The Jaldapara Wild Life Sanctuary, West Bengal

BY

J. JUAN SPILLETT

(With two plates and two maps)

TABLE AND MAPS

I. INTRODUCTION

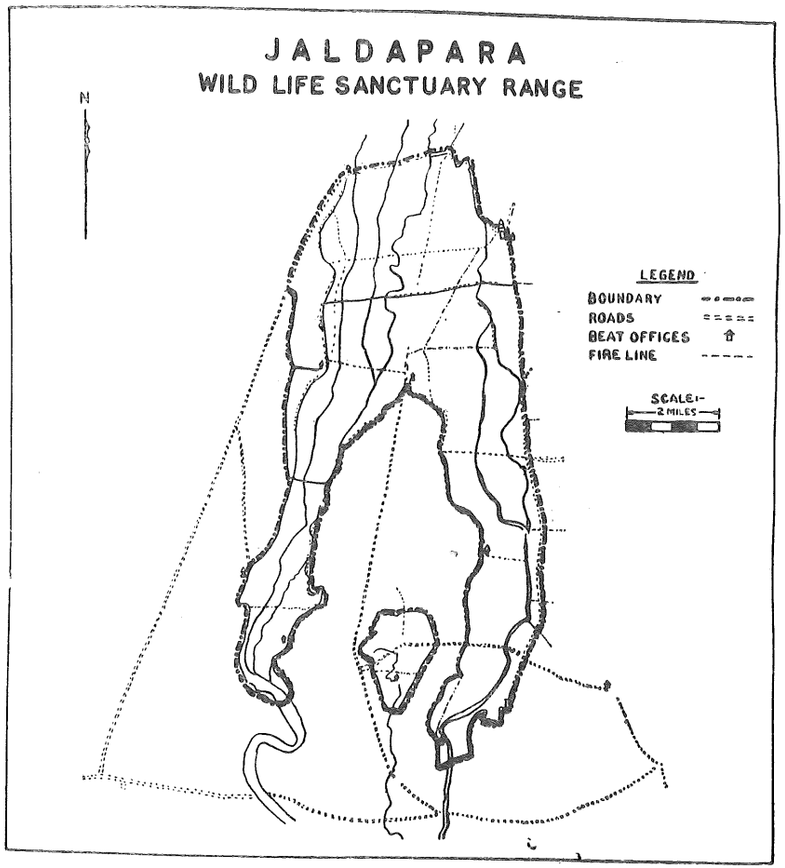
The Jaldapara Wild Life Sanctuary in northern West Bengal is an example of how conservation measures can preserve both a vanishing species and a worthy wild life area as a part of a nation's heritage. By the early 1930's the great Indian One-horned Rhinoceros was on the verge of extinction in what is now the state of West Bengal. The Bengal Rhinoceros Preservation Act of 1932 (Bengal Act VIII of 1932) condemned the indiscriminate destruction of this impressive animal and provided it with legal protection. However, illegal poaching and encroachment by cultivation and human habitation upon the few remaining haunts of this rare species continued. Although the area presently occupied by the sanctuary was unofficially recognized as such as early as 1936, it was not until 13 March 1941 that it was set apart as a sanctuary, primarily for the preservation of the rhino (Government Order No. 10549, which was later amended by Notification No. 5238 on 3 April 1943). Jaldapara was first known as a game sanctuary, but subsequently as a wild life sanctuary—dedicated to the preservation and conservation of all the wild life, both plants and animals, within its confines.

The Jaldapara Range covers a total of 25,833 acres (40·36 square miles). Besides the sanctuary, this includes the 1243 acre Salkumar Block, part of which is cultivated lands and the remaining forests are commercially exploited for forest produce. This block, however, forms an isolated island and, except for administrative purposes, has little relation to the sanctuary. The sanctuary proper includes 24,590 acres (38·42 square miles) and, with a little imagination, takes the form of a man's pair of trousers. The northern boundary or the 'waist' is approximately two and one-half miles across. The total length of the 'legs' is about 11 miles. And the length of the 'inseams' is almost eight miles.

Accommodation for visitors and catering facilities are provided by the Forest Department at the Baradabri Tourist Lodge on the east bank of the Malangi River, along the north-eastern boundary. The lodge contains three units, each of which accommodates two people. A youth hostel is also located near-by and provides accommodations for sixteen people. Although the hostel is under the direction of the Education Department and is primarily for the use of students, it is administered by the Forest Department and can be used by other visitors by special arrangement.

The nearest railroad station is Hasimara, less than four miles from the Baradabri Tourist Lodge. However, it should be noted by visitors arriving by train that the Assam Mail does not stop at Hasimara, but all trains stop at Madarihat, seven miles to the north-west. There is

also a Forest Rest House near the Madarihat station and from here an access road is presently being constructed by the Forest Department. This road runs along the western boundary of the sanctuary to the proposed site of a new tourist lodge to be built shortly by the Forest Department along the Holong River four miles south of Madarihat. Thrice weekly unscheduled air flights from Calcutta land at the Hasimara airfield, three miles distant from Baradabri. The office and quarters of the Jaldapara Range Officer in charge of the sanctuary are centrally located at the ' crotch '. Beat offices, each manned by a Forester and two Forest Guards, are strategically located along the sanctuary's boundaries (see Map 1).



Map. 1. General map of the Jaldapara Wild Life Sanctuary, West Bengal, depicting the beat offices, firelines, and principal streams

II. Habitat

Streams

Jaldapara is located in a level flood plain, 200 feet (61 metres) above sea-level. The sanctuary is intersected by numerous rivers and streams that flow basically from north to south. The west ' leg ' is drained by the Torsa River, which is the largest river in the area. It rises in the Chumbi Valley of Tibet and then flows across Bhutan before entering India at Baladuar and finally emptying into the Brahmaputra near Cooch Behar. The east ' leg ' is drained by the Malangi River, which becomes the Siltorsa in the southern part of the sanctuary. Both the Torsa and the Malangi have a rapid flow and are fed by numerous tributaries. Their clear waters, flowing over a rock shingle bed, are a welcome contrast to the muddy, silt-laden streams common in much of India. Some of the other principal streams of the area are the Holong, Chel, Basra, and Para rivers. Most of these are perennial, but some occasionally become almost completely dry between February and April.

