

Reprints WCMC/I

27893

An assessment of the importance of the forests
of south-east Viti Levu, Fiji.

Prepared by

The IUCN Conservation Monitoring Centre,
Cambridge, U.K.

May 1986

This report has been prepared by the IUCN Conservation Monitoring Centre under contract to the U.K. Commonwealth Development Corporation. Its aim is to assess the implications of proposals for rainforest exploitation in the south-east of Viti Levu.

This document is intended for guidance but should in no way replace the advice of local conservation experts or a full Environmental Impact Assessment.

SUMMARY

1. Like other high volcanic islands in the Pacific, Viti Levu, the main island of Fiji, has diverse forests which are important watersheds, are rich in endemic species and are of considerable regional significance.
2. Viti Levu has been identified, on the basis of its species endemism and an analysis of its ecosystems and species richness, as the fifth most important island for conservation in the Pacific.
3. There are approximately 1500 vascular plant species native to the islands of Fiji of which 40-50% are endemic. The wet zone lowland forests of Viti Levu east of the Sigatoka River are particularly species-rich.
4. Sixteen species of birds endemic to Fiji are found on Viti Levu together with 1 endemic bat, 2 endemic reptiles and 2 endemic frogs. The majority of these are known from forest regions.
5. There are probably in excess of 3500 species of terrestrial invertebrates in the Fiji islands. Many groups are poorly known but evidence from the Macrolepidoptera suggest almost 50% endemism. The majority of endemics is entirely dependent on the rain forests of Viti Levu and Vanua Levu.
6. Extensive logging has already occurred in the south-east part of Viti Levu and further logging is likely to have serious consequences for the remaining rain forests and their biota.
7. The three main rivers (Rewa, Navua and Sigatoka) draining to the south coast have forested catchment areas and their water regimes may well be altered by logging, particularly the Navua where logging is already heavy.
8. Logging generally leads to soil run-off through erosion, resulting in increased sediment-loading in rivers and the deposition of silt in coastal waters which has an impact on coral reefs and mangroves. Sedimentation is already a major threat to the fringing reefs of Viti Levu which are one of the country's prime tourist attractions.
9. Removal of trees will reduce protection from hurricane damage.
10. Fiji has a series of 5-year Development Plans prepared by the Government which provides for the use of Fiji's natural resources. The most recent, the Ninth Development Plan, which is currently in operation, has a greatly expanded conservation section.
11. Nevertheless, there is an inadequate reserve system both in terms of its size and the diversity of natural habitat covered. Little provision has been made to protect the rain forest of south-east Viti Levu, the only reserve within this area being the Garrick Memorial Reserve. Additional reserves have been proposed for this region.
12. Given the importance of the forests of south-eastern Viti Levu, logging activities should only be increased following detailed environmental impact assessments.

Introduction

Fiji, situated in the path of prevailing south-west trade winds, has a tropical marine climate and consists of over 300 islands of varied topography including both low coral atolls and high mountainous interior.

CONTENTS

	Page
Summary	1
Contents	2
Introduction	3
Flora and fauna	3
Biogeographical considerations	4
Logging and its consequences	5
Impact on watersheds	5
Impact of logging on the marine environment	5
Impact of logging on flora and fauna	6
Protected Areas	7
Remedial Action	8
References	9
Appendix 1 Nature Reserves	10
Appendix 2 Proposed Reserves	11
Appendix 3 Endemic Palms	13
Appendix 4 Threatened Animal Species	14
Appendix 5 Endemic Animal Species	15
Appendix 6 Conservation Legislation	17

Endemic vertebrates are listed in Appendix 5. No large land animals are known to exist in Fiji. One of the 13 endemic Fijian birds occurs in the forests of Viti Levu, but the other 12 are restricted to the remaining forested areas of the island. The 13 endemic Fijian birds occur in the forests of Viti Levu, but the other 12 are restricted to the remaining forested areas of the island.

There are a large number of endemic invertebrates on Viti Levu, most of which are poorly known. Insects, one of the better known groups, include over 3000 species, representing an extremely important part of the island's biota. The majority of Fijian insects are in the orders Lepidoptera (1000+), Coleoptera (1000+), Diptera (300+) and Hymenoptera.

