



The conservation status of the leopard, goral and serow in
Bangladesh, Bhutan, northern India and southern Tibet

A report prepared by the IUCN Conservation Monitoring Centre
for the United States Fish and Wildlife Service

August 1987

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EXECUTIVE SUMMARY

This report documents what is currently known about the conservation status of the leopard Panthera pardus, goral Nemorhaedus goral and serow Capricornis sumatraensis in Bangladesh, Bhutan, northern India and southern Tibet. While very little is known about these populations, due to a lack of research, those of leopard and serow in Bangladesh appear to be most severely threatened. By contrast, all three species are likely to be widespread and common throughout much of northern India and Bhutan but nothing is known about their status in southern Tibet. The species are legally protected in Bangladesh and India but not yet in Bhutan or China. Effective enforcement of protection measures, however, is generally lacking throughout the region. Protected areas exist for the species in all of the subject countries except Tibet and, in the case of serow, Bangladesh. Findings in this report are briefly discussed in relation to other relevant research in the region.

INTRODUCTION

This report on the conservation status of the leopard Panthera pardus, goral Nemorhaedus goral and serow Capricornis sumatraensis in Bangladesh, Bhutan, northern India (viz. Himalayan region) and southern Tibet has been requested by the United States Fish and Wildlife Service for purposes of reconsidering the status of these species, all of which are listed as 'Endangered' under the United States Endangered Species Act, 1973. The report is based on information gathered from existing sources in the subject countries and from other sources available to the IUCN Conservation Monitoring Centre. It does not include field surveys, which fall outside the scope of this project. Over 50 experts knowledgeable about wildlife in the subject countries were consulted in writing, about 70% of whom responded. A list of persons approached for information is appended to this report.

As requested and where possible, the report addresses population distributions, sizes and trends, together with the extent and impact of human exploitation on the three species. It also outlines measures taken to conserve the species at national or provincial level, including details of appropriate legislation, the more important protected areas in which the species are known to be present and relevant scientific research.

SUMMARY OF RESULTS

Information concerning the conservation status of the three species in each of the subject countries is given in the main body of this report. This information is summarised in Table 1 and forms the basis to the following conclusions.

1. In view of the general absence of quantitative surveys of mammals in the Himalayan region, the present distribution and status of the leopard, goral and serow cannot be described for the subject countries with much precision. From the available information, however, it is evident that the leopard and serow are most severely threatened with extinction in Bangladesh, where they are confined to a few small, isolated populations. Habitat disturbance, hunting and, in the case of the leopard, depletion of its prey base are largely responsible for their decline. By contrast, all three species are widely distributed throughout much of northern India and may still be common. Populations of all the species are likely to be most stable in Bhutan, where forested habitat is among the least disturbed in the Himalayan region. Suitable habitat for leopard, goral and serow in southern Tibet is restricted to small pockets of forest on the southern side of the Great Himalayan divide, but nothing has been recorded about the status of these populations.
2. The leopard and serow are totally protected by law in both Bangladesh and India, while the goral is subject to licensed hunting in India. Effective enforcement of protection measures is generally lacking, as is also the case in China. Here, all three species are included in the national protection list, but this has no legislative basis. Draft legislation providing for licensed hunting of leopard, goral and serow is under review in Bhutan.

Table 1 Summary of information concerning the conservation status of leopard, goral and serow in Bangladesh, Bhutan, northern India and southern Tibet.

	BANGLADESH	BHUTAN	N. INDIA	S. TIBET
Leopard				
- present status	?nearing extinction	?widespread, ?numerous	widespread, common	uncertain
- immediate threats	hunting (pelt) reduction in prey spp. habitat disturbance	none	habitat disturbance	hunting (pelt, bones)
- legal protection	total (Schedule III)	planned	total (Schedule I)	planned
- no. protected areas*	2-5	3-4	15	none
- research undertaken	surveys only	none	surveys only	surveys only
Goral				
- present status	species absent	?widespread, ?common	widespread, ?common	uncertain
- immediate threats		none	habitat disturbance hunting (meat)	hunting (skin)
- legal protection		planned	licensed hunting (Schedule III)	planned
- no. protected areas*		4	8	none
- research undertaken		none	surveys, limited study	surveys only
Serow				
- present status	small, isolated populations	?widespread	widespread, ?common	uncertain
- immediate threats	habitat disturbance hunting (meat)	none	habitat disturbance hunting (meat, horns, skin)	hunting (horns, skin)
- legal protection	total (Schedule III)	planned	total (Schedule I)	planned
- no. protected areas*	0	2	7	none
- research undertaken	surveys only	none	surveys, limited study	surveys only

* > 1000ha



3. A number of protected areas exist for the three species in most of the subject countries. Southern Tibet is an exception, no protected area known to contain any of the three species having been established there to date. Bangladesh also lacks any protected area with serow.

DISCUSSION

In attempting to document what is known about the current status of leopard, goral and serow in different parts of the Himalayan region, the general lack of quantitative data to support valued judgements is clearly evident. More extensive field surveys need to be conducted in the subject countries to provide essential numerical data upon which management policies can be formulated.

