay next to the reef, with many visitors, in the absence of a marina or diving centres, using a locally provided glass bottom boat to view the inner reef area.

Scientific Research and Facilities An extensive marine resources inventory has been completed. Several additional studies on terrestrial flora and fauna are carried out each year by visiting scientists, while the coral reef has been studied by scientists from CIMAR of the Universidad de Costa Rica. There are simple laboratory facilities at the Park headquarters and skiffs with outboard motors for marine research are available.

Conservation Management A team composed of personnel of the Costa Rican National Park Service and CATIE have developed a master plan. The document is now under review by Park Service personnel (Bozo, 1986).

Management Problems In the past areas were cleared for cocoa and bananas; this is no longer permitted. Harvesting of coconuts is allowed along the beach, but causes no real problems. There was widespread mortality of the *Diadema antillarum* population during the 1983 El Nino phenomena, and reefs are affected by increased siltation, measurable over the past 15 year period.

Staff A superintendent, four guides, five guards and two labourers.

Budget No information

Local Administration Parque Nacional Cahuita, Servicio de Parques Nacionales, Ministerio de Agricultura y Ganaderia, San José.

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Date August 1987

Irazu Volcano National Park (Cartago Volcano)

Management Category V (Protected Landscape)

Biogeographical Province 8.16.04 (Central American)

Geographical Location The central highlands, Cartago province; about 10km due north-east from the city of Cartago. 9°58'N, 83°50'W.

Date and History of Establishment Irazu Volcano was first established as a national park on 30 July 1955, in accordance with the Organic Law No. 1917 of the Costa Rican Institute of Tourism. Article 6 of this law decrees that this Institute is responsible for the guardianship and the conservation of the zones found in a radius of 2km around the craters. In 1961 the Law of Lands and Settlements declared the Irazu Volcano as national property from 3,000m at sea level to the summit.

Area 2,308ha

Land Tenure About two-thirds government land; the rest private holdings.

Altitude 900-3,432m (summit of the volcano).

Physical Features Irazu Volcano is the highest peak in the central volcanic Cordillera (3,432m). The site consists of the Irazu mountain, an active volcano, which forms a single mountainous spur which narrows to the east. On its long axis there are several volcanic cones with their still well-formed craters. Recent lava flows are visible at the base of the secondary crater, the Cervantes Gulch. On the summit of the volcano there are two craters, the eastern and extinct mouth, Diego de la Haya crater, and the western mouth that stretches 1,050m in diameter. In the 300m deep crater of Diego de la Haya is a lake full of sediment washed down from the sides of the crater. A plain called the Hermosa beach is the first level or outer crater. It forms a wide terrace around the southern edge of the present crater. The first records of an eruption date from 17 February 1723 (there have been numerous eruptions since that date - 1726, 1821, 1918.....) while the last violent period took place between 1963 and 1965.

The present volcanoes in the mountain range rise over a foundation of volcanic rocks dating from the lower Tertiary period (50-60 million years ago). At the base of these cones there are remains of sediments deposited probably in the upper Tertiary period (10-20 million years ago). The Cordillera began to be formed in the Pliocene period (11 million years ago) and underwent major activity. Today the activity is reduced to a moderate emission of gases and vapours from the fumaroles on the north-west slopes of the volcano. The park consists of basalt andesite along with old lava flows, ash and pumice and pyroclastic accumulations. The rocks contain a high percentage of feldspar and plagioclase-andesite as well as small amounts of melanocratic compounds (Boza and Mendoza, 1981).

Costa Rica

Climate Ground temperatures of 18.5°C have been recorded around the craters. The temperature rising to 82°C where the gases are expelled from the fumaroles.

Vegetation At the present time, only small patches of vegetation remain in the volcanic peak zone, generally in the river beds. Here it is possible to distinguish several oak species, mainly *Quercus costaricensis* and other trees such as *Escallonia* (Saxifragaceae), dogwood (Cornaceae) and magnolia (Magnoliaceae).

On the volcano's summit are numerous species which have been able to recolonise after the last volcanic activity. The most abundant species include *Arctostaphylos rubescens*, *Hypericum silenoides*, *Acaena elongata*, *Gunnera insignis*, *Smilacina paniculata*, *Vaccinium consanguineum*, and *Pernetia coriacea* (see Boza and Mendoza, 1981 for complete list). Below the timber line oak forest, mostly *Quercus costaricensis*, is the dominant vegetation type in non-agricultural areas.

Fauna Most noteworthy are the birds such as the rose-throated hummingbird, volcano junco, mountain robin, black guan, band-tailed pigeon and quetzal (*Selasphorus flammula*, *Junco vulcani*, *Turdus nigrescens*, *Dendrocopus villosus*, *Chamaepetes unicolor*, *Columba fasciata*, *Diglossa plumbea* and *Pharomachrus ocinno*). Among the mammals are *Sciurus sp.*, *Sylvilagus brasiliensis*, coyote *Canis latrans*, mexican porcupine *Coendu mexicanus* and brocket deer *Mazama americana*. In general the fauna is scarce and not obvious to the general observer (Boza and Mendoza, 1981).

Cultural Heritage The nearby city of Cartago used to be the capital of the province. The volcano has been visited by numerous explorers and naturalists over the centuries including Alexander von Frantzius in 1859 and Karl Sapper in 1899 (see details in Boza and Mendoza, 1981).

Local Human Population There are numerous small farms and cattle pastures on the lower slopes of the park. The local economy is based on cattle and potato farming.

Visitors and Visitor Facilities The area is very scenic and has magnificent panoramic views of the surrounding oceans and is used heavily for tourism. A good road connects the volcano with the cities of Cartago and San José. A number of facilities have been built by the Institute of Tourism.

Scientific Research and Facilities Considerable research has been done on the geology of the area; very little on biological aspects (for details about volcanology of the area and for reference lists see Boza and Mendoza, 1981).

Conservation Management The National Parks Service took over management of the park in 1976 (from the Costa Rican Institute of Tourism). A new management plan was elaborated by a SPN/CATIE team and revised by SPN personnel. This plan recommends a change of management category from National Park to National Monument including in the same unit the 500ha Ricardo Jimenez National Recreation Area.

Management Problems The fauna and flora of the upper part of the volcano has suffered considerably from the effects of the 1963-65 volcanic eruptions and the onslaught from the felling of forests to create cattle pasture land and potato fields. About 60% of the flanks of the crater below the tree line (about 3,100m) is now under pasture or agriculture. Dairy farming is increasing in the least disturbed areas to the north and north-east of the volcano. A large number of television and radio relay antennas exist on the crater rims.

Staff One superintendent, one guide, seven guards and two labourers. (Note: The Costa Rica Tourism Institute was in charge of the area until about two years ago; the Park Service began active management in 1978).

Budget No information

Local Administration Parque Nacional Volcan Irazu, Servicio de Parques Nacionales, Ministerio de Agricultura y Ganaderia, San José.

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Date August 1987

ECUADOR

Area 270,678 sq km

Population 9,250,000 (1983)

Parks and Reserves Legislation The first conservation legislation came into existence in November 1926, the law "prohibiting the hunting of heron in the coastal provinces" (MAG, 1977). Subsequently, laws leading to the creation of national parks and reserves were initiated with the declaration of the Archipelago de Colón (Galápagos) Park in May 1936 (Supreme Decree No. 31). The next major conservation law was the Supreme Decree No. 523 of 1964, designating "reserve zones and natural monuments". In 1970, law No. 818 on "protection of wildlife and forestry resources" was passed and led to the immediate establishment of the nature reserves of Cotacacachi-Cayapas and Cayambe-Coca. The law also allowed for the protection and development of natural flora and fauna according to Article 39. The current legislation relating to all protected areas is based on Decree No. 1306 of 27 August 1971. It is the fundamental law on protected areas in Ecuador and permits the creation of conservation areas without recourse to long bureaucratic procedures (Paucar, 1984). The law specifies the following points:

1. National parks and reserves are designated at the request of the Forestry Service and the Direction of Tourism through inter-ministerial accord.
2. All areas considered for reserves or national parks become public land and are subsequently available for expropriation.
3. National parks and reserves cannot be utilised or exploited for agriculture, livestock, forestry, hunting, fishing or colonisation (MAG, 1977; Paucar, 1984).

Invoking Decree No. 1306, the Ministry of Agriculture and Livestock (MAG) and the Ministry of Industry, Commerce and Integration, signed the Interministerial Accord No. 322 of 1979. The Accord defined Ecuadorian wildland management categories (Article No. 1). This act subsequently led to the creation and establishment of legal boundaries for national parks, ecological reserves, fauna production reserves and natural recreation areas. The 1981 "Forestry, Natural Area Conservation and Wildlife" Law (No. 74, Article No. 1) declared all flora and fauna as state property. Management plans are required for all parks and reserves (Article 70). Provision is made within the legislation for expropriation of private property within the parks (Article 73) and authorisation is granted to limit visitation (Article 75). Unauthorised occupation or damage to any land is prohibited (Article 18).

National Parks (Parques Nacionales) in Ecuador are extensive natural areas of at least 10,000ha. They are designated for their ecological diversity, unique flora or fauna and/or geology, as well as for their great natural significance for science, education and public recreation (MAG, 1977). Visitors are allowed to enter, under controlled conditions, for purposes of inspiration, education, research, culture and recreation. Zoning is based upon means of access and management priorities for each protected areas (Interim Accord No. 333 of 1979, Article 1).

Ecological Reserves (Reservas Ecológicas) are extensive areas with one or more ecosystems, with fauna and flora of great national significance or threatened with extinction. These reserves must have sufficient area, at least 10,000ha, to conserve "wildlife, geology, cultural sites or partly altered habitats".

Essentially, ecological reserves safeguard the environment of large regions and regulate land use and development of rural zones. They are under direct management control of government organisations and prohibit exploitation or occupation, although visitors are allowed to enter for education, research and recreation (Figueroa, 1983).

Ecuador

National Recreation Areas (Áreas nacionales de Recreación) are areas of at least 1,000ha where:

1. tourism or recreational resources exist in a natural or semi-natural environment of great scenic beauty.
2. They are located in areas which are easily accessible from major population centres of the country.
3. Tourism and recreational activities are encouraged, as is environmental education and scientific research.
4. Management includes encouraging wildlife as an attraction for recreation or tourism (Wetterberg, 1985).

Geobotanical Reserves (Reservas Geobotánicas) are areas dedicated to the preservation of outstanding geological resources where research, education and recreation are permitted (Figueroa, 1983; Wetterberg, 1985).

Fauna Production Reserves (Reservas Faunísticas) are located in areas of 1,000ha or more where "economic" wildlife species exist, where subsistence hunting for sport, subsistence or commercial enterprises (Wetterberg, 1985).

The World Heritage Convention was ratified on 16 June 1975 with two sites being inscribed (Galápagos Islands and Sangay National Park). One biosphere reserve has been designated, that of the Archipelago of Colón-Galápagos, in 1985.

Ecuador accepted the Convention on international Trade (CITES) through executive decree No. 77 of 1975.

Parks and Reserves Administration and Management The 1971 law for protection of national parks and reserves (Decree No. 1306) provided for the administration and control of the park system by the Forest Service, in close collaboration with the National Tourist Office and the General Fisheries Directorate. The head of the administration dealing with protected areas is the Ministry of Agriculture and Livestock (MAG), immediately below which is the National Forestry Programme (PRONAF) and its subsidiary the Department of Natural Areas and Wildlife (ANVS). The directorate of ANVS is divided into four sections, that of a) national parks and reserves, b) wild flora and fauna conservation, c) basic research and studies and d) forestry protection. The national park and reserve section is further sub-divided into the various administrative offices for each area. The larger protected areas have an administrative and wardening infrastructure with offices located in the nearest and most-centrally located large towns (Wetterberg, 1985).

Addresses Departamento de Áreas Naturales y Vida Silvestre, Ministerio de Agricultura y Ganadería, Quito.

Additional Information Ecuador is divided into three distinct zones; the *Sierra* or uplands of the Andes consisting of high mountain ridges (and highly prized farming land with 2.57 million inhabitants; the coastal plain between the Andes and the Pacific, with 2.02 million inhabitants (25%) and a dominance of fruit plantations; and the *Oriente*, the upper Amazon basin on the east of the country, consisting of undeveloped tropical forest (3% of the population). The territory of Ecuador is divided into various categories of land use, with 10% arable land, 8% pastoral land and 52% forest land (Butland, 1977).

The principal problems affecting the protected area system in Ecuador were identified by Ponce (1981) and Wetterberg (1985). The greatest threats come from:

- a) Human settlement and colonisation in the parks and along the boundaries.
- b) Conflict between park authorities and regional development organisations.

- c) Oil exploration and the associated increased access into the hinterland.
- d) Lack of professionally and technically trained personnel.
- e) Lack of management plans for the majority of protected areas (Paucar, 1984).

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Protected Landscapes

	(hectares)
<i>Unspecified areas</i>	
Pululahua Reserva Geobotanica	3,806 *
<i>National Recreation Areas</i>	
Cajas	28,808 *
El Boliche	1,077 *

Pululahua Reserva Geobotanica

Management Category V (Protected Landscape)

Biogeographical Province 8.33.12 (North Andean)

Geographical Location The park is located to the north of Quito and adjacent to San Antonio de Pichincha (Cala cali parisj-parroquia) - Pichincha province. 00°05'N, 78°40'W ??

Ecuador

Date and History of Establishment The site was originally declared a National Park in 1966. In 1971 the law of National Parks and Reserves was passed (Decree No. 1306 of 27 August 1971) and the Pululahua Geobotanical reserve was subsequently created in February 1978. The geobotanical reserve is dedicated to the preservation of outstanding geological resources where research, education and recreation are allowed (Figueroa, 1983).

Area 3,806ha

Land Tenure No information

Altitude 1,600-3,200m

Physical Features The site consists of the slopes and crater of the extinct volcano, Mt. Pululahua.

Climate No information

Vegetation The vegetation shows marked altitudinal zonation and is characterised by poor forest cover, scrub vegetation and rough grass lands.

Fauna No information

Cultural Heritage No information

Local Human Population Within the protected area is a total of 80 families.

Visitors and Visitor Facilities The park, although close to the capital city, receives 1,000 visitors a year (Wettenberg, 1982). There were no buildings in 1982.

Scientific Research and Facilities No information

Conservation Management In 1982 there was still no management plan for the park (Wettenberg, 1982). The objectives of the reserve's management are to conserve the woods and vegetation cover in the suburbs of San Antonia de Pichincha, Calacali and surrounding towns and villages. Current plans include training of staff for at least minimal knowledge on wildland and wildlife management concepts. Their employment depends on budget allocations but even with predictions of expansion the park will be understaffed by normally accepted international criteria (Wettenberg, 1982).

Management Problems No information

Staff In 1982 there was a single guard but the projected staff for 1987 was due to be 1 professional warden (peritos forestales) and 3 guards (Wettenberg, 1982).

Budget No information

Local Administration No information

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Date August 1987

Cajas Area Nacional de Recreación

Management Category V (Protected Landscape)

Biogeographical Province 8.37.12 (South Andean)

Geographical Location The park is located in the equatorial region of western Ecuador. It is 18-22km west of the city of Cuenca (450km from the capital, Quito). The surrounding villages include Soldados and Angas in the south, Molleturo in the north and Miguir in the west (provincia del Azuay). 2°46'S, 79°12'W.

Date and History of Establishment The site was created as an Area Nacional de Recreacion under the Interministerial Act No. 203 of 6 June 1977, following Law No. 1306-IX/1971 on National Parks and equivalent reserves. A series of regulations exist controlling recreation, forest exploitation, livestock grazing and fishing as well as prohibiting hunting. The park is laid out in distinct zones depending upon scenic importance, recreational value and conservation needs (zona de uso intangible, zona de uso extensivo and zona de uso intensivo).

Area 28,808ha

Land Tenure Private and public ownership

Altitude 3,150-4,450m

Physical Features The park topography has largely resulted from extensive glaciation in the Quaternary period, when the glaciers left behind U-shaped valleys, frontal and lateral moraines, as well as numerous glacial lakes. The highest point in the park is Arquitectos (4,450m), a former volcano, but there are numerous other peaks over 4,000m such as at San Luis, Portada de Baute, Portada de Burines and Yanaurco. The rock substrate is largely volcanic in origin, consisting of lavas, andesites and pyroclasts. The area is rich in standing water with at least 232 lakes over 10ha in size. These lakes were formed from river deltas or as a series of moraine dammed river valleys, resulting in a string of boxed lakes (hence the name "Cajas" from caja or box). Such lakes include Laviuco, Ingacocha, Ingacarreteto, Mamamag, Luspa, Toreadora and Atuyacu (Loyalá, n.d.; Erazo, n.d.). The diversity of lakes represents a complete range illustrating each stage in succession from oligotrophic deep lakes, through mesotrophic and eutrophic habitats, to shallow pools and boggy depressions. Other forms of water are in abundance and there are numerous mountain torrents and small tributaries forming the Tomebamba and Yanuncay rivers.

Climate The reserve lies in the equatorial zone and exhibits a cold/humid climate. There is a recorded average of 1200mm rainfall per year and a temperature level which ranges only slightly from month to month: 3-6°C (February-May), 5-9°C (June-August) and 6-12°C (September-January). Greatest temperature changes are between night and day with extremes of 24°C and -5°C.

Vegetation The park has long been affected by man and the introduction of domestic livestock such as cattle, horses and especially sheep, yet much of the climax vegetation still survives in a relatively undamaged condition. The area has been divided into various bio-ecological zones, depending on altitude, climate and vegetational associations (Holdridge classification). These are a) the montane cloud forest zone (bosque humedo-montano) from 2,800-3,400m, b) the subalpine zone (piso subalpino) from 3,400-4,200m and c) the alpine zone (piso alpino) in the mountain peaks above 4,200m.

- a) The montane cloud forest zone consists of i) woodland dominated by *Myrtus* sp., *Weinmaria fagaroides*, *Podocarpus* sp., *Vallea* sp., *Escallonia myrtilloides*, *Alnus jurulensis*, *Solanum stellatum*, *S. pteropodum*, *Osteomeles glabrata* and *Siphalicampylus gigantus*; ii) grasslands (*Pradera*) - herbaceous communities dominated by *Alchemilla pectinata*, *Trifolium repens* and various Graminea species; iii) chaparral (chaparro), an arrested seral vegetation community dominated by scrub species (the climax woodland is

prevented from forming because of overgrazing and fire management). Representative species include *Embrotium grandiflorum*, *Lomatia oblicua*, *Ceratostema* sp., *Lorantus nitidus*, *L. piguanteus* and *Chusquea* sp.

- b) The subalpine zone consists of two main habitats, that of i) scattered woodland patches dominated principally by *Polylepis incans* and *Ginoxis* sp., associated with *Escollonia* sp., *Berberis insignis*, orchids and bromeliads, ii) steppe (pajonal) where the dominant species include tussock grass *Stipa* sp. in association with *Chuquiragua insignis*, *Senecio vaccinioides*, *Berberis* sp. and *Loricaria* (MAG, n.d.).
- c) The alpine zone is principally composed of *Stipa* sp. along with *Lericaria* sp. and *Gnaphalium* sp.

The lakeside vegetation includes *Juncus* and Cyperaceae (MAG, n.d.).

Fauna The montane cloud forest includes over 60 species of bird, including altitude Tucan (*Andigena hypoglauca*, *A. laminirostris*), owl *Bubo virginianus*, trogon *Trogon personatus*, woodpeckers and humming-birds. Representative species in the pradera savannah include *Sylvilagus brasiliensis*, *Nothoprocta curvirostris*, *Gallaria guttensis* and *Gallinago* sp., whilst the birds of the chaparral include *Columbus fasciata*, *Leptotilla verreauxi*, *Zenaida auriculata* and *Turdus* sp. At higher altitude there are condors *Vultur gryphus* and also *Phalioboenus carunculatus* and *Odocoileus virginianus*.

The lakes are rich in coot, duck and migratory birds as well as brown and rainbow trout, amphibians and water insects. Typical water birds include *Rallus* sp., *Anas discord*, *A. georgina*, *A. flavirostris*, *Larus serranus*, *Podiceps* sp. and *Penelope montagnii* (Loyala, n.d.).

Mammals of the park include tapir *Tapirus roulini*, mustelids *Mustela frenata* and *Conepatus quitensis*, also *Didelphys azarae*, *Dasyprocta variegata* and deer *Odocoileus virginianus*, *Mazama rufina* (Loyala, n.d.).

Cultural Heritage The modern town of Cuenca was founded by the Spanish in 1557. Before this date the area was variously inhabited by the old Canaris culture, which was a centre of astrology in the XV century, and subsequently conquered by the Tupac-Yupanqui Incas who established a central monarchy at Cuenca. Today in the park there are numerous archaeological ruins, including a sun-worshipping temple and the Inanan great highway of the ancient Inca. Precolonial (pre-Spanish) dwellings can be found along the Inaganan near Lake Mamamag and numerous other lakes. Near Molleturo are the ruins of Paredones, one of the most important and best preserved ruins in Azuay (Loyala, n.d.).

Local Human Population The nearby city of Cuenca has a large population (105,000 inhabitants) many of whom use the park for recreation. Local human activities continue within the park and include livestock herding (1,500 bovines, 300 equids and 800 sheep - MAG, 1978), charcoal production and trout fishing (Lake Llaviuco). There are at present no inhabitants within the park, but there are a number of small villages on the park boundary (total population 300-400 people).

Visitors and Visitor Facilities The park is of major recreational value for the native population of Ecuador, being particularly important for its magnificent scenery. The number of visitors each year averaged 5,172 in the mid-1970s of which the vast majority came from the nearby city of Cuenca (Escandon, n.d.; El Comercio, 1982). The park can be easily reached from Cuenca along numerous well-maintained roads. Information and guided tours are obtainable at the Centro de Informacion y Guardiania by Lake Toreadora (3,780m). Activities are orientated toward environmental education and outdoor pursuits such as camping, hiking, fishing and rock climbing. Visitor hiking trails have been created and signposted as circular tours around the park. Future proposals include tourist hotels, visitor centres and environmental education establishments around Lake Llaviuco (MAG, 1978).