CONTENTS

Page

1

Summary

2

Contents

3

Introduction

4

Flora and Fauna

5

Biogeographical considerations

6

Logging and its consequences

7

Impact on waterbirds

8

Impact of logging on the marine environment

9

Impact of logging on flora and fauna

10

Protected Areas

11

Remedial Action

12

References

13

Appendix 1 - Nature Reserves

14

Appendix 2 - Proposed Reserves

15

Appendix 3 - Endemic Plants

16

Appendix 4 - Threatened Animal Species

17

Appendix 5 - Endemic Animal Species

18

Appendix 6 - Conservation Legislation

Digitized by the Internet Archive
in 2010 with funding from
UNEP-WCMC, Cambridge

Introduction

Fiji, situated in the path of prevailing south-east trade winds, has a tropical marine climate and consists of over 300 islands of varied topography including both low coral atolls and high volcanic islands. Viti Levu, the largest, has a rugged mountainous interior, with peaks rising to over 1200 metres, which results in a wet windward south-east and a dry leeward north-west. Annual rainfall is high, exceeding 3000 mm. The interior is drained by five major rivers, the Rewa, Navua, Sigatoka, Ba and Nadi, the first three draining through the south-eastern forests to the south coast. The island is still densely vegetated in many areas, with rain forest in the south-east and "talasinga" (dry forests, savanna woodlands and grasslands) in the north-west. The south coast is known as the 'Coral Coast' and is bordered by the longest chain of fringing reefs in Fiji, the only major break being opposite the mouth of the Sigatoka River. Suva Barrier Reef, protecting Suva Harbour and Laucala Bay, lies off the south-east corner of the island.

Flora and fauna

Fiji has around 1500 native vascular plant species, including 310 pteridophytes. Forty to fifty per cent of native species are endemic, with one endemic family (Degeneriaceae) and 11 endemic genera (nine of which are monotypic, the remainder containing two or three species). In general, endemic plant species are restricted to the remaining forested areas; the lowland forests of the wet zone, such as those to the east of the Sigatoka River on Viti Levu, are particularly species-rich. Virtually every forested region of Fiji which is bounded by a major valley is the entire range of at least one plant species. Upland rain forests support fewer tree species, but the number of epiphytic species increases with altitude (especially among orchids and ferns). There is no comprehensive list of rare and threatened plants for Fiji but data are available for palms, ten species endemic to Fiji occurring in south-east Viti Levu. A full list of endemic palms is given in Appendix 3 with their distribution within Viti Levu where known.

Endemic vertebrates are listed in Appendix 5. No large land animals are native to Fiji. There are two endemic bats, one of which is known from Viti Levu. Sixteen of the 23 endemic Fijian birds occur in the forests of Viti Levu, nine primarily or exclusively in mature forests. On Viti Levu, four species occur only in the forests of the south-east (although they may occur on other islands) and one, the Pink-billed Parrotfinch Erythrura kleinschmidti (IUCN category: Rare) is endemic to this region. There are seven (or eight - with a possible new species) endemic reptiles in Fiji, one of which - the elapid snake Ogmodon vitianus (IUCN category: Indeterminate) - occurs only on Viti Levu. There are two endemic frogs, the eastern-most frogs of the South Pacific, both of which occur on Viti Levu.

There are a large number of endemic invertebrates on Viti Levu, most of which are poorly known. Insects, one of the better known groups, include over 3000 species, representing an extremely important part of the island's biota. The majority of Fijian insects are in the orders Lepidoptera (1000+), Coleoptera (1000+), Diptera (300+) and Hymenoptera

(250+). The literature on Fijian insects is scanty; the only complete catalogue is for the Macrolepidoptera (butterflies and larger moths). Nearly half of Fiji's 400 Macrolepidoptera are endemic and the majority of these endemics are entirely dependent on the rain forests of the two major islands, Viti Levu and Vanua Levu. Endemism among molluscs is also high, particularly at the generic level, and many taxa are forest dwellers.

Biogeographical considerations

Biogeographic relationships and patterns of dispersal in the South Pacific are far from being clearly understood. What is certain, however, is that the richness and high endemism and remoteness of the rain forests of Vanua and Viti Levu are of regional as well as local significance.

The origin of the Fijian fauna and flora has been contentious. Some authorities have envisaged a mainly continental biota, part of a once much larger land mass possibly connected to Australia. More recent work, however, gives greater credence to an insular biota, acquired mainly via oceanic migration routes. The Melanesian and Polynesian islands lie like stepping stones from New Guinea to the eastern Pacific, providing a variety of routes for the colonization of those islands by animals and plants. Without doubt the fauna and flora of Fiji has its origin in New Guinea, the Solomons and Vanuatu (with the probable exception of Fiji's two iguanas and one boa, which are almost certainly Central or South American in origin). The mode of dispersal is believed to have been mainly by flotation (plants, some invertebrates) and by flight, either directly (birds, insects, arachnids) or as passengers (plants, molluscs). Flights by Lepidoptera of 1500 km or more are commonplace in the Pacific.