There is also a need for 'low-key', long-term studies to monitor population stability. Some data, based on a 7-8 year study in Nepal's Chitwan National Park, already exist for the leopard (Seidensticker et al., in press). Contrary to preconceptions, leopards do not appear to be dispersing from the park at a rate sufficient to replace those killed at its edge. Whether or not the Chitwan situation is the general trend is unknown because data do not exist for other sites. It is believed, however, that the small size and insularity of protected areas resulting from extensive fragmentation, widespread reduction in the prey base and direct mortality by man are conditions under which large carnivore populations may become extinct, as has happened to the tiger in Bali and Java (Seidensticker, 1986). Such conditions are becoming increasingly evident in Bangladesh with respect to its leopard population.

References

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The Conservation status of the Leopard (*Panthera pardus*) in Bangladesh

Summary The leopard population in Bangladesh is thought to be on the brink of extinction, but no quantitative scientific surveys have been undertaken to assess its present status. Largest numbers occur in the Chittagong Hill Tracts where human pressures are least due to tribal unrest. The species is totally protected by law and occurs in a number of protected areas. No detailed study of the species has been undertaken in Bangladesh.

Distribution As recently as 1940 the species occurred over the entire country and in all habitats, except possibly for a major portion of the Sundarbans and coastal forests (Khan, 1986). It no longer occurs west of longitude 90°E, nor in the sal forest (*Shorea robusta*) belt of north-central Bangladesh where it was last sighted in Madhupur National Park in 1962 (Khan, 1985). Now totally absent from the Sundarbans and from sal forest, the species is occasionally found in the tea gardens and evergreen forests of Sylhet, notably Rajkandi and Patharia (Gittins and Akonda, 1982), Chittagong, Chittagong Hill Tracts and Cox's Bazaar forest divisions (Khan, 1984, 1985, 1986).

Population The leopard has become rare and its population may no longer be viable in Bangladesh (Khan, 1986). The majority are found in the Chittagong Hill Tracts and Cox's Bazaar area (F. Karim, *in litt.*, 1987). Numbers are probably low in the forests of Sylhet District (Gittins and Akonda, 1982). The Society for Conservation of Nature and Environment speculates that the total population is in the region of 200 leopards but this estimate is not based on any scientific data (F. Karim, *in litt.*, 1987).

Threats Overhunting resulting from the demand for the skin trade, habitat disturbance (e.g. deforestation) and modifications (e.g. tea, rubber and oil palm plantations), and an unprecedented reduction in the prey base are largely responsible for the decline of the leopard population (Khan, 1986). Human disturbance has been much reduced since the 1970s due to tribal unrest in the Chittagong Hill Tracts (F. Karim, *in litt.*, 1987).

There are no records of leopards being killed in areas where they now occur (M.A.R. Khan, *in litt.*, 1987). Leopards tend to keep away from human habitation, consequently, the incidence of cattle lifting is very low or even non-existent (F. Karim, *in litt.*, 1987; M.A.R. Khan, *in litt.*, 1987).

Conservation Measures The species is protected under the Bangladesh Wildlife (Preservation) Act, 1973. Listed under Schedule III, it cannot be legally hunted, killed or captured.

It is present in Himchari National Park (1729ha) (Sarker and Fazlul Huq, 1985) and Rema-Kalenga Wildlife Sanctuary (1095ha), where it used to be numerous (Mountfort and Poore, 1968). Leopard may occur in the proposed Hazarikhil Wildlife Sanctuary (2909ha) and Teknaf Game Reserve (11 651ha) (Olivier, 1979), and also in Pablakhali Wildlife Sanctuary (42 087ha) (Sarker and Fazlul Huq, 1985).

Some preliminary information about the leopard's distribution and status in Bangladesh has been obtained from mammal surveys (Gittins and Akonda, 1982; Khan, 1985), but no detailed scientific study of the species has been conducted.

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The Conservation Status of the Goral (Nemorhaedus goral) in Bangladesh

The goral does not occur in Bangladesh. It is present in the neighbouring hills of Arakan in Burma (Prater, 1971) and in India, in the Cachar District of Assam and Mizoram (see this report).

References

Prater, S.H. (1971). The Book of Indian Animals. Third (Revised) Edition. Bombay Natural History Society, Bombay. Pp. 263-264.

The Conservation Status of the Serow (*Capricornis sumatraensis*) in Bangladesh

Summary Formerly abundant in eastern Bangladesh, the serow now occurs in small numbers in some of the evergreen forests remaining in Chittagong, Chittagong Hill Tracts and Sylhet districts. The total population is thought not to exceed 100 animals but no surveys have been conducted. The species' continued survival in Bangladesh is attributed to its preference for steep terrain that is relatively inaccessible to human disturbance. The serow is protected by law and a small sanctuary for its protection has been established near Cox's Bazaar. No study of the species has been undertaken in Bangladesh.

Distribution The species is not known to have occurred west of the Jumuna River (90°E). Although feared extinct by earlier workers, small numbers of serow are now known to reside in the unclassified state forests of Sylhet, Chittagong, Chittagong Hill Tracts North and South, and Cox's Bazaar forest divisions of eastern Bangladesh (Khan, 1985). Also, in the districts of Comilla, Jamalpur and Mymensingh, degraded sal forest (*Shorea robusta*) and grassland (dense *Imperata arundinacea*) is visited by serow from neighbouring forests in the Indian states of Meghalaya and Tripura (M.A.R. Khan, *in litt.*, 1987).

Population The total resident population is estimated to be in the region of 50-100 animals, occurring in scattered, isolated units with little chance of genetic exchange (Khan, 1984). This estimate, however, is based on speculation rather than quantitative surveys. The species' continued survival in Bangladesh is attributed to its preference for steep hills, relatively free from human disturbance (F. Karim, *in litt.*, 1987).