Scientific Research and Facilities The environmental education programme in the Cajas is well developed and has been active since the mid-1970s. In the 1978-1979 season over 1,000 students from the Cuenca area high schools and universities were brought to one of the two environmental education trails that are designated in the areas of intensive recreational use. They were also given courses on park ecology and Ecuadorian conservation. Studies by CRE (Centro de Reconversión Económica) involve ecological maps, identifying areas of high soil erosion risk, and recording the climax vegetation communities. Research on the lake succession of Cajas has been undertaken by Loyala and the Facultad de Agronomía de la Universidad Católica de Cuenca (Loyala, n.d.).

Conservation Management The main management priorities for the park authorities are to maintain the Cajas area for the recreational benefit of the people of the region and the nearby cities. This is achieved through promoting recreation, environmental education activities, maintaining the social and traditional rights of the local people (such as grazing rights) and protecting and restoring the archaeological and historical remains. By-laws exist concerning the management of the park. The woods are managed and exploited commercially whilst the savannah is maintained by grazing and burning. Hunting is forbidden throughout the park.

The NRA is divided into different management and land use zones with priorities to maintain and protect the great scenic value of the park. The management zones include: a) zona de uso intangible (restricted use area), located to protect areas of biological interest from potentially damaging recreational activities. b) zona de uso extensivo (extensive use area) representing a zone of environmental investigation and education and outdoor recreational activity. Road construction, fishing and timber exploitation is permitted. This zone is largely restricted to the subalpine areas of the park. c) zona de uso intensivo (intensive use area) which corresponds to the most accessible zone in the park and is under the greatest pressure from visitors. Activities permitted in the zone include commercial wood exploitation, fishing, restricted hunting, environmental education and motoring. This zone is proposed for the development of hostels, motels, restaurants and information centres (Loyala, n.d.; MAG, 1978; UCNW, 1985).

Management Problems One of the greatest environmental problems in the park is excessive soil erosion resulting from abuse of the vegetation cover. There is timber extraction and *Stipa* burning/overgrazing. *Polylepis* sp. of the paramo is exploited for charcoal and wood is illegally gathered as fire wood or grazed, inhibiting plant regeneration. Illegal fishing is destroying the native lake fish populations.

Staff There are six permanent park guards and wardens (proposals to increase this figure to at least 15).

Budget No information

Local Administration Programa de Parques Nacionales y Vida Silvestre, Ministerio de Agricultura y Ganadería, Dirección Agropecuaria, Zona 9, Cuenca (tel: 82 3053).

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Date August 1987

El Boliche Area Nacional de Recreación

Management Category V (Protected Landscape)

Biogeographical Province 8.33.12 (Northern Andean)

Geographical Location This equatorial protected area is situated in the northern Andes between Quito (63km) and Latacunga (32km). It is found on the main Panamerican highway between the Mts. Ruminahui and Cotapaxi and is adjacent to the Cotopaxi National Park (Canton Latacunga, province Cotopaxi). 0°35'S, 59°00'W

Date and History of Establishment The site was created as an Area Nacional de Recreación on 26 July 1979 under Article Number 11 - Decree 1306 (1971).

Area 1,077ha

Land Tenure No information

Altitude up to 3,650m

Physical Features The protected area is formed on the foothills of the volcano Mt Ruminahui (4,782m) in the peaks between the valleys of Machachi and Latacunga. The volcano Ruminahui forms a triangle of peaks along with Mts Cotopaxi and Sincholagua (the Avenue of Volcanoes). The topography is essentially gently rolling countryside which rises in the north to Mt Sunfana.

Climate The area is located in the tropics and has a mean minimum temperature of 12-16°C and mean maximum of 22-25°C depending upon altitude. Rainfall averages at 3800-4800mm per year with relative humidity figures above 80%.

Vegetation The natural high altitude forests of the Andean region has largely been destroyed by man leaving vegetation dominated by bunch grasses and small shrubs. The high altitude vegetation of the area is represented by montaine wet forest and montaine rain forest with relict *Polylepis* and *Gnoxys* in a tiered canopy woodland structure around the accommodation facilities. A large proportion of the woodland consists of pine plantation. The open paramo habitat typically includes *Hyperium laricifolium*, *Brachyotum lepidifolium*, *Polylepis incana* and *Oreopanax argentata* (MAG, n.d.).

Fauna The fauna has been much reduced after centuries of human pressures. One of the major more representative mammals of the area is the llama *Llama glama* (MAG, n.d.).

Cultural Heritage No information

Local Human Population The park is situated only 65km from Quito, the capital city.

Visitors and Visitor Facilities The park receives numerous visitors, with up to 60,000 in 1981. The site is well equipped with paved roads and has dramatic mountain views, scenic woods, picnic, barbecue and camp sites along with mountain log huts (run by the Departamento de Areas Naturales y Vida Silvestre). Sports are possible on the southern fields of El Boliche and trekking is popular throughout the park. Provision of additional sports facilities is planned. There are seminar and conference facilities at the Administration Centre.

Information expositions, audio-visual displays and leaflets are available at the Casa de Administración in the north-west of the park close to the railway facilities (Anon., 1982; MAG, n.d.).

Scientific Research and Facilities The station of NASA is situated only a few kilometres from the site and can be reached by paved road. There is also the Estacion forestal de campo de Cotopaxi, research facilities and plant re-introduction pens in the extreme south of the park (MAG, n.d.; Putney, 1976).

Conservation Management The Area Nacional de Recreación El Boliche was set up expressly to preserve the natural environment and provide recreation for the population of the capital city. By 1979 the El Boliche ANR authorities were establishing management plans for:

- a) the type of recreation facilities;
- b) how the watershed and forests of the park are administered;
- c) to identify the type of information services required.

Subsequently camp sites, information/interpretation centres, visitor trails and roads were established with the aims of ensuring that people would visit for longer than just weekend trips. Forestry projects and afforestation programmes have been undertaken by the Ministerio de Agricultura y Ganaderia with priorities to control soil erosion and create future timber reserves. The first forest trees were planted in 1929 around the forestry station, with subsequent planting in 1959 at Mirador Sunfana and in 1973 along the Pan American highway. A total of between 7-8 million trees have been planted in the Cotopaxi area. Current projects include the breeding and re-introduction of llama into the wild. In the future the park authorities hope to breed vicuna from Peru and Bolivia. There are various restrictions to prevent forest fires, litter and disturbance from domestic animals (dogs are prohibited). Hunting and fishing sports are prohibited (Anon., 1982; MAG, n.d.; Putney, 1976).

Management Problems No information

Staff Warden staff are present (MAG, n.d.)

Budget No information

Local Administration Departamento de Administracion de Areas Naturales Vida Silvestre, Dirección de Desarrollo Forestal, 560 Piso Edificio del Ministerio de Agricultura y Ganaderia, Quito. Tel: 518-593.

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Date August 1987

MARTINIQUE

Area 1,079sq.km

Population 328,566 (1982)

Parks and Reserves Legislation Since 19 March 1946 the status of Martinique has been that of an Overseas Department of France, and the island is subsequently subject to the same legislation as metropolitan France. The general framework for establishing national parks is provided by Act No. 60-708 of 22 July 1960 and its enforcement order, No. 61-1195 of 31 October 1961. The Nature Conservation Act (Loi sur la protection de la nature) of 10 July 1976 applies to all aspects of conservation and the establishment of nature reserves. Subject to the owner's consent the decision to establish a reserve is issued in the form of a decree after the local authorities have been consulted (as stipulated by Decree No. 77-1298 of 25 November 1977). The approval for a nature reserve on private property is valid for a six-year period, renewable by tacit agreement.

The concept of regional natural parks was advanced in the early 1960s, their aim being to provide facilities for tourists, to preserve traditional architecture and landscapes, and stimulate local enterprises and rural development. In the Martinique regional natural park, wildlife conservation is also of importance and there are zoned areas to safeguard the differential land uses in the park. The criteria for establishment and designation of regional natural parks was set out in Decree No. 67-158 of 1 March 1967 and updated by Decree No. 75-983 of 24 October 1975. The designated protected areas of Martinique include nature reserves (réserves naturelles), regional natural parks (parcs naturels régionaux) and maritime hunting reserves (réserves de chasse maritime) all of which have been established following standard metropolitan France guidelines. Martinique is covered by CITES in its position as a French Overseas Department.

Parks and Reserves Administration and Management The Direction de la Protection de la Nature is responsible for establishing parks and reserves as well as the regulation of hunting. The parc naturel régional is managed by a board composed of representatives of the municipalities, communes and professional organisations (including the Union Régional des Associations de Protection de l'Environnement à la Martinique). The board is largely an advisory body which is unable to undertake its own management work. The Office Nationale des Forêts is actually responsible for administering major natural habitats within the protected areas. The Caravelle peninsula reserve is maintained by the "parc naturel" authorities for its nature conservation interest and protected by a local wardening system.

Addresses

- ° Parc Naturel Régional, Ancienne Caserne Bouille, Fort-de-France.
- ° Siège du Parc, Tivoli, Ancien Collège Agricole, 97200 Fort-de-France.

Additional Information The lesser Antillian island of Martinique lies within the tropical belt and is represented by 25% of the land surface as forest (Butland, 1977). The largest area under cultivation is accounted for by banana plantations and sugar cane (11,500ha) whilst fisheries and tourism are increasingly important elements of the economy (Butland, 1977; ICBP, 1987). Research in Martinique is conducted by the Délégation Régionale à l'Architecture et à l'Environnement, the Institut Scientifique et Technique des Pêches Maritime and the Institut National de la Recherche Agronomique (ICBP, 1987).

There are five non-governmental conservation groups, the Société pour l'Etude de la Protection et l'Aménagement de la Nature en Martinique, the Société des Amis du Parc, the Alliance Nature et Développement and the Association pour Nature et Environnement (ICBP, 1987).

Martinique

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Protected Landscapes

Regional Nature Parks
Martinique

(hectares)

70,150 *

Martinique Parc Naturel Régional

Management Category V (Protected Landscape)

Biogeographical Province 8.41.12 (Lesser Antillean)

Geographical Location The park is located in the lesser Antillean island of Martinique in the Caribbean. It consists of two separate zones making up 60% of the island from the north-west tip (Cap St. Martin) down to near the peninsular of the La Caravelle Nature Reserve and the main town, Fort de France. A separate extension to the park extends from the Baie de Fort de France, surrounds the village of Rivière-Salée down to the southern tip of Martinique, the Pointe de Salines. 14°36'N, 61°05'W

Date and History of Establishment Martinique is part of the French Antilles, an overseas department of France administered by mainland French laws and regulations. The site was established as a Parc Naturel Régional in 1975 following the French decree of 24 October 1975 and subsequent Ministerial Act of 24 August 1976.

Area 70,150ha (517ha in the La Caravelle Réserve naturelle, 250ha in the wetland reserve of Fort de France).

Land Tenure The montane areas are under private ownership as is most of the coastal strip. The rest of the island is essentially under public ownership.

Altitude 0-1,397m

Physical Features The park consists of the volcanic hilly and mountainous region of the island as well as coastal cliffs, beaches and reefs. The cultivated lowlands (at altitudes less than 500m) from Fort de France, Le Lamentin and the Caravelle peninsular are excluded from the park. The highest point is Montagne Pelée (1,397m) a dormant volcano (last erupted 1928) to the south of which is a volcanic escarpment of just under 1,000m. The south of the island reaches a maximum of under 300m. The rocks of the island range from labradorite, basalt and granite of recent volcanic origin to calcareous sediments of limestone as on the La Caravelle peninsular. Clays are also present along with siliceous sands and beach sands of coral origin. Much of the geomorphology derives from the Oligocene period. The tufas are of the Eocene and recent periods, whilst the calcareous material was deposited in the lower Micoene (Aquitanian period). Minerals include quartz along with quantities of zeoliths and amythyst, yellow and red jasper and rare silicified wood. The island is rich in water supplies and the Mt. Pelée, Massif du Carbet and Morne Jacob massifs are important watersheds for the entire island. Major rivers include the Lézarde with its estuary, Lamentin Baie and the river Salée,

with its source in Mt. du Vauclin (504m) in southern Martinique. Other rivers in the south are only temporary. Coral reefs exist in the Baie de Fort de France, on the south coast near Le Diamant, and on the east coast from Baie des Anglais up to the Ile de Ramville (Loup Bordelais, Garou and Caye Mitan) (Portecop, 1979).

Climate Average annual rainfall reaches a maximum in the Martinique highlands around Montagne Pelée of 7620mm dropping to 1270mm per year on the south-west. Lowest is 500mm at Ste Anne. There are fairly well defined dry seasons in the winter months. The island is within the hurricane belt and maximum rainfall occurs in September-October. Trade winds prevail and moderate the temperature which reaches 30-32°C in calm periods.

Vegetation The vegetation of Martinique is very diverse with up to seven main biotypes which have been identified (Portecop, 1979). Altitude and the degree of aridity has a marked effect upon the vegetation types. At highest altitudes, 800m and above, are cloud forests which lead down to rain forests from 800-500m. The greater proportion of Martinique was once naturally covered by "moist" forest. Coastal areas consist of dry woodland and mangrove, and in areas of low rainfall (less than 127cm/year) are cactus scrub.

The marine zone includes the vast seagrass meadows, dominated by *Thalassia testudinum*. The mangroves are of three types: a) black mangrove consisting of *Rhizophora mangle* with *Cymodocea namatorum*, *Caulerpa* sp., *Udothea* sp.; b) *Avicennia* mangrove dominated by *Avicennia nitida* and white mangrove characterised by *Conocarpus erecta* and *Laguncularia racemosa*.

The sandy littoral vegetation consists of *Ipomea pes-caprea*, *Canavalia maritima*, *Thespesia populnea* and the euphorbia *Hypomane mancinella*. The arid zone is characterised by cacti and succulents such as *Cephalocereus nobilis*, *Opuntia dilleni* and the agave *Furcraea tuberosa*.

The dry forest consists of vegetation of 20-30m in maximum height, dominated by *Tabebuia pallida*, *Elaphirum simaruba*, *Pisonia fragrans*, *Fagra martinicensis* and *Ceiba pentandra*, and an understorey of *Eugenia ligustrina* and *Randia mitis*. The herbaceous layer is very poor. At higher altitudes are forests dominated by mahogany *Swietenia mahagoni* (Fiard *et al.*, n.d.; Portecop, 1979; UNEP/IUCN, in prep.)

Fauna The marine zone is characterised by seagrass meadows and reefs, consisting of the corals *Siderastrea radians*, *S. siderea*, *Porites astreoides*, *P. divaricata*, *Manicina areolata*, *Solenastrea bournoni* and *Millepora alcicornis*. The green turtle *Chelonia mydas* and hawksbill turtle *Eretmochelys imbricata* breed on the southern shores (Carp *et al.*, 1982; UNEP/IUCN, in prep.).

In the mangrove habitats are rich faunal components, dominated by the molluscs *Crassostrea rhizophorae*, *Brachidontes recurvus*, *Isoguomon alata*, *Murex brevifons* and *Littorina angulifera*. There are also crabs *Ucides cordatus* and *Ucca rapax* (UNEP/IUCN, in prep.). The characteristic mangrove birds include *Gallinula chloropus cerceris*, *Nycticorax violacea*, *Ardea herodias adoxa*, *Coccyzus minor vincentis* and *Ictenia bonana* along with the passage (July-December) birds *Arenaria interpres morinella*, *Charadrius semipalmatus*, *Actitis macularia* and *Tringa fluvipes*. There are also lizards such as *Sphaerodactylus vicenti ronaldii* (Pinchou, 1963; IUCN, 1982).

The magnificent frigatebird *Fregata magnificens*, sooty terns *Sterna fuscata* and brown noddies *Anous stolidus* are amongst the coastal avifauna. The dry forest is characterised by the birds *Zenaida aurita aurita*, *Columbigallina passerina trochila*, *Eteania martinica* and the endemic *Ramphocinclus brachyurus*, whilst the martinique oriole *Icterus bonana* is characteristic of the humid forest zone (Pinchou, 1963; IUCN, 1982; Van Halewyn *et al.*, 1984).

Cultural Heritage Historic ruins include 17th century distilleries and colonial houses. Cock pit fighting - (fights of "cocks versus fer-de-lance snake") is still an important sport in Martinique. The original inhabitants of the island were the Arawak Indians. Today the inhabitants are of French, African and Carib origin. Many remains of the prehistoric Arawak

Martinique

period are displayed in the Musée Départemental. There is a ruined city, St Pelée, on the slopes of the volcanic Mount Pelée and at Trois Islets across the bay from Fort de France Napoleon first met Josephine (Desjeux et Desjeux, 1984).

Local Human Population The park is highly populated with up to 300 inhabitants/sq.km., and a total figure of 80,000 people living in 34 parishes (communes). The economy of the island is based on tourism, fishing, aquaculture and the banana and rum industries. Beef cattle (Brahman) are bred and grazed on the grass pastures of the northern island (Desjeux et Desjeux, 1984; UNEP/IUCN, in prep.).

Visitors and Visitor Facilities An ecomuseum for the park is housed at the Ancien Collège Agricole in Tivoli. On the island there are nine museums, including those for geology, conchology and the rum industry, as well as the Parc des Floralies des Trois-Islets with representatives of different Martinique bird species. Activities include 33 hiking trails, swimming, scuba diving, snorkelling and spear fishing. Golf, cycling and sailing are also catered for. Festivals are important highlights to the Martinique year for tourists and local people alike (Desjeux et Desjeux, 1984)..

Scientific Research and Facilities Extensive surveys have been undertaken on the marine environment. From 1983 to 1984 a major survey was carried out during the Corantilles II programme under the auspices of the Comité Régional Martinique (COREMA) de la Fédération Française d'Etudes et de Sports sous Marins.

Conservation Management Protection in the park does not extend to the marine areas but includes the wetland of the Fort de France Bay where hunting is prohibited. The park is of significant ecological interest for a diversity of ecosystems ranging from the relatively undamaged Mt Pelée tropical cloud forests to the internationally important migratory bird wetland at the Baie de Fort de France. The park is managed primarily to safeguard the natural and cultural heritage of the island, including the maintenance and development of the rural economy. The forests are protected and actively managed by the Office National des Forêts. The Caravelle peninsula reserve is maintained by the Parc Naturel authorities for its nature conservation interest and protected by a warden system (Desjeux et Desjeux, 1984; UNEP/IUCN, in prep.).

Management Problems Threats to the environment on Martinique are urban and industrial development, as well as sewage pollution (in Baie de Fort de France). The soils erode easily in deforested areas and on steep slopes and this has led to excessive siltation in the coastal areas, often harming the marine life such as the coral. The shallow lagoonal areas are excessively fished by the local people. Recent hurricanes, such as Hurricanes David and Allen, have caused damage to a variety of habitats in Martinique from coral reefs to montaine forests (UNEP/IUCN, in prep). *Tibouchina chamaecistus* (V) is being depleted through picking of its flowers in the high altitude regions of the park (ICBP, 1987).

Staff There is one game warden managing Caravelle reserve.

Budget No information

Local Administration Ancien Collège Agricole-Tivoli, BP 437, 97205 Fort de France. Tel: (19-596) 73.17.25.

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Date July 1987

PERU

Area 1,285,215.6 sq km

Population 16,000,000 (1980)

Parks and Reserves Legislation The two main laws dealing with the establishment and management of protected areas are the Decree Law No. 21147 of 5 May 1975 (Forestry and Wildlife Law) and the Supreme Decree No. 160-77-AG of 31 March 1977 (Regulations of units of conservation). The Forestry and Wildlife Law relates to the establishment of conservation "units" in Peru as public domain (Chap. 11, title 2). All units are established formally by supreme decree and signed by the President of Peru. Article No. 1 of the Law states that since the forest resources and wildlife are in the public domain, there are no acquisition rights. Indeed, in Article 20, the Law allows for expropriation of land. Infraction relative to flora and fauna is also dealt with in the Law (Chap. 1, title 6). Articles 16-19 define the four categories of conservation unit, varying from national park to hunting reserve. Conservation units or protected areas are also dealt with in the Agrarian Reform Law No. 17716 (1969) which states that national parks and forests, forest reserves and archaeological zones declared by law are not to be considered for land distribution under the reform law (reiterated in the Decree Law No. 22175, Article 54, which states that "lands declared as parks, reserves, sanctuaries, or as national or protected forests, cannot be appropriated for other purposes"). The 1977 Supreme Decree on "regulations of the units of conservation" defines the national system of conservation areas or units (SINUC) as including national parks, national reserves, national sanctuaries and historic sanctuaries. The regulations also require preparation of management plans and define protected area zonation. Additional areas which are not specified in the "national system of conservation units" are protected and designated under supreme resolution or ministerial resolution. These categories include national forests and protection forests, hunting reserves (state and private), communal reserves and fishery reserves (Wetterberg, 1985). The conservation units defined in the Forestry and Wildlife Law (No. 21147, Articles 16-19) include:

National Parks (Parques Nacionales), relatively large areas protected in their natural state for their associations of wild fauna and flora and scenic beauty.

National Reserves (Reservas Nacionales) are areas set up for the protection of wildlife "whose conservation is of national interest". The wildlife can be propagated and its products utilised by the state, or if the reserves are on agricultural or livestock land the Ministry of Agriculture can authorise the utilisation of wildlife by the landowners. Mineral exploitation is also possible within national reserves (Supreme Decree No. 069-82-AG).

National Sanctuaries (Sanctuarios Nacionales) are areas set up to protect, in a natural state, a species or a community of flora and fauna. Other types of national sanctuary include those natural or geological formations of scientific interest, as well as areas of natural landscape interest (Wetterberg, 1985).