However, the flora and fauna of Fiji are quite different from, and much richer than, those of the islands of the eastern Pacific. Fiji features weakly or not at all in the patterns of taxa spreading eastwards (whereas Vanuatu and Samoa are often involved, at least for Macrolepidoptera). The vegetational and physical diversity of Vanua Levu and Viti Levu has permitted the establishment of a large number of species, many of them rain forest inhabitants. These forests then, are the key to diversity in Fiji.

Vanua Levu and Viti Levu are last outposts for many rain forest organisms. A large proportion of the fauna and flora of these islands remains endemic and reaches no further eastwards for the simple reason that there are few rain forests in that direction. Small rain forests occur within the Samoas, but in general the attenuation of species in an easterly direction is rapid. Twenty-three per cent of the indigenous phanerogam flora of Fiji extends no further eastwards, most of these being endemic forest plants with heavy seeds. Similarly, the 50 per cent endemic Macrolepidoptera are virtually all rain forest species. The species of larger moths and butterflies that are common to the islands of Fiji and Polynesia tend to be restricted to the talasinga (dry) areas of the former and the low-lying coral atolls and raised limestone islands of the latter. Such Polynesian islands are too small and too isolated for the seeds of many forest plants to reach them, and often too dry for the seeds to prosper.

Logging and its consequences

There is currently little accessible lowland rain forest left on Fiji's two largest islands and much of the natural forest has disappeared on Viti Levu. Forested sections of the south-east have been heavily logged, largely due to easy accessibility from the capital Suva. Further pressure on these forests will have a serious effect on their flora and fauna.

Impact on watersheds

Rain forests have an important function in controlling the water cycle of the region, and on islands such as Viti Levu which are subject to severe hurricanes they afford considerable protection. Flooding earlier this year may have been exacerbated by the extensive logging that has already occurred. Logging on steep slopes or in areas with heavy rainfall leads to soil instability, subsequent erosion and loss of nutrients, particularly on volcanic soils such as those of Viti Levu. Soil run-off increases the turbidity of streams and rivers and may reduce the availability of pure water supplies. Much of the high rainfall on Viti Levu drains through the Rewa, Sigatoka and Navua Rivers to the south coast; logging within these watersheds would significantly increase their sediment loading. Of particular concern is the Navua catchment which contains approximately half the standing crop of harvestable timber.

Impact of logging on the marine environment

Sediment carried downstream by rivers is deposited along the coast and can adversely affect the marine environment. Coral mortality in the Suva area, due to the removal of vegetation from the watershed of the Rewa River, was recorded as early as 1924 and increased sediment loading in coastal waters is now recognised as being the major threat to Fiji's reefs. Corals invariably require clear, relatively nutrient-poor water as they depend on symbiotic algae within their tissues for their nutrients. Turbid waters inhibit photosynthesis in the algae, resulting in the death of the coral. Silt also causes oxygen depletion in the water and inhibits the recruitment of coral larvae which require a firm substrate for settling. Throughout the world, increased sediment loading of coastal waters is leading to significant damage on fringing reefs.

The Coral Coast is the main tourist resort area in Fiji, tourism being the second major source of foreign exchange in the country. The reefs are a major attraction for snorkelling, glass bottom boat tours, SCUBA diving and recreational fishing. They also provide an important source of fish and shellfish to local villagers and protect beaches from erosion by wave action and storms. The Suva Barrier Reef, rated as one of the top SCUBA diving sites in the world, may also be affected although it lies offshore. Water quality is deteriorating in the Suva Harbour area and further siltation in the Rewa River should be avoided at all costs if the appeal of this site is to be maintained. Damage to the south coast reefs from increased siltation in the Sigatoka, Navua and Rewa Rivers could have a significant impact on the tourist industry if the reefs lose their reputation with overseas visitors.

Mangroves, a second important coastal habitat, serve as nursery areas for economically important fish, contribute to the protection of the coastline and play a major role in preventing siltation of coral reefs. They grow best in areas with significant inputs of freshwater, which may therefore be significantly altered by loss of forest. In Fiji, the main threat to mangroves is land reclamation, and there is a major effort underway to document this and formulate future management options. Indirect impacts from logging activities through altered freshwater input and increased sediment loading could negate these efforts to maintain pristine samples of mangrove habitat along the south coast, for example the proposed Samabula River mangrove reserve, near the mouth of the Rewa River.