Floods

Streams in this region have a tendency to cut new channels during the annual flood season, from May to September. They intercommunicate by a network of ' cross-country ' watercourses. The frequent changes in stream beds result in numerous pools and marshes, favourite haunts of rhino.

The behaviour of these rivers is always unpredictable, but since 1950 there have been two devastating floods, one in 1952 and the other in 1954. The latter, which was caused primarily by the Torsa River, was of enormous magnitude. It flooded approximately 600-square miles in this area and did considerable damage to crops, bridges, roads, and human dwellings. Entire forests were washed downstream and many of those that remained standing were so laden with sand and silt that many of the trees subsequently died and their vegetational composition was radically changed.

Fire

The Forest Department maintains 20 miles of 50-feet wide firelines within the sanctuary. These are divided into 12 lines, most of which run east to west. The other sides of the blocks or compartments are formed by the north to south flowing streams. These lines are intended to protect the area against fire or to provide a means by which burning can be controlled and systematically utilized for management purposes. They also encourage the movement of animals and provide paths or landmarks both for visitors and workers within the sanctuary.

The sanctuary is annually burned by a controlled rotation method. Alternate blocks are first burned. The unburned blocks provide cover

and forage for the wild life until new growth in the burned areas is sufficient to provide these necessities. Then the remaining blocks are burned by the sanctuary staff. It is evident that what was once a predominantly forest area is gradually becoming a savannah or grassland due to annual burning. This is probably desirable for such species as rhino and hog deer, but may be detrimental for such species as sambar and barking deer.

Climate

Jaldapara is located in a moist tropical zone. Rainfall is monsoonal and the total annual precipitation is approximately 165 inches. The effect of the south-west monsoon is usually marked by a few heavy rains in May. Frequent heavy rains can then be expected throughout June, July, and August. The rains decrease by mid-September and usually cease before mid-October. However, the atmosphere is usually humid and there are heavy dews from November to January. Early rains can also be expected in April.

The mean daily temperature range from November to February, the winter season, is 60-70°F. (15·56-21·11°C). From May to September, the monsoon or rainy season, it is 80-90°F. (26·67-32·22°C.), and during the rest of the year it averages 75-80°F. (23·89-26·67°C.). Severe wind storms are common between April and May and sometimes occur in September and October.

Vegetation

The entire Sanctuary lies in a level flood plain. The soil consists mainly of a deep bed of sand, superimposed with a thin layer of light, friable loam. The whole formation is detritus, washed down from the neighbouring Himalayas. This riverain habitat consists primarily of forests interspersed with tall, dense grasses and interconnecting waterways. Much of the sanctuary is flooded each year by the rivers flowing through it. During these floods, most of the animals retreat to the slightly higher forest areas. The ground and much of the vegetation is fairly dry by late November or early December and between January and March most of the sanctuary, including both the forests and grasslands, is burned by the sanctuary staff. Although numerous vegetational types are found here, they can be roughly divided into two classes : riverain forests and grasslands or savannah.

Forests

Although complicated by numerous interconnecting streams, transects taken inland from the main rivers of the sanctuary indicate the forest succession for this area. A narrow fringe of deciduous forests, composed of more or less pure stands of *khair* (*Acacia catechu*) or *sissu* (*Dalbergia sissoo*), is generally encountered along streams, such as the

Torsa River. Both *khair* and *sissu* prefer porous alluvial soils, which may or may not be dry for a considerable portion of the year. *Sissu* is particularly evident in areas where the grass has been grazed heavily by livestock and is too short to be readily burned. In slightly more stable areas, *khair* and *sissu* yield to such species as silk cotton or *simul* (*Bombax ceiba*) and *siris* (*Albizzia* spp.). These may be either in pure or mixed stands, but are most often accompanied by numerous other species, such as *sidha* (*Lagerstroemia parviflora*), *tun* (*Cedrela toona*), *gamar* (*Gmelina arborea*), *pitali* (*Trewia nudiflora*), *kainjal* (*Bischofia javanica*), and *kadam* (*Anthocephalus cadamba*). Where the water level is not deep, almost pure stands of *pitali* and *kainjal* are evident, with perhaps a few *chalta* (*Dillenia indica*) and other species. Along the river beds, adjoining dry mixed forests or plateau-like areas where the permanent water level is fairly deep, *tanki* (*Bauhinia purpurea*) oftentimes predominates. Eventually on the more permanent sites or more stable areas are encountered mixed forests. Here the most predominate tree species are usually *harra* (*Grewia laevigata*) and *barkaule* (*Casearia graveolens*). *Sal* (*Shorea robusta*), a valuable hardwood species, is confined to the east bank of the Malangi in the northern and the extreme southern portions of the sanctuary.

A number of different species of weeds and climbers or vines are also associated with the forests of Jaldapara. *Assamlota* (*Eupatorium* spp.) is the most common weed and is associated both with trees and other vegetation. *Kowcha* (*Mucuna prurita*), a herbaceous climber which often kills the trees around which it entwines, is quite frequently seen. *Mikania* (*Mikania cordata*) is not yet widespread, but is already a problem in some areas and may eventually become a major problem in the sanctuary. It is reported to have been introduced from Malaysia and both trees and grass are killed by its strangling tentacles. Simple culling does little to deter its spread and burning does not kill its roots. There is apparently no inexpensive method to control this undesirable plant. *Charchare* (*Vitis* spp. or *Cissus adnata*) is also present.

The most common shrub in the sanctuary is *boroi* or *kool* (*Zizyphus mauritiana* var. *fruticosa*). With fire protection, *Macaranga denticulata*, *Alphia alughas*, *Trema orientalis*, and other species spread rapidly, particularly, in damp areas.