Threats Habitat disturbance is largely responsible for the species' decline. It is particularly susceptible to slash-and-burn cultivation, fleeing from the forest when it is fired to be trapped, killed and eaten (Khan, 1984). Some eight serow are known to have been trapped or killed and eaten for meat between 1978 and 1982 (Khan, 1985), and a further four or five between 1983 and March 1987 (M.A.R. Khan, *in litt.*, 1987).

Conservation Measures The species is protected under the Bangladesh Wildlife (Preservation) Act, 1973. Listed under Schedule III, it cannot be legally hunted, killed or captured.

A small sanctuary for serow has been established near Ramu, Cox's Bazaar, but it is not managed adequately. Protected areas need to be established within the Chittagong Hill Tracts and Cox's Bazaar area to safeguard the species' future survival (F. Karim, *in litt.*, 1987).

Some preliminary information about its distribution and status in Bangladesh has been obtained from mammal surveys (Gittins and Akonda, 1982; Khan, 1985), but no scientific study of the species has been undertaken.

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- Gittins, S.P. and Akonda, A.W. (1982). What survives in Bangladesh? *Oryx* 16: 275-287.
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The Conservation Status of the Leopard (*Panthera pardus*) in Bhutan

Summary Little is known about the leopard in Bhutan, except that it is considered to be numerous and widely distributed over much of the country. The species is not protected but legislation providing for licensed hunting has been drafted. The leopard is known to occur in a number of protected areas. No study of the species has been undertaken in Bhutan.

Distribution Precise information concerning the leopard's distribution in Bhutan is not available. Being an adaptable species, its range extends to both tropical and temperate regions (Blower, 1986). Quite likely, it occurs throughout much of the country.

Population The leopard is considered to be numerous in Bhutan (Jackson, 1981) but nothing is known about the size of its population.

Threats Specific information is not available but the leopard is unlikely to be under any immediate threat. Some 53% of the country is forested (Sargent *et al.*, 1985), indicating that the leopard's habitat and that of its prey species must largely be intact.

Conservation Measures The killing of leopard (and other cats) was banned in 1975 (Jackson, 1976). Leopard were so numerous, however, that they were responsible for significant losses to domestic livestock populations. Consequently, the ban on killing cats, which also provided compensation for livestock losses, was lifted and farmers encouraged to kill offending predators (Jackson, 1981).

The leopard is listed in Schedule II of the draft Bhutan Wildlife (Protection) Act, 1985, providing for licensed hunting (except in the case of females or young). The new draft legislation is considered to be unnecessarily complex and it has been recommended that all wildlife be protected subject to the issue of hunting licences (Blower, 1986).

The species is known to occur in Manas Wildlife Sanctuary (43 854ha) (Jackson, 1981), and also Neoli Wildlife Sanctuary (4000ha) and Phipsoo (Mochu) Reserve Forest (27 843ha) (Blower, 1986). It is also likely to be present in Jigme Dorji Wildlife Sanctuary (790 495ha), which extends across all of northern Bhutan.

No scientific study of the species has been undertaken.

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The Conservation Status of the Goral (Nemorhaedus goral) in Bhutan

Summary Little is known about the goral in Bhutan, but it is likely to be widely distributed throughout much of the country. The species is not protected but legislation providing for licensed hunting has been drafted. The species is known to occur in several protected areas. No study of the goral has been undertaken in Bhutan.

Distribution Information concerning the species' distribution in Bhutan is lacking. An inhabitant of open and fairly precipitous terrain, it probably occurs throughout much of the country.

Population There is no information about the size and status of the population in Bhutan, although its presence in a number of protected areas mentioned below suggests that it may be common.

Threats The goral's habitat is being destroyed through overgrazing by livestock and dry season grass burning in Doga National Park (Blower, 1985). The extent of such threats elsewhere in Bhutan has not been assessed.

Conservation Measures The goral is listed under 'big game' in Schedule III of the draft Bhutan Wildlife (Protection) Act, 1985, providing for licensed hunting (except in the case of females or young). The new draft legislation is considered to be unnecessarily complex and it has been recommended that all wildlife be protected subject to the issue of hunting licences (Blower, 1986).

Doga National Park (2100ha) was established in 1974 largely for the protection of the goral but the area is so degraded as to be of little conservation value (Blower, 1986). The species also occurs in Manas Wildlife Sanctuary (43 854ha) and Namgyal Wangchuk Wildlife Reserve (19 709ha) (Dorji, 1977; Lahan, 1986). It must also be present in Jigme Dorji Wildlife Sanctuary (790 495ha), which extends across all of northern Bhutan.

No scientific study of the goral in Bhutan has been undertaken.

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The Conservation Status of the Serow (*Capricornis sumatraensis*) in Bhutan

Summary Little is known about the serow in Bhutan, except that its distribution extends from tropical to temperate zones. It is unlikely to be under any immediate threat, particularly since its forest habitat must largely be intact. The serow is not protected, but legislation providing for licensed hunting has been drafted. The species occurs in some protected areas. No study of the serow has been undertaken in Bhutan.

Distribution Very little is known about the serow's distribution in Bhutan, although Blower (1986) mentions that it is an adaptable species whose range extends to both tropical and temperate zones.