Impact of logging on flora and fauna

Complete surveys of plants and animals are not available at this time (particularly for the invertebrates), but IUCN identifies 24 threatened animal species occurring in Fiji, listed in Appendix 4. A tenet of biogeographical theory is that the diversity of a fauna is, to some extent, a function of the area of vegetation with which it is associated. Any reduction of that area must be deleterious in terms of reducing diversity, the question is whether the losses are acceptable. There are too few scientific data to predict when accumulated reductions in area reduce diversity to such an extent that extinctions of endemic species become likely. However, within the limited confines of Fiji, where the small areas of rain forest are already under severe pressure, an extension of logging operations should only be undertaken with extreme caution and in the least environmentally disturbing way. General comments on the main taxonomic groups are as follows:

Birds: Logging always adversely influences the number of bird species supported within a forest area. Although a few species increase their numbers and some others colonize the area, the majority of species decline in abundance and some species, usually those already at naturally low densities, suffer extinction. The Pink-billed Parrotfinch is a low-density species, endemic to south-eastern Viti Levu forests, and is a prime candidate for total extinction if logging on the island proceeds.

Reptiles: Too little information is available on the ecology of Fiji's terrestrial reptiles to predict the consequences of logging for their population levels.

Amphibians: The Fijian Ground Frog Platymantis vitianus and Fijian Tree Frog P. vitiensis are respectively mainly and entirely restricted to indigenous moist forest and thus particularly at risk from logging operations.

Insects: It is only possible to assess the potential effects of logging on the Macrolepidoptera but there is good reason to suppose that the conclusions for this group of insects would relate closely to other groups. There are no data on the impact of logging on Fijian forests but in Vanuatu, large scale logging operations at Nouankao River on Erramango Island had an enormous and deleterious effect on the Lepidoptera, resulting in dominance by cosmopolitan species inhabiting secondary vegetation. Extinctions of Lepidoptera on Fiji are now a real possibility; two endemic forest species, Utetheisa clareae and Hypolimnas inopinata, are already seriously threatened. It is a small progression to the situation in Hawaii, where many species of insects are extinct and literally hundreds endangered.

Molluscs: Molluscs of the high volcanic islands are considered to be under greatest threat of all molluscan faunas. For example, on Hawaii, about 600 of the original 1061 endemic terrestrial snails are now extinct and a further 200-300 are considered endangered. Loss of forest habitat has been the major cause of their decline. Unfortunately the molluscs of Viti Levu are poorly known, but by extrapolation one can expect many extinctions with increasing forest loss.

Plants: Particular groups of plant species at risk are epiphytes such as ferns, orchids and bryophytes.

Protected areas

A review of the protected areas system of Oceania has recently been carried out by Arthur Dahl for IUCN. Although this work is still in draft form there are a number of conclusions which can be drawn. Dahl drew up a list of all islands of sufficient size and/or isolation to be potentially of some distinct conservation interest. A second list of 226 islands of significant conservation interest due to the presence of features such as endemic species or protected areas was then drawn up and subjected to an analysis based on values allotted for a variety of features of conservation interest including ecosystem and species richness, numbers of threatened species, endemism, etc. Viti Levu was ranked fifth highest in importance after New Caledonia, Lord Howe, New Guinea and Norfolk Island. The report also notes that east of Papua New Guinea, the Solomons and Vanuatu, lowland rain forests generally survive only as small fragments (or in remote islands or areas). It suggests that whenever possible these remaining samples should be included in protected areas (perhaps while allowing other compatible uses such as education and recreation).

Plants and communities that are unique to or representative of Fiji's native flora and fauna are not represented within existing reserves and should be protected, particularly on Viti Levu which has the greatest variety of Fijian endemics. There are currently 12 protected areas in Fiji, of which seven occur on Viti Levu.

The only reserve protecting forest in the area of interest to the Commonwealth Development Corporation is the Garrick Memorial Reserve which appears to be the only reasonably secure reserve in Fiji. Situated 40 km west of Suva, it has an area of 695 ha, principally covered with tropical rain forest and some secondary growth, and is the only reserve on Viti Levu that is a truly representative sample of medium-altitude rain forest. It was donated freehold to the National Trust for Fiji and efforts are being made to develop it into the first national park. It was selectively logged about 90 years ago, and logging has occurred up to the marked boundary. Approximately half of the reserve has been surveyed, but no species inventory is currently available. It is nevertheless likely that many of the island's endemic forest birds and other endemic species occur here but it is unlikely that a reserve of this size is large enough to ensure species survival in the long-term.

