

HABITAT, HUNTING AND CONSERVATION OF RUPICAPRINES IN MIZORAM, NORTHEAST INDIA¹

CHARUDUTT MISHRA, T.R. SHANKAR RAMAN² AND A.J.T. JOHNSINGH³

(With one text-figure)

Key words: Serow, goral, slash-and-burn shifting cultivation, habitat ecology, wildlife management

A conservation status survey of serow *Nemorhaedus sumatraensis* and Himalayan goral *N. goral* was conducted in three protected areas and nearby villages in Mizoram state. Serow occurred in all three areas (Dampa Tiger Reserve, Murlen National Park, Phawngpui Wildlife Sanctuary) but there was no evidence of goral in Dampa. Goral mainly used steep grassland areas adjoining cliffs. The serow used areas where primary or secondary forests bordered steep slope vegetation along cliffs. The ratio of serow to goral skulls among trophies accumulated by local hunters was 4.2:1, reflecting greater relative abundance of serow in the recent past. While both species are hunted, serow are also likely to suffer from habitat loss due to shifting cultivation. Protection of key habitats such as cliffs with adjoining forests and grasslands and strengthening vigilance and monitoring efforts are suggested.

INTRODUCTION

Three species of rupicaprines, serow *Nemorhaedus sumatraensis*, Himalayan goral *N. goral*, and red goral *N. baileyi*, occur along the Himalayan mountain chain and the northeastern hills in India (Groves and Grubb 1985). Information pertaining to their status and distribution is nevertheless scarce, particularly in northeast India. This region, identified as one of the most biogeographically important conservation areas in the country (Rodgers and Panwar 1988), is also among the top 18 biodiversity 'hotspots' in the world (Myers 1988, 1990). Currently, the diverse flora and fauna of this region are threatened by logging, shifting cultivation or *jhum*, and illegal hunting by local communities (Johnsingh 1985, Choudhury 1987, Myers 1988, Rodgers and Panwar 1988, Katti

1992). This survey was undertaken to assess the conservation status of rupicaprines in the state of Mizoram in northeast India, one of the least surveyed and documented wildlife areas in the country (Rodgers and Panwar 1988). Even reliable information on presence or absence of species, including birds and large mammals, was lacking from Mizoram until recent surveys and studies (Rai and Johnsingh 1993, Mishra *et al.* 1994, Raman 1995, Raman *et al.* 1995a, 1995b).

STUDY AREA

Survey sites: The survey was conducted in three protected areas of Mizoram: Dampa Tiger Reserve in western Mizoram, Murlen National Park, and Phawngpui Wildlife Sanctuary, both in eastern Mizoram. Dampa Tiger Reserve (23° 20'-23° 47' N, 92° 15'-92° 30' E) has an area of 500 km² and ranges altitudinally between 250 and 1,100 m above msl level. The vegetation consists of tropical wet evergreen forest in the valleys and semi-evergreen forest close to the ridges. Large areas

¹Accepted February, 1997

²Present address:

Centre for Ecological Research & Conservation,
3076/5 IV Cross Gokulam Park, Mysore 570002, India.

³Wildlife Institute of India, P.O. Box 18, Chandrabani,
Dehradun-248 001, India.