Population Information concerning the size and status of the population in Bhutan does not exist.

Threats Specific details are not available, but the serow is unlikely to be under any immediate threat. Some 53% of the country remains forested (Sargent *et al.*, 1985), indicating that its habitat must largely be intact.

Conservation Measures The serow is listed in Schedule II of the draft Bhutan Wildlife (Protection) Act, 1985, providing for licensed hunting (except in the case of females or young). The new draft legislation is considered to be unnecessarily complex and it has been recommended that all wildlife be protected subject to the issue of hunting licences (Blower, 1986).

The species is known to occur in Manas Wildlife Sanctuary (43 854ha) (Jackson, 1981) and it must also occur in Jigme Dorji Wildlife Sanctuary (790 495ha), which extends across all of northern Bhutan.

No scientific study of the serow in Bhutan has been undertaken.

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- Blower, J.H. (1986). Nature conservation in Bhutan: project findings and recommendations. FO: DP/BHU/83/022. FAO, Rome. 55 pp.
Jackson, P. (1981). Conservation in Bhutan. Unpublished report. 15 pp.

The Conservation Status of the Leopard (*Panthera pardus*) in northern India

Summary The leopard occurs in all Himalayan states of northern India, within a great variety of habitats. It is considered common and in certain parts of its distribution numbers are thought to have increased in recent years. The species is regarded as a nuisance in some areas, particularly in north-eastern India where the frequency of confrontations with humans is increasing on tea plantations. The leopard is totally protected by law. Not only does it occur in a number of Himalayan protected areas but it has also benefitted from the establishment of several tiger reserves in the foothills. Wildlife surveys have provided some preliminary information on the species' distribution in parts of the Himalaya but more detailed investigations are required in order to assess its status throughout northern India.

Distribution The leopard is widespread in India, including all Himalayan states, and occurs in a great variety of habitats (Pocock, 1939; Prater, 1971).

The species has been recorded from many localities in Jammu & Kashmir, including places in the vicinity of the Vale of Kashmir, such as Dachigam Valley (Kurt, 1978) and Gulmarg (Ullah, n.d.). It is absent from Ladakh.

In Himachal Pradesh, the species is widely distributed at altitudes of up to 3400 m in the catchments of the Beas, Ravi and Sutlej rivers and it occurs elsewhere in the Simla Water Catchment Reserve and Chail Sanctuary (Gaston et al., 1983). It is not clear whether tracks found at 3000-3400m in the upper Parbati Valley and at 3600m in Hampta Nala (Manali region) were those of common or snow leopard (Fox et al., 1986). The leopard is also present in the Siwaliks (W.A. Rodgers, in litt., 1987).

The leopard is widespread in northern Uttar Pradesh. It occurs in the foothills, including small forest patches outside Mussoorie (W.A. Rodgers, in litt., 1987), as well as on the southern slopes of the Great Himalaya. Its altitudinal distribution (up to 2800m or more) overlaps with that of the snow leopard in Kedarnath Sanctuary (Green, 1982), and possibly also in Govind Pashu Vihar Sanctuary (Fox et al., 1986).

In north-eastern India, the leopard is present in all states. Although an inhabitant of forests, it has adapted well to secondary scrub and even urban areas (P.C. Das, in litt., 1987).

Population The present size of the Himalayan population of leopard in northern India is not known but the species is considered common. In Kashmir, it is believed that Dachigam's leopard population has increased during the last few years, with the recovery of the hangul *Cervus elaphus hanglu* population (D.W.P., n.d.). Similarly, numbers of leopard in Himachal Pradesh are thought to have increased markedly since a survey in 1983, when there were an estimated 200 within the state (Chief Conservator of Forests, in litt., 1987).

Elsewhere, censuses have been conducted in Corbett (Uttar Pradesh) and Namdapha (Arunachal Pradesh) tiger reserves, where there were an estimated 43 and 40 leopards, respectively, in 1984 (Anon., 1986). The leopard population in Corbett appears to be increasing, having been estimated at 25 in 1975 (Anon., 1975-76). In Dudwa National Park there are an estimated 7 leopards (W.A. Rodgers, in litt., 1987).

In the early 1960s, Gee (1964) considered there to be slightly more leopard than tigers in India, somewhere on the region of 6000-7000 compared to ten times that number 50 years ago. There is, however, no statistical basis to this estimate. According to A. Wright (in litt., 1977), numbers have declined sharply since the 1940s, to as low as that for the tiger population, particularly with the boom in the fur trade in 1960s.

Threats In the face of diminishing forest cover and declining prey populations, the leopard has become a nuisance in many regions of northern India. The reported incidence of leopard predation on livestock in Himachal Pradesh in areas below 1220m has risen phenomenally (from 12 in 1983 to 200 in 1986) since a five-year ban on hunting was introduced in 1983, particularly in the districts of Hamirpur, Mandi, Una, Solan, Simla and Sirmur (Chief Conservator of Forests, in litt., 1987). This may reflect the fact that compensation is paid for loss of livestock and human lives. Likewise, in parts of north-eastern India, incidents of predation on domestic livestock are common. More serious is the loss of forest habitat to teak, rubber, coffee and tea plantations, resulting in higher frequencies of confrontations between leopards and estate workers. The incidence of tea workers being mauled is high in northern Bengal, doubtless because leopards use the cover afforded by such plantations and sometimes raise their litters in the deep drains under the tea bushes (P.C. Das, in litt., 1987; D.K. Lahiri Choudhury, in litt., 1987). In Arunachal Pradesh, however, the leopard is not under any immediate threat. Human population density is low and there is very little predation on livestock by leopard (J.K. Mehta, in litt., 1987).