The remaining six reserves within Viti Levu are listed in Appendix 1. It is notable that there are no significant areas of land protected on this island and those reserves that do exist are generally not representative of the important habitats on the island. The traditional land tenure system (where 83% of land is under communal ownership) has meant that it is difficult to establish protected areas. Of the 177 'natural phenomena' identified in Fiji by the National Trust, only 22 types are protected in nature reserves and most of the recognised habitat types on Viti Levu appear to receive little or no protection. Forestry legislation allows for the establishment of Forest Reserves (as Crown Land or long-term native leases) and enables parts of native land to be declared Protected Forest (with the consent of the Native Land Trust Board). A small area of forests on ridges and very steep slopes is classified as 'protection forest' and may not be logged. Prior to 1975, all areas of mangrove outside urban areas were declared forest reserves, but were declassified in 1975 to allow Fijians to practise their traditional rights; they are now vulnerable to development.

Dahl (1980) considered that Fiji will need large parks to provide adequate protection for endemic birds, plants and marine ecosystems, and many smaller reserves to protect more restricted ecosystems. This is particularly true for Viti Levu which requires both mountain and lowland forest reserves (preferably continuous), as well as separate reserves in the east and west. The National Trust for Fiji has stressed that the future of Fiji's rainforests and wildlife is far from secure. It considers that the establishment of a system of reserves and parks on Viti Levu, where development is proceeding most rapidly, is a priority. Proposals have been made to extend the system of protected areas; those within the specified area of interest in south-eastern Viti Levu are listed in Appendix 2. If these proposals are finalized and the areas protected, coverage of natural features by protected areas will be considerably improved. However, as one of the criteria for identifying suitable areas was to avoid conflict with agricultural schemes, forestry projects and other development plans, it is possible that several habitat types and their biota would still be under represented within the protected areas system.

Remedial actions

This submission contains no specific recommendations, as these were not requested and in any case only general observations could be made. The most obvious of these must, however, be mentioned, namely the need for extensive environmental impact assessment prior to any decision to proceed with logging. Such assessment should treat not only the areas proposed for logging but also the coastal areas downstream of them. IUCN(CMC) is available for further suggestions and comment if required.

References

1. Ash, J. and Vodonaivalu, S. (in prep.). Floristic inventory of Fiji. Draft paper for a Report on Tropical Forest Inventory by D. Campbell.
2. Balgooy, M.M.J. van (1971). Plant-geography of the Pacific as Based on a Census of Phanerogam Genera. Blumea Suppl. 6. Rijksherbarium, Leiden.
3. Berry, M.J. and Howard, W.J. (1973). Fiji Forest Inventory. 2 vols. Land Resources Study 12. Foreign and Commonwealth Office, Overseas Development Administration.
4. Dahl, A.L. (1980). Regional Ecosystems Survey of the South Pacific Area. Technical Paper 179. South Pacific Commission.
5. Dunlap, R.C. and Singh, B.B. (1980). A National Parks and Reserves System for Fiji. A Report to the National Trust for Fiji. 3 vols.
6. Eaton, P. (1984). Land Tenure and Conservation: Protected Areas in the South Pacific. Unpublished report.
7. Lal, P.N. (1984). Environmental Implications of Coastal Development in Fiji. *Ambio* 13 (5-6): 316-321.
8. Myers, N. (1980). Conversion of Tropical Moist Forests. (A report prepared for the Committee on Research Priorities in Tropical Biology of the National Research Council). National Academy of Sciences, Washington, D.C. 205 pp.
9. Robinson, G.S. (1975). Macrolepidoptera of Fiji and Rotuma: A Taxonomic and Biogeographic study. E.W. Classey, Faringdon. 362 pp.
10. Saenger, P., Hegerl, E.J. and Davie, J.D.S. (Eds) (1983). Global Status of Mangrove Ecosystems. Commission on Ecology Papers Number 3. IUCN, Gland, Switzerland. 88 pp.
11. Singh, B. (1985). Country Review: Fiji. Third South Pacific National Parks and Reserves Conference and Ministerial Meeting. Apia, Western Samoa, 24 June - 3 July 1985.
12. Smith, A.C. (1951). The vegetation and flora of Fiji. Scientific Monthly 73: 3-15.
13. Smith, A.C. (1979-). Flora Vitiensis Nova: A New Flora of Fiji. Pacific Tropical Botanic Garden, Hawaii. (2 vols so far. 1 - Gymnosperms and monocotyledons except orchids, 495 pp.; 2 - dicotyledons, 810 pp.; 3,4 - dicotyledons and orchids, in prep).
14. Smith, A.C. (1984). In litt.
15. Watling, D. (1982). Birds of Fiji, Tonga and Samoa. Millwood Press, Wellington.
16. Wells, S.M. (1985). Fiji. IUCN Directory of Coral Reefs of International Importance. Volume 3 Western Central Pacific. Draft.