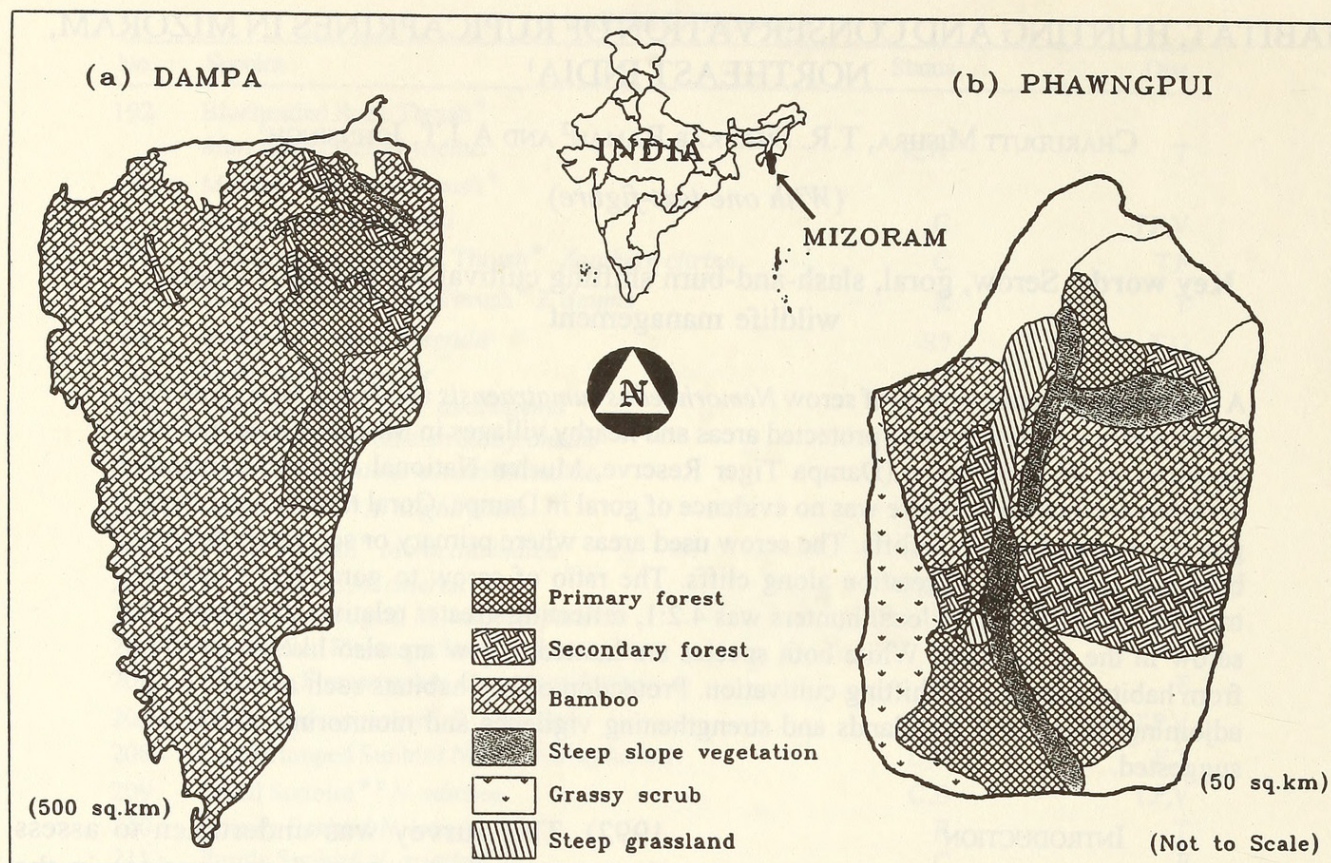


Fig. 1: Vegetation maps of Dampa and Phawngpui Wildlife Sanctuaries, Mizoram, North-East India.

occur under bamboo (mainly *Melocanna bambusoides*), which is secondary vegetation in areas previously cleared for shifting cultivation or *jhum*. Murlen National Park (c. 23° 64' N and 93° 29' E; 200 km²) and Phawngpui Wildlife Sanctuary (c. 22° 62' N and 93° 02' E; 50 km²) which are at higher altitudes (c. 1,200 to 2,100 m), are covered with sub-tropical broadleaved hill forests with oaks (*Quercus* spp.) as characteristic species (Champion and Seth 1968). All three areas have long (> 3 km) chains of cliffs. A narrow belt of vegetation occurs along these cliffs (steep-slope vegetation; Fig. 1) which is richer in grass cover and has a lower tree density than surrounding areas. Steep, open grasslands occur along the cliffs in Phawngpui, with tree cover along the *nullahs* and gullies. The areas below the cliffs are generally covered with well-wooded broad-leaved forests within the protected areas, but mostly by bamboo outside.

People and land-use: The human population of Mizoram is predominantly tribal, and over 60% of the people are dependent on *jhum* for subsistence (Singh 1995). The Mizos (the name covers several tribal communities such as the *Ralte*, *Pachau*, *Lushai*, and *Lai*) have a long tradition of hunting similar to many other hill communities in south and south-east Asian forests. We have observed houses of several hunters in villages adorned with trophies of serow, goral, macaque, bear, wild pig, deer, and hornbill.