Grassslands

Transects from the main rivers inland also indicate the succession of the grasslands or savannahs. However, as has been previously mentioned, the sanctuary is predominantly forest and without annual burning almost all of the grasslands would eventually become forests. Besides burning, the successional stages are, of course, dependent upon the behaviour of the streams and the stability of the site. *Cassia* or

khasila (*Saccharum spontaneum*), a relatively short grass which is usually less than six feet high, has remarkable powers of colonization and is one of the primary invaders on new riverain accretions. This grass is commonly found on sandy soils, but may also be encountered in clay pockets, which are often silted-up old stream beds. *Dachla* or *khagri* (*Phragmites karka*) is also generally found in clay pockets, as is *Saccharum procerum*. Some of the other grasses present in the sanctuary are *Erianthus elephantinus*, *Anthistiria gigantea*, *Andropogon nardus*, *Arundinella brasiliensis*, *Arundo donax*, *Paspalidium punctatum*, *Sacciolepis myosuroides*, and so forth.

Improvements

In addition to controlled burning and the construction and maintenance of firelines, the Forest Department has attempted in various ways to improve the wild life habitat of the sanctuary and to improve the possibilities for visitors to view the wild animals. A total of 12 glades, eight in the east side and four in the west, are maintained by the sanctuary staff. Each glade consists of a circular clearing, about 150 feet in diameter, with a centrally located salt lick. The bushes have been removed from these areas and the grass is burned prior to December. Salt is regularly mixed with the soil in a bare spot in the center. Therefore, during the visitor season (January-April) both green forage and salt are present in these glades to entice animals into the open where they can be readily seen by visitors. A number of wallowing pools for rhino have also been constructed in different areas and natural wallows have been improved or enlarged.

Although the firelines within the sanctuary serve as paths or roads for workers and visitors on elephant back, the Forest Department has wisely refrained from constructing motorable roads. The sanctuary is not large and due to its unique shape almost any part of it can be quite easily reached from roads outside the boundaries. One exception to this rule is the present construction of a road entering the west side, which leads to the site of a new tourist lodge to be built along the Holong River. This will make some of the best wild life habitat in the sanctuary readily accessible to visitors. It will be interesting to note what effect this road has on the relatively dense animal populations now present in that area.

All forms of hunting, shooting, and fishing are prohibited in the sanctuary. However, Forest Officers of gazetted rank or designated members of the sanctuary staff are authorized to shoot dhole or Indian wild dog (*Cuon alpinus*) and otter (*Lutra lutra* or *L. perspicillata*). Throughout India wild dogs have the reputation of being merciless and ruthless killers. Nevertheless, there have been no reports of their presence in this vicinity during recent years and, even if they were present

they should probably be considered as an integral part of the faunal composition of the sanctuary. As such, they should be extended the protection of the sanctuary until such time as it is definitely established that their presence is a threat to the existence of other animal species. Because of its supposed depredations upon valuable fish resources, the otter is classed as vermin in West Bengal, as well as in a number of other Indian States. Whether or not there is a sound basis for this, there appears to be little basis upon which to persecute this animal in a sanctuary where all fishing is prohibited. It is, therefore, suggested that otter also be afforded the protection of the sanctuary.

III. Wild Life Enumerations

West Bengal was formerly very rich in wild life, but due primarily to the spread of cultivation, including tea plantations and human habitation, this valuable natural resource has been drastically reduced. It appears that only in sanctuaries, such as Jaldapara, can remnants be preserved of the vast numbers of wild animals once found here. Besides rhino, other mammals represented in the sanctuary include: wild elephant, gaur or Indian 'bison', swamp deer, sambar, chital or spotted deer, hog deer, barking deer or Indian muntjac, wild pig, tiger, leopard, jungle cat, large and small Indian civets, mongoose, otter, jackal, sloth bear, common hare, northern palm squirrel, gayal, and so on. The Jaldapara range was never the natural habitat of the gayal, but six were introduced into the sanctuary from Manipur by the Forest Department in 1964. Larger mammals such as wild elephant, gaur, swamp deer, and chital are rare. Although wild buffalo (*Bubalus bubalis*) formerly inhabited northern Bengal they have been exterminated in this area and are presently restricted to a few locations in the neighbouring state of Assam. The Forest Department is considering their re-introduction into Jaldapara. Over 200 species of birds, including peafowl, red junglefowl, and several species of partridges and numerous species of fish and reptiles are also present in the sanctuary.

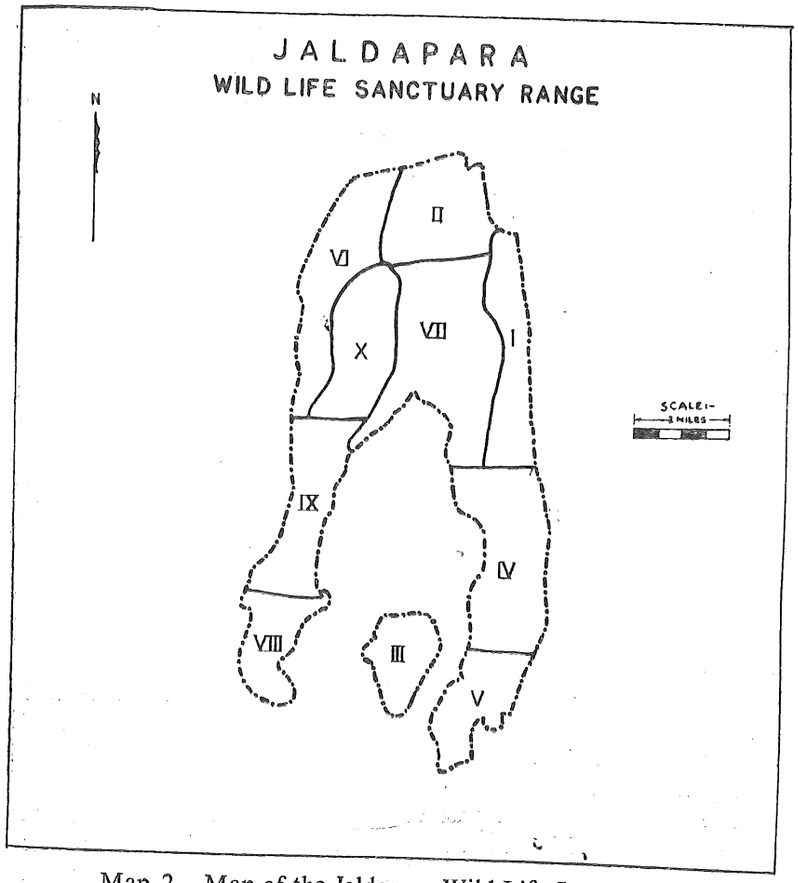
Previous Enumerations and Methods

The Forest Department has conducted wild life enumerations in the Jaldapara Sanctuary for three consecutive years (1964, 1965, and 1966). Therefore relatively accurate data is already available upon which future management plans and policies may be based.