Appendix 1

Reserves within Viti Levu

- A Garrick Memorial Reserve (described in text)
- B Suva and Namuka Forest Reserve, Bay of Islands, Suva containing:
- | | |
|---------------------------|---|
| Draunibota Nature Reserve | 2 ha. Limestone island, forest and scrub. |
| Labiko Nature Reserve | 0.3 ha. Limestone island, forest and scrub. |
| Vuo Nature Reserve | 1.2 ha. Atoll, beach forest. |
- C Nadarivatu - Nadala Forest Reserve containing:
- | | |
|-------------------------------|---|
| Nadarivatu Nature Reserve | 93 ha. Approximately 80 km north-west of Suva. Montane rain forest. |
| Naqaranibuluti Nature Reserve | 279 ha. 83 km north-north-west of Suva. Montane rain forest (includes Mt Lomalangi). |
| Tomanliivi Nature Reserve | 1350 ha. 80 km north-north-west of Suva. Montane rain forest and cloud forest, (includes Mt Victoria, Fiji's highest mountain). |

Appendix 2

List of Proposed Reserves in the Area of Interest Specified by CDC

(in order of priority set by the National Trust for Fiji)

<u>Proposed Area</u>	<u>Reserve/ Park</u>	<u>Main reason for protection</u>
Sigatoka Sand Dunes	R	geological feature
Waidradra Agricultural Research Station	R	<u>Neoveitchia storckii</u> (palm)
Samabula River Mangroves	R	unique species of mangrove and conservation education
Naulu Lokia Swamps	R	whitebrowed rail and other birds
Mt Voma - Korobasabasaga Range	P & R	geological feature.
Suva Barrier Reef	P & R	protect reef
Navua Swamp	R	Sago palms
Savura Creek Catchment Area	R	commercially valuable indigenous spp. (tropical rain forest)
Coral Coast Reefs	P & R	protect reefs and enhance tourism
Navua River	P	perpetuation of culture
Mt Rama - Korobaba Range	P & R	geological feature

Threatened Category Definitions used in Appendices 3 & 4.

The categories used in this list represent an assessment of the global status of a species and do not necessarily refer to its status within Fiji.

- | | |
|------------------------------|--|
| 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 category is appropriate. |
| Insufficiently Known (K) | Taxa that are suspected, but not definitely known, to belong to any of the other categories because of lack of information. |
| Commercially Threatened (CT) | Taxa not currently threatened with extinction but most or all of whose populations are threatened as a sustainable resource, or will become so unless their exploitation is regulated. |

Appendix 3

Endemic Palms of Fiji with the IUCN Categories.