The State has seen dramatic changes related to its human population over the last century. The population had reached almost 700,000 by 1991, an 850% increase since the beginning of the century. The current population density is over 33 per km² (Singh 1995). During this period, the literacy rate increased to 82.3% and most of the people, originally animists,

became Christian due to missionary activities. Rapid changes follow modernisation and development activities and, as a result, over 46% of the population lives in towns and cities today. Nevertheless, in remote rural areas, traditional lifestyles persist more or less intact and largely revolve around activities pertaining to *jhum*, hunting, and the village community.

Jhum is the primary occupation of the majority of people in Mizoram. Much of the surveyed protected area has undergone *jhum* in the past, as indicated by the large areas with secondary bamboo vegetation (Fig. 1a and b). Description of *jhum* activities and vegetation succession are available in Ramakrishnan (1992), Raman (1995), and Raman *et al.* (in press). With the loss of habitat associated with *jhum* and increasing population, hunting is not sustainable any more. In the vicinity of towns and villages, even the usually common birds and mammals are very scarce.

METHODS

The survey was conducted between 24th December 1993 and 18th January 1994. Different forest types were traversed on foot, and evidence (faecal pellets, dung piles, tracks) and direct sightings of rupicaprines were recorded. Rough vegetation maps of Dampa and Phawngpui were sketched on 1:50,000 contour maps with the aid of a compass to get an idea of the potential habitat for goral and serow. This could not be done at Murlen National Park due to the short time spent there. Forest Department officials were interviewed and houses in the villages surrounding the surveyed areas were visited in order to collect information on hunting. We enumerated rupicaprine trophies in the villages and measured their horn lengths.

RESULTS

Dampa Tiger Reserve: Neither goral nor serow were seen in Dampa. However, during a

2.5 km walk (Table 1) along cliffs (associated with steep slope vegetation; Fig. 1a) we found 7 dung piles of serow, 6 of which were fresh. No faecal pellets or dung piles of goral were found (Table 1). Skull trophies of hunters in Lallen, a village at the boundary of Dampa, also revealed an absence of goral skulls (Table 2).

TABLE 1

ENCOUNTER RATE OF GORAL AND SEROW PELLET GROUPS AND DUNG PILES IN THE SURVEYED PROTECTED AREAS

Protected area	Species	Pellet Groups (per km)	Dung Piles (per km)
Dampa WLS	Goral	0	0
	Serow	0	2.7 (n=7)
Murlen NP	Goral	66.0 (n=99)	10.0 (n=15)
	Serow	2.7 (n=4)	0
Phawngpui NP	Goral	51.7 (n=62)	15.0 (n=18)
	Serow	4.2 (n=5)	5.0 (n=6)

Murlen National Park: A walk along the cliffs in Murlen yielded 4 sightings of goral totalling 5 animals (3.3 goral/km; Table 3). The subspecies *N. goral hodgsoni* occurs in Mizoram. Encounter rate of goral faecal pellet groups was highest in Murlen (Table 1). We saw only 4 old faecal pellet groups of serow, and no dung piles in Murlen (Table 1). Vapar, a village at the boundary of Murlen yielded 9 goral and 41 serow skulls (Table 2).

TABLE 2

COMPARISON OF GORAL AND SEROW SKULLS COUNTED IN VILLAGES ADJOINING THE SURVEYED PROTECTED AREAS

Protected area	No. of sampled hunters' houses	Goral skulls	Serow skulls	Ratio of goral to serow skulls
Dampa WLS	2	0	8	—
Murlen NP	3	9	41	1:4.5
Phawngpui NP	2	12	39	1:3.2
Overall	7	21	88	1:4.2

Phawngpui Wildlife Sanctuary:

Phawngpui had relatively large patches of steep grasslands (Fig. 1b) which could be scanned from vantage points. During such scans, we saw 10 goral, although a few of these were possibly the same animals resighted. While scanning a steep grassy slope, a maximum of 4 goral within a 200 m x 50 m area were seen. Cliff walks yielded an encounter rate of 5.8 goral/km, which was highest among all the three protected areas surveyed (Table 3). One house in Thaltlang, a village at the boundary of Phawngpui, and another in Darzo, a few kilometres away, together had 39 serow and 12 goral skulls (Table 2). Although no live serow were seen in Phawngpui, the area had the highest encounter rates for serow faecal pellet groups as well as dung piles (Table 1). All the dung piles appeared fresh.