Historical Sanctuaries (Santuarios Históricos) are areas established at historic sites to protect the natural heritage and landscape of the region. They also aim to maintain the heritage and country crafts of the local peoples and promote the area for its cultural and recreational value.

Other protected area categories relate to forestry protection or hunting, and are defined by Wetterberg (1985).

One of the earliest international conservation agreements made by Peru was ratification of the "Convention on the protection of the flora, fauna and beautiful natural scenery of American countries" signed in November 1946. Peru accepted the Convention on International Trade (CITES) on 30 December 1974 (ratified in Decree Law No. 21080 of 18 June 1975). The accords on the "Conservation of the fauna and flora of the Amazon territories" was signed with Brazil on 7 November 1975 and with Columbia on 30 March 1974. Peru also ratified the

"Convention on nature protection and wildlife preservation of the western hemisphere" in Article No. 101 of the 1979 National Constitution. Three biosphere reserves were listed and accepted by the MAB Committee in 1977 (Manu, Huascarán and Nor-oeste) and the World Heritage Convention was ratified on 24 February 1982, with one site inscribed in 1983 (Macchu Picchu) (Ponce del Prado, 1983).

Parks and Reserves Administration and Management The General Directorate of Forestry and Fauna (Dirección General Forestal y de Fauna) of the Ministry of Agriculture was originally responsible for the usual technical activities of the National Parks administration under Decree Law No. 19608 (21 November 1972), while the regional organisations of the Ministry were responsible for managing the other protected areas. Since 1981, however, the responsibility for conservation is being shared by various Government agencies (Ponce del Prado, 1983). Ultimate responsibility for conservation policy decisions still rests with the General Directorate of Forestry and Fauna, but this is supported by INFOR (Instituto Nacional Forestal y de Fauna), which has responsibility for executive management of the entire national system of conservation units. INFOR governs the general directorate of conservation which is divided into two units, that of conservation and wildlife. The conservation unit directorate is responsible for a proportion of the parks, reserves and sanctuaries (Ponce del Prado, 1983; Wetterberg, 1985). The day-to-day management of protected areas is the responsibility of the regional development agencies, which provide the necessary funding and integration with other development projects and land-use plans (Anon., 1982; Ponce del Prado, 1983; Wetterberg, 1985).

Addresses

- ° Dirección General Forestal y de Fauna, Ministerio de Agricultura, Natalio Sónchez 220 (3er. Piso), Lima
- ° Instituto Nacional Forestal y de Fauna, Lima

Additional Information Peru is divided into four regions running north-south along the country. The *Costa* is a narrow coastal plain consisting of large tracts of desert broken by fertile valleys and is rich in oil fields; the *Sierra* contains the Andes, with peaks of over 7,000m where most of the livestock is bred; the *Montaña*, fertile sub-tropical uplands which separate the Andes and the forests of eastern Peru and are largely undeveloped; the *Selva*, or Amazonian jungle in the east, which is largely undeveloped rainforest where oil exploration has been underway since 1973. Land use in Peru is roughly divided into 68% forest, 21% pastoral land and 2% arable (Butland, 1977). Threats and problems specific to the protected area system are based on a lack of public awareness of conservation. As a result, these areas are of secondary importance in government policy, and have low visitor figures (Wetterberg, 1985). The division of park administrative responsibilities makes it difficult to manage the parks effectively. For example, policy and regulatory matters are the responsibility of the General Directorate of Forestry, while financial matters and project administration are coordinated by INFOR, and the day-to-day running of the protected areas is the responsibility of the regional development corporation (Wetterberg, 1985). Other problems affecting protected areas include shortage of personnel and adequate funds. There tends to be a lack of skilled staff, but especially a lack of commitment among the professionals in charge of the units (Dourojeanni, 1985; Wetterberg, 1985). Specific threats to protected areas include mining and oil exploration, road building, pollution and reservoir construction, in addition to unlawful hunting and livestock grazing (Dourojeanni, 1985).

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Protected Landscapes

	(hectares)
<i>Historical Sanctuaries</i>	
Chacamarca	2,500 *
Pampa de Ayacucho	300 *
Subtotal	2,800

Information on a third historical sanctuary, Macchu Picchu, is also included.

Santuario Historico de Chacamarca

Management Category V (Protected Landscape)

Biogeographical Province 8.36.12 (Puna)

Geographical Location The site is situated in the Andean highlands of Junin district, immediately to the south of the city of Junin. 11°12'S, 75°58'W

Date and History of Establishment The site was created as an historical sanctuary (santuario historico) on 7 August, 1974, under the law (supreme resolution) 0750-74-AG.

Area 2,500ha

Land Tenure Property of rural communities of Chichausiri

Altitude 4,000-4,125m

Physical Features The Junin pampas which form part of the Bombon meseta are flat plains of the high Andes. The pampas of the high plateau are composed of Recent Quaternary moraine deposits of conglomerates and clays, as well as "fluvial glaciers" which fill depressions and hollows of the plateau.

Climate The mean annual temperature averages 5°C with a total mean annual rainfall of 800mm. The dry season lasts from May to September and the wet season from October to April.

Vegetation The vegetation is of the very humid tropical paramo type, with typical puna grasslands of *Calamagrostis sp.*, *Festuca sp.*, *Stipa sp.*, *Distichia muscoides*, *Plantago rigida*, *Hypochoeris sp.* and *Gentiana prostrata* (Ministry of Agriculture, 1980).

Fauna The most representative park fauna include mammals cavy *Cavia tschudii*, Colpeo's fox *Dusicyon culpaeus* and hognosed skunk *Conepatus rex*. Birds are typically represented by Andean lapwing, rufous-bellied seedsnipe, Andean tinamou, mountain vizcacha, buff-necked ibis, Puna ibis and Andean goose (*Ptilosceles resplendens*, *Attagus gayi*, *Nothoprocta pentlandii*, *Lagidium peruanum*, *Theristicus caudatus*, *Plegadis ridgwayi* and *Chloephaga melanoptera*).

Cultural Heritage The park was established to protect the scenery on the site of the historic battle of Junin and today the site is marked by an obelisc. There are numerous relicts of the ancient Pumpush culture and in the area there is also the remains of the Inca Way (Dourojeanni, 1982).

Local Human Population No information

Peru

Visitors and Visitor Facilities Visitors to the park can visit the site of the historic battle of Junin as well as hike around the area. Major tourist circuits include the Junin-Huallay-Chacamarca trail which passes by the National reserve of Junin lake as well as the sanctuaries of the Junin battlefield and of Huayllay. The park is accessible by road or by rail (Dourojeanni, 1982).

Scientific Research and Facilities All scientific work is undertaken in collaboration with the nearby Junin National Reserve authorities.

Conservation Management The authorities aim to maintain the cultural heritage (including the archaeological remains of the Pumpush culture), promote the area for its cultural and recreational value and conserve and even re-create the traditional landscape and scenery of the region, as it would have been at the time of the historic battle of Junin. Traditional activities in the park are regulated. There is no management infrastructure in the park itself. It is dependent on Junin National Reserve for all conservation work (Ministry of Agriculture, 1980).

Management Problems Traditional agriculture and cattle breeding activities are regulated by Ministry of Agriculture.

Staff No information.

Budget The site receives no official funding for nature conservation. Funding sources include the education sector and the military.

Local Administration All administration is organised by the authorities of the Junin National Reserve, Ondores Forestry District, Ondores, Junin.

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Date August 1987

Santuario Histórico Macchu Picchu

Management Category II & X (National Park and World Heritage Site)

Biogeographical Province 8.35.12 (Yungas)

Geographical Location The site is located on the highest part of the eastern highlands of the Andes, above the Rio Urubamba northwest of Cuzco (Cuzco Department). 13°10'-13°13'S, 72°33'-72°37'W

Date and History of Establishment Created as an historical sanctuary (santuario histórico) on 8 January 1981, under law (supreme resolution) DS 001-81-AA. The site was designated as a World heritage site in 1983.

Area 32,592ha

Land Tenure Private ownership (property of four main "predios": Mandorpampa, Quente, Torontay and Rita-Quente)

Altitude 1,452-3,600m

Physical Features The site lies in the Selva alta zone, and includes part of a highly dissected mountain massif of the high Andes plateau which rises steeply from the Urubamba river valley. The area around the ruins of Macchu Picchu consists of many rocky pinnacles with exposures supporting thin soils, although the area also includes sites with complex systems of old Inca terraced land constructed to conserve the soils. The Urubamba alluvial basin is an almost continuous zone of arable and pastoral farming land. Geologically the area is very complex, being a combination of marine sedimentary rocks of the Cretaceous-Tertiary period and intrusive rocks and volcanic material, including lavas and granites. The sedimentary deposits include Ordovician schists, slates and quartzites. Streams and rivers feed the major Rio Urubamba valley system as well as smaller valleys in the north such as that of Quillabamba (MAA, 1986).

Climate The annual temperature averages 16°C and the total mean annual rainfall is 1500-3000mm at low altitudes. At 2,500m altitude the average temperature drops to 10.2°C, with a total annual rainfall of 2170mm. The dry season lasts from May to September and the wet season from October to April.

Vegetation The site has been influenced by man for many centuries leading to a combination of man-made habitats, paramo grassland, *Polylepis* thickets, partially degraded virgin forest and former cultivated land which has reverted back to forest or scrub. The mountain peaks around the ruins of Macchu Picchu are typified by rocky exposures, thin soils, grasses and woody shrubs. At lower altitudes patchy woodlands predominate, their distribution very much depending upon past human interference especially during the Inca period when the form of agriculture was highly sophisticated. The vegetation rises from the dry subtropical forest along the river valleys to the very humid low montane forest. Tree genera represented in the denser woodland include mahogany *Cedrela*, *Podocarpus* (the only conifer in Peru), Lauraceae *Ocotea*, Cunoniaceae *Weinmannia*, *Nectandra* and also *Cecropia* in the Conocephaleae family. There are a number of tree ferns represented including *Cyathea* and also palms such as *Geromoina*, *Guasca* and *Riupala* (MAA, 1981). Around the rivers and streams are reeds *Phragmites*, willow and alder, while close to the ruins themselves are open grassland habitats, low shrubs and scattered thickets of *Polylepis* and bamboo (Parker *et al.*, 1982). The high altitude subalpine paramo includes many Graminae, *Festuca*, *Stipa* and *Puya* sp. such as *P. raimondii*. The mountain ridge lines are characterised by the bamboo *Gaudua* (Parker *et al.*, 1982).

Fauna Mammals include otter, dwarf brocket deer, long-tailed weasel, Pampas cat and ocelot (*Lutra longicaudis*, *Mazama chunyi*, *Mustela frenata*, *Felis colocolo* and *Felis pardalis*). One of the most threatened species found within the area is spectacled bear *Tremarctos ornatus* (Jorgenson, 1982). The bird community includes Andean condor *Vultur gryphus* and Andean cock-of-the-rock *Rupicola peruviana*. In the low altitude areas and agricultural fields are mountain caracaras *Phalco baenus megalopterus* and Andean lapwing *Vanellus resplendus*, whilst in the riverside trees are red-backed hawks *Buteo polysoma* and American kestrels *Falco sparverius*, as well as speckled teal *Anas flavirostris* and Andean gull *Larus serranus*. In the narrow stream valleys are torrent duck *Merganetta armata*, white-capped dipper *Cinclus leucocephalus* and fasciated tiger-heron *Tigrisoma lineatum*. Birds around the ruins include black-tailed trainbearer *Lesbia victoriae*, white-winged black-tyrant *Knipolegus aterrimus*, tufted tit tyrant *Anairetes alpinus*, cinereous conebill *Conirostrum cinereum*, blue-capped tanager *Thraupis cyanocephala* and rufous-collared sparrow *Zonotrichia capensis*. Also a new species of wren *Thryothorus* commonly lives in the bamboo thickets (Parker *et al.*, 1982). Snakes such as *Boa* are present and there are numerous lizards and frogs in the damper areas.

Cultural Heritage The park was established to protect the landscape of the renowned Macchu Picchu archaeological site, founded by the Inca culture. It is thought that it was a royal Inca residence and was perhaps the centre for collecting coca, a royal monopoly, from surrounding plantations. Eventually the site fell into ruin, was covered by the encroaching forest, and "lost to science" until re-discovery in 1911. There are also the remains of the Inca Way in the area, and local legends abound (including that of the spectacled bear which is supposed to serve as a messenger between the spirits of the high elevations and those of the jungle).

Peru

Local Human Population Much of the park area is settled with many small communities and farms especially on the lower slopes. The original inhabitants were skilled in irrigation works, and terraces, and drainage and irrigation canals extend long distances across irregular ground. The land tends to be settled on the grassy mountain ridges, which are maintained by fire management and grazing regimes, while the natural forests survive on the steep slopes and in more inaccessible gorges and valleys. Agriculture (maize and barley) and livestock grazing (llamas and sheep) are the dominant economies and affect a full 20,000ha of the total 32,592ha of the park. Additional local income comes from tourism associated with the Inca ruins (MAA, 1981; Peyton, 1983). The nearby city of Cuzco was the Inca capital and is today still an important town with well over 105,000 inhabitants. It is the administrative and commercial centre for a considerable part of the Urubamba basin.

Visitors and Visitor Facilities In the mid 1980s some 180,000 visitors per year visited the Inca Trail as well as to the historical sanctuary itself. The park is accessible by road or by rail from the lower valley and then bus or car to the ruins along steep mountain routes. Accommodation includes an hotel and camping facilities. A museum exists at the ruins and there are plans to develop the area further for tourism.

Scientific Research and Facilities Since 1982 research has been undertaken on the ecology of the spectacled bear in cooperation with the New York Zoological Society (Peyton, 1982). Vegetation transects have been undertaken, and over 4,500 herbarium specimens have been collected. Numerous bird studies have been made (Parker *et al.*, 1982).

Conservation Management The site was established to protect the natural heritage (flora, fauna and geological) and landscape of the region around the ancient ruins of Macchu Picchu. It also aims to maintain the cultural heritage and promote the area for its recreational value. Macchu Picchu is reported to be the most important revenue-producing park in Peru, and management is oriented to deal with heavy tourist use of certain parts of the site. Jurisdiction is divided between seven government departments. This has caused some difficulties in the past, however meetings are now underway to bring together the different agencies involved in sanctuary management. Main environmental work is undertaken by the local ministry of agriculture with main offices at Cuzco (Macchu Picchu HEP HQ), however much of the day to day management of the landscape is undertaken by the landowners themselves. The park is surrounded by intensively managed agricultural lands which are burned annually (Jorgenson, 1982). The area is important for the spectacled bear, but its habitat is reported to be insufficient for a viable population (although the site forms an important corridor between the oriental and central range populations of the bear)(Jorgenson, 1982). Jorgenson (1982) and Peyton (1982), both of whom work on bear populations, have made proposals suggesting the re-drawing of the site boundaries to divide the natural habitats from the farm land by buffer zonation. They also suggest extending the park boundaries to the Rio Santa Maria in the province of La Convencion and to the Apurimac River.

Management Problems The lack of a master/management plan, difficulties of departmental coordination, and the fact that around two-thirds of the park is under agricultural or livestock influence are serious problems facing park management. It has also been reported that there is currently insufficient control of park use by the local population. Another more specific problem is the increased tourist pressure on the Inca Way and remains, and the damage caused (Dourojeanni, 1985).

Staff No information

Budget No information

Local Administration Region Agraria IX, Cuzco, Matara 394- Cuzco Tel: 2970-63

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Date August 1987

Santuario Histórico Pampa de Ayacucho

Management Category V (Protected Landscape)

Biogeographical Province 8.36.12 (Puna)

Geographical Location The park is located in the Puna High Andes, near Quinua in the department of Ayacucho, province of Huamanga and district of Quinua (Southern Peruvian Sierra). The park is roughly triangular in shape; the eastern section consists of the Cerra Condorcunca and Curi Orcco, the park boundary then passes westwards along the river valley by the villages of Chihuacoraro and Potampampa to the Sunal monumento Quinua, just to the north-east of Quinua. 13°02'S, 74°06'W.

Date and History of Establishment The site was created as an historical sanctuary (santuario historico) on 14 August 1980 under the law (supreme resolution) DS 119-80-AA.

Area 300ha

Land Tenure State owned and property of the rural community

Altitude Altitudes range from 3,250 to 3,800m above sea level.

Physical Features The park is situated in the Peruvian highlands and consists of flat and sloping terrain of the Condorcunca hills. It is composed of Upper Tertiary Ayacucho volcanic material which was formed after late Miocene mountain folding. The eastern section of the park consists of the steep slopes of the Cerra Condorcunca and Curi Orcco massifs as well as the river Ouabredo Aborsapaio which then flows westwards along the valley south of Chihuacoraro, towards Quinua.

Climate The dry season lasts from May to September and the rainy season from October to April. Precipitation ranges from 750-1000mm per year with temperatures of 3-12°C.

Vegetation The park is typified by high altitude expanses of grasslands (paramo-altiplano). Dominant vegetation are grasses of the genera *Calamagrostis*, *Festuca* and *Stipa* (particularly *Stipa ichu*). In some areas bushes and shrubs are common, and include such species as *Plantago sp.*, *Ephedra americana*, *Trifoloum amabile* and *Alchemilla pinnata* (Dir. Gral. Forestal y de Fauna, 1981).

Peru

Fauna The fauna of Ayacucho includes many typically Andean species. Among the mammal fauna are deer *Odocoileus virginianus*, *Dusicyon culpaeus* and cat *Felis jacobita*. The rich Puna type avifauna includes Puna tinamou, spotted nothura, ornate tinamou, Andean tinamou, American kestrel, white-throated caracara, Andean lapwing, buff necked ibis and grey-breasted seedsnipe (*Tinamotis pentlandii*, *Nothura maculosa*, *Nothoprocta ornata*, *N. pentlandii*, *Falco sparverius*, *Phalcoboenus albogularis*, *Vanellus resplendens*, *Theristicus caudatus* and *Thinocorus orbignyianus*) (Dir. Gral. Forestal y de Fauna, 1981).

Cultural Heritage On 9 December 1824 there was a great battle on the Pampa de Ayacucho between the revolutionary Peruvian forces and the Spanish authorities, the result of which led to the historic "Act of capitulation" by the Europeans. Today a pyramidal monument marks the spot where the battle took place. The entire area is rich in archeological remains and includes many ruins from the pre-inca Wari period (500-1000 AD).

Local Human Population There is no major settlement within the park itself but on the limit of the reserve are the communities of Chihuacoraro and Potampampa and the town of Quinua. The local economy is partly based on livestock rearing and also rural agriculture (Ministry of Agriculture, 1980).

Visitors and Visitor Facilities The site is of particular recreational value to the inhabitants of the adjacent town of Quinua, it is also accessible from many other towns and cities via Ayacucho (road or air transport). Accommodation is available in Quinua and the main activities are based on outdoor pursuits such as hiking. Tourist trails are available and include the circuit of Ayacucho, ruins of Wari and Quinua.

Scientific Research and Facilities No information

Conservation Management The park was established to protect the natural heritage and landscape of the region where the historic battle of Ayacucho was fought. It also aims to maintain the cultural heritage and country crafts of the local peoples and promote the area for its cultural and recreational value. Traditional activities in the park are regulated. Management is primarily based on preserving the traditional landscape. Traditional agricultural and cattle breeding activities are regulated by the Ministry of Agriculture.

Management Problems No information

Staff No information

Budget The site has received no official funding for nature conservation. Funding sources include the education sector and the military.

Local Administration Dir. Gral. Forestal y de Fauna, Lima. Region Agraria, XV1-Avenida 28 de Julio No. 622, Ayacucho.

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Date August 1987

AFRICA

Outside of South Africa it is difficult to identify any area specifically set up as a protected landscape in sub-Saharan Africa, the protected areas having largely been established for their nature conservation importance, usually in areas of low population, or from where inhabitants could be moved. A few sites could be listed, including the Chimalavera Regional Nature Park of Angola, the Marsabit Nature Park of Kenya and the tourist areas of Namibia/SWA, but these remain largely unconvincing. It has also been suggested that areas such as the Ngorongoro Conservation Area of Tanzania, or the Luangwe Valley of Zambia are protected landscapes, however, we would interpret these as true multiple-use management areas. More difficult to define are the dozen or so recreation parks of Zimbabwe, where recreation in a natural setting is a major objective. Most of these areas are "artificial" to a greater or lesser extent, extensively managed, and identified by the Department of National Parks and Wild Life as multiple-use areas. In North Africa, as in sub-Saharan Africa, there is a large network of category II protected areas, yet only two identified protected landscape areas, El Kala National Park in Algeria and Toubkal National Park in Morocco. Both were originally listed by IUCN as category II sites, however following site visits they are considered to be more appropriately category V. Unlike many other large protected areas in North Africa, they have zoned areas which include significant proportions of domestic livestock grazing land, agricultural land and associated rural village communities.

ALGERIA

Area 2,381,741 sq.km

Population 21,463,500 (est. 1984)

Parks and Reserves Legislation The first conservation legislation and forestry code came into existence in 1912. Subsequently from 1923 to 1939 a series of 14 National Parks were set up by the occupying French authorities. Following independence the conservation laws and forestry regulations lapsed. In 1979 a study was instigated to establish a new legal framework intended to cover all aspects of nature conservation and the creation of parks and reserves. In 1982-83 major changes became apparent with a proposal being put forward on 5 February 1983, one on hunting passed on 21 August 1982 and one on the general management of forests passed on 23 June 1984. These would include a new statute for national park and nature reserve creation and management, on pollution control and the protection of non-domestic species. Simultaneously a new council of hunting is directed to create hunting reserves and construct a list of wild species. These measures are intended to be part of a national strategy for the conservation of fauna. One national park was established by the Ministry of Culture in 1972 (decree 72-168); the next four are governed by decrees 83-458 of July 1983 (decrees 83-459 to 83-462) in accordance with the law on the protection of the environment of 5 February 1984. The basic park statutes are set out in 83-458. The national park legislation provides for five zones in each park, zone one (integral reserve) to zone five (peripheral) where tourist installations may be built, while the basic aims are to promote nature protection, tourism and sporting activities. Nature reserves will be smaller but confer stricter protection with buildings being forbidden (MHEF, 1983; Bouzid, 1987). The World Heritage Convention was ratified on 24 June 1974 with one site being inscribed. The Wetlands Convention was acceded to on 4 November 1983 with two sites inscribed.