<u>Species</u>	<u>Category</u>	<u>Distribution in Viti Levu</u>
<u>Balaka longirostris</u> Becc.	I	Known only from Viti Levu in various forest types at elevations from near sea level to 1000 m
<u>Balaka macrocarpa</u> Burret	I	Viti Levu (including Namosi: Nambukavesi Creek) and Vanua Levu at elevations up to 820 m in dense forest
<u>Balaka microcarpa</u> Burret	I	Recorded from Rewa Valley
<u>Balaka pauciflora</u> (H.A.Wendl.) H.E.Moore	I	
<u>Balaka seemanii</u> (H.A.Wendl.) Becc.	R	
<u>Calamus vitiensis</u> Warb. ex Becc.	R	Viti Levu and Taveuni (from sea level to 600 m)
<u>Clinostigma exorrhizum</u> (H.A.Wendl.) Becc.	R	Viti Levu (including Mt Koromba and Wainimaki River area), Ngau, Vanua Levu and Taveuni (230-900 m)
<u>Cyphosperma tanga</u> (H.E.Moore) H.E.Moore	V	Only known from Viti Levu in dense forest between 750-900 m (but also below 600 m) inland from Namboutini on south coast
<u>Cyphosperma trichospadix</u> (Burret) H.Moore	R	
<u>Goniocladus petiolatus</u> Burret	K	
<u>Metroxylon vitiense</u> (H.Wendl.) H.Wendl. ex Hook.f.	R	Viti Levu (including Navua River valley), Ovalau, Vanua Levu
<u>Neoveitchia storckii</u> (H.A.Wendl.) Becc.	E	Known with certainty only from a very limited area in Naitasiri Province, west of the Rewa River near the tributary with the Waindina River
<u>Physokentia rosea</u> H.E.Moore	R	Viti Levu (750-1120 m, including headwaters of Wainimala and Sigatoka Rivers)
<u>Physokentia thurstonii</u> (Becc.) Becc.	R	
<u>Pritchardia thurstonii</u> F.Muell. & Drude	R	
<u>Veitchia filifera</u> (H.A.Wendl.) H.E.Moore	K	
<u>Veitchia joannis</u> H.A.Wendl.	R	
<u>Veitchia pedionoma</u> (A.C.Smith) H.E.Moore	R	
<u>Veitchia petiolata</u> (Burret) H.E.Moore	R	
<u>Veitchia pickeringii</u> (H.A.Wendl.) H.Moore	K	
<u>Veitchia sessilifolia</u> (Burret) H.E.Moore	R	
<u>Veitchia simulans</u> H.E.Moore	R	
<u>Veitchia vitiensis</u> (H.A.Wendl.) H.Moore	V	Viti Levu and Kandavu (including hills east of Navua River)
<u>Veitchia</u> sp. H. Moore et al. 1935	R	

Appendix 4

Threatened Species of Animals

Taxon	Common name	World Category
BIRDS		
- <u>Pterodroma macgillivrayi</u>	Macgillivray's Petrel	I
<u>Falco peregrinus</u>	Peregrine Falcon	V
** <u>Rallus poecilopterus</u>	Bar-wing Rail	E
** <u>Trichocichla rufa</u>	Long-legged Warbler	E
** <u>Erythrura kleinschmidti</u>	Pink-billed Parrotfinch	R
REPTILES		
+ <u>Eretmochelys imbricata</u>	Hawksbill Turtle	E
+ <u>Chelonia mydas</u>	Green Turtle	E
+ <u>Dermochelys coriacea</u>	Leatherback	E
** <u>Brachylophus fasciatus</u>	Fiji Banded Iguana	V
** <u>Ogmodon vitianus</u>	Fiji Snake	I
AMPHIBIANS		
** <u>Platymantis vitianus</u>	Fijian Ground Frog	K
INVERTEBRATES		
? <u>Trochus niloticus</u>	Trochus	CT
<u>Charonia tritonis</u>	Triton's Trumpet	R
? <u>Pinctada margaritifera</u>	Black-lipped Pearl Oyster	CT
? <u>Hippopus hippopus</u>	Horse's Hoof Clam	I
? <u>Tridacna crocea</u>	Crocus Clam	K
? <u>Tridacna derasa</u>	Southern Giant Clam	K
x <u>Tridacna gigas</u>	Giant Clam	V
? <u>Tridacna maxima</u>	Small Giant Clam	K
? <u>Tridacna squamosa</u>	Scaly Clam, Fluted Clam	I
* <u>Birgus latro</u>	Coconut Crab, Robber Crab	R
** <u>Hypolimnas inopinata</u>	Butterfly	V
** <u>Papilio schmeltzii</u>	Butterfly	R
** <u>Utetheisa clarae</u>	Butterfly	E

Note: Numerous other insects could be assigned to threatened categories

- ** found in south-eastern forests of Viti Levu
- + Occur regularly in Fijian waters around Viti Levu; no recent evidence of nesting on that island
- * Probably only on uninhabited offshore islands of Viti Levu
- ? Distribution within Fiji unknown
- x Probably extinct within Fiji
- Not on Viti Levu