TABLE 3
ENCOUNTER RATE OF GORAL IN THE SURVEYED PROTECTED AREAS

Protected area	Distance walked on cliffs (km)	Encounter rate of goral during cliff walks (per/km)	Total number of goral seen during cliff walks and scans
Dampa WLS	2.5	0	0
Murlen NP	1.5	3.3	4
Phawngpui NP	1.2	5.8	17

All evidences and sightings of goral and serow were restricted to steep slopes (> 30°) — serow occurring only in steep-slope vegetation and adjoining forest (Fig. 1), and goral also in the steep grasslands in Phawngpui. The only exception was a single faecal pellet group of serow (out of 9 pellet groups and 13 dung piles) in Dampa which was recorded in secondary forest vegetation approximately 200 m away from steep-slope vegetation.

The seven hunters' houses that we visited yielded 88 serow and 21 goral skulls (Table 2, 4). The average horn lengths of goral and serow were 11.6 cm and 18.8 cm respectively (Table 4).

TABLE 4
HORN LENGTHS OF GORAL AND SEROW

Species	Average Horn length (cm)		Maximum Horn length	
	Present survey	Schaller (1977)	Present survey	Schaller (1977)
Goral,	11.6 (n=14)	15.0	19.0	23.0
Serow	18.8 (n=58)	23.0	25.0	32.0

DISCUSSION

Populations of the congeneric south Asian rupicaprines, serow and goral, have declined due to unregulated hunting and habitat changes over most of their range. The Formosan serow *N. swinhoei* population, for instance, has declined due to a combination of illegal hunting and conversion of its virgin forest habitat into agricultural lands (Lue 1987). In central and eastern China, the distribution and abundance of the Chinese goral *N. caudatus* is reported to be changing rapidly (Mead 1989), while in the Amur and Ussuri region of Russia, their number is estimated to have fallen by 75% since the end of the 19th century (Zhiwotschenko 1990). In contrast, the Japanese serow *N. crispus* has benefited from strict control over hunting, and the conversion of natural forests into conifer plantations. Its population increased 25-fold between 1955 and 1979 (from 3,000 to 75,000), and the resulting damage to commercial tree plantations necessitated culling of large numbers (Horino 1990, Soma 1990, Johnsingh 1992).

In Mizoram, and much of northeast India, *jhum* is one of the major reasons for habitat change. The area under *jhum* is increasing every year. *Jhum* cycles have decreased to 3-5 years in some places, and large areas are covered by an arrested successional vegetation of weeds and bamboo (Ramakrishnan 1992). *Jhum*, however, does not seem to have affected goral substantially. Goral are grazers, graminoids forming the bulk of their diet (Green 1985, Mishra 1993, Mishra and Johnsingh 1996). They avoid areas where dense understorey vegetation hampers visibility or quick movement, and prefer steep, open grassy

slopes interspersed with forest cover and cliffs (Mishra 1993, Mishra and Johnsingh 1996). Since such areas are not arable, the cliffs and steep grasslands that goral inhabit in northeast India do not undergo *jhum*. The steep grasslands in Phawngpui, for example, represent good habitat for goral (Fig. 1b). Although relatively unaffected by *jhum*, the species is unlikely to be very common over much of northeast India due to naturally restricted availability of suitable habitat. In Murlen, for instance, the habitat for goral seemed to be restricted to a chain of cliffs along the southern boundary of the Park.

In contrast to goral, no evidence of serow was recorded from the steep grasslands in Phawngpui (this habitat was almost absent in Dampa and Murlen). Serow were found using areas where primary and secondary forests bordered the steep slope vegetation along cliffs. These forested areas have relatively more tree and shrub cover and less grass cover. Phawngpui, in addition to steep grasslands, had such areas, and, in fact, both the rupicaprines were found using them - goral largely using the cliffs and serow using cliffs as well as the adjoining forest.