The first enumeration was conducted on 21 May 1964. Eleven enumeration parties (each consisting of an elephant, mahout, enumerator, and Forest Guard) were employed in each compartment or block in the sanctuary between 04.00 and 12.30 hours. Firelines or features such as streams or boundary lines were used to divide the sanctuary into the

enumeration blocks, which averaged a little less than four square miles each. The parties systematically zigzagged across their assigned block, tallying all animals sighted. Although some animals are usually missed when this method is used, it gives a minimum count for the different species and provides a relatively reliable index of abundance. The same methods were again employed by ten enumeration parties on 25 April 1965.

These methods were slightly modified for the 1966 enumeration, which was conducted on April 26. As in 1965, ten parties were used, but each started counting at 04.00 on the southern boundary of their assigned blocks and terminated at 12.00 hours at the northern boundary (Map. 2). Therefore, the possibility of duplicate counts of the same



Map 2. Map of the Jaldapara Wild Life Sanctuary, West Bengal, depicting the census blocks utilized during the 1966 wild life enumeration

animals by enumerators in adjoining blocks was probably eliminated. As previously mentioned, the methods used give only a minimum count or index of relative abundance for the larger mammals in the sanctuary. A great deal of care and judgment, based upon experience and an intimate knowledge of the entire sanctuary, must be used to estimate how many animals of each species may have been missed or overlooked (Table).

Age Composition and Sex Ratios

Only the numbers for each species observed were recorded prior to the 1966 enumeration. This year an attempt was also made to classify the animals as to sex and age class (i.e. adult male, adult female, or young). If there was any doubt as to the sex of an adult animal, it was classified as ' non-sexed '.

Age composition generally reflects the status of a species in terms of its reproductive potential. A high percentage of young animals generally indicates that a population is growing or thriving, whereas a relatively small proportion a young indicates a low producing or senile population. Sex ratios likewise are an indication of reproductive potential. Most mammals, particularly ungulates, are promiscuous in their mating and a single adult male is generally sufficient to cover five or more females. Therefore, within reasonable limits, a predominantly female population has a higher reproductive potential than one with more males. With reliable age composition and sex ratio data a trained biologist can often compute the average annual rate of net increase or loss, as well as determine the present status of the population.

Age composition and sex ratio data collected during the 1966 enumeration, along with data previously collected, will be discussed under the various mammal species.

Rhino

No evidence of rhino poaching was observed during the eight days I spent on elephant back in the Jaldapara Sanctuary. Therefore, it may be reasonable to assume that practically none, if any, exists. Neither was any evidence of natural death among rhino encountered during the wild life enumeration. Therefore, I am unable to fully account for the discrepancy in the numbers of rhino counted this year as compared to the two previous years (32 versus 72 in 1964 and 75 in 1965). The day of the 1966 enumeration (April 26) was very warm and most of the rhino tallied were observed in or near wallows or streams. Perhaps, due to this factor, a relatively large number were overlooked. I observed as many as 20 different rhino in a single day (April 2) along the Torsa River in the western ' leg ' of the sanctuary. During seven days in the field prior to the enumerations I observed a total of 46 rhino, of which at

TABLE

TOTAL COUNTS FOR ANIMALS OBSERVED IN THE JALDAPARA WILD LIFE SANCTUARY, WEST BENGAL, DURING THE 1964, 1965, AND 1966 WILD LIFE ENUMERATIONS

Species		Year			Estimated Total
Common Name	Scientific Name	1964	1965	1966	(1966)
Great Indian One-horned Rhinoceros	*Rhinoceros unicornis*	72	75	32	50-60
Indian Elephant	*Elephas maximus*	2	2	0	1-2
Gaur or Indian 'Bison'	*Bos gaurus*	7	11	0	10
Swamp Deer	*Cervus duvauceli*	0	0	3	10
Sambar	*Cervus unicolor*	20	22	20	40-50
Chital or Spotted Deer	*Axis axis*	11	20	0	10
Hog Deer	*Axis porcinus*	141	101	132	400-500
Barking Deer	*Muntiacus muntjak*	188	171	68	125-140
Wild Pig	*Sus scrofa*	88	44	55	125-150
Sloth Bear	*Melursus ursinus*	0	3	2	10
Tiger	*Panthera tigris*	2	7	0	5
Leopard	*Panthera pardus*	0	0	0	1+
Jungle Cat	*Felis chaus*	0	0	3	—
Rhesus Macaque	*Macaca mulatta*	56	162	165	—
Common Hare	*Lepus nigricollis*	1	9	15	—
Northern Palm Squirrel	*Funambulus pennanti*	4	19	8	—
Indian Python	*Python molurus*	1	2	0	—
Common Cobra	*Naja naja*	1	0	2	—
Water Monitor	*Varanus* sp.	1	2	2	—

NOTE. Five rhino are also reported to inhabit Goru Mara, a small sanctuary west of Jaldapara in West Bengal. The gayal seen around the Baradabri Tourist Lodge being domesticated are omitted from the count.

least 40 were different animals. Included in my total count were two 'non-sexed' adults, 12 adult males, 21 adult females and 11 young. Thus, of the rhino which I observed, 36% of the sexed adults were males and 52% of the adult females were accompanied by young. In comparison, 54% of the adults observed during the enumeration were males and only 31% of the adult females were accompanied by young. In either case, the relatively high percentage of young would probably indicate that the population is thriving. I feel certain that there are at least 50 rhino in the sanctuary. A factor worthy of note is that wherever domestic livestock grazing is evident there are few, if any, rhino present. Examples are Blocks 3, 4, and 5 which reported a combined total of only two rhino.