Parks and Reserves Administration and Management In the 1960's the Department of Water and Forests, Ministry of Agriculture and Agricultural Revolution held general responsibility for conservation. In the 1970's a Ministère de la Mise en Valeur des Terres et de la Protection de l'Environnement was established. At present overall responsibility is with the Ministère de l'Hydraulique, de l'Environnement et des Forêts (MHEF). Below the vice-Minister for MHEF there are six divisions including the Direction de la Sauvegard et de la Promotion de la Nature (DSPN). The DSPN is itself divided into 3 sections; those concerned with "Parcs nationaux et réserves naturelles", "loisirs et forêts" and "environnement". The sous-direction for the national parks and reserves is sub-divided into bureaux of "parc nationaux", "réserves naturelles" and "faune et flore en disparition". All research is undertaken by the Laboratoire d'ornithologie et d'Ecologie des Vertébrates which is part of the Institut National Agronomique. This multiplicity of organizations resulted in a recommendation in the FAO report of 1979 (TCP/ALG/6703) for a protocol to ensure coordination between these bodies. Each national park has its own budget. The Director is appointed directly by the Minister and has powers of independent action. The aims of the legislation and administration of protected areas is to continue the conservation of native flora and fauna within a framework of a national conservation network and the consolidation of existing protected establishments (namely national parks, regional parks, nature reserves and hunting reserves). The FAO report recommended an ecosystems inventory and the construction of a protected areas list as part of a national plan for a protected areas system (Drucker, 1987).

Addresses

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- ° Departement de recherche en ecologie forestière et environnement, INRF, BO37, Cheraga, Alger.
- ° Laboratoire d'ornithologie et d'ecologie des vertébrates, INA, El Harrach.

Algeria

Additional Information Northern Algeria has been densely populated ever since Roman times but the south until recently has remained unexplored. The result was that the coastal areas have been intensively managed for 2,000 years, but the mountain forests and areas in the Sahara desert remained relatively undamaged until comparatively recently. The northern part of the country is represented by a mediterranean flora and fauna over to the southern foothills of the Atlas mountain ranges which run east-west parallel to the distant Mediterranean coast. To the south of the mountain and Haut plateau is steppe-land which quickly runs into the Sahara desert. An outlier of mediterranean vegetation survives on the Hoggar mountains in the extreme south of the country. The greatest habitat losses in recent years have been through the felling and burning of extensive forests and also from the conversion of grazing land, especially Atlas steppe, to arable land. Management of the reserves and parks appears to be very effective and well controlled. Their protection is often enhanced by being surrounded and enclosed by fences. The new National Park at El Kala is perhaps the one exception since much of its lakes are under threat from drainage (Drucker, 1987).

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Protected Landscapes

(hectares)

National Parks
El Kala

76,438 *

El Kala National Park

Management Category II (Parc national) (RAMSAR convention sites: lacs Oubeira (2,400ha) and Tonga (600ha))

Biogeographical Province 2.17.06 (Mediterranean Sclerophyll)

Geographical Location The parc national of El Kala is situated in the north-east of Algeria along the Mediterranean coast and over to the Tunisian border. It is found in the wilaya (district) of El Tarf. Situated near the village of El Kala which is approximately 5-6km to the west. The park is limited in the west by the Cap Rosa, in the east by the Cap Mézira. In the south-west it is limited by the track RW 109 from El Mélah to the lighthouse of Cap Rosa. From the lighthouse, the track leads to the Oued-er-Rekibat; the southern limit of the park passes along the Oued towards the east including the forest of alder which borders the river. The limit crosses the lac then leads in the direction SW-NE to the Cap Mézira. The park covers 40km of coast line from the Cap Rose to Cap Roux. The parks includes the integral reserves naturelles of the réserve d'Oubeira, réserve cynégétique du Tonga, parc cynégétique du Mélah (Bougazelli *et al.*, 1976). 36°54'N, 08°27'E.

Date and History of Establishment Total legal protection. Establishment decree nr. 83.462 of 23 July 1983. The site was originally called the Réserve de la Calle (Dupuy, 1972). Legislation is primarily concerned with nature conservation, recreation and protection of the traditional landscape of the area. Oubeira and Tonga have been designated under the Ramsar Convention.

Area 76,438ha. Tonga (2,392ha), Oubeira (2,974ha) and Mélah (824ha)

Land Tenure State owned and farmland under private ownership

Altitude 0-1,202m

Physical Features The park lies in the plain below the great tellian Atlas, with similar geology to the Atlas itself. The bedrock consists of an alternation of sandstones and clays of the Tertiary and Quaternary eras. The Tertiary deposits are of mid Eocene origin and are 300m thick. They are composed of green and brown clays, schists and small banks of sandstones. The Quaternary deposits are largely the result of Oued (river) deposits. They are composed of muds, sands and pebbles. The pedology - soils tend to be podsolized originally from sandstones and numidian clays upon which rich vegetation thrives. The sandstones are covered by humus of 10-12cm (Mezali, 1985). The coastal dunes date from the Quaternary period. The topography is characterised by a low gentle relief with a maximum altitude of 100m. The sections near the Tunisian frontier rise to 1,200m. The Baie de Annaba is bordered by a long beach with dunes which extends from the mouth of the Seybouse to Cap Rosa. There are dunes, up to 177m, extending from the sea to between Lake Mélah and Lake Oubeira and over to the town of El Kala. Numidian sandstone attains a height of 258m at Kef Trebiche. Each of the marshes and lakes are situated in shallow basins, overlooked by woodclad hills. A well developed coastal dune system is present between the coast and the lakes. The lakes Oubeira and Tonga are closed freshwater basins (0.5-1m average depth) with abundant vegetation and little open water; Lake Mélah is a salt-water lagoon connected with the sea. There are many other smaller lakes and marshes which represent a haven for winter migrating birds. The principal rivers are Oued El-Arouh and Oued Mélah.

Algeria

Climate The climate of mediterranean bioclimatic sub-humid to humid. Average annual temperature 15°C, with a mean minimum for the coldest month of -2.0°C, mean maximum temperature for the hottest month is 49.4°C. The average annual precipitation ranges from 879mm-1191mm (Mezali, 1985). Snow occurs in winter at higher altitudes.

Vegetation The protected area covers a large wetland complex together with a woodland complex (the latter represents 71.4% of the park - Mezali, 1985). The marine area includes rich sea grass *Posidonia oceanica* beds. There are two littoral pine forest associations: aleppo pine forest and a mixed pine forest of aleppo and maritime pines. There are 7-8 wooded vegetation communities (Ganssen, 1958). These include cork oak, deciduous oak, holm oak, garigue oak and maritime pine (*Quercus suber*, *Q. faginea*, *Q. ilex*, *Q. coccifera* and *Pinus maritima*). There are also oleo/lenticis, riverine and alder carr habitats. The most important woodland community, however, is the *Quercus ruber* series which is found between 400-900m on the exposed north and north-east slopes. It covers a total area of 34,200ha with an understorey of *Erica scoparia*, *E. cinerea* and some young *Quercus suber* (a unique assemblage in Algeria; found at Oued en Nahl near Cap Rosa) (Bougazelli et al., 1976). *Quercus faginea* is restricted with *Pteridium aquilinum* to Djebel Dyr, Gourrah and Nehed where the altitude is over 900m. *Quercus ilex*, the main shrub series in this degraded habitat, where trees reach a height of 6-8m, include *Genista tricuspidata*, *Pteridium aquilinum* and *Erica arborea*. The main ground species are *Coronilla valentina*, *Viola sylvestris* *Phlomis bovie* (IUCN/CMC, 1987). *Quercus coccifera*, is a shrub of 1-2m, found in very degraded and exposed habitats. It is found on the littoral coast between Cap Rosa, El Kala and Cap Roux. Maritime pine is found on the coast of El Kala, to the north of Lake Mèlah, El Tarf, and it is unique in north-eastern Algeria. Species include pine *Pinus halepensis*, juniper *Juniperus phoenicea*, *Daphne gnidium*, *Jasminum fruticosum*, *Genista aspalathoides* and *Rhamnus alaternus*. The beach vegetation is characterised by *Agropyron junceum*, *Euphorbia peplis*, *Salsola kali*, *Cakile aegyptiaca*, *Ipomaea stolonifera* and *Calystegia soldanella*. The aquatic vegetation mainly consists of *Phragmites*, *Scirpus* and *Typha*. The submerged vegetation is dominated by *Potamogeton* sp., in the eutrophic Lake Oubeira and by *Ruppia spiralis* in the salty Lake Mèlah. The transition lake and terrestrial vegetation consists of alder *Alnus glutinosa*, with islets of willow *Salix alba* and *S. cinerea*. In patches of deep water under the alders are shrubs such as *Laurus nobilis*, and climbers *Hedera helix* and *Vitis vinifera* as well as numerous ferns *Osmunda regalis*, *Dryopteris thelypteris*, the threatened *D. gongyloides*, *Athyrium felix-femina* and on the trees *Asplenium obovatum* (Thomas, 1973 cited in Bougazelli, 1976). The rocky coast vegetation includes *Inula clihmoides*, *Anthemis maritima*, *Calendula suffruticosa*, *Criethnum maritimum*, *Daucus carota* ssp. *aristidis*, *Elichrysum stoeches* ssp. *rupestre*, *Armeria mauritanica*, *arborescens*, *Anthyllis barva-jovis*, and *Thymelaea hirsuta* on the summits of the cliffs (IUCN/CMC, 1987).

Fauna The supra-littoral zone is rich in *Chthamalus stellatus* and *Littorina neritoides* which is often succeeded in the marine zone by encrusting algae such as *Lithophyllum tortuosum* and also *Mytilus africanum* and *Corallium rubrum* (IUCN/CMC, 1987). Inter-tidal species include *Pachygrapsus marmoratus*, *Actinia equina*, *Erophia spirifrous* and *Masthasterias glacialis*. Lake fauna includes *Carcinus moenas*, *Cardium edule*, *Palcemonetes varians occidentalis*, *Gammarus locusta* and *Halorchestia deshayesci* on the banks of the saline Lake Mèlah (Bougazelli et al, 1976). Birds at the park include along the coast *Alca torda*, *Fratrercula arctica*, *Hydrobates pelagicus* and *Phalacrocorax carbo* (MHEF, 1985). In the cork woods and scrub by the lakes around El Kala are *Columba palumbus*, *Streptopelis turtur*, *Milvus nigrans*, *Picus veridis*, *Dendrocopus major*, *D. minor*, *Jynx torquilla*, *Cettia cetti*, *Sylvia atricapilla*, *S. borin*, *Phylloscopus bonelli* and *Serinus serinus* (Chalabi et al., 1984; IUCN/CMC, 1987). The El Kala waterfowl, include *Anas penelope*, *Aythya ferina* (up to 9,000), *A. fuligula* (12,000), *Fulica atra* (35,000), *Tachybaptus ruficollis* and *Podiceps cristatus*. Other species include the rare *Oxyura leucocephala* and *Porphyrio porphyrio* (Lake Tonga). In winter there are many diving ducks at Lake Oubeira which is rich in aquatic plants. Lake Mèlah has a population of *Aythya fuligula* rare in the rest of North Africa. Birds tend to spend the day at Lake Mèlah and the night on Lake Oubeira (Skinner and Smart, 1984; Ledant et al., 1985; IUCN/CMC, 1987). Mammals include wild boar *Sus scrofa*, otter *Lutra lutra*, and scarce species including caracal *Felis caracal* and barbery stag *Cervus elaphus barbarus* (the latter inhabiting the forest south of Lake Mèlah). The mediterranean monk

seal *Monachus monachus* is occasionally found in inaccessible sea caves and below between the mouth of the River Mafrag, near Annaba and the Cap Roux (Mezali, 1985; Bouzali *et al.*, 1976; IUCN/CMC, 1987).

Cultural Heritage Several pre-historic and historic sites are found in the littoral zone such as neolithic remains, Roman ruins and ruins of a French garrison of the 16th century, when there was much exploitation of the red coral beds. As recent as the late 18th century Abbé Poirer recorded the barbary leopard and lion in the area of Vieux Calle and Lake Mélah (Bougazellui *et al.*, 1976). In 1679 up to 400 people died in one year at Vieille Calle from malaria (IUCN/CMC, 1987).

Local Human Population Numerous villages and hamlets are scattered throughout the park. There is an estimated 100,000 residents in the town of El Kala and El Tarf village (IUCN/CMC, 1987). The local economy is based on cereal crops, fruit orchards, livestock herding and small scale industry.

Visitors and Visitor Facilities There are estimates of 50,000-100,000 visitors each summer. The main centre for visiting the park is at El Kala town where there are hotels, simple accommodation, camp sites, restaurants and banking facilities. Educational activities include nature trails and exhibits (IUCN/CMC, 1987).

Scientific Research and Facilities A major feasibility study was carried out in 1976 by Bougazelli *et al.*, (1976). Research facilities include a climatological station, field research station and experimental sites such as an arboretum. Waterfowl counts have been carried out since 1967, by IWRB, the Station Biologique de Tour du Valat, Camargue and the Institut National Agronomique, El Harrach near Alger. There are proposals to extend the park over the border into the neighbouring Tunisian Tabarka woodland and to include a marine reserve area where the monk seal may be present (IUCN/CMC, 1987).

Conservation Management The park was established to protect the unique wetland complexes and their associated fauna, flora, hydrology and monuments (prehistoric and historic sites) along with the traditional lifestyles of the region. The assemblage of these humid zones are of international importance for rare breeding birds as well as wintering and resting palaearctic migratory species. The El Kala complex is recognised as one of the top three most important wetlands in the Mediterranean. Lakes Oubeira, Tonga and Mélah are each Grade I in the Morgan listing (Morgan, 1982) and certainly the most important area for waterfowl in Algeria. Lake Tonga is most important for its number and diversity of nesting birds (including 7 species of heron, it is also the most important nesting area of aquatic birds in the eastern Mediterranean. It includes a number of internationally rare bird species such as *Oxyura leucocephala*, *Anas angustirostris* and *Porphyrio porphyrio*. Other important rare bird species at El Kala include *Ardeola ralloides*, *Marmaronetta angustirostris* (only c1,000 pairs left in the world), *Aythya nyroca* and *Tachybaptus rufficollis* (Ledant et Jacob, 1982). In the El Kala area there are a number of endemic Mediterranean and localised Algerian bird species and sub-species such as *Puffinus puffinus yekouan*, *Phalacrocorax aristotelis demarestii* and *Porphyrio porphyrio porphyrio* (Ledant et Jacob, 1982). El Kala is also of major importance for acting as a refuge for some of the last Barbary stag left in North Africa. There are a number of nationally rare plants at El Kala, including *Polygonum senegalense* and *Paspalidium obtusifolium* at Lake Oubeira, *Spartina batens*, *Lemna trisulca*, *Nymphaea alba*, *Nuphar lutea*, *Ranunculus flammula*, *Cardamine parviflora* and *Trapa bispinosa* at Lake Tonga. Outside the bounds the rocky coast and sandy marine base have been recommended for inclusion within the park due to their rich mediterranean biocenosis; important *Corallium rubrum* formations, large *Posidonia oceanica* meadows and the presence of monk seals. The Nicha rirhia alder carr (between the route of Righia and the Lac des Oiseaux) at approximately 800m across is one of the largest and least damaged of such habitats in North Africa. It contains many rare humidity seeking species such as abundant *Osmundo regalis*. It has been recommended for total protection (Chelabi *et al.*, 1984). The exploitation of natural resources is controlled. Hunting is prohibited (red coral is now protected from exploitation). A Management plan has been prepared by University College, London (1986). The park authorities control human activities such as agriculture and aquaculture - fishing, forestry and grazing which all currently take place in the area (IUCN/CMC, 1987).

Algeria

Management Problems In the past the independence wars of the 1950s and 1960s led to frequent fires and poaching of wildlife; the Barbary deer was almost exterminated. Currently the ensemble of these humid biotopes is menaced through drainage projects and agriculture. The principal environmental problems are the degradation of the forests due to grazing and fire, shooting pressure on the lakeshore, wetland drainage and dredging. Several attempts to drain the wetland area were unsuccessfully initiated in the past but high risks remain with the newly proposed water resources scheme in El Kala region. Insufficient equipment and untrained personnel represent the main management problems (Skinner and Smart, 1984). There are also threats to the unprotected Garaet el Mekhada, a large *Scirpus* marsh which is situated just outside the national park although it represents an integral part of the area. There are proposals to build a dam (mexenna) on the Oued el Kebir to be sited in the park. Lake Oubeira could be used as a "balancing" lake for the dammed water (Mezali, 1985; IUCN/CMC, 1987).

Staff 30 people (5 administrative, 20 wardens, 2 researchers and 3 technicians)(IUCN/CMC, 1987).

Budget The annual budget is 1,400,000 Algerian Dinars, provided by the Government (IUCN/CMC, 1987).

Local Administration Direction du parc national d'El Kala, BP73, El Kala, wilaya d'el Tarf.

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Date August 1987

ZIMBABWE

Area 389,361 sq.km

Population 7,500,000 (1982)

Parks and Reserves Legislation The Parks and Wild Life Act 1975 (amended 1 January 1982) provides for establishment of National Parks (Part II), Safari Areas (Part V), Recreational Parks (Part VI), Sanctuaries (Part IV) and Botanical Reserves and Gardens (Part III). Use of these areas is covered in the Parks and Wild Life (General) Regulations, Statutory Instrument 900 of 1981. The various areas combine to form the Parks and Wild Life Estate. The Act and Regulations outline general procedure and are further refined by Area Policy Documents approved by the Minister on the recommendation of an advisory Parks and Wild Life Board. These documents describe the key objectives for an area or group of areas, application of these objectives and the legislation, an outline plan, and preparation for management and development plans. National Parks are established to protect landscapes, conserve ecosystems and their elements (with particular emphasis on large mammals and their habitats), and to protect important sites for research, education and their intrinsic aesthetic value. They normally consist of one or more of the following zones: Special Conservation Area (usually small and designed to protect especially sensitive biological features, or for defined research, with access strictly controlled), Wilderness Area (with visitor access strictly controlled, and a level of development which depends on local conditions), Wild Area (with greater visitor access and improved access roads), and Development Area (containing staff and visitor facilities with permanent or seasonal accommodation). Controlled sport hunting is permitted in Safari Areas, and wild populations may be harvested or otherwise used providing that this is not in conflict with species/ecosystem conservation or with the wilderness qualities or future resource values of the area. Recreation Parks are established to preserve and protect the natural features they contain for the enjoyment, long-term benefit, cultural inspiration and recreation of the people of Zimbabwe and visitors. A number of parks and reserves are a part of the estate of the late Cecil John Rhodes and as such are also covered by the terms of the Rhodes Estates Act of 1978.

Parks and Reserves Administration The Department of National Parks and Wild Life Management, within the Ministry of Natural Resources and Tourism, is responsible for management, administration and development of the protected areas system. The Department is a scientifically based and ecologically orientated land use agency with a special responsibility to ensure the proper conservation and use of the nation's parks and wildlife resources. Its key objectives include the administration and management of the Estate, which covers the protection of landscapes of special quality, the conservation of representative samples of natural ecosystems, and all organisms indigenous to Zimbabwe, and to conserve and manage natural and semi-natural areas for a range of outdoor recreational pursuits, for the long-term benefit, enjoyment and cultural inspiration of the citizens of this country and their visitors. These responsibilities and objectives are accomplished by protecting and managing the Estate, research and development of appropriate land management practices inside and adjacent these areas, promoting public awareness in all sectors of society of the values of this Estate, promoting appropriate uses of the Estate, providing an appropriate administration and the training and development of staff to facilitate and support these functions and to encourage a rationalised and appropriate industry based on the Estate.

Address

- ° Department of National Parks and Wild Life Management, PO Box 8365, Causeway, Harare.
- ° Forestry Commission, PO Box 8111, Causeway, Harare.

Additional Information To try and encourage appreciation of protected areas by local populations, the Department of National Parks and Wild Life introduced the buffer zone concept in 1960. In addition, park values that can be appreciated by neighbouring rural communities are nurtured by the government. Considerable emphasis is placed on the role of protected areas in raising rural living standards and generating material revenue through domestic and foreign tourism and utilization of wildlife (Child, 1984a). Where overt action in

a national park is determined by ecological considerations, useful products are disposed of to local people, or to the best advantage for revenue e.g. "Operation Windfall" (1980-1), where elephants in certain regions had degraded the habitat to such an extent that an elephant cull was deemed necessary. The best possible use of products was arranged, as well as considerable research studies (Child, 1984c).

Outside the protected areas there are efforts in various parts of the country to develop more rational land-use policies in inhabited regions. For example in the area just south of the Kariba valley there are currently plans to identify the better soils for arable farming, leaving much of the poorer land for wildlife (which will be managed so that local people benefit). This strategy and others like it will certainly help to ensure the long-term survival of Zimbabwe's wildlife (de Toit 1985). However, realisation of such plans brings a number of problems in terms of land-use and resource utilisation, as well as sociological issues (Department of National Parks and Wildlife Management, 1984).

Beef exports to the EEC are threatening the buffalo population as EEC regulations stipulate that an exporting country must be free of foot-and-mouth disease. Beef is an important source of foreign exchange. The Zimbabwe government has allowed over 1,000 buffalo to be killed and a system of fences, vaccination zones and buffer zones constructed around Hwange and Gonarezhou National Parks. Buffalo are to be eradicated from the other zones, although about 100 have been vaccinated. Ironically these areas are better suited to multi-species ranching, as cattle grazing will cause deterioration of these areas which may need restocking with buffalo in the future (Pitman, 1985).