In spite of their steepness, *jhum* is prevalent in such forest areas. Some of the primary forest areas below the cliffs in Dampa and virtually all the areas outside the Park have been cleared for *jhum* and are covered by dense bamboo stands (Fig. 1a). The understorey vegetation in bamboo forests is considerably altered, with much lower tree and shrub species richness and abundance than primary and late-successional secondary forests (Raman 1995, Raman *et al.* in press). This habitat conversion is detrimental for serow. It is a browser, with bamboo and graminoids forming a very small proportion of its diet (Green 1985).

Hunting and relative abundance: We found people in villages around the sanctuaries well-informed of the sanctuaries and the associated restriction on hunting and *jhum*. Hunting, however, is very widespread. Birds otherwise common in human habitations are not seen in the vicinity of Mizo villages. The sight of hunters

with shotguns are common on roads near forest areas and serow and goral are often victims.

It is interesting to compare the number of goral and serow skulls counted in some of the villages adjoining the surveyed areas. All areas showed a greater number of serow skulls, with an overall ratio of 4.2:1 (Table 2). Information obtained from a hunter in Murlen who had kept a record of all the animals he shot, showed a ratio of 30 serow to 3 goral. This predominance of serow skulls is largely a reflection of their greater abundance at least in the recent past. As mentioned before, this is because of greater availability of steep, dense areas in the northeast, which are used by serow, as compared to the steep, open grassy slopes used by goral. Almost all birds and mammals are hunted and eaten, suggesting that this difference in skull numbers is not due to selective hunting of serow.

Conservation efforts: The Mizoram Forest Department has taken some commendable steps toward wildlife conservation in the state. Of the total area of 21,087 km² of the state, about 35.3% is protected State forest. In Dampa, eleven villages were successfully shifted outside the sanctuary in 1989-90, and *jhum* is now allowed only along the village fringes. Similar efforts are being made in Phawngpui and Murlen. Thus, a basis for sound conservation strategies already exists in Mizoram. Nevertheless, pressures on land are substantial and are likely to increase in future — in 1995 the Forest Department relented to the demand of several villages to *jhum* within Dampa Tiger Reserve. Hunting is an even more immediate threat to wildlife in Mizoram. Conservation efforts have to address the issue of hunting, a part of the Mizo people's psyche (Rai and Johnsingh 1993). It is important to strengthen the Forest Department staff by providing equipment and communication facilities to deal with poachers. Such steps, coupled with special protection of key habitats such as cliffs and primary forests at the base of cliffs, are required to conserve populations of the two rupicaprines in Mizoram.

ACKNOWLEDGEMENTS

We thank the Director, Wildlife Institute of India, for infrastructural support and help. The

Mizoram State Forest Department funded this survey, and we are indebted to them, and to Aparajita Datta and M.D. Madhusudan for their comments on the paper.