Wild Elephant

No wild elephant were observed in the Jaldapara Sanctuary during the 1966 enumeration. However, a single male *makhna* was observed in the vicinity of the Jaldapara Forest Office on April 5 and 6. Two elephant were reported in both the 1964 and 1965 enumerations. A wild tusker also killed one of the Forest Department's domestic male tuskers near the Jaldapara Forest Officer's quarters in 1965.

Wild elephant are not permanent residents inside the sanctuary and are usually attracted into this area by crops, such as paddy. The enumeration was conducted in the dry season. Therefore, due to an absence of forage or crops only a few elephant at most would normally be expected in the sanctuary at this time of year. During their migrations or seasonal movements, elephant enter or leave the sanctuary by way of the Chilapata Range to the east, the Madarihat Range to the west, or the Nilpara Range and Bhutan to the north. The only side of the sanctuary not commonly traversed by elephant at one time or another during the year is the Patlakhawa Protected Forest area to the south.

Gaur or Indian 'Bison'

No gaur were reported during the 1966 enumeration. Several parties, however, reported fresh tracks. Mr. Sanyal, Assistant Divisional Forest Officer, Cooch Behar observed five head (3 males, a large female, and a calf) west of the Torsa River on April 2. We also observed two (a young adult male and an adult female) north of the Jaldapara Forest Rest House on April 5 and a solitary adult male in the same vicinity on April 6. These bovines are generally forest dwellers and are migratory in nature. Although some were obviously not counted during the 1966 enumeration, it is doubtful that as many as 20 are ever present in the sanctuary at one time.

Swamp Deer

Herds of swamp deer were once common in much of northern West Bengal. However, this animal is now very rare even in the Jaldapara

Sanctuary. None were reported in the 1964 and 1965 enumerations, but three adult females were observed in 1966. I also observed a single female on April 1. Here as in many parts of India, the outlook for this species is not promising and there are probably fewer than 10 in the sanctuary.

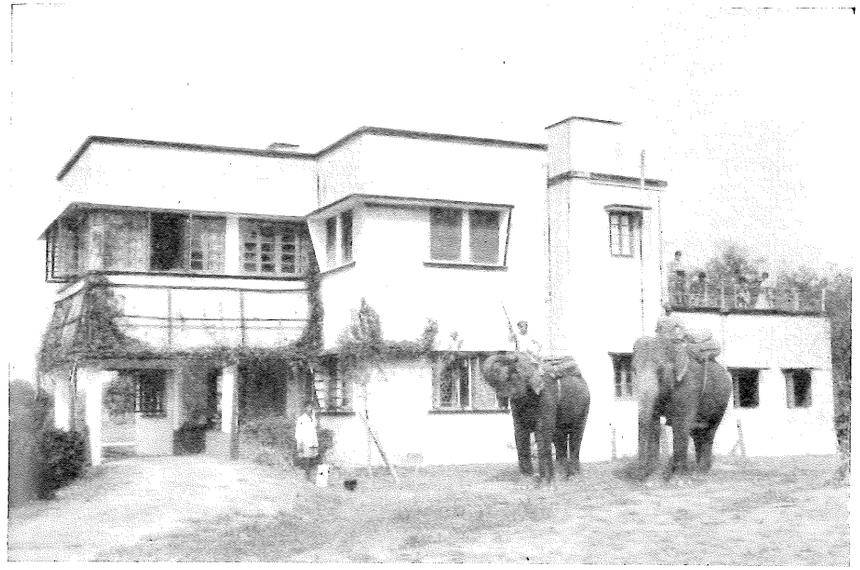
Sambar

Sambar are not encountered in herds and rarely in large numbers, but are still relatively common in many forest areas of India. However, due to their shy and somewhat solitary nature, it is very difficult to determine their numbers accurately. Twenty were observed in the 1964 enumeration, 22 in 1965, and 20 again in 1966. Undoubtedly less than half of the sambar in the sanctuary were observed during these enumerations, but the figures indicate that the population is probably stable. In the 1966 count, no young were observed and 60% of the adults reported were males. Prior to the enumeration I observed 12 sambar, including 7 adult males, 3 adult females, a yearling, and a small fawn. Therefore, 70% of the adults which I observed were males (all of which had hard antlers) and two of the three adult females were accompanied by young. This closely approximates the results of the enumeration. It is not known why almost twice as many adult males as adult females were observed. This indicates a very low reproductive potential for this population. There are probably between 40 to 50 sambar in the sanctuary and, although not overly abundant, they are not rare in the sanctuary as are chital and swamp deer.

Chital or Spotted Deer

Chital, although the most common deer in many parts of India, are extremely rare in the Jaldapara Sanctuary. Eleven were reported in the 1964 enumeration, 20 in 1965, but none were observed in 1966. I did not observe any chital inside the sanctuary. Further, the Jaldapara Range Officer stated that he has seen only one animal, which he could positively identify as a chital, during the almost two years he has been stationed here. The closely related hog deer often attain fairly large proportions before losing all of their spots. Therefore, I am inclined to believe that there have never been more than a few chital, at most, in the sanctuary during recent years, and perhaps some of those reported as such in 1964 and 1965 were actually young hog deer. It has also been observed that chital seem to prefer a deciduous forest habitat, which is not present in Jaldapara. Perhaps this is one of the reasons why they are apparently rare in this area ; and, if they are present, why their numbers have not increased.