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Protected Landscapes

	(hectares)
<i>Recreation Parks</i>	
Bangala	2,800
Lake Kariba	283,000
Lake Kyle	18,000
Lake Robertson	8,100
Manjirenji	3,500
Matobo (Matapos)	2,900
McIlwaine	55,000

Ngezi	5,800
Sebakwe	2,700
Subtotal	381,800

Not all of these areas can be classified as protected landscapes, and for most the Department of National Parks and Wild Life Management recommended classification as Multiple Use Management Areas.

Lake Kariba Recreational Park

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Geographical Location On the north-west border with Zambia in Mashonaland, North/Matabeleland North Province. It excludes the waters contained in Matusadona National Park. 16°30'-18°00'S, 27°-29°05'E.

Date and History of Establishment 1979

Area 283,000ha. Contiguous to Matusadona National Park (137,000ha)

Land Tenure No information

Altitude 482m

Physical Features Kariba is a man-made lake resulting from the damming of the Zambezi River at Kariba in 1958. The water covers 518,000ha of what was once the Gwembe trough. The lake has currents and sudden storms. The rivers Mlibizi, Zambezi, Sanyati, Ume, and Sebungwe still flow through it.

Vegetation 100,000ha of forest were cleared prior to flooding. Explosive growth of the exotic floating fern *Salvinia molesta* on the lakeshore acted as a stabiliser. The fern once covered 15% of the lake surface but has now declined to under 2%. Emergent vegetation is not particularly well developed, apart from extensive beds of torpedo grass *Panicum repens* which provide valuable grazing for fish when submerged, and for ungulates when exposed. The phytoplankton of the lake is currently under investigation.

Fauna Lake birds include egrets: *Egretta* spp., kingfishers (Alcedinidae), little bee-eater *Merops pusillus*, black-collared barbet *Lybius torquatus*, fish eagle *Haliaeetus vocifer*, and herons such as Goliath heron *Ardea goliath*. The lake is not particularly productive, but 42 fish species are known to exist including bream *Tilapia* sp., vundu *Heterobranchus longifilis*, Hunyani salmon *Labeo altivelis*, kupa *Distichodus mossambicus*, chessa *Distichodus schenga*, bottlenose *Mormyrus longirostris*, and cornish Jack *Mormyrops deliciosus*. Tigerfish *Hydrocynus vittatus* are a popular sporting species. The Tanganyika sardine *Limnothrissa miodon* has been introduced and is prospering in the vacant lacustrine habitat. The future survival of eels is uncertain. The lake is rich in crocodile *Crocodylus* sp..

Visitors and Visitor Facilities The lake is a popular tourist destination served by the town of Kariba. Facilities include lodges, campsites, walking and canoe trails, watersports, boat hire, and various safaris.

Scientific Research and Facilities Lake Kariba Fisheries Research Institute at Kariba provides a monitoring service and has undertaken extensive research into characteristics of the lake, biology and fishing gear. The Institute is part of the Department of National Parks and Wild Life Management. The University of Zimbabwe and the University of Witwatersrand jointly sponsor the Nuffield Research Institute, which is concerned with fundamental research on the lake.

Zimbabwe

Conservation Management There is a park policy document which promotes the development of a productive, sustained and efficient commercial fishery and the proper utilisation of other biological resources. Particular activities may be precluded from certain areas of the lake; commercial fishing is prohibited in major river estuaries.

Management Problems Minimal, but include poaching and danger from pollution of rivers flowing into the lake.

Staff Warden and ranger with support staff at Kariba assisted by wardens at Matusadona, Bumi Hills and Binga and ranger and staff at Chete. The Kariba Institute has a staff of four ecologists, a senior technician, a technician, and support staff.

Budget No information

Local Administration Warden at Kariba.

References There are many departmental reports, scientific papers, and theses covering the formation of the lake and its effects on terrestrial animals; physical characteristics of the habitats; the biology of important organisms including fish and clam species; and productivity.

Date 1983

Lake Kyle Recreational Park

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Geographical Location 32km south-east of Masvingo (formerly Fort Victoria) in Masvingo Province, eastern Zimbabwe. 20°15'S, 31°10'E.

Date and History of Establishment 1963

Area 18,000ha including 9,105ha water

Land Tenure No information

Altitude 1,200m

Physical Features Lake Kyle is an artificial lake constructed to provide water for the vast irrigation schemes of the lowveld. It is located at the confluence of the Mshagashe and Mtilikwe Rivers. The park is bounded on three sides by tributaries of the Mtilikwe.

Vegetation The grassy plains are interrupted by densely wooded ravines.

Fauna Many mammals have been reintroduced including: white rhinoceros, giraffe, buffalo,gnu, greater kudu, nyala, bushbuck, eland, reedbuck, impala, sable antelope, zebra, oribi, duiker, steenbuck, hippopotamus, warthog, and Lichtenstein's hartebeest (*Ceratotherium simum*, *Giraffa camelopardalis*, *Syncerus caffer*, *Connochaetes gnou*, *Tragelaphus strepsiceros*, *Tragelaphus angasi*, *Tragelaphus scriptus*, *Taurotragus oryx*, *Redunca arundinum*, *Aepyceros melampus*, *Hippotragus niger*, *Equus burchelli*, *Ourebia ourebi*, *Cephalophus* sp., *Raphicerus campestris*, *Hippopotamus amphibius*, *Phacochoerus aethiopicus* and *Alcelaphus lichtensteini*). Birds include ostrich *Struthio camelus*. Crocodiles *Crocodylus* sp. are present. Fish include black bass *Micropterus salmoides*, bream *Tilapia* spp., yellowfish *Barbus marequensis*, and bottlenose *Mormyrus longirostris*.

Visitors and Visitor Facilities There are many visitors because of high quality gameviewing. Facilities include caravan and campsites, four hotels on the lakeshore, pony trails, and water-sports. The lake is renowned for bass fishing.

Scientific Research and Facilities No information

Conservation Management The 7,600ha Game Park has been established on the northern lakeshore. A game fence restricts the movement of larger ungulates. Commercial fishing is permitted.

Management Problems No information

Staff No information

Budget No information

Local Administration The Warden, Lake Kyle Recreational Park, P Bag 9136, Masvingo.

References

- ° Readers Digest, (1983). *Game Parks and Nature Reserves of Southern Africa*. Cape Town, South Africa.
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Date 1983

Robert McIlwaine Recreational Park

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Geographical Location On the shores of Lake MacIlwaine about 30km south-west of Harare in Mashonaland South Province. 17°55'S, 30°50'E.

Date and History of Establishment Originally established as Robert McIlwaine National Park.

Area 55,000ha including 30,000ha water and contiguous with Lake Robertson Recreational Park (8,100ha).

Land Tenure Some areas on the north lakeshore are leased out, but remain under the control of the Parks and Wild Life Department. These may in future become freehold, while still remaining part of the park.

Altitude 1,300m

Physical Features The park is located on a 14.5km long lake created by a dam across the Hunyani River, where it flows through a ridge of ironstone hills which form the northern boundary. The lake supplies water to Harare. Fairly uniform topography with scattered granite kopjes and dolerite dyke intrusions. Soils are generally sandy. Water temperatures range from 14 to 27°C and the lake stratifies in summer.

Vegetation The typical Mashonaland highveld has four main plant communities. The woodland area is dominated by *Brachystegia* with msasa and mnondo wooded communities associated with the granite kopjes and numerous termitaria. The remaining area is mainly vlei grassland varying from generally dry to marshy. Heavy msasa scrub in the Game Park is affecting the grass cover. It is proposed to introduce a number of indigenous trees to the area,

Zimbabwe

including *Acacia* species. Msasa veld is retained in its natural state in certain parts of the park and does not occur in other conservation areas in Zimbabwe. Dense algal blooms occur in the lake.

Fauna The Game Park contains: reedbuck, steenbuck, duiker, sable antelope, leopard, olive baboon and other monkeys, buffalo, oribi, and warthog (*Redunca arundinum*, *Raphicerus campestris*, *Sylvicapra grimmia*, *Hippotragus niger*, *Panthera pardus* (T) *Papio sp.*, *Syncerus caffer*, *Ourebia ourebi* and *Phacochoerus aethiopicus*). Introduced mammals include: giraffe, zebra, greater kudu, eland, blue wildebeest, impala, waterbuck and tsessebe (*Giraffa camelopardalis*, *Equus burchelli*, *Tragelaphus strepsiceros*, *Taurotragus oryx*, *Connochaetes taurinus*, *Aepyceros melampus*, *Kobus ellipsiprymnus* and *Damaliscus lunatus*), some of which have become well established. Crocodile are present. The 250 bird species include: ostrich *Struthio camelus* in the scrub; fork-tailed drongo *Dicrurus adsimilis*, northern grey tit *Parus griseiventris*, spotted creeper *Salpornis spilonotus*, blue-eared glossy starling *Lamprotornis chalybaeus*, white-throated robin chat *Cossypha humeralis* and Mashona fly-catcher *Hyltiota australis* in the *Brachyshegia* woodland; and darters *Anhinga rufa*, cormorant *Phalacrocorax sp.*, herons, egrets and ducks on the lake. At least 23 fish species have been recorded in the lake including: bream *Tilapia spp.*, yellowfish *Hydrocynus vittatus*, barbel *Clarias gariepinus*, tigerfish *Hydrocynus vittatus* and Hunyani salmon *Labeo altivelis*.

Cultural Heritage Many Bushman paintings have been found in the area.

Visitors and Visitor Facilities Lake McIlwaine is Harare's premier recreation park and tourism is encouraged with game viewing, water-sport facilities, tennis and croquet lawns, swimming pools, chalets, lodges, and caravan and campsites. Good sport fishing for tigerfish, bream, yellowfish, barbel and Hunyani salmon. Bilharzia and crocodile discourage swimming.

Scientific Research and Facilities An ornithologist is stationed permanently in the park studying, in particular, *Quelea* control, waterfowl and pesticide build-up in eggs of long-crested eagle *Lophaetus occipitalis*. The Zimbabwean Ornithological Society carries out ringing, feeding studies, and observations in the area. Fish research concentrates on production and management of sport fish stocks. There are research stations in the park managed by the Parks and Wild Life Department with facilities including accommodation and laboratories. University field base for fish research.

Conservation Management There is a park policy document. There have been game introductions and programmes to control water hyacinth. Most of the southern lakeshore is managed as a Game Park (1,600ha), though it is essentially an artificial park. A bird sanctuary is proposed on the northern lakeshore in an area containing a wide variety of natural and man-made habitats. The remainder of the north bank is set aside for visitor facilities.

Management Problems Tourist pressure is very high and this has some deleterious effects on the natural value of the area. Control of water-hyacinth in the lake is necessary and there have been problems of water pollution. Fish poaching is common.

Staff No information

Budget No information

Local Administration The Warden, Lake McIlwaine, P Bag 962, Norton.

References None listed

Date 1983

Sebakwe Recreational Park

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Geographical Location 54km east of Kwekwe in central Zimbabwe. 19°00'S, 30°10'E.

Date and History of Establishment 1969

Area 2,700ha including Great Dyke Reservoir 1,518ha.

Land Tenure No information

Altitude No information

Physical Features Spectacular cliff scenery. The park includes the artificial Great Dyke Reservoir.

Vegetation Lies within the drier Zambebian Miombo woodland zone and is dominated by *Brachystegia* spp., and *Julbernardia globiflora*. Flora within the Botanical Reserves includes *Acacia karroo* and mountain acacia *Brachystegia glaucescens*.

Fauna The migratory game population includes sable antelope *Hippotragus niger*, impala *Aepyceros melampus*, and greater kudu *Tragelaphus strepsiceros*. Reservoir fish include tiger fish *Hydrocynus vittatus* and bream *Tilapia* spp..

Visitors and Visitor Facilities Year-round coarse fishing on the dam is the main tourist attraction. Also yachting, and game-viewing on foot.

Scientific Research and Facilities No information

Conservation Management No information

Management Problems No information

Staff No information

Budget No information

Local Administration The Senior Ranger, PO Box 636, Kwekwe.

References

- ° Readers Digest, (1983). *Game Parks and Nature Reserves of Southern Africa*. Cape Town, South Africa.

Date 1983

PACIFIC

In the islands of the South Pacific there are a number of sites. Eaton identifying protected landscapes in New Caledonia and Tonga. However, his review is to some extent contradictory and our information suggests that sites in Fiji, Western Samoa and Papua New Guinea (as well as additional sites in Tonga) are also protected landscapes, as well as sites on the American island of Guam and in the Hawaiian islands. The main theme of Eaton's review is the effect of the land tenure systems of the region on protected areas and conservation. With the exception of "true" protected areas, mainly set up on crown land, it would seem that land protection in the area either applies through a system of taboos, which leaves the area as a *de facto* Category I (strict nature reserve), or through careful management of land use and development (much as the Wildlife Management Areas of Papua New Guinea) where areas are managed more as category VIII (multiple-use areas).

GUAM

Area 550 sq.km

Population 111,000 (1982). About 20% of this total comprises American military personnel and dependents.

Parks and Reserves Legislation Guam was originally ceded by Spain to the United States of America in the Treaty of Paris on 10 December 1898. The island was captured by the Japanese in 1941 and retaken by the American forces in 1944. Guam's current constitutional status is that of an "unincorporated territory" of the United States of America. Guam received civilian rule from 1951, following which efforts have been made to protect conservation areas (several protected areas were established in 1953). In 1975 the Guam Territorial Park System came into existence. The Government of Guam areas are protected by Public Law No. 12-209 as either natural preserves or as conservation reserves. New protected areas of Government of Guam ownership are added by legislative or administrative action of the Department of Parks and Recreation. This Parks and Recreation enabling legislation provides for natural preserves, conservation reserves, territorial and community parks, recreational facilities, historical and prehistorical sites (IUCN-CMC, 1985). The Federal Government also administers protected areas, ecological reserve areas, which were established in 1984 by action of the Chief of Naval Operations, United States Navy. The two park areas were created by Federal Public Laws Nos. 95-348 (1978) and 78-42 (1978)(Anon., 1985). Other relevant legislation specific to conservation in Guam includes the Forestry and Conservation Laws, Territorial Seashore Act, as well as a number of U.S. federal legislative acts. There are also several relevant Executive Orders signed by the Governor of Guam, including one on the Protection of Wetlands (Anon., 1985). The protected areas include *managed nature reserves* (ecological reserve areas), established as physical or biological units in which current natural conditions are maintained. The Government of Guam areas are either *natural preserves*, whose purpose is to remain unimproved or *conservation reserves*, which may be managed for the purpose of making them accessible to the public "in a manner consistent with the preservation of their natural features". *Multiple-use management or recreation areas* (national historic parks and seashore parks) are created to protect outstanding marine life, terrestrial wildlife, oceanic resources, scenery and cultural heritage, including landscape resulting from World War II (Anon., 1985).

Parks and Reserves Administration and Management The Department of Parks and Recreation is responsible for the Guam Territorial Park System, which includes three protected areas. The multiple-use management areas have development and management divided among several agencies: the Department of Parks and Recreation is responsible for coordination, planning, facility maintenance, outdoor recreation, historic preservation and scenic resources. The Department of Agriculture is responsible for wildlife, marine resources, forestry, fire prevention and soil resources. The Department of Land Management is responsible for leases and land registration. The Guam Environmental Protection Agency is responsible for water and air pollution and solid waste (Anon., 1985). The Division of Forestry and Soil Resources has responsibility for development, management and protection of forests and watershed resource lands, whilst the U.S. National Park Service has management and development responsibility for National Park Service areas. Federal Protected Areas are administered by the United States Navy and United States Air Force (Anon., 1985).

Addresses

- ° Department of Parks and Recreation, P.O. Box 2950, Agana, Guam 96910.
- ° US National Park Service, P.O. Box FA, Agana, Guam 96910.
- ° Guam Aquatic & Resource Wildlife Division, Fish & Wildlife Service, P.O. Box 23367, GAMF, Guam MI 96921.

Guam

Additional Information Guam is a small island of the Marianas Archipelago in the Pacific Ocean. The major products of the island are fish, sweet potatoes, cucumbers, water melons and beans and a few cattle, hogs and poultry. Other main sources of income are construction and tourism. Rainforest with *Artocarpus*, *Elaeocarpus*, *Pandanus*, *Ficus* and *Guamia* originally covered most of the island; much has been logged and cleared for coconut plantations. The mixed forests on old volcanic soils have been completely destroyed, whilst ravine forests survive along river valleys and on some volcanic and limestone hillslopes. There are also still some small areas of mangrove (Davis *et al.*, 1986).

Various "development", "master" and "management" plans have been developed for all or part of Guam, and several of these have included nature conservation aspects (Anon., 1985). Policy on natural resources is that areas important for recreation, critical marine and wildlife habitats, "shall be protected through policies and programmes affecting such resources" (Anon., 1985). Development in particularly fragile areas should be regulated, but is not, in actual practice. Several conservation areas totalling 1,150ha were established in 1968, and several more have been established since (National Park Service had protected 8,100ha by 1978). However, much of Guam is under the control of the military. The most important areas on Guam for at least birds, are the northern cliffs and northwesternmost plateau habitats. Most of this land lies within the Anderson Air Force Base. The U.S. Air Force, in cooperation with the Department of Agriculture and the Forest Service, was declared the Pati Point area as a Research Natural Area. Many protection laws are presently insufficiently enforced for future conservation of the area (Anon., 1985).

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Protected Landscapes

	(hectares)
<i>Territorial Seashore</i>	
Guam Territorial Seashore	6,135 *
<i>National Historic Parks</i>	
War in the Pacific	779 *

Guam Territorial Seashore Park (Guam Seashore Study Area)

Management Category V (Protected Landscape)

Biogeographical Province 5.02.13 (Micronesian)

Geographical Location The Park covers an extensive but irregularly patterned area in the south-west of Guam, with park areas interspersed by non-park private land. It includes a contiguous stretch of coastline from Anae Island and Patch Reef, 1km off shore south of Nimitz Beach Park in the west, southwards to include twenty-two acres (8.9ha) of Cocos Island and all of the Lagoon, and east to include a portion of Ajayan Bay, just north of Manell Channel. The area includes Cetti Bay on the south-west coast between Sella and Fouha Bays (UNEP/IUCN, in prep.). 13°13'-13°25'N, 144°38'-144°44'E

Date and History of Establishment The Guam Territorial Seashore Park was established on 12 December 1978 under Executive Order No. 78-42, and is designed to protect the wildlife, marine life and other oceanic resources and natural environment of south-west Guam. Some portions have been protected since 1953. The earlier Public Law 95-625 proposing a Guam National Seashore and National Historic Park (from Taleyfac Bay to Ajayan Bay) was never authorised (UNEP/IUCN, in prep.).

Area The site covers 3,596ha of land and 2,539ha of coast and sea.

Land Tenure There is a mosaic of Federal, Government of Guam and private ownership.

Altitude 0-400m

Physical Features The southern half of the island is largely volcanic in origin comprising a series of hills reaching over 400m high and extending along the west side of the island. The general physical character of the area is determined by volcanic activity modified by limestone deposits and subsequently cut by erosion. The land area is divisible into three major types - dissected volcanic uplands, the interior basin, and the coastal lowlands and valley floors. The coastal areas are of two zonations - the south-west coast and the Cocos Lagoon to Ajayan Bay area. Anae Island is the only one of the eight islets on the south-west coast which is not associated with a fringing coral reef. The western and northern sides of the island and patch reefs slope steeply to a 30m terrace while the eastern and southern sides consist of a gently sloping terrace 3-8m deep. In these protected waters, large coral mounds, pinnacles and ridges, 6-8m high, are separated by sandy floored channels (UNEP/IUCN, in prep.). Cetti Bay is surrounded by steep slopes and sandy beaches. The shoreline consists of rocky volcanic headlands with steep shorelines, bordered by low-lying narrow limestone terraces. Silt content is high and visibility low in the inner bay, but visibility is good in other areas.

Cocos Barrier Reef and Lagoon comprises a triangular barrier reef (7.2 sq.km), lagoon and associated islands. The area has been divided into three biotopes. The terrestrial biotope includes Cocos Island and a small sand islet at its eastern end, Babe Island, with the landward border along Cocos Lagoon. This consists of a narrow fringing reef, an intertidal zone dotted with mangrove patches and seagrasses. A second biotope consists of the deep Mamaon and Manell Channels and a third includes the lagoon, barrier reef-flat platform and fringing reef-flat platforms. The barrier reefs are nearly 5km long on the north-west side, 5-6km long on the south. On the north-east side of the lagoon there is a 4km long stretch of coast consisting of steep mountainous land and alluvial coastal lowland (UNEP/IUCN, in prep.).

The fringing reef platform bordering most of the south-east shoreline is completely cut by the Ajayan River, forming a small estuary with moderate alluvial silt deposition at the river mouth. A small islet, Agrigan Island, is located on the south-west reef flat. The channel is characterised by progressively steeper fringing reef walls seaward to approximately 18m in depth. The floor of the channel grades from a silt-mud zone to sand approximately midway out. Water visibility improves seaward. The reef flats are wide and largely covered by seagrass beds (UNEP/IUCN, in prep.). The coral cover on the reefs of Cocos Barrier Reef and Lagoon is variably dense, based on differing degrees of reef-flat exposure. In general, there is an increase in coral cover and diversity from the seaward side to the lagoon side. The shallow terrace extends lagoonward to the 3m contour, varying in width from 200-1,000m. The boundary along the shore shelf is demarcated by seagrass (UNEP/IUCN, in prep.).