REFERENCES

- CHAMPION, H.G. & S.K. SETH (1968): A revised survey of the forest types of India. Manager of Publications, Govt. of India, Delhi.
- CHOUDHURY, A. (1987): Notes on the distribution and conservation of Phayre's leaf monkey and hoolock gibbon in India. *Tiger Paper* 14(2): 2-6.
- GREEN, M.J.B. (1985): Aspects of the ecology of the Himalayan musk deer. Ph.D. Thesis, University of Cambridge, Cambridge.
- GROVES, C.P. & P. GRUBB (1985): Reclassification of the serows and gorals (*Nemorhaedus*: Bovidae). pp. 45-50 *In*: The biology and management of mountain ungulates. Lovari, S.(ed.), Croom Helm. U.S.A.
- HORINO, S. (1990): Serow damage and its prevention. *Trans. 19th IUGB Congress, Trondheim, 1989*.
- JOHNSINGH, A.J.T. (1985): Understand, assist, protect and conserve: flora and fauna of Arunachal Pradesh. *The India Magazine* January, 64-71.
- JOHNSINGH, A.J.T. (1992): The Japanese serow: Lessons for Himalayan serow conservation. *Hornbill* 1992(4): 28-32.
- KATTI, M.V. (1992): Nightmare in dreamland. *Hornbill* 1992(4): 4-9.
- LUE, K.Y. (1987): A preliminary study on the ecology of Formosan serow *Capricornis crispus swinhoei*. *In*: The biology and management of *Capricornis* and related mountain antelopes. Soma, H. (ed.), Croom Helm, U.S.A.
- MEAD, J.I. (1989): *Nemorhaedus goral*. *Mammalian species* 335: 1-5.
- MISHRA, C. (1993): Habitat use by goral (*Nemorhaedus goral bedfordi*) in Majhatal Harsang Wildlife Sanctuary, Himachal Pradesh, India. M.S. Dissertation, Saurashtra University, Rajkot, India.
- MISHRA, C. & A.J.T. JOHNSINGH (1996): On habitat selection by the goral *Nemorhaedus goral bedfordi* (Bovidae, Artiodactyla). *J. Zool., Lond.* 240: 573-580.
- MISHRA, C., T.R.S. RAMAN & A.J.T. JOHNSINGH (1994): Survey of primates, serow, and goral in Mizoram. Wildlife Institute of India, Dehradun.
- MYERS, N. (1988): Threatened biotas: "Hot spots" in tropical forests. *Environmentalist* 8: 187-208.
- MYERS, N. (1990): The biodiversity challenge: Expanded hot-spots analysis. *Environmentalist* 10: 243-256.
- RAI, N.D. & A.J.T. JOHNSINGH (1993): A preliminary survey of the clouded leopard (*Neofelis nebulosa*) in Mizoram and Sikkim, Wildlife Institute of India, Dehradun.
- RAMAKRISHNAN, P.S. (1992): Shifting agriculture and sustainable development: An inter-disciplinary study from north-east India. MAB Series, Vol. 10, UNESCO, Paris.
- RAMAN, T.R.S. (1995) Shifting cultivation and conservation of tropical forest bird communities in Mizoram, north-east India, M.S. Dissertation, Saurashtra University, Rajkot, India.
- RAMAN, T.R.S., C. MISHRA & A.J.T. JOHNSINGH (1995a): Observation on Pallas's squirrel *Callosciurus erythraeus* and other squirrels in Mizoram, northeast India, *J. Bombay nat. Hist. Soc.* 92: 412-415.
- RAMAN, T.R.S., C. MISHRA & A.J.T. JOHNSINGH (1995b): Survey of primates in Mizoram, northeast India. *Primate Conservation* 16: 59-62.
- RAMAN, T.R.S., G.S. RAWAT & A.J.T. JOHNSINGH (in press): Recovery of tropical rainforest avifauna in relation to vegetation succession following shifting cultivation in Mizoram, Northeast India. *J. Appl. Ecol.*
- RODGERS, W.A. & H.S. PANWAR (1988): Planning a protected area network in India. Vol II. Wildlife Institute of India, Dehradun.
- SINGH, D. (1995): The last frontier: People and Resources in Mizoram. Report, Tata Energy Research Institute, New Delhi.
- SONA, H. (1990): Serows (genus *Capricornis*). *In*: Grzimek's Encyclopedia, Mammals. McGraw-Hill, Inc. pp 505-506.
- ZHIWOTSCHENKO, V. (1990): Gorals (genus *Nemorhaedus*) *In*: Grzimek's Encyclopedia, mammals. McGraw-Hill, Inc. pp 506-507.



Mishra, Charudutt, Raman, T. R. Shankar, and Johnsingh, A J T. 1998. "Habitat, hunting and conservation of rupicaprines in Mizoram, northeast India." *The journal of the Bombay Natural History Society* 95, 215–220.

View This Item Online: <https://www.biodiversitylibrary.org/item/189682>

Permalink: <https://www.biodiversitylibrary.org/partpdf/155919>

Holding Institution

Smithsonian Libraries and Archives

Sponsored by

Biodiversity Heritage Library

Copyright & Reuse

Copyright Status: In Copyright. Digitized with the permission of the rights holder

License: <http://creativecommons.org/licenses/by-nc/3.0/>

Rights: <https://www.biodiversitylibrary.org/permissions/>

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.