Spillett : Jaldapara Sanctuary



Above : The Baradabri Tourist Lodge at the Jaldapara Wild Life Sanctuary. (*Photo: J. Juan Spillett*) *Below:* The author in the field in Jaldapara. (*Photo: E. P. Gee*)

Spillett : Jaldapara Sanctuary

Above: A rhino in typical riverain habitat in Jaldapara. *(Photo : J. Juan Spillett)*
Below : A young male hog deer. *(Photo : E. P. Gee)*

Hog Deer

Hog deer are by far the most common large mammal in the Jaldapara Sanctuary. This is to be expected in an area that is predominantly riverain habitat. These deer are most commonly encountered in small groups in savannah or grassland areas or along the forest edge, but rarely inside the forest where they are replaced by the solitary barking deer. Total counts for the 1964, 1965, and 1966 enumerations (141, 101, and 132 respectively) indicate that the sanctuary's hog deer population has been quite stable during the past three years. In the 1966 enumeration, 46% of the classified adults were males and only 4% of the adult females were accompanied by young. Prior to the enumeration I classified a total of 119 hog deer (34 adult males, 53 adult females, and 32 young). Therefore, only 39% of the adults I classified were males and 60% of the adult females were accompanied by young. Probable reasons for discrepancies in the enumerators' figures as compared to mine are : (1) most of the young were approaching yearling size and were often difficult to distinguish from adults, (2) the main rut season had passed and the males were shedding their antlers, making it difficult to distinguish antlerless males from females, and (3) without binoculars it is often difficult to distinguish hog deer from barking deer and the enumerators did not have binoculars to aid them as I did. Also, (4) I had been classifying animals as to age and sex almost daily for the past three months, while many of the enumerators were relatively inexperienced in such work. Based upon my data, the hog deer population appears to be doing well and I estimate there are probably 400-500 present in the sanctuary.

Barking Deer

Barking deer or Indian muntjac are solitary forest dwellers and are rarely encountered in groups of more than three. The dense forests which they inhabit and their solitary and shy nature make it difficult to census this species. Although totals of 188 and 171 were reported in the 1964 and 1965 enumerations, only 68 were reported in 1966. Barking deer and hog deer are generally encountered in different habitats. However, in much of Jaldapara where there is an intermingling of forests and grasslands, hog deer and barking deer are often in close association. Under such conditions it is often difficult to distinguish these two species without the aid of binoculars. I observed less than 20 barking deer during eight days inside the sanctuary and am inclined to believe that some of the animals reported as barking deer, particularly in the 1964 and 1965 enumerations, were probably hog deer. In the 1966 enumeration, 39% of the classified adults were males and 13% of the adult females were accompanied by young, whereas in my small sample the adult sex ratio was almost 50-50 and almost one-third of the adult females

were accompanied by young. In either case this species is probably doing fairly well and I estimate there are at least 125 barking deer in the sanctuary.

Wild Pig

Wild pig are relatively common in much of the Jaldapara Sanctuary. Except for solitary males, they are usually encountered in family groups or sounders. However, the dense cover which they generally inhabit and their practice of remaining hidden until closely approached and then suddenly breaking in all directions make it extremely difficult to count them accurately. Accurate sex and age ratio data is even more difficult to obtain. However, enumeration figures for the past three years indicate that the wild pig population in the sanctuary has been relatively stable. During the 1966 enumeration, eight adults were not sexed, but 57% of the adults classified were males and the 18 adult females tallied were accompanied by only five young. Prior to the enumeration I tallied 19 wild pigs : 11 unsexed adults, 2 adult males, 2 adult females, and 4 very small young. Totals in both cases indicate a very high adult/young ratio, particularly for a species with such a high reproductive potential. Many tribal people, who are experts with their primitive bows and arrows, are employed in the near-by tea estates. There is evidence that pig are perhaps the most commonly poached animal inside the sanctuary. However, hog deer also appear to be poached regularly. This may be one of the reasons for the small proportion of young pigs to adults. Wild pig are also common prey for many carnivores, such as tiger, and the young are more susceptible to predation than the adults. Nevertheless, the wild pig population appears to be in good condition and I estimate there are probably 125 to 150 in the sanctuary.

Other Mammals

Besides the mammals which have already been discussed, other mammal species observed during the enumerations also deserve attention. Bear were reported in both the 1965 and 1966 enumerations, three and two respectively. These were probably sloth bear, but there is the possibility that the Asiatic black bear (*Selenarctos thibetanus*) also inhabits this area. Tiger were reported in 1964 and 1965, but not in 1966. I saw evidence of at least three different tigers inhabiting the sanctuary. Although leopard is not common in this area and apparently had not previously been reported for the sanctuary, I observed the pug marks of a leopard north of the Jaldapara Forest Rest House prior to the 1966 enumeration. Wild cat, most probably the jungle cat (*Felis chaus*), were also reported during the 1966 enumeration. Asiatic jackal (*Canis aureus*) are present and most generally seen along the boundaries

of the sanctuary near villages. Mongoose (*Herpestes* spp.) are also frequently observed. Troops of rhesus monkey (*Macaca mulatta*) are commonly encountered inside the sanctuary. There is no evidence, however, of the presence of the common langur (*Presbytis entellus*). Northern palm squirrel (*Funambulus pennanti*) is common in the sanctuary's forests and the common hare (*Lepus nigricollis*) is frequently seen in the drier grassland areas. Although not reported, there was evidence that otter (*Lutra* spp.), large and small Indian civets (*Viverra zibetha* and *Viverricula indica*), porcupine (*Hystrix* sp.), and other small mammals are also present. The gayal, introduced into the sanctuary from Manipur by the Forest Department, are domestic and frequent the area around the Baradabri Tourist Lodge. One female had a calf in 1965.

Reptiles

Wild life enumerations such as have been conducted in the Jaldapara Sanctuary do not give an indication of the abundance of the reptilian species. However, Indian python (*Python molurus*) were reported both in 1964 and 1965, common cobra (*Naja naja*) were reported in 1964 and 1966, and water monitor (*Varanus* sp.) was reported in 1966. Other unidentified reptiles, particularly snakes, were also observed.

The great variety of faunal forms, including mammals, birds, reptiles, and fishes, as well as the abundance of floral species present in Jaldapara indicates a wise choice by the Forest Department in establishing a wild life sanctuary in this area and makes it even more imperative that the wild life of this outstanding area be protected and preserved.