Climate Tropical; warm and humid throughout the year. Two well-defined seasons: dry season from January to May; wet season from July to October. Annual mean temperature for 1981 was 25.9°C. Coolest months are January, February and March, the warmest months May and June. Average annual rainfall is 2286mm.

Vegetation The area encompassed by the park includes almost every major type of habitat found on Guam and is representative of all the southern islands of the Marianas line. The southern half of the island has several vegetational zones. The volcanic upland savanna grasslands are dominated by swordgrass *Miscanthus floridulus* and scattered *Casuarina* trees,

along with *Pennisetum polystachyon*, *Lycopodium carnum* and the threatened tree fern *Cyathea lunulata* (Anon., 1985). This eroded savanna habitat is thought to be the result of repeated burning. There is much secondary growth forming thickets and one introduced plant, the "Tangan-tangan", a scrubby legume, originally planted by the military, forms dense thickets at the exclusion of other native vegetation (UNEP/IUCN, in prep.). The forested ravines, river valleys and the forest patches on the limestone caps of the volcanic uplands are characterised by the betel palm *Areca catechu* but include a variety of trees such as banyans *Ficus benghalensis*, screw-pine *Pandanus kirkii* and breadfruit *Artocarpus altilis* with a lush undergrowth component. Apart from a couple of mangrove areas the coast is largely dominated by coconut *Cocos nucifera* plantations which sometimes extend up the river valleys. Associated species include *Messerachnidia argentea*, *Scaevola taccada* and *Ipomoea pes-caprae* (Anon., 1985). The mangrove swamp is situated between Merizo and the Suyafe River and has *Rhizophora*, *Bruguiera* and *Lumnitzera* components. The coastal area is important for its seagrass *Enhalus acoroides* concentrations which are to be found off the northern end, to the south of Taleyfac Bay and again near the Ajayan river. Some 90 species of marine plants have been recorded. (UNEP/IUCN, in prep.; Eldridge, 1979).

Fauna The majority of the native land birds are confined to the north of the island. Representative birds in the park include fairy tern, Vanikoro swiftlet, white-tailed tropic bird, noddy tern, brown booby and reef heron (*Gygis alba*, *Collocalia vanikorensis*, *Phaeton lepturus*, *Anous stolidus*, *Sula leucogaster* and *Demiguetta sacra*) (Anon., 1985; UNEP/IUCN, in prep.). Similarly the fruit bat *Pteropus marianus* apparently occurs in the area (Anon., 1985). The most important conservation areas of the site are on the coast and in particular around Cocos Lagoon. This is a very rich marine system due to its high diversity and wide range of habitats. The coral communities are scattered throughout the length of the south-west reef flat and are usually restricted to holes, depressions and margins. Cocos Lagoon contains one of the most diverse coral communities on Guam (dominated by *Porites*) but within the lagoon their distribution is patchy. Some 159 species of coral have been found, 58 species of gastropods, 49 species of bivalves and 40 species of echinoderms. In the lagoon itself some 267 species of fish have been identified out of a total of 276 for southern Guam (UNEP/IUCN, in prep.). The endangered Hawksbill *Eretmochelys imbricata* and the Green Turtle *Chelonia mydas* have been observed and the latter breeds. Porpoises are regularly seen and the dugong *Dugong dugong* was last sighted in 1974 (UNEP/IUCN, in prep.).

Cultural Heritage The park is rich in prehistoric cultural resources. There are numerous ruins of forts and stone bridges dating from the Spanish period, as well as World War II relics, such as Japanese Zero aircraft (Anon., 1985).

Local Human Population Three villages exist adjacent to the park with a total population in 1980 of 895 people (Anon., 1985). The local economy is based on agriculture and livestock grazing.

Visitors and Visitor Facilities There are plans for a full range of interpretive facilities and under the General Development Plan there are moves to promote recreational use in accordance with the Land Classification Plan. There are also plans for intertidal reef flat nature trails and a management plan is proposed for the natural seashore in accordance with the appropriate recreation category. Overnight accommodation is being established in a major resort development on the Island of Cocos. Facilities include chalets, hotel, swimming pool, restaurant and support facilities. At present there are three boat launching sites, with the main site being Merizon Pier Park. The Cocos Lagoon is used for organised (Marianas Yacht Club) and individual water sports including both motor and sail boat races, diving, snorkeling, water skiing and fishing (UNEP/IUCN, in prep.).

Scientific Research and Facilities Several marine biota studies have been carried out in the Nimitz Channel, the Taleyfac Bay region, at Sella Bay, Fouha Bay, Umatac and Toguan Bay. Shellfish and sea urchins studies were conducted in 1978 and the Division of Aquatic Wildlife Resources carries out inshore creek censuses and periodic offshore aerial surveillance programmes. Two artificial reefs have been constructed to investigate improved lagoon

management techniques. Other reserves may be suggested in the future and be based on the completed "inventory of environments in Guam" and the detailed mapping of reef flats conducted around the island (UNEP/IUCN, in prep.).

Conservation Management Hunting, shelling, fishing, ranching, boating and outdoor recreation activities are permitted. The Guam Environmental Protection Agency water quality rating for most of this area is "A", recreational, but for Anae Island and Patch Reef and for Cetti Bay is "AA", conservation. There are three Natural Landmarks within the Park: Faha Point, Mt Lamlam and Facpi Point (UNEP/IUCN, in prep.). The Master Plan was adopted in 1979 and encourages multiple use (Anon., 1985). The U.S. Army Corps of Engineers (1983) has reviewed planning and the management of the entire area. The Department of Parks and Recreation is responsible for co-ordination, planning, facility maintenance, outdoor recreation, historic preservation and scenic resources. The Department of Agriculture is responsible for leases and land registration. The Guam Environmental Protection Agency is responsible for water and air pollution and solid waste. All agencies have active programs in the Park in their area of responsibility (Anon., 1985). At present the Federal lands are largely former military zones or recreation areas; the governmental lands are generally semi-natural without management, whilst the private areas are scattered and sparsely populated and include old plantations and agricultural holdings. Of interest is the fact that two-thirds of Cocos Island is in private hands. There is a programme of land acquisition by the Department of the Interior for the Government of Guam (UNEP/IUCN, in prep.).

Stojkovich (1977, quoted by UNEP/IUCN, in prep.) gives a list of recommendations for the Cocos Lagoon area which include prohibiting fishing, coral harvesting and shell collecting within the proposed sanctuary except by special permit; the GEPA water quality classification to be changed from "A" recreation to "AA" conservation; the establishment of an upper limit on the number and type of point source discharges into Mamaon and Manell Channels; recreational activities to be retained but strictly controlled; the establishment of an upper limit on the number of transport boats and persons using the area at any given time, the establishment of the entire Cocos area as a marine underwater park with trails and basic information on the geology, physiography and biota; the placement of artificial reefs and fish traps for scientific and maricultural purposes should be allowed with the issuance of a special permit; strict litter laws to be implemented especially for waste cans (UNEP/IUCN, in prep.).

Stojkovich also recommended that Ajayan Bay, Anae Island, and Cetti Bay be established as natural sanctuaries in which no coral harvesting be allowed; that fishing be allowed only by special permit; that swimming, snorkelling and SCUBA diving activities be retained; that special care be taken to preserve the seagrass beds and that the adjacent wetlands be included in any preservation plan. Mooring buoys should be established and underwater trails developed (UNEP/IUCN, in prep.).

A number of these recommendations have been taken care of in the course of implementation of the park. There are plans for a full range of interpretive facilities and under the General Development Plan there are moves to promote recreational use in accordance with the Land Classification Plan. Overnight accommodation will be restricted to camp grounds. There are also plans for intertidal reef flat nature trails (UNEP/IUCN, in prep.).

Management Problems There have been large scale introductions of flora (300 species), avifauna (7 species) and mammals (5 species). The introduced Philippine Rat Snake *Boiga irregularis* is a major suspect in the drastic decline of the native fauna. Other introduced fauna include feral cats, dogs, pigs, rats and a south-east Asian elk. The sponge *Terpios* was overgrowing corals at Anae Island at a rapid rate in the early 1970s and its growth rate was monitored (Bryan, 1973). The increasing popularity of the Merizo coast and of Cocos Island, as a full-time fishing and tourist operation, could be a threat. Randall *et al.* (1975, quoted by UNEP/IUCN, in prep.) considered that any physical disruption of habitats within the lagoon or immediately adjacent areas could have serious effects on the fish population in particular. Shell populations have been depleted by collectors, especially popular species such as *Cassia cornuta*. There is some illegal fishing with dynamite and bleach (Anon., 1985). However, Randall found that little change had occurred between 1975 and 1982 although there had been

Guam

a substantial increase in tourism in the area (UNEP/IUCN, in prep.). Development of coastal recreation is a possible future threat to the area. There have also been major pollution and litter problems, as well as major threats from agricultural encroachment (Anon., 1985).

Staff One park manager and three ground workers (Anon., 1985).

Budget US\$70,000 for the fiscal year 1985 (Anon., 1985).

Local Administration Department of Parks Recreation, 490 Naval Hospital Road, Agana Heights, Guam 96910

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Date August 1987

War in the Pacific National Historical Park

Management Category V (Protected Landscape)

Biogeographical Province 5.02.13 (Micronesian)

Geographical Location The park lies on the westward side of the island of Guam, by the Philippine sea. It is in two discontinuous shoreline sections: the Asan Unit (Adelup Point west to Gapan Islet) and the Agat Unit (Rizal Beach south to Bangi and Alutom Islands). 13°13'-13°22'N, 144°44'-144°38'E

Date and History of Establishment Established by the U.S. National Park Service on 18 August 1978 under Federal Public Law 95-348 as a "Multiple-Use Management Area". The legislation authorises the inclusion of the reef areas of Agat, Piti and Asan.

Area 779ha

Land Tenure U.S. Federal Government (326ha); Government of Guam (353ha); and private property (100ha)

Altitude The lowest point is approximately 65m below sea level. The highest point is 313m (Mt Genjo-Mt Chacao range).

Physical Features The National Historical Park includes the reef areas of Agat, Piti and Asan and the seven separate units which encompass the shore and reef flats. The seven physically separate units: Asan Beach Unit, Asan Inland Unit, Fonte Plateau Unit, Piti Unit, Mt Chachao/Mt Tenjo Unit, Agat Unit and Mt Alifan Unit include sand beaches, offshore reefs, rugged hills and mountain crests (Anon., 1985). These units range from 52m to 978m in width and are substrated by a combination of scattered sand, gravel, coral-algal rubble and boulders.

The intertidal beaches give way to low limestone cliffs with occasional volcanic headlands. There are some small offshore islands and raised pinnacle limestone rocks. Sections of the shoreline have been altered with artificial structures such as sea walls and sewage outlets (Randall, 1977 quoted by UNEP/IUCN, in prep.; Eldridge, 1979).

Climate Tropical; warm and humid throughout the year. Two well-defined seasons: dry season from January to May; wet season from July to October. Annual mean temperature for 1981 was 25.9°C. Coolest months are January, February and March, the warmest months May and June. Average annual rainfall is 2286mm.

Vegetation There are scattered patches of seagrass *Enhalus acoroides* which in places become the dominant marine vegetation. Some 43 species of marine plant have been recorded. The sandy beach vegetation is dominated by coconut palm *Cocos nucifera*, whilst the other areas consist either of modified limestone forest containing breadfruit *Artocarpus mariannensis*, lemonberry *Triphasia trilobion* and banyan *Ficus prolixa*, or open savanna vegetation dominated by grasses *Miscanthus floridulus* and *Pennisetum polystachyon* along with ground orchid *Spathoglottis plicata*, club moss *Lycopodium cernum* and savanna fern *Dicranopteris lincarlis* (Anon., 1985).

Fauna The coral communities dominate the inner reef formations but vary widely in distribution, and are composed of a moderate number of coral species. Only a few corals are to be found on the outer reef. However, in total some 140 species have been identified in the Agat area. Studies have recorded 75 species of gastropod, 18 species of bivalves, 45 species of echinoderms and 26 fish species on the coastline (Anon., 1985; Eldridge, 1979).

Cultural Heritage The primary purpose for establishing the park is to preserve the historic features from World War II. The park contains Japanese defensive fortifications including pill boxes, coastal defence guns, military equipment, foxholes and trench works. The two beaches preserved are the assault beaches of the American invasion of 21 July 1944 (Anon., 1985).

Local Human Population There are four villages adjacent to the park which had a total population of 5,650 in 1980 (Anon., 1985). The land use of the park is divided between preservation, agriculture, residential use and commercial activities (Anon., 1985).

Visitors and Visitor Facilities The park has largely been established to preserve the landscape and to act as a recreational area. A visitor centre is situated in the north of the park near Adelup Point in the Asan beach unit and can easily be reached along numerous paved roads. Facilities include numerous snorkel and scuba diving areas in the Asan beach and Agit unit areas, along with fishing and boating. There are also parking areas and numerous scenic points. The World War II relicts are well marked (Anon., 1985).

Scientific Research and Facilities The Division of Aquatic and Wildlife Resources (Department of Agriculture) has conducted inshore reef research in the Asan unit. Other surveys have been undertaken by the Department of Biology, University of Guam (Raulerson, 1979).

Conservation Management The primary purpose of establishing the park is to quote the documents "to commemorate the bravery and sacrifice of those participating in the Pacific Theatre of World War II". The park was also established to "conserve and interpret outstanding natural, scenic and historic values and objects on the island of Guam for the benefit and enjoyment of present and future generations" (Anon., n.d.). The general management plan for the park has been approved and implemented (National Parks Service, 1983). Conservation management is specified as being "to preserve and interpret important natural features such as native plant communities and stream and marine bed environments for public use and enjoyment". Shelling, fishing, boating and outdoor recreation activities are permitted. The park has a programme to acquire private land (Anon., 1985).

Guam

Management Problems There are some problems from fishing with bleach and dynamite (Anon., 1985). Sections of the shoreline have been altered by sea walls and sewage outfalls. Agat Bay is moderately heavily developed (Randall, 1978). Other problems include grassland fires, poaching and illegal dumping (Anon., 1985).

Staff Four permanent staff, Superintendent Chief Ranger for maintenance and administration. Other employees are hired on a limited term contract (Anon., 1985).

Budget US\$212,000 for the fiscal year 1985 (Anon., 1985)

Local Administration Park Superintendent, War in the Pacific National Historical Park, P O Box FA, Agana, Guam 96910.

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Date August 1987

WESTERN SAMOA

Area 2,836 sq.km (Upolu 692 sq.km; Savai'i 1,131 sq.km)

Population 159,000 (1982); over two-thirds of whom live on Upolu, the rest on Savai'i

Parks and Reserves Legislation Western Samoa, a former German protectorate, was administered by New Zealand from 1920 to 1961. The first environmental legislation in Western Samoa was the Agriculture, Forests and Fisheries Ordinance (1959) and the Forests Act (1967), which make the relevant government departments responsible for the conservation, protection and development of natural resources, especially soil, water and forest. The Forests Act allows for protection of forest and water catchment areas as "protected land". The legislation relevant to protected areas is the National Parks and Reserves Act of December 1974 which provides for establishment, preservation and administration of National Parks, and Nature, Recreation and Historic reserves on public land. *National Parks*, unless islands, must cover an area of more than 600ha, and are to be preserved in perpetuity for the benefit and enjoyment of the people. This includes preservation of flora and fauna and maintenance of other conservation areas. Other designations included under the act are: *Nature Reserves*, to protect, conserve and manage flora, fauna or aquatic life; *Recreation Reserves*, covering outdoor natural or wild areas; *Historic Reserves*, of national historic, legendary or archaeological significance; and additional areas declared for specified purposes. The Water Act (1965) provides for the prohibition of the removal of protective vegetation within 60m of rivers. Prior to this legislation, two areas were established under the Stevenson Memorial Reserve and Mount Vaea Scenic Reserve Ordinance (1958). For the first time, the Fourth Five Year Plan 1980-84 included a section specifically on the environment, "Environmental planning for development" (Anon., 1975).

Parks and Reserves Administration and Management Both the National Parks and Reserves Act, and the Forest Act are administered through the Forestry Division, part of the Department of Agriculture and Forests. All parks and reserves are administered by the National Parks and Reserves Section of this Division, though resources are fairly limited (a superintendent two rangers and 15 labourers with an annual budget of WSS\$23,000 in 1984). The majority of staff are field based. Management aims are to: establish examples of each type of reserve, ensuring that as many of the different types of vegetation and wildlife as possible are conserved; improve and develop appropriate facilities, to enable the full enjoyment and appreciation of the reserves; promote public awareness, understanding and appreciation of these areas.

Addresses Superintendent, National Parks and Reserves Section, Forestry Division, Department of Agriculture and Forests, PO 206, Apia.

Additional Information Western Samoa is located in central Polynesia. It consists of nine islands, of which the seats of government and commerce are concentrated on the two main islands, Savai'i and Upolu. Of the other islands, only Manono and Apolima are inhabited. Much of the original lowland tropical forest on Upolu and Savai'i has been modified by commercial plantation development or clearance caused by rapidly expanding villages. Montane cloud forests and meadows are less damaged and still contain a rich endemic fauna and flora (Davis *et al.*, 1986).

Advice on a comprehensive approach to development of a parks and reserves system was taken from an IUCN/UNDAT (United Nations Development Advisory Team) study prepared in 1979 which recommended the reservation of 6% of the land in a system which would provide permanent protection for all major ecosystems within the island. However, acquisition of the land for the parks system poses problems. About 80% of the land is customary land ("Matai" system), 11% is public land and about 4% each as private freehold owned by the Western Samoa Trust Estates Corporation (Anon., 1975; 1979). Customary land may be leased for certain purposes, and the government has the power to obtain land for public purposes. IUCN/WWF and New Zealand Forest Department sponsored a two year project (No. 1650 - establishment

Western Samoa

and equipment of conservation areas) in Western Samoa, 1979-1980. They funded the services of an experienced national parks ranger to advise and assist the government in the development of parks, with particular emphasis on the training of local staff through sponsored courses in New Zealand, and the use of parks for education and recreation. Western Samoa was also one of the target countries, together with New Caledonia, Fiji and Tonga, for the IUCN/WWF conservation action plan (Project No. 1488) in 1979. The major problems facing conservation work is indiscriminate collection of firewood, shooting and agricultural encroachment. Commercial forestry, although widespread, is not regarded as a major threat to the forest, except where followed by land clearance for settlement. Hydroelectric schemes in Western Samoa are usually accompanied by some form of watershed protection, thereby, providing for protected areas in addition to the park and reserve system (WWF Project 1488).

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Protected Landscapes

	(hectares)
<i>Nature Reserves</i>	
Tusitala Historic and	64 *
<i>Reserves</i>	
Togitogiga Recreation	3

Tusitala Historic and Nature Reserve
(consisting of Mount Vaea Scenic Reserve,
Stevenson (Tusitala) Memorial Reserve and Vailima Botanic Garden)

Management Category V (Protected landscape)

Biogeographical Province 5.05.13 (Central Polynesian)

Geographical Location The site is located on the northern side of Upolu island, 1-2km inland from the suburbs of Apia. The protected area is at the end of Ala o le Alofa Road of Vailima. 5°04'N, 75°57'W

Date and History of Establishment Originally created in 1958 as Mount Vaea Scenic Reserve and Stevenson Memorial Reserve, then redesignated and expanded in 1977/78 under the National Parks and Reserves Act of 1974.

Area Mount Vaea Scenic Reserve, 52ha; Stevenson memorial, 0.4ha; Vailima, 12ha

Land Tenure Government

Altitude 100-476m

Physical Features The park is located on the east-facing slopes of Mount Vaea. The terrain is very rocky (basalt) with a shallow top soil. Mount Vaea is a remnant of a 2 million year old volcano (National Parks and Reserves Section, n.d.). There are numerous streams, pools and waterfalls dominated by the Vailima stream system.

Climate No information

Vegetation Forest covers about 3/4 of the Vaea scenic reserve of which the majority is now secondary or replanted woodland on former lowland rainforest. A large area around the stream was replanted in 1963 following severe storm damage. The most common trees are *Albizia chinensis*, *A. falcataria*, *Cedrella odorata* and introduced rubber trees (National Parks and Reserves Section, n.d.). Small patches of original rainforest exist within the secondary forest.

Fauna Birds commonly seen here include wattled honey-eater, Samoan starling, white rumped swiftlet, triller, Samoan fantail and red-vented bulbul (*Foulehaio carunculata*, *Aplonis atrifusca*, *Collocalia spodiopygia*, *Lalage sharpei*, *Rhipidura nebulosa* and *Pycnonotus cafer*) (National Parks and Reserves Section, n.d.).

Cultural Heritage The site includes the tomb of Robert Louis Stevenson, who spent his last years on the island. His home is now the residence of the Head of State. Stevenson involved himself in local politics, attempting to effect a reconciliation between two rival chiefs, but in 1893 war broke out between their supporters and the victors were exiled or jailed by the colonial administration (National Parks and Reserves Section, n.d.).

Local Human Population No information

Visitors and Visitor Facilities The area is particularly well-used for country activities, ranging from hiking to swimming and picnicking (facilities are being developed). Car parking facilities are available along with forest trails, R.L. Stevenson's tomb and house and the Vailima Botanical Garden. Access is by bus, taxi or private car from Apia.

Scientific Research and Facilities At the Vailima Botanical Gardens are grown food crops from the Pacific region. There are also experimental forestry trials at the Gardens (National Parks and Reserves Section, n.d.).

Conservation Management The area has been established to safeguard the scenery and countryside around Robert Louis Stevenson's home and tomb, as well as to act as an important recreation area for the residents of Apia.