Conservation Measures The leopard is listed in Schedule I (revised in March 1987) of the Wildlife (Protection) Act, 1972, providing for its complete protection. This legislation, or similar in the case of Jammu & Kashmir, which enacted the Wildlife (Protection) Act in 1978, has been adopted by all states, except Nagaland. Export of skins and other products was banned in June 1968.

The extensive measures undertaken to protect natural habitat to save the tiger in India, through the establishment of a network of tiger reserves, have undoubtedly benefitted the leopard. A number of tiger reserves with leopard are located in the vicinity of the Himalayan foothills, namely: Corbett National Park (52 082ha) and Dudwa National Park (49 029ha) in Uttar Pradesh; Buxa (74 500ha) in West Bengal; Manas (283 712ha) in Assam; and Namdapha National Park (180 782ha) in Arunachal Pradesh (Anon., n.d.). Within the main Himalayan range, the leopard is known to be present in Dachigam National Park (14 100ha) (Kurt, 1978; D.W.P., n.d.) and Kishtwar National Park (31 000ha) (Ullah., n.d.) in Kashmir; Great Himalayan National Park (173 600ha) (Gaston et al., 1981) in Himachal Pradesh; Govind Pashu Vihar Sanctuary (95 312ha) (Anon., 1986), Kedarnath Sanctuary (97 500ha) (Green, 1982), Nanda Devi National Park (63 033ha) (Tak and Lamba, 1985) and Valley of Flowers National Park (8750ha) (W.A. Rodgers, in litt., 1987) in Uttar Pradesh; Jaldapara Sanctuary (11 563ha) (Spillett, 1967) and Neora Valley National Park (8800ha) (W.A. Rodgers, in litt., 1987) in West Bengal; and Barnadi Sanctuary (7014ha) (W.L.R. Oliver, in litt., 1985) in Assam.

Studies of the leopard in the Himalayan region of northern India are limited. Some information on the species' distribution and status has been obtained from wildlife surveys conducted in Himachal Pradesh in 1978-80 (Gaston et al., 1981, 1983), and in north-western India in 1985-86 (Fox et al., 1986). Less extensive surveys have been conducted in a number of locations in Uttar Pradesh, notably: Kedarnath Sanctuary (Green, 1982, unpublished data) and Nanda Devi National Park (Tak and Lamba, 1985).

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The Conservation Status of the Goral (*Nemorhaedus goral*) in northern India

Summary The goral occurs throughout much of the Himalaya of northern India, its distribution extending to the foothills. The species may still be common but its range has probably contracted, particularly within the Himalayan foothills where habitat disturbance has been extensive. The goral is protected by law, subject to licensed hunting, and occurs in a number of protected areas distributed over much of its range. Limited work relating to the distribution, status and ecology of the species has been undertaken, but more extensive surveys are required in order to assess the status of the population in northern India.

Distribution The goral is distributed throughout the Himalaya from Kashmir to Arunachal Pradesh and extending to the Siwaliks of the Outer Himalayan foothills (Jerdon, 1867; Blanford, 1891; Prater, 1971). Its choice of habitat is liberal, so long as the terrain is steep, rocky and provides some cover (Schaller, 1977).

There are few details concerning the goral's distribution in Jammu & Kashmir, but it does not occur in the Transhimalayan area of Ladakh.

The species continues to be widely distributed and locally common in Himachal Pradesh (Gaston, 1986), its distribution extending as far south as the Siwaliks (W.A. Rodgers, *in litt.*, 1987). It occurs in the catchments of the Beas and Ravi and, elsewhere, in the Simla Water Catchment Reserve and Chail Sanctuary, within an altitudinal range of 1600-3700 m (Gaston *et al.*, 1981, 1983).

In Uttar Pradesh, the goral is widespread, its distribution still extending as far south as the Siwaliks, where it is present in Corbett National Park (Bedi, 1985) and in Rajaji National Park as low as 600m (W.A. Rodgers, *in litt.*, 1987). The species has recently been sighted quite close to human habitation in the Ganges gorge above Rishikesh (A. Chandola, *in litt.*, 1987). In the Himalayan sanctuaries of Govind Peshu Vihar and Kedarnath, it has been recorded within an altitudinal range of 1800-2000m (Fox *et al.*, 1986) and 1680-3600m (Green, 1985), respectively.

In the Eastern Himalayan states of Sikkim and Arunachal Pradesh, the goral is found within an altitudinal range of 900-2750m (P.C. Das, *in litt.*, 1987). It also occurs in Nagaland, Manipur and Mizoram (W.A. Rodgers, *in litt.*, 1987) and is reported from the Cachar District of Assam (Choudhury, 1983).

Population The size of the Himalayan population of goral in northern India is not known. In Himachal Pradesh, substantial populations occur in the Sainj and Tirthan valleys (Gaston *et al.*, 1981), and numbers remain high in Simla Water Catchment Reserve and Chail Sanctuary (A.J. Gaston, *in litt.*, 1987).