Miscellaneous Observations

Mr. Sanyal and I spent seven days on elephant back between March 31 and April 7, becoming acquainted with as much of the Jaldapara Sanctuary as possible. Twice during this time the courtship behaviour of the Indian rhino was observed. Perhaps one observation, as recorded in my notes, would be of interest.

April 2 at 05.45 : Just after crossing the Torsa River north-west of the Jaldapara Forest Rest House, we heard the roar, followed by two honking snorts, of rhino somewhere along the river north of us. We started towards the noise, but within a short time encountered an adult rhino. We observed it until we were able to determine its sex and ensure that there were no other rhino present in the tall grass near by. After leaving the solitary male we sighted a large male at 06.00 coming directly towards us across an open island of sand in the river bed. On the distant bank were two more rhino. The male approaching us had a large bleeding gash, about 24 inches long, which extended across the top of his neck and down onto the left shoulder. Although the light was still poor, (sunrise was at 05.30 but there was a smoky haze in the sky) I attempted to take a few

photographs of the apparently ousted suitor. The male slowly moved into the dense grass on the river bank just north of us. We decided to try to get closer to the courting pair across the river. Although the river bed was open sand and gravel bars, we took our two elephants up to less than 200 feet from the two rhino without them apparently sensing our presence. The courting male was noticeably smaller than the ousted one and had a much shorter horn. I could see no evidence of aggression on either him or the female. We could only conjecture as to what had actually happened a few minutes earlier.

Whenever the female moved, the male followed closely at her side. When she stopped the male would move up near her head and rub his head along her neck and head and occasionally butt her lightly in the chest. She would occasionally open her mouth and several times appeared to be playfully nibbling at his head and ears. She would frequently begin her slow shuffle diagonally downriver towards us and the male would follow at her side until she stopped. The ' caressing ' would then be repeated. Approaching the main channel of the river, they swam across one of the few deep places in the river. They could have easily waded across only a few feet either up or downstream.

We remained motionless, but when they had moved directly downwind of us, they suddenly stiffened and became alert. Their heads went up, necks extended and ears cocked forward. They acted confused and would turn first one way and then the other. Although we were only about 75 feet upriver from them, they appeared not to be able to distinguish us and our elephant clearly. Suddenly they turned and dashed across a shallow stretch of water and disappeared into the tall grass on the river bank. After waiting a short while we attempted to follow, but their love-making had ceased and upon our approach all we saw were their wobbling rumps as they ran snorting through the dense grass.

Prior to coming to Jaldapara, I had observed during a three-week visit to the Kaziranga Wild Life Sanctuary in Assam that when a female rhino accompanied by a calf was observed there would almost invariably be other females with calves in the immediate vicinity. This also held true in my observations at Jaldapara. Discussing this point with Mr. E. P. Gee, during his visit to Jaldapara on April 3, he stated that he had noted the same in his observations.

The following day (April 4) Mr. Sanyal and I visited the western ' leg ' of the sanctuary along the west bank of the Torsa River. We encountered a female rhino with about a 3-year-old calf and shortly afterwards another female with about a 2-year-old calf. At the second location, a somewhat circular opening of relatively short grass, my mahout (Kancha Bhuzel) became excited and insisted that we stop while he told us what he had observed on this site the previous year.

Kancha claimed that he was passing through this area on his elephant

(Rukali Number 2, a large and fairly old female) when he came upon a female rhino giving birth to a calf on this site. The female was evidently in labour as she would lie down and then get up and move a short distance and lie down again. He stated that six adult females formed a sort of circle around the pregnant female and whenever he attempted to approach they would alternately charge him and his elephant. Therefore, he said he remained along the edge of the forest and watched the female have her calf. He also stated that at birth the calf was a pinkish colour and within a few minutes was upon its feet and the group slowly moved together into the near-by forest.

Whether or not there is a definite social tendency among female rhino or females with calves remains to be investigated.

IV. Conservation Problems

All exploitation of Jaldapara's natural resources, including grazing of domestic livestock, cutting of reeds and grass or thatch, gathering of firewood, felling of trees, shooting, fishing, etc. is prohibited. This is as it should be, but in actual practice is very difficult to enforce. The sanctuary's unusual shape, resulting in almost a 50-mile boundary, makes the problem of complete protection very difficult. In addition, much of the sanctuary adjoins cultivated lands inhabited by high densities of rural people, most of whom are illiterate and have little understanding of the need or value of areas such as wild life sanctuaries or reserved forests. Many feel little, if any, obligation (moral or otherwise) to comply with the laws which have been established for the protection of this area.

Livestock

The major problem confronting the Jaldapara Sanctuary is that of illegal grazing. Overgrazing by domestic livestock is evident in many parts of the sanctuary and particularly the eastern ' leg ' in the Chilapata Block. Several camps, each with well over 100 head of buffalo, have been established along the western boundary in this block. There are no grazing lands available for domestic animals in this area, except inside the sanctuary. Professional graziers are illegally maintaining their large herds upon the sanctuary's resources. From their camps, well-beaten paths lead deep inside the sanctuary. Little forage remains in many parts of the sanctuary and there are extensive areas that are severely trampled. There is not even sufficient grass left to burn in some parts and, as a result, *sissu* trees are invading what were formerly grasslands. Also, areas grazed by livestock are almost completely void of wild life. I saw only four hog deer and a solitary hare while visiting the 4556-acre Chilapata Block. Domestic grazing is also evident along both boundaries of the Torsa Block and the north-eastern corner of the Malangi

Block. I did not visit the exterior boundary of the Jaldapara Block. There is, however, little evidence of domestic grazing in the vicinity of the Jaldapara Range Office. The relatively high numbers of wild animals observed in this area is a marked contrast to what was observed where illegal grazing was evident.

On April 5, two professional graziers were apprehended by the Forest Department for illegal grazing of their buffalo inside the sanctuary in the Chilapata Block. Some of their buffalo were impounded and they paid a fine of Rs. 10 per adult head to the Forest Department, as well as an additional fine to the pound keeper. As a result, some of the remaining buffalo camps on the edge of the sanctuary were shortly moved to other areas by their owners.