Appendix 5

List of Animals believed Endemic to Fiji

Scientific Name	Common Name	Found on Viti Levu	Endemic to Viti Levu	Found in south-east forests
MAMMALS				
<u>Notopteris macdonaldi</u>	Long-tailed Fruit Bat	*		?
<u>Pteralopex acrodonta</u>	Monkey-faced Fruit Bat			
BIRDS				
<u>Accipiter rufitorques</u>	Fiji Goshawk	*		*
<u>Rallus poecilopterus</u>	Bar-wing Rail	*		*
<u>Pterodroma macgillivrayi</u>	Fiji Petrel			
<u>Ducula latrans</u>	Paele's Pigeon	*		*
<u>Ptilinopus layardi</u>	Velvet or Whistling Dove			
<u>Ptilinopus luteovirens</u>	Golden Dove	*		*
<u>Ptilinopus victor</u>	Orange Dove			
<u>Charmosyna amabilis</u>	Red-throated Lorikeet	*		*
<u>Prosopaea personata</u>	Yellow-breasted Musk Parrot			
<u>Prosopaea tabuensis</u>	Red-breasted Musk Parrot	*		*
<u>Phigys solitarius</u>	Collared Lory	*		*
<u>Gymnomyza viridis</u>	Giant Forest Honey-eater	*		*
<u>Myzomela jugularis</u>	Orange-breasted Honey-eater	*		*
<u>Xanthotis provocator</u>	Kadavu Honey-eater			
<u>Mayrornis lessoni</u>	Slaty Flycatcher	*		*
<u>Mayrornis versicolor</u>	Versicolor or Ogea Flycatcher			
<u>Myiagra azureocapilla</u>	Blue-crested Broadbill	*		*
<u>Myiagra vanikorensis</u>	Vanikoro Broadbill	*		*
<u>Trichocichla rufa</u>	Long-legged Warbler	*		*
<u>Vitia ruficapilla</u>	Fiji Warbler	*		*
<u>Rhipidura personata</u>	Kadavu Fantail			
<u>Zosterops explorator</u>	Layard's White-eye	*		*
<u>Lamprolia victoriae</u>	Silktaill			
<u>Erythrura kleinschmidti</u>	Pink-billed Parrotfinch		*	*
REPTILES				
<u>Brachylophys vitiensis</u>	Crested Iguana			
<u>Emoia concolor</u>	Green Skink			Distribution unknown
<u>Emoia parkeri</u>	Skink		*	
<u>Emoia new sp. A</u>	Skink			Distribution unknown
<u>Emoia new sp. B</u>	Skink			Distribution unknown
<u>Lepidodactylus gardeneri</u>	Rotuma Gecko			
<u>Ogmodon vitianus</u>	Fiji Snake (Bolo)		*	*
also possibly				
<u>Candoia new sp.</u>		*		?

AMPHIBIANS

<u>Platymantis vitianus</u>	Fiji Ground Frog	*	?
<u>Platymantis vitiensis</u>	Fiji Tree Frog	*	?

INVERTEBRATES

With over 3000 species of insects and probably in excess of 500 other invertebrates on Fiji, they represent an important part of the island biota. Many are poorly known, but evidence from the Macrolepidoptera (butterflies and moths) implies that about 50% of these may be endemic. Of Fiji's 400 Macrolepidoptera, approaching 200 are endemic and virtually all of these are forest species. Endemism among molluscs is also high, particularly at the generic level and many taxa are forest dwellers.

Appendix 6

Conservation legislation

Laws that specifically deal with conservation include the following:

- (a) National Trust for Fiji Act (Chapter 265) - Established the National Trust for Fiji and gives it responsibility for preservation, protection and management of the Fijian heritage. It provides for the permanent preservation of land (including reefs) for the benefit of the nation; the protection and augmentation of such lands and their surroundings and to preserve their natural aspect and features; to protect animal and plant life; and to provide for the access to and enjoyment by the public of such lands.
- (b) Town Planning Act (Chapter 109) - For the preparation of Town Planning Schemes including the conservation of natural beauties of the area including lakes, banks of rivers, foreshore or harbours, and other parts of the sea, hill slopes, summits and valleys.
- (c) Native Land Trust Act (Chapter 115) - Gives provision to proclaim nature reserves over any part of native land.
- (d) Land Conservation Act (Chapter 120) - Provisions to appoint Land Conservation Officers.
- (e) Birds and Game Protection Act (Chapter 120) - Prohibits the hunting of most birds except certain scheduled species and controls the hunting of game species.
- (f) Fisheries Act (Chapter 135) with provisions to control fishing methods.
- (g) Mining Act (Chapter 125) with provisions to conduct environmental impact assessments and to restore areas.
- (h) Forestry Act (Chapter 128) with provisions to declare areas of Crown land as reserved forest and nature reserves and to declare parts of native land as protected forest.

Legislation that has been drafted or proposed and awaits enactment includes the following:

- (i) National Parks and Reserves Bill proposed by the National Trust for Fiji.
- (j) A new Town and Country Planning Act.