The goral is probably also common in Uttar Pradesh. In a small part of Kedarnath Sanctuary the species occurs at a density of 2.6 animals per sq. km (Green, 1987). Lavkumar (1978) observed several groups of goral in the Manda Devi basin, the largest group totalling 21. This observation, however, is disputed by Tak and Lamba (1985) who found signs of goral just outside but not extending to within the basin.

Threats Commonly found close to most hill stations, the goral was much hunted by sportsmen (Jerdon, 1867; Blanford, 1891). There is much illegal hunting in Uttar Pradesh by, for example, Nepalese immigrant grass cutters in Rajaji

National Park and limestone workers at Banog, where a population of 50 or more goral has been reduced to below 10 (W.A. Rodgers, *in litt.*, 1987). Gaston *et al.* (1983) found evidence of hunting for goral in Tirthan Valley, Himachal Pradesh, as did M.J.B. Green (unpublished data) in Kedarnath Sanctuary, Uttar Pradesh. Similarly, in Khangchendzonga National Park, Sikkim, the species is sporadically killed for its meat by musk deer hunters (B.S. Lamba, *in litt.*, 1987). The main threat, however, is habitat disturbance, particularly in the Himalayan foothills where it is likely that the goral's distribution has contracted considerably.

Conservation Measures The goral is listed in Schedule III (revised in March 1987) of the Wild Life (Protection) Act, 1972, providing for licensed hunting (except in the case of females and young). This legislation, or similar in the case of Jammu & Kashmir which enacted the Wild Life (Protection) Act in 1978, has been adopted by all states except Nagaland. In Himachal Pradesh, a complete ban on hunting is thought to be responsible for the increased frequency of sightings of goral (Chief Conservator of Forests, *in litt.*, 1987).

The goral occurs in a number of protected areas distributed across much of its Himalayan range. The more important among these are: Kishtwar National Park (31 000ha) (Ullah, n.d.) in Kashmir; Great Himalayan National Park (173 600ha) (Gaston *et al.*, 1981) in Himachal Pradesh; Corbett National Park (52 082ha) (Bedi, 1985), Govind Pashu Vihar Sanctuary (95 312ha) (Fox *et al.*, 1986), Kedarnath Sanctuary (97 500ha) (Green, 1985) and Rajaji National Park (24 700ha) (W.A. Rodgers, *in litt.*, 1987) in Uttar Pradesh; Khangchendzonga National Park (85 000ha) (B.S. Lamba, *in litt.*, 1987) in Sikkim; and Namdapha National Park (180 782ha) (Chatterjee and Chandiramani, 1986) in Arunachal Pradesh.

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The Conservation Status of the Serow (*Capricornis sumatraensis*)
in northern India

Summary The serow is widespread throughout much of the Himalaya of northern India, though it is absent from Ladakh and there is particular uncertainty about the present extent of its distribution in north-eastern India. The species may be common, but estimates of population size or density are limited to a few localities. Habitat disturbance, especially removal of the forest understorey, is the main threat. The serow is totally protected by law and occurs in a number of protected areas distributed over much of its range. Limited work relating to the distribution, status and ecology of the species has been undertaken, but more extensive surveys are required in order to assess the status of the population in northern India.

Distribution The serow occurs throughout the Himalaya of northern India, from Kashmir to the Mishmi Hills in Arunachal Pradesh (Blanford, 1891; Prater, 1971). It is definitely present in all Himalayan states apart from Nagaland, Manipur, Mizoram and Tripura, where its presence is uncertain. An inhabitant of precipitous, wooded mountains, it is usually found in forest at altitudes of up to some 3360m (Jerdon, 1867; Blanford, 1891). Occasional, unconfirmed reports of the species in the Siwaliks may mark the southernmost extent of its distribution.

There are few details concerning the serow's present distribution in Jammu & Kashmir, but it is absent from the Transhimalayan area of Ladakh.

In Himachal Pradesh, the species is widely distributed in small numbers throughout the catchment of the upper Beas, probably occurring in Solang Nala (Gaston et al., 1983) and definitely present in Jagatsukh, Sainj and Tirthan valleys (Gaston et al., 1983; Gaston, 1986). South of the Sutlej River, it is present at Dharangati and Choppal. Its status in Mandi, Kangra and Chamba districts is less clear, but it is reported from Chhota Bangahal, Naina Devi and Kugti (Gaston, 1986). The species is also present in the Ravi Valley, where it was frequently seen in 1985 (A.J. Gaston, in litt., 1987).

The serow is probably widely distributed throughout the districts of Uttarkashi, Chamoli and Pithoragarh of northern Uttar Pradesh, although data are meagre. In the Kedarnath Sanctuary it has been recorded within an altitudinal range of 2040-3350m (Green, 1985), and in Govind Pashu Vihar Sanctuary tracks were found at 2600m (Fox et al., 1986). North of Almora, there have been recent sightings of the species at Binsar (P.J. Garson, in litt., 1987).

In the Eastern Himalaya its distribution extends to hilly terrain south of the Brahmaputra River. It definitely occurs in Sikkim, Arunachal Pradesh, Assam, Meghalaya and Tripura, and probably in Nagaland, Manipur and Mizoram, within an altitudinal range of about 300-3000m (P.C. Das, in litt., 1987; M.A.R. Khan, in litt., 1987).