Management Problems No information

Staff No information

Budget No information

Local Administration No information

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Date August 1987

ANTARCTIC AND ARCTIC

Antarctic and sub-antarctic protected areas are the subject of two recent reviews of protected areas carried out by SCAR and Clarke and Dingwall respectively. In neither region are Category V sites recognised, although only Clarke and Dingwall refer to IUCN Management Categories. Arctic protected areas have been reviewed by Karpowicz and Harrison who identified only four protected landscapes north of the Arctic Circle, three Norwegian landscape protection areas (all of which are fairly small), and the huge Arctic National Wildlife Refuge. This area, which is categorised on the advice of colleagues in the US, is a 7.3 million hectare wilderness with unique wildlife resources and sensitive ecosystems. Alaskan villagers pursue a subsistence way of life in the area, including hunting, fishing and trapping. Mining is allowed, but only on permits valid prior to the establishment of the refuge. Wildlife refuges are set up in the United States to protect wildlife and their habitats, and all of the other 15 national wildlife reserves in Alaska are designated as category IV. It would seem likely, therefore, that a re-evaluation of the Arctic NWR category within our database is necessary.

Arctic National Wildlife Refuge

Management Category V (Protected Landscape)

Biogeographical Province 1.13.19 (Alaskan Tundra)

Geographical Location On the north-east corner of Alaska with the Beaufort Sea coast forming the northern boundary, the United States/Canada border forming the southern boundary and the western boundary at 149°70'W.

Date and History of Establishment Established as the Arctic National Wildlife Range on 6 December 1960. Name change to Arctic National Wildlife Refuge on 2 December 1980 with further protection and doubling of area. Permitted activities are subsistence hunting, fishing and trapping, commercial guiding, scientific research with approval of the refuge manager, mining only on valid claims existing prior to the establishment of the refuge and seismic exploration from 1982. Oil drilling or development was prohibited before 1985, and since then can only be carried out following the approval of the United States Congress.

Area 7,306,596ha. Zones identified are the Shublik Springs and Firth Mancha Creek Research Natural Areas and Neruokpuk Lakes Public Use Natural Area.

Land Tenure Federal government ownership.

Altitude Sea level to 2,758m

Physical Features The refuge includes a segment of the Brooks Range in the northeast Alaska and borders the Yukon basin in the south and the Arctic Ocean in the north. There are 4 major physiographic provinces in the refuge: the Northern Plateaux containing the Porcupine Plateau, an area of scattered hills with broad tree-covered valleys between Porcupine River and the Brooks Range; the Arctic Mountains comprising the rugged glaciated west-trending peaks of the Brooks Range which form a continental divide between the Arctic Slope and Yukon drainage; the Arctic Foothills in an area of moderate relief between the coastal plain and the rugged interior mountains; and the Arctic Coastal Plain which is a flat formerly submerged area of treeless tundra underlain by continuous permafrost with a surface of ice-wedge polygons. Braided streams and rivers flow northward to the Arctic ocean and there are numerous freshwater lakes and wetlands. Continuous daylight from May through early August.

Climate Climate is dry arctic and subarctic. July maximum temperature range is 80°-85°F on the southern slopes of the Brooks Range. Mean coastal maximum 40°F. Mean annual precipitation 6" occurring mainly as snow. Winter temperatures (October-April) around -40°F.

Vegetation The refuge contains 4 major vegetation associations: tundra; shrub thickets; treeless bogs and muskegs; and boreal forest (taiga). Wet tundra (mainly a sedge-cottongrass mat) and moist tundra are the major associations on the Arctic coastal plain. A low tussock-heath tundra occupies extensive areas where drainage is impeded by permafrost. A pronounced polygonal pattern results from frost cracks in the wet soil with vegetation of mainly moss, horsetail, sedge and some stunted dwarf willow and birch. Lower portions of southern stream valleys are characterized by tundra meadows and numerous lakes. Prominent plants are grass-like sedge and cottongrass. Gravel moraines and other well drained lower sites of southern valleys have a dwarf shrub habitat. A shrub thicket (high brush) association occurs on floodplains and near the treeline. Willows border most of the northern and southern drainages. The treeless bogs and muskeg association occurs in the boreal forest of the southern river valleys where conditions are too wet for tree growth. The boreal forest is mainly black and white spruce (white spruce predominant) with some stands of balsam poplar paper birch and has a northern limit on the south slope of the Brooks Range. Pure stands of poplar are a unique phenomenon along several north-flowing rivers including the Firth, Canning and Kongakut. Narrow spire-like trees occur on slopes with well-drained soils and the forest floor supports a rich growth of lichens. Trees are scattered and stunted on poorly drained sites with slow growth (a typical 10cm diameter spruce often over 200 years of age).

Arctic

Fauna The refuge contains 44 mammal species including polar, brown (grizzly) and black bears, musk oxen, moose, caribou, Dall sheep, and wolf. Caribou are the most numerous large mammal with about 110,000 in the Porcupine herd and 5,000 in the Central Arctic herd. Small mammals include arctic and red fox, wolverine, lynx, otter, beaver, marten, coyote, mink, weasel, porcupine and various hares. Small mammals include vole, lemming, squirrel, shrew and Alaska marmot. The refuge contains about 142 bird species including rough-legged hawk, golden and bald eagle and gyrfalcon. The presence of trees is the primary factor determining the northern distribution of about 25 species. There are 31 waterfowl species in the tundra wetlands and adjacent coastal waters including nesting Canada goose, white-fronted goose, black brant and whistling swan. The most common of 27 species frequenting moist tundra plant association are savannah sparrow and lapoland longspur. Breeding ducks include pintail, green-winged teal and oldsquaw. Thousands of snow geese feed on the coastal tundra prior to fall migration. The most abundant shorebirds include the semi-palmated sandpiper and northern phalarope and shorebirds are the dominant breeding group on the coastal plain tundra. Small numbers of the endangered peregrine falcon *Falco peregrinus anatum* nest along the Porcupine River. Willow and rock ptarmigan are the most common resident upland gamebirds.

Cultural Heritage No information

Local Human Population No information

Visitors and Visitor Facilities About 500-1,000 visitors annually between June and September.

Scientific Research and Facilities There is the Holmes Research Station at Peters Lake and Kaktovik Field Station at Barter Island. Various research is carried out within the area, including projects on polar bear and caribou, and on sheep.

Conservation Management No current information

Management Problems Law enforcement is reported to be inadequate as a result of the small staff and large area involved. Perhaps a more serious threat, however, is from potential developments connected with seismic exploration and oil drilling and transport. Along the Arctic Coast within the refuge are thousands of oil barrels, four abandoned military sites and a beached ship.

Staff There were eight permanent full-time employees in 1981, and 1-4 seasonal workers.

Budget US\$374,000 budgeted for fiscal year 1981.

Local Administration Refuge Manager, Arctic National Wildlife Refuge, 101 12th Avenue, Fairbanks, Alaska 99701.

References

There is no single comprehensive account of the refuge's natural history. Numerous government and non-government reference works are available and a bibliography of the area is currently being prepared by refuge staff. The University of Alaska library and the refuge office contain the largest collection of references.

Date 1981

DRAFT LIST OF PROTECTED LANDSCAPES

This list of protected landscapes is a direct print-out from the protected areas database for all sites currently considered to be best designated under IUCN Management Category V. This list, which is an update of that provided by the *United Nations List of National Parks and Protected Areas*, is deliberately presented in a draft format for a number of reasons.

IUCN originally proposed the protected landscape notion as a distinct management category in 1973, refining the definitions in 1978 and then at the World National Parks Congress in 1982. However, aside from the categories of world heritage and biosphere reserve designations, three protected area types - strict nature reserves, national parks, and wildlife sanctuaries (defined as IUCN categories I, II and IV respectively), have attracted most attention globally as regards protected areas establishment and management. As a result, protected landscapes and the objectives of their establishment at international level have perhaps remained largely obscured.

The second reason for presenting this information in draft form is our realisation that our resources of information may not in this particular case be fine-tuned enough to cover all relevant agencies. Our information traditionally comes from the management authorities at the national (or federal) level dealing with national parks and wildlife sanctuaries, and these, we suspect, may not necessarily be the agencies dealing with protected landscapes. Also, the mechanisms for protection of landscapes may differ from those relating to national parks, and these areas may be less "clear cut" administratively and legally, and more controlled by land-use planning legislation than natural resource protection legislation (and hence more hazy - prompting such questions as - when is an area covered by planning control a "protected landscape" as defined by IUCN?).

We also believe that there is not always a clear understanding of the aims of IUCN's categories paper, and in some cases lack of understanding of the definitions themselves (not helped by the fact that the paper is only published in the English language). We therefore suspect that a number of the areas currently listed within our files as national parks (or even as sanctuaries) on the recommendations of our contacts may in reality be category V sites, and vice-versa. Not all difficulties with definition are problems of understanding, however. Defined categories are merely "pigeon holes" for dealing with information. In fact there is a continuum of objectives governing the management of sites, and one area may have elements from a variety of categories. This can and does create problems of categorisation. Also, the protected landscape category as presently defined contains within its single category definition a spectrum of objectives which adds to the difficulty of accurately classifying sites.

Finally, information that is often the most difficult to obtain is not what is protected and where, but determining how well the area is protected, and if it is achieving its objectives. PADU, working with CNPPA, has recently reviewed the information on Africa, for example, and as a result of this work our appreciation of the conservation status of a number of African sites has changed. Assessment of this sort is continuing, but currently in a subjective rather than objective manner because of the patchy nature of the information and low staff levels. These problems are perhaps reflected in the following list.

It is for these reasons that we present here what we see as a *draft* list of protected landscapes, and one that we expect to be amended and updated extensively.

Draft List of Protected Landscapes

ALGERIA

National Parks

El Kala NP	2.17.06	76,438	1983
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ANGOLA

Regional Nature Parks

Chimalavera Regional Nature Park	3.08.04	15,000	1974
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ARGENTINA

Protected Regions

San Guillermo PR	8.37.12	981,000	1972
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Nature Parks

Cerro Colorado Archaeological and NaP	8.31.11	3,000	1974
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AUSTRALIA

State Recreation Areas

Booti Booti SRA	6.	1,146	
Bournda SRA	6.	2,244	
Bungonia SRA	6.	3,570	
Burrendong SRA	6.	1,235	
Burrinjuck SRA	6.	1,714	
Davidson Park SRA	6.	1,215	
Illawarra SRA	6.	1,150	
Munmorah SRA	6.	1,008	
Wyangala SRA	6.	2,013	

Nature Parks

Cutta Cutta Caves NaP	6.	1,499	
Douglas Hot Springs NaP	6.11.10	3,107	
Ellery Creek Big Hole NaP	6.09.07	1,766	
Redbank NaP	6.09.07	1,295	
Ruby Gap NaP	6. .	9,257	
Trephina Gorge NaP	6.09.07	1,771	

Environmental Parks

Goneaway EP	6.12.10	24,800	1974
Mount Zamia EP	6.06.06	1,140	
Townsville Town Common EP	6.01.01	3,248	
Wilandspey EP	6.07.06	5,200	1977

Parks

Cape Schanck Coastal P	6.06.06	1,080	1975
Discovery Bay Coastal P	6.13.11	8,530	1979
Gippsland Lakes Coastal P	6.06.06	16,500	1979
Lake Albacutya P	6.05.06	10,700	
Lysterfield P	6. .	1,151	
Murray-Kulkyne P	6.13.11	1,550	

State Parks

Cathedral Range SP	6.06.06	3,577	1979
Chiltern SP	6.13.11	4,255	
Coopracambra SP	6.06.06	14,500	1979
Eildon SP	6.06.06	24,000	
French Island SP	6.05.06	7,750	1979
Holey Plains SP	6.06.06	10,450	1978

Draft List of Protected Landscapes

Mount Samaria SP	6.06.06	7,600	1979
Mount Worth SP	6. .	1,040	
Nepean SP	6. .	1,151	
Pink Lakes SP	6.05.06	50,700	1979
Wabonga Plateau SP	6.13.11	21,200	1980
Warby Range SP	6.13.11	3,320	
<i>Recreation Parks</i>			
Para Wirra RP	6.05.06	1,409	
<i>Other areas</i>			
Beechworth HP	6.13.11	1,130	
Big Desert Wilderness	6.05.06	113,500	1979
AUSTRIA			
<i>National Parks</i>			
Hohe Tauern NP	2.32.12	25,000	1983
<i>Nature Reserves</i>			
Altauseersee NR	2.32.12	1,050	1959
Arnspitze NR	2.32.12	12,500	1942
Dachsteingebiet NR	2.32.12	20,000	1964
Gesause und anschliessendes Ennstal NR	2.32.12	23,800	1958
Grundlsee, Toplitzsee, Kammersee NR	2.32.12	9,700	1966
Hohe Wand NR	2.32.12	1,800	1969
Kaisergebirge NR	2.32.12	10,200	1963
Karwendel NR	2.32.12	72,000	1933
Lainzer Tiergarten NR	2.32.12	2,300	1941
Valsertal NR	2.32.12	3,300	1941
Villacher Alpe NR	2.32.12	1,902	1942
Wildapenar Salzatal NR	2.32.12	51,460	1958
<i>Landscape Protected Zones</i>			
Lobau LPZ	2.32.12	1,000	1954
<i>Other areas</i>			
Blockheide Eibenstein	2.32.12	1,400	1964
Bohmerwald	2.32.12	96,000	
Grossfragant	2.32.12	1,115	
Keutschacher See-Tal	2.32.12	2,532	1971
Millstätter See-Sud	2.32.12	1,984	1970
Neusiedlersee-Seewinkel	2.11.05	40,000	1932
Vornbacher Enge	2.32.12	3,000	
Weissensee	2.32.12	7,648	1970
Wollanig-Oswaldi Berg	2.32.12	1,120	1970
BANGLADESH			
<i>National Parks</i>			
Bhawal NP	4.03.01	5,022	1982
Madhupur NP	4.03.01	8,436	1982
BELGIUM			
Foret d'Anlier	2.09.05	1,800	
Foret de Soignes	2.09.05	4,326	
Foret de St-Michel St-Hubert	2.09.05	1,700	

*Draft List of Protected Landscapes***BURMA**

Hlawga W Zoo Park		3,056	
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COSTA RICA*National Parks*

Barra Honda NP	8.16.04	2,295	1974
Cahuita NP	8.16.04	1,700	1970
Volcan Irazu NP	8.16.04	2,309	1955

CZECHOSLOVAKIA*Protected Landscape Areas*

Beskydy CHKO	2.11.05	116,000	1973
Biele Karpaty CHKO	2.11.05	62,808	1979
Bile Karpaty CHKO	2.11.05	71,500	1980
Blanik CHKO	2.32.12	4,000	1981
Ceske stredohori CHKO	2.32.12	107,000	1976
Cesky kras CHKO	2.32.12	13,000	1972
Cesky raj CHKO	2.32.12	12,500	1955
Horna Orava CHKO	2.11.05	70,333	1979
Jeseniky CHKO	2.11.05	75,000	1969
Jizerske hory CHKO	2.32.12	35,000	1967
Kokorinsko CHKO	2.32.12	27,000	1976
Krivoklatsko CHKO	2.32.12	62,792	1978
Kysuce CHKO	2.11.05	65,462	1984
Labske Piskovce CHKO	2.32.12	30,000	1972
Luzicke hory CHKO	2.32.12	35,000	1976
Mala Fatra CHKO	2.11.05	19,792	1967
Male Karpaty CHKO	2.11.05	65,504	1976
Moravsky kras CHKO	2.11.05	12,000	1956
Muranska planina CHKO	2.11.05	21,931	1976
Orlicke hory CHKO	2.32.12	20,000	1969
Palava CHKO	2.11.05	7,000	1976
Podyji CHKO	2.11.05	10,300	1978
Polana CHKO	2.11.05	20,079	1981
Ponitrie CHKO	2.11.05	37,665	1985
Slavkovsky les CHKO	2.32.12	64,000	1974
Slovensky kras CHKO	2.11.05	36,165	1973
Slovensky raj CHKO	2.11.05	14,230	1964
Stiavnicke vrchy CHKO	2.11.05	77,630	1979
Sumava CHKO	2.32.12	160,000	1963
Trebonsko CHKO	2.11.05	70,000	1979
Velka Fatra CHKO	2.11.05	60,610	1973
Vihorlat CHKO	2.11.05	4,383	1973
Ychodne Karpaty CHKO	2.11.05	66,810	1977
Zdarske vrchy CHKO	2.11.05	71,500	1970

DENMARK*Protected Regions*

Selso-Lindholm-Bognaes PR	2.11.05	1,990	
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ECUADOR*National Recreation Areas*

Cajas NRA	8.37.12	28,808	1977
El Boliche NRA	8.33.12	1,077	1979

<i>Other areas</i>			
Pululahua Reserva Geobotanica	8.33.12	3,806	1978
FRANCE			
<i>National Parks</i>			
Cevennes NP	2.09.05	84,800	1970
<i>Pre-parcs</i>			
Cevennes pre-parc	2.09.05	228,000	1970
Ecrins pre-parc	2.32.12	178,600	1973
Mercantour pre-parc	2.17.06	200,000	1979
Pyrenees Occidentales pre-parc	2.16.06	206,000	1967
Vanoise pre-parc	2.32.12	145,000	1963
<i>Regional Nature Parks</i>			
Armorique PNR	2.09.05	65,000	1969
Briere PNR	2.32.12	40,000	1970
Brotonne PNR	2.09.05	40,000	1974
Camargue PNR	2.17.06	82,000	1970
Corse PNR	2.17.06	150,000	1972
Cote Bleue RNP	2.17.06	3,070	1982
Foret d'Orient PNR	2.09.05	70,000	1970
Haut Languedoc PNR	2.09.05	145,000	1973
Haut-Jura PNR	2.09.05	62,088	
Haut-Jura Parc Naturel Regional	2.09.05	62,088	1986
Haute Vallee de Chevreuse PNR	2.09.05	25,600	1975
Landes de Gascogne PNR	2.09.05	206,000	1970
Livradois-Forez Parc Naturel Regional	2.09.05	297,000	1983
Lorraine PNR	2.09.05	205,000	1974
Luberon PNR	2.17.06	120,000	1977
Marais Poitevin PNR	2.09.05	200,000	1979
Montagne de Reims PNR	2.09.05	50,000	1976
Morvan PNR	2.09.05	173,000	1970
Nord-Pas-de-Calais PNR	2.09.05	167,000	1968
Normandie Maine PNR	2.09.05	234,000	1975
Normandie-Maine PNR	2.09.05	234,000	1975
Pilat PNR	2.09.05	65,000	1974
Queyras PNR	2.32.12	60,000	1977
Vercors PNR	2.32.12	135,000	1970
Volcans d'Auvergne PNR	2.09.05	346,000	1977
Vosges du Nord PNR	2.09.05	120,000	1976
GERMAN DEMOCRATIC REPUBLIC			
<i>Landscape Protected Areas</i>			
Hiddensee	2.11.05	1,860	1955
Sachsische Schweiz	2.32.12	36,800	1956
GERMANY, FEDERAL REPUBLIC OF			
<i>Nature Reserves</i>			
Ammergauer Berge NR	2.32.12	27,600	1963
Die Lucie NR	2.11.05	1,800	
Eggstatt-Hemhofer Seenplatte NR	2.32.12	1,008	
Feldberg NR	2.32.12	3,231	
Hahnheide NR	2.11.05	1,450	
Hochkienberg in Chiemgauer Alpen NR	2.32.12	9,500	
Hoher Ifen NR	2.33.12	2,430	
Karwendel und Karwendelvorgebirge NR	2.32.12	19,000	1959

Draft List of Protected Landscapes

Laacher See NR	2.09.05	1,743	
Luneberg Heide NR	2.11.05	19,740	1906
Oberharz NR	2.11.05	7,053	1954
Retterschwanger Tal mit Daumen NR	3.32.12	2,100	
Wahner-Heide NR	2.09.05	2,630	
<i>Landscape Protected Areas</i>			
Danube Reservoirs NR & LPA	2.32.12	17,500	
Steinhuder Meer NR & LPA	2.09.05	5,780	
<i>Nature Parks</i>			
Altmühltal NaP	2.32.12	290,800	
Augburg-Westliche Walder NaP	2.11.05	117,500	
Bayer Rhon NaP	2.11.05	109,000	
Bayerischer Spessart NaP	2.09.05	130,700	1963
Bergstrase NaP	2.09.05	40,000	
Dummer NaP	2.09.05	3,600	
Fichtelgebirge NaP	2.11.05	98,000	
Frankenhohe NaP	2.11.05	97,000	
Franker Wald NaP	2.11.05	111,600	
Frankische Schweizveldensteiner Forest NaP	2.11.05	1,747	
Hasberge NaP	2.11.05	86,000	
Hessenreuther und Manteler Wald NaP	2.11.05	27,000	
Nordeifel NaP	2.09.05	174,300	1960
Oberpfelzer Wald NaP	2.32.12	112,900	
Siebengebirge NaP	2.09.05	4,200	1922
Steigerwald NaP	2.32.12	128,000	
Steinwald NaP	2.32.12	25,000	
<i>Other areas</i>			
Baerguendle Oytal and Hoefats	2.11.05	3,850	
Buckebergand Suntel	2.09.05	12,000	
Deister	2.09.05	9,500	
Diepholzer Moorniederung	2.09.05	17,850	
Eckernforder Bucht	2.11.05	11,563	
Elbe: Bleckede-Lauenburg	2.11.05	1,329	
Elbe: Schnackenburg-Hitzacker	2.11.05	2,836	
Flensburger Innen und Aussenfoerde	2.09.05	15,000	
Gramschatzer	2.09.05	6,000	
Grinden-Schwarzwald	2.09.05	15,000	
Grosser Ploner See	2.11.05	2,973	
Habichtswald	2.11.05	4,000	
Hils	2.09.05	10,000	
Hoher Vogelsberg	2.09.05	7,000	
Hohwacher Bucht	2.11.05	6,849	
Kellerwald	2.09.05	12,000	
Kermeter	2.09.05	6,000	
Nutscheld	2.09.05	5,000	
Ostfriesische Meere	2.09.05	7,931	
Paderborner Hohebane	2.09.05	3,000	
Rheinwald Taubergiesen	2.09.05	1,742	
Schachen und Reintel	2.11.05	4,000	
Schoenbuch	2.09.05	15,000	
Selenter See	2.11.05	2,141	
Siebengebirge	2.09.05	4,200	
Starnberger See	2.32.12	5,720	
Unterer Vogelsberg	2.09.05	10,000	
Westerhever Vorlandereien	2.09.05	2,131	