Population There are few estimates of population size, but the serow may still be common. A small population exists in Dachigam National Park, Kashmir. Holloway and Wani (1970) made a conservative estimate of about a dozen animals. Subsequently, Kurt (1978) identified seven groups of 2-7 animals in lower Dachigam. Such relatively large group sizes are surprising in view of the species' predominantly solitary behaviour (Green, 1987). In Uttar Pradesh, the serow is common in the Kedarnath Sanctuary, where a density of 1.6 animals per sq. km has been recorded within suitable habitat (Green, 1987), and is present in fairly good numbers in the lower Rishi Gorge of Nanda Devi (Tak and Lamba, 1985).

Threats Habitat destruction, particularly disturbance to the forest understorey, is the main threat. Poaching appears to be limited in Himachal Pradesh, where the serow is not much sought after (Chief Conservator of Forests, in litt., 1987). According to Tak and Kumar (1983), however, the species is threatened largely due to excessive hunting for its meat and skin. In addition, the horns and skins may be considered as good trophies as, for example, in Mizoram. Here, tribals kill nearly 100 serow each year (B.S. Lamba, in litt., 1987).

Conservation Measures The serow is listed in Schedule I (revised in March 1987) of the Wild Life (Protection) Act, 1972, providing for its total protection. This legislation, or similar in the case of Jammu & Kashmir which enacted the Wild Life (Protection) Act in 1978, has been adopted by all states except Nagaland.

The species occurs in a number of protected areas, notably Dachigam National Park (14 100ha) (Holloway and Wani, 1970; Kurt, 1978; D.W.P., n.d.) and Overa Sanctuary (3237ha) (Ullah, n.d.) in Kashmir; Great Himalayan National Park (173 600ha) (Gaston et al., 1981) in Himachal Pradesh; Govind Pashu Vihar Sanctuary (95 312ha) (Fox et al., 1986), Kedarnath Sanctuary (97 500ha) (Green, 1985) and Nanda Devi National Park (63 033ha) (Tak and Lamba, 1985) in Uttar Pradesh; and Namdapha National Park (180 782ha) (Chatterjee and Chandiramani, 1986) in Arunachal Pradesh.

No comprehensive survey of the serow's distribution and status in northern India has been undertaken. Some information is available for Himachal Pradesh and north-western Uttar Pradesh based on wildlife surveys carried out in 1978-80 (Gaston, et al., 1981, 1983), 1985 (Gaston, 1986) and 1985-86 (Fox et al., 1986). Green (1987) examined the ecological relationships between serow and several other Himalayan ungulates in northern Uttar Pradesh.

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The Conservation Status of the Leopard (*Panthera pardus*) in southern Tibet

Summary The leopard appears to be restricted to the southern slopes of the Great Himalaya, but very little is known about its status and the extent of its distribution in southern Tibet. The species is protected but, in the absence of legislation, this is not enforced. Protected areas have yet to be established in the region. Some preliminary information on the leopard's distribution in south-eastern Tibet has been obtained from mammal surveys, but more detailed and extensive research is needed in order to assess its status throughout southern Tibet.

Distribution The leopard does not appear to have ever been present in the Transhimalayan region of Tibet (Tan, 1986) but it does occur in some forested areas on the southern slopes of the Great Himalaya. For example, the species has been recorded from the montane mixed forests of south-eastern Tibet on the southern slopes of the Nyaingentanglha Shan (Feng *et al.*, 1981), although not from the Medog region (Cai *et al.*, 1981). There are a number of other forested areas in southern Tibet on the border with Nepal (e.g. Gyirong and upper Arun Valley) and north-eastern India (e.g. Yadong, between Sikkim and Bhutan) in which the leopard may be present.

Population There is no information concerning the size and status of the leopard population in southern Tibet.

Threats The leopard has always been regarded as a pest; moreover, its pelts have been much sought after for the export market (Tan, 1986). Prior to the species' protection, 65, 304 and 160 pelts were purchased by the local Supply and Marketing Cooperative of the Changdu Region, southern Tibet, in 1968, 1970 and 1971, respectively. Most pelts originated from Chayu County (Yanling Song, *in litt.*, 1987). The leopard is still hunted for its pelt. Moreover, as the tiger becomes rarer, leopard bones are replacing tiger bones for use in Chinese medicines (Tan, 1986).

Conservation Measures The leopard has been included in the national protection list since the late 1970s and is listed as vulnerable. Protection is not very effective, however, as the list has never been officially announced or legalised (Tan, 1986).

There are no protected areas within the species' distribution in southern Tibet. Research is limited to mammal surveys carried out in south-eastern Tibet in the 1970s (Cai *et al.*, 1981; Feng *et al.*, 1981).

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The Conservation Status of the Goral (*Nemorhaedus goral*) in southern Tibet

Summary The goral is probably restricted to the southern slopes of the Great Himalaya but very little is known about its status and the extent of its distribution in southern Tibet. The species is included in the national protection list but, in the absence of legislation, its protection is unlikely to be effectively enforced. Protected areas have yet to be established in the region. Mammal surveys have provided some preliminary information on the species' distribution in south-eastern Tibet, but more detailed and extensive research is needed in order to assess its status throughout southern Tibet.

Distribution The goral does not occur in the Transhimalayan region of Tibet but it does inhabit some forested areas on the southern slopes of the Great Himalaya. The species, together with *N. cranbrooki*, has been recorded from montane mixed forests on the southern slopes of the Nyainqentanglha Shan (Feng *et al.*, 1981). Neither of these two species were collected from the Medog region during surveys in 1973 and 1977 (Cai *et al.*, 1981). There are several other forested areas in southern Tibet on the border with Nepal (e.g. Gyirong and upper Arun Valley) and north-eastern India (e.g. Yadong, between Sikkim and Bhutan) in which the goral may be present.

Population There is no information concerning the size and status of the population in southern Tibet.

Threats The present extent to which the species is hunted is not known. Traditionally, the goral is hunted for its skin. Some 100 skins used to be purchased annually by the local Supply and Marketing Cooperative in the Changdu Region of southern Tibet. Most skins originated from Jilong County (Yanling Song, *in litt.*, 1987).

Conservation Measures The goral is listed in the Second Category of the national protection list. It is doubtful if protection is very effective as the list has never been officially announced or legalised.

There are no protected areas within the species' distribution in southern Tibet. Research is limited to mammalian surveys carried out in south-eastern Tibet in the 1970s (Cai *et al.*, 1981; Feng *et al.*, 1981).

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The Conservation Status of the Serow (*Capricornis sumatraensis*)
in southern Tibet

Summary The serow is probably restricted to the southern slopes of the Great Himalaya but very little is known about its status and the extent of its distribution in southern Tibet. The species is included in the national protection list but, in the absence of legislation, its protection is unlikely to be effectively enforced. Protected areas have yet to be established in the region. Mammal surveys have provided some preliminary information on the species' distribution in south-eastern Tibet, but more detailed and extensive research is needed in order to assess its status throughout southern Tibet.

Distribution The serow does not occur in the Transhimalayan region of Tibet but it does inhabit some forested areas on the southern slopes of the Great Himalaya. The species has been recorded from montane mixed forests on the southern slopes of the Nyainqentanglha Shan (Feng *et al.*, 1981) and also from the Medog region during surveys in 1973 and 1977 (Cai *et al.*, 1981). There are several other forested areas in southern Tibet on the border with Nepal (e.g. Gyirong and upper Arun Valley) and north-eastern India (e.g. Yadong, between Sikkim and Bhutan) in which the serow may be present.

Population There is no information concerning the size and status of the population in southern Tibet.

Threats The present extent to which the species is hunted is not known. Traditionally, the serow is hunted for its horns, which are used in Chinese medicines, and for its skin. Some 135* skins were purchased in 1970 and some 92* skins in 1971 by the local Supply and Marketing Cooperative in the Changdu Region of southern Tibet (Yanling Song, *in litt.*, 1987).

* These figures include several skins of takin *Budorcas taxicolor*.

Conservation Measures The serow is listed in the 'First Category' of the national protection list. It is doubtful if protection is very effective as the list has never been officially announced or legalised.

There are no protected areas within the species' distribution in southern Tibet. Research is limited to mammal surveys carried out in south-eastern Tibet in the 1970s (Cai *et al.*, 1981; Feng *et al.*, 1981).

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APPENDIX

List of persons consulted

The following persons were approached for information to include in this report, many of whom kindly responded. Their assistance is gratefully acknowledged.

- Mr A.W. Akonda, Senior Research Officer, Wildlife Division, Dhaka, Bangladesh
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- Mrs F. Burhenne, IUCN Environmental Law Centre, Bonn, F.R. Germany
- Mr Leo Caminada, Kossracht am Rigi, Switzerland
- Mr Alok Chandola, Explor India, New Delhi, India
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- Mr J.C. Daniel, Curator, Bombay Natural History Society, Bombay, India
- Mr P.C. Das, Chief Wildlife Warden (Rtd), Gauhati, Assam, India
- Mr J.E. David, Data Centre for Natural Resources, World Wildlife Fund-India, Bangalore, India
- Mr D.C. Dorji, Director of Industry and Forests, Royal Government of Bhutan, Thimpu, Bhutan
- Dr J.L. Fox, International Snow Leopard Trust, Washington, U.S.A.
- Dr P.J. Garson, Department of Zoology, University of Newcastle upon Tyne, Newcastle
- Dr A.J. Gaston, Canadian Wildlife Service, Ottawa, Canada
- Mr Reet Hazarika, Tour Consultant, Gauhati, Assam, India
- Mr C.G. Hickman, Food and Agriculture Organisation of the United Nations, Bhutan
- Professor K.Z. Husain, Department of Zoology, Dhaka University, Bangladesh
- Mr Peter Jackson, Chairman, IUCN/SSC Cat Specialist Group, IUCN, Gland, Switzerland
- Mr Rodney Jackson, California Institute of Environmental Studies, Davis, U.S.A.
- Mr N.D. Jayal, Director, The Indian Natural Trust for Art and Cultural Heritage, New Delhi, India

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Mr J.K. Mehta, Chief Wildlife Warden, Arunachal Pradesh, Itanagat, India

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Preservation, Jammu & Kashmir, Srinagar, India

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Mr Bittu Sahgal, Editor, Sanctuary Magazine, Bombay

Mr R.E. Salter, Edmonton, Canada.

Dr George Schaller, New York Zoological Society, New York, U.S.A.

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Mr R.P. Sharma, Chief Wildlife Warden, Uttar Pradesh, Lucknow, India

Mr T.R. Sharma, Chief Wildlife Warden, Sikkim, Gangtok, India

Mr Arjan Singh, Pallia, Uttar Pradesh, India

Mr R.L. Singh, Director, Project Tiger, New Delhi, India

Mr V.B. Singh, Chief Conservator of Forests (Rtd), Lucknow, India

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