GREECE*National Parks*

Aenos NP	2.17.06	2,862	1962
Mikra Prespa NP	2.33.12	4,900	1974
Mount Oeta NP	2.17.06	3,010	1966
Parnassos NP	2.17.06	3,513	1938
Parnes NP	2.17.06	3,812	1961
Pindos (Valia Calda) NP	2.33.12	3,360	1966
Vicos-Aoos NP	2.33.12	3,400	1973

Forest Reserves

Kalavrita Aesthetic Forest	2.17.06	1,750	1977
Kavala Aesthetic Forest	2.17.06	2,816	1979
Nestos Aesthetic Forest	2.17.06	2,380	1977
Ossa Aesthetic Forest	2.17.06	16,900	1977
Patras Aesthetic Forest	2.17.06	1,850	1974
Sciathos Island Aesthetic Forest	2.17.06	3,000	1977

Other areas

Theodorou Island	2.17.06	3,450	1966
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GUAM

Guam Territorial Seashore	5.02.13	6,135	1978
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HAITI

La Citadelle	8.40.13	2,200	1968
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HONG KONG*Country Parks*

Lam Tsuen CoP	4.06.01	1,520	1979
Lantau North CoP	4.06.01	2,220	1978
Lantau South CoP	4.06.01	5,640	1978
Ma On Shan CoP	4.06.01	2,880	1979
Pat Sin Leng CoP	4.06.01	3,125	1978
Plover Cove (and extension) CoP	4.06.01	5,224	1978
Sai Kung East CoP	4.06.01	4,477	1978
Sai Kung West CoP	4.06.01	3,000	1978
Shing Mun CoP	4.06.01	1,400	1977
Tai Lam CoP	4.06.01	5,330	1979
Tai Mo Shan CoP	4.06.01	1,440	1979
Tai Tam (including Quarry Bay Extension) CoP	4.06.01	1,585	1977

HUNGARY*Landscape Protected Areas*

Aggteleki LPA	2.11.05	19,708	1978
Badacsonyi LPA	2.11.05	7,028	1965
Barcsi osborokas LPA	2.11.05	3,417	1974
Borzsonyi LPA	2.11.05	17,897	1978
Budai LPA	2.12.05	10,234	1978
Davavanyai LPA	2.12.05	3,433	1975
Ferto-to LPA	2.12.05	12,542	1977
Gemenci LPA	2.12.05	17,779	1977
Gerecsei LPA	2.12.05	8,617	1977
Hansagi LPA	2.12.05	6,245	1976
Kelet-Mecsek LPA	2.12.05	9,248	1977

Draft List of Protected Landscapes

Koszegi LPA	2.11.05	3,987	1980
Kozep-tiszai LPA	2.12.05	7,670	1978
Lazberci LPA	2.11.05	8,510	1975
Martelyi LPA	2.12.05	2,232	1971
Ocsai LPA	2.12.05	3,575	1975
Orgovanyi LPA	2.12.05	2,953	1976
Orsegi LPA	2.11.05	37,911	1978
Pilisi LPA	2.11.05	23,323	1978
Pusztaszeri LPA	2.12.05	22,226	1976
Soproni LPA	2.12.05	4,905	1977
Szabadkigyosi LPA	2.12.05	3,785	1977
Szatmar-Beregi LPA	2.12.05	22,246	1982
Szentgyorgyvolgyi LPA	2.11.05	1,916	1976
Tihanyi LPA	2.11.05	1,100	1952
Vertesi LPA	2.12.05	13,723	1976
Zselicsegi LPA	2.11.05	9,042	1576
<i>Landscape Parks</i>			
Matra Landscape Conservation Area	2.12.05	11,862	1985
Sarret Landscape Conservation Area		2,210	1985
Tokaj-Bodrogzug Landscape Conservation Area		4,242	1985
ICELAND			
<i>Nature Reserves (Landscape)</i>			
Esjufjöll NR (Landscape)	2.05.05	27,000	1978
Herðubreiðarfríðland NR (Landscape)	2.05.05	17,000	1974
Hornstrandir NR (Landscape)	2.05.05	58,000	1975
Hvannalindir NR (Landscape)	2.05.05	4,000	1973
Lonsoraefi NR (Landscape)	2.05.05	32,000	1977
Vatnsfjorour NR (Landscape)	2.05.05	20,000	1975
<i>Other areas</i>			
Myvatn-Laxa	2.05.05	440,000	1974
INDIA			
<i>Game Reserves</i>			
Gulmarg GR	2.38.12	18,000	1981
INDONESIA			
<i>Recreation Parks</i>			
Danau Matado/Mahalano RP	4.24.13	30,000	1979
Danau Towuti RP	4.24.13	65,000	1979
Gunung Gamping RP	4.22.13	1,102	1982
Gunung Tampomas RP	4.22.13	1,250	1979
Gunung Tangkuban Perahu RP	4.22.13	1,290	1974
Pulau Weh RP	4.21.13	1,300	1982
Tuti Adagae RP (Alor Is.)	4.23.13	5,000	1981
ITALY			
<i>National Parks</i>			
Circeo NP	2.17.06	8,400	1934
Stelvio NP	2.32.12	137,000	1935

Nature Parks

Adamello Brenta Reg NaP	2.32.12	43,600	1967
Alpe Veglia NaP	2.32.12	39,300	
Alta Valle Pesio NaP	2.32.12	2,690	1978
Cansiglio NaP	2.32.12	25,300	1972
Maremma NaP	2.17.06	7,800	1975
Paneveggio-Pale S. Martino Reg NaP	2.32.12	15,800	1967
Portofino Reg NaP	2.17.06	1,200	1935
Prescudin NaP	2.32.12	1,647	1974
Puez Geissler NaP	2.32.12	9,400	1977
Rieserferner NaP	2.32.12	15,000	
Sarntaler Alpen NaP	2.32.12	29,800	
Schlern NaP	2.32.12	6,400	1974
Texelgruppe NaP	2.32.12	33,000	1976
Valle del Ticino Reg NaP	2.32.12	120,000	1974

Parks

Groane Reg P	2.32.12	3,000	1976
Po Delta Regional P	2.32.12	30,000	1982

JAPAN*National Parks*

Akan NP	2.14.05	90,538	1934
Ashizuri-Uwakai NP	2.02.02	10,967	1972
Aso NP	2.02.02	72,492	1934
Bandai-Asahi NP	2.15.05	189,582	1950
Chichibu-Tama NP	2.02.02	121,600	1950
Chubu-Sanguo NP	2.02.02	174,323	1934
Daisen-oki NP	2.02.02	31,927	
Daisetsuzan NP	2.14.05	230,894	1934
Fuji-Hakone-Izu NP	2.02.02	122,686	1936
Hakusan NP	2.02.02	47,683	1962
Iriomote NP	2.03.03	12,506	1972
Ise-Shima NP	2.02.02	55,549	1946
Joshinetsu Kogen NP	2.15.05	189,028	1949
Kirishima-Yaku NP	2.02.02	55,008	1934
Minami Arupusu NP	2.02.02	35,752	1964
Nikko NP	2.15.05	140,698	1934
Ogasawara NP	2.02.02	6,433	1972
Rikuchu-Kaigan NP	2.15.05	12,348	1955
Rishiri-Rebun-Sarobetsu NP	2.14.05	21,222	1974
Saikai NP	2.02.02	24,653	1955
Sanin-Kaigan NP	2.02.02	8,996	1963
Seto-Naikai NP	2.02.02	62,957	1934
Shikotsu-Toya NP	2.14.05	98,332	1949
Shiretoko NP	2.14.05	38,633	1964
Towada-Hachimantai NP	2.15.05	85,409	1936
Unzen-Amakusa NP	2.02.02	25,496	1934
Yoshino-Kumano NP	2.02.02	58,546	1936

KOREA, REPUBLIC OF*National Parks*

Bukhan Mt NP	2.15.05	7,845	1983
Chiak Mt NP	2.15.05	18,209	1984
Chiri Mt NP	2.02.02	44,045	1967
Chuwang Mt NP	2.15.05	10,558	1976
Dogyu Mt NP	2.15.05	21,900	1975
Halla Mt NP	2.02.02	13,300	1970

Draft List of Protected Landscapes

Kaya Mt NP	2.15.05	5,781	1972
Kyeryong Mt NP	2.15.05	6,098	1968
Kyong Ju NP	2.15.05	13,816	1968
Naejang Mt. NP	2.02.02	7,603	1972
Odae Mt NP	2.15.05	29,850	1975
Songni Mt NP	2.15.05	28,340	1970
Sorak Mt NP	2.15.05	37,300	1970
Worak Mt NP	2.15.05	28,450	1984
<i>Marine National Parks</i>			
Hallyo MNP	2.02.02	47,862	1968
Sosan MNP	2.15.05	32,899	1978
Tadohae MNP	2.02.02	203,910	1981
LUXEMBOURG			
<i>Nature Parks</i>			
Parc Germano Luxembourgeois NaP	2.09.05	78,400	1964
MALAYSIA			
<i>Game Reserves</i>			
Pulau Tioman GR	4.07.01	11,400	1972
<i>Parks</i>			
Templer Park	4.07.01	1,200	1955
<i>Virgin Jungle Reserves</i>			
Larut Hills VJR	4.07.01	2,747	
MARTINIQUE			
<i>Regional Nature Parks</i>			
Martinique RNaP	8.41.13	70,150	1976
MOROCCO			
<i>National Parks</i>			
Toubkal NP	2.17.06	36,000	1934
NETHERLANDS			
<i>National Parks</i>			
Kennemerduinen NP	2.09.05	1,240	1950
<i>Nature Reserves</i>			
Amsterdamse Waterleidingduinen NR	2.09.05	3,370	
<i>Other areas</i>			
Oude Venen	2.09.05	1,288	
NORWAY			
<i>Landscape Protected Areas</i>			
Brannsetta LPA	2.06.05	1,880	1983
Dovre LPA	2.03.03	5,700	1974
Favnvassdalen LPA	2.03.03	1,390	1983
Femundsmarka LPA	2.03.03	7,000	1971
Froan LPA	2.03.03	4,000	1979
Gardsjoen LPA	2.06.05	2,000	1983

Draft List of Protected Landscapes

Grytdalen LPA	2.03.03	1,600	1978
Indre Vassfaret LPA	2. .	4,200	1985
Innerdalen LPA	2.03.03	7,300	1977
Jaerstrendene LPA	2.03.03	1,608	1977
Mosvatn/Austfjellet LPA	2.10.05	30,600	1981
Osterdalen LPA	2.03.03	2,700	1983
Reisa LPA	2. .	8,000	1986
Skaupsjoen/Hardangerjokulen LPA	2.03.03	55,900	1981
Skipsfjorddalen LPA	2.03.03	4,200	1978
Strandaa/Os LPA	2.03.03	1,670	1983
Utladalen LPA	2.03.03	30,000	1980
Vassfaret & Vidalen LPA	2.10.05	20,000	1985
Vidmyr-Hovden LPA	2.10.05	5,900	1986
PAKISTAN			
<i>National Parks</i>			
Margalla Hills NP	4.08.04	14,786	1980
PARAGUAY			
<i>Protection Forests</i>			
Jaku'i Protection Forest	8.08.02	1,000	1975
Nacunday Protection Forest	8.08.02	1,000	1975
PERU			
<i>Historical Sanctuaries</i>			
Chacamarca HS	8.36.12	2,500	1974
PHILIPPINES			
<i>National Parks</i>			
Agoo-Damortis NP	4.26.13	10,947	1965
Aurora Memorial NP	4.26.13	5,626	1949
Biak-na-Bato NP	4.26.13	2,117	1937
Mainit Hot Spring NP	4.26.13	1,381	1958
Mount Arayat NP	4.26.13	3,715	1933
Mount Banahaw-San Cristobal NP	4.26.13	11,133	1941
<i>Natural Monuments</i>			
Central Cebu NM	4.26.13	11,894	1937
<i>Other areas</i>			
Lake Dapao	4.26.13	1,500	1965
POLAND			
<i>Landscape Parks</i>			
Bolimowski PK	2.11.05	25,900	1986
Brodnicki PK	2.11.05	22,240	1985
Chelmski PK	2.11.05	23,500	1983
Dolina Slupi PK	2.11.05	120,210	1981
Drawski PK	2.11.05	63,642	1979
Gor Stolowych PK	2.32.12	13,600	1981
Gostynynsko-Wloclawski PK	2.11.05	51,344	1979
Inski PK	2.11.05	51,843	1982
Kaszubski PK	2.11.05	34,544	1983
Kazimierski PK	2.11.05	38,670	1979
Kozienicki PK	2.11.05	45,535	1983

Draft List of Protected Landscapes

Ksiazanski PK	2.32.12	4,500	1981
Lagowski PK	2.11.05	10,070	1985
Lasy Janowskie PK	2.11.05	62,950	1984
Mazowiecki PK	2.10.05	5,510	1986
Mazurski PK	2.10.05	69,219	1978
Mierzeja Wislana PK	2.11.05	22,390	1985
Nadmorski PK	2.11.05	27,610	1978
Narwianski PK	2.10.05	47,915	1985
Poleski PK	2.11.05	27,500	1983
Pszczewski PK	2.11.05	57,587	1986
Snieznicki PK	2.11.05	28,800	1981
Sobiborski PK	2.11.05	19,000	1983
Strzelecki PK	2.11.05	10,300	1983
Suwalski PK	2.10.05	14,901	1976
Szczecinski PK	2.11.05	22,383	1982
Trojmiejski PK	2.11.05	33,104	1979
Tucholski PK	2.11.05	52,929	1985
Wdzydzki PK	2.11.05	17,650	1983
Wigierski PK	2.10.05	21,301	1976
Wzniesienie Elblaskie PK	2.11.05	33,292	1985
Zaleczanski PK	2.11.05	14,278	1978
Zespol Jurajskich PK	2.11.05	246,276	1980
Zespol Parkow Ponidzia PK	2.11.05	82,647	1986
Zywiecki PK	2.11.05	57,660	1986
PORTUGAL			
<i>National Parks</i>			
Peneda-Geres NP	2.16.06	70,290	1970
<i>Nature Reserves</i>			
Serra da Malcata Partial NR	2.16.06	16,200	1981
<i>Nature Parks</i>			
Arrabida NaP	2.17.06	10,821	1976
Mountain of Aires and Candeeiros NaP	2.16.06	34,000	
Serra da Montezinho NaP	2.16.06	75,000	
Serra de Estrela NaP	2.16.06	100,000	1976
<i>Other areas</i>			
Sintra-Cascais Protected Landscape	2.16.06	3,258	
SOUTH AFRICA			
<i>Nature Reserves</i>			
Albert Falls Public Resort NR	3.08.04	3,012	1975
Chelmsford Public Resort NR	3.08.04	6,845	1975
Midmar Public Resort NR	3.08.04	2,831	1968
Spioenkop Public Resort NR	3.08.04	4,562	1975
SPAIN			
<i>Nature Parks</i>			
Cuenca Alta del Manzanares NaP	2.16.06	4,304	1978
Dehesa del Moncayo NaP	2.17.06	1,389	1978
Dels Aiguamolls de l'Emporda NaP	2.17.06	4,784	1983
Dunas de Corralejo & Islas de Lobos NaP	2.40.13	2,482	1982
Hayedo de Tejera Negra NaP	2.16.06	1,391	1978
Lago de Sanabria NaP	2.16.06	5,027	1978
Lagunas de Ruidera NaP	2.16.06	3,750	1979

Draft List of Protected Landscapes

Monfrague NaP	2.16.06	17,852	1979
Monte El Valle NaP	2.17.06	1,900	1979
Sierra Espuna NaP	2.17.06	9,961	1978
Torcal de Antequera NaP	2.17.06	1,200	1978
<i>Hunting Reserves</i>			
Ancares Leoneses HR	2.16.06	38,300	1973
Mampodre HR	2.16.06	29,238	1966
Montes Universales HR	2.17.06	59,260	1973
Riano HR	2.16.06	73,214	1966
Saja HR	2.16.06	180,186	1966
Sierra de la Culebra HR	2.16.06	65,891	1973
Sierra de la Demanda HR	2.16.06	73,819	1973
Sonsaz HR	2.16.06	68,106	1973
Urbion HR	2.16.06	100,023	1973
Vinamala HR	2.16.06	49,230	1966
SWEDEN			
<i>Nature Reserves</i>			
Sandsjobacka NR	2.10.05	4,700	1968
<i>Other areas</i>			
Brattforsheden	2.03.03	10,000	1984
Fegen	2.10.05	3,668	1980
Firth of Gullmarn	2.10.05	11,860	1983
Hackeberga	2.11.05	4,350	1982
Halle-Hunneberg	2.10.05	5,950	1982
Innerviskfjardarna	2.03.03	1,530	1974
Kinnekulle	2.10.05	7,000	1982
Malingsbo-Kloten	2.10.05	44,800	1981
Nordingra	2.03.03	6,000	1983
Stigfjorden	2.10.05	2,780	1979
SWITZERLAND			
<i>Landscape Protected Areas</i>			
Derborence LPA	2.32.12	1,000	1959
Piora LPA	2.32.12	3,700	
THAILAND			
<i>National Parks</i>			
Doi Khuntan NP	4.10.04	25,529	1975
Khao Laem Ya - Mu Ko Samet NP	4.05.01	20,000	1981
Khao Sam Lan NP	4.05.01	4,457	1981
Phu Kradung NP	4.10.04	34,812	1962
<i>Wildlife Sanctuaries</i>			
Ton Nga Chang WS	4.07.01	18,200	1978
UGANDA			
<i>Sanctuaries</i>			
Entebbe S	3.05.04	5,200	

*Draft List of Protected Landscapes***UNITED KINGDOM***National Parks*

Brecon Beacons NP	2.08.05	143,400	1957
Dartmoor NP	2.08.05	91,300	1951
Exmoor NP	2.08.05	68,632	1954
Lake District NP	2.08.05	228,000	1951
North York Moors NP	2.08.05	143,221	1952
Northumberland NP	2.08.05	103,079	1956
Peak District NP	2.08.05	142,285	1951
Pembrokeshire Coast NP	2.08.05	57,937	1952
Snowdonia NP	2.08.05	218,847	1951
Yorkshire Dales NP	2.08.05	176,113	1954

Other areas

New Forest	2.08.05	26,900	
Broads	2.08.05	28,700	

UNITED STATES*National Reserves*

Pinelands NaR	1.05.05	438,210	1978
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National Wildlife Refuges

Arctic NWR	1.13.09	7,306,596	1960
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Natural Monuments

Devil's Tower NM	1.18.11	1,346	1906
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National Lakeshores

Apostle Island NL	1.22.14	17,084	1970
Indiana Dunes NL	1.05.05	5,073	1966
Pictured Rocks NL	1.05.05	28,661	1966
Sleeping Bear Dunes NL	1.22.14	28,775	1970

National Seashores

Assateague Island NS	1.06.05	16,038	1965
Canaveral NS	1.06.05	23,321	1975
Cape Cod NS	1.05.05	18,018	1961
Cape Hatteras NS	1.06.05	12,270	1937
Cape Lookout NS	1.06.05	11,493	1966
Cumberland Island NS	1.06.05	14,924	1972
Fire Island NS	1.05.05	7,834	1964
Gulf Islands NS	1.06.05	57,084	1971
Padre Island NS	1.18.11	54,196	1968
Point Reyes NS	1.07.06	26,426	1972

Parks

Catoctin Mountain Park	1.05.05	2,334	1936
Piscataway Park	1.05.05	1,701	1961

National Historic Parks

C & O Canal NHP	1.05.05	50,161	1971
Chaco Culture NHP	1.19.12	13,760	1907
Jean Lafitte NHP	1.06.05	3,480	1978

*Draft List of Protected Landscapes**National Recreation Areas*

Bighorn Canyon NRA	1.19.12	48,644	1966
Curecanti NRA	1.19.12	16,985	1965
Cuyahoga Valley NRA	1.05.05	12,950	
Delaware Water Gap NRA	1.05.05	28,340	1965
Lake Chelan NRA	1.20.12	25,047	1968
Ross Lake NRA	1.20.12	47,582	1968

Other areas

Adirondack Park	1.05.05	2,426,200	1971
Appalachian National Scenic Trail	1.05.05	21,058	1968
Buffalo National River	1.05.05	38,100	1972
Delaware National Scenic River	1.05.05	1,113	1978
Lower St Croix National Scenic River	1.05.05	3,512	1972
New River Gorge National River	1.05.05	25,101	1978
Obed Wild and Scenic River	1.05.05	2,125	1976
Ozark National Scenic Riverways	1.05.05	32,209	1972
Rio Grande Wild and Scenic River	1.09.07	3,885	1978
St Croix National Scenic River	1.05.05	25,373	1969

URUGUAY*National Parks*

Arequita NP	8.32.11	1,000	1964
Franklin Delano Roosevelt NP	8.32.11	1,500	1916

YUGOSLAVIA*National Parks*

Djerdap NP	2.33.12	82,115	NA
Kozara NP	2.33.12	3,375	NA
Lovcen NP	2.17.06	2,400	1952

Other areas

Fruska Gora	2.33.12	22,000	1960
Glacicia	2.33.12	23,760	1958
Mavrovo	2.33.12	73,088	1949
Pelister	2.33.12	12,000	1949
Resava	2.33.12	10,000	1957

ZIMBABWE*Botanical Reserves*

Bunga Forest Botanical Reserve	3.07.04	1,558	1975
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Recreation Parks

Ngezi RP	3.08.04	5,800	1956
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