Poaching

Rhino poaching does not appear to be excessive in the Jaldapara Wild Life Sanctuary. However, there is evidence that other animals, such as wild pig and hog deer, are regularly poached inside the sanctuary. This is further indicated by the fact that rhino can usually be closely approached on elephant back, whereas the other animals are shy and easily frightened. Shooting was heard inside the sanctuary on three occasions during my first visit (April 1-7). However, it appears that bows and arrows are most commonly used for poaching here. A party of poachers, labourers from a near-by tea estate, was also encountered.

The presence of large numbers of tea estate labourers, villagers, and military personnel along the boundaries of the sanctuary makes it imperative that the sanctuary staff be exceptionally vigilant to minimize illegal practices. However, the Forest Department presently does not have the legal authority that it should have to help the staff apprehend and prosecute those whom they encounter violating the law.

The size of the present sanctuary staff appears to be adequate. The nine beat offices, each of which is manned by a Forester and two Forest Guards, are also well situated along the boundaries. However, it is suggested that at least one patrol unit consisting of two armed guards, a mahout, and an elephant be detailed to patrol the sanctuary regularly. The objective of this unit would be to minimize poaching and other illegal activities throughout the sanctuary. Personnel from the present staff could be utilized to form such a unit. Beat Officers and Forest Guards should also be required to patrol their assigned blocks.

Poaching and other illegal activities inside the sanctuary are presently considered as problems of law enforcement. They should, however, be considered as a long-term problem of education. The public, particularly those living near sanctuaries or reserved forests, should not only be informed as to what the laws in these areas are, but should also be taught why these laws exist and their importance. This should be done

by every means possible—through the schools, through proper publicity, and through explanations by a well-informed staff. Concerning the latter, this can best be done by men that have been trained in the basic concepts of conservation. Basically, conservation is the wise use of natural resources so as to provide the greatest benefit for the greatest number of people.

Other Illegal Activities

Most of the natural resources of lands adjoining Jaldapara have been depleted. Therefore, in addition to illegal grazing or poaching, many of the near-by people also turn towards the sanctuary to supply their needs for firewood and construction materials, such as poles and thatch. Individually these violations may appear to be minor offences, but collectively they attain enormous proportions.

Practically all of the rural dwellings in the surrounding areas consist of thatch or *kutcha* huts constructed over pole and bamboo frames. Although some stands of bamboo are present on private lands, the only near-by source for thatch or wood is the sanctuary. In addition, reserve supplies of thatch, as well as stacks of firewood, are present in front of many dwellings. Families enter the sanctuary and clear cut relatively large areas of grassland for thatch. It is then tied into bundles and eventually carried out of the sanctuary.

Firewood is illegally collected from the sanctuary forests, primarily by women or young girls. If apprehended by members of the sanctuary staff, they often evade the offence by claiming that the staff members tried to molest them. In some areas, such as the Chilapata Block, the felling of large trees is evident. Some of the remaining stumps are over two feet in diameter. These illegally felled trees are sawed into suitable lengths so that they can be removed from the sanctuary by bullock carts. Therefore, some violations are not just a matter of supplying personal needs, but have attained the proportions of commercial exploitation.

Now is the time to halt violations of the sanctuary's laws and regulations. The longer these violations are permitted to continue the more difficult it will become to suppress them. In fact, through continually breaking the law, many people become convinced that it is not wrong, but their inherited right.

Military

The Bhutan border is less than 10 miles north of the Jaldapara Sanctuary. During the 1962 emergency, caused by the Chinese invasion into Indian territory, the military established an encampment at Baradabri along the north-eastern boundary. It is regretful that they chose this area when there are other near-by reserved forests that could have been equally well utilized.

Army personnel at Baradabri freely enter the sanctuary to bathe and to do their laundry in the rivers and streams. They also use the forests and grasslands as defecation sites. These activities are not restricted to any particular location, but depend upon the choice of the individuals. Military personnel may or may not participate in other illegal activities such as poaching, but their mere presence has resulted in the part of the sanctuary adjoining the tourist lodge being almost completely void of wild animals. Therefore, visitors staying at the lodge enter a considerable distance into the sanctuary by elephant before they can see wild animals.

The Commanding Officer of the military in this area should be contacted and should be requested that bathing and laundering by military personnel be restricted to specified areas. Toilet facilities should also be provided to eliminate the disturbing, as well as insanitary, practice of using the sanctuary as an outdoor latrine.

Because of the military situation, foreign visitors must first receive a permit from the Home and Political Department of West Bengal before they can visit northern West Bengal or the Jaldapara Wild Life Sanctuary. Due to the time and difficulties involved in obtaining such a permit, relatively very few foreigners presently visit Jaldapara. Every effort should be exerted to expedite the issuing of permits for Jaldapara with a minimum of delay and inconvenience to foreign visitors.

V. Recommendations

Most of my recommendations closely parallel those already presented by the Forest Department of West Bengal in its present working plan for the Jaldapara Wild Life Sanctuary. The following recommendations are made :

1. That the exploitation of the sanctuary's natural resources (including the grazing of domestic livestock, the cutting of trees and reeds or thatch, the killing or capturing of all animals, etc.) be perpetually prohibited and the rules and regulations prohibiting their exploitation be strictly enforced.

2. That mobile patrol units (consisting of armed guards, a mahout, and an elephant) be detailed to patrol the entire sanctuary regularly to minimize illegal activities.

3. That Beat Officers and Forest Guards be required to patrol their assigned beats regularly and to report violations or evidence of violations encountered.

4. That action be taken to obtain the necessary legal authority for Forest Department personnel to enforce the rules and regulations of the areas under their jurisdiction.

5. That a system of rewards and punishments be established to encourage Forest Department personnel better to meet their obligations. The establishment of a State Wild Life Division should also be considered to help train and attract the most suitable men for the special type of work required in wild life sanctuaries or national parks.

6. That no one but bonafide visitors and Forest Department staff or labourers be permitted inside the sanctuary. This would eliminate all excuses by others entering the sanctuary to violate its rules and regulations.

7. That a programme of education and publicity be undertaken to help people become aware of the importance and value of such areas as sanctuaries, as well as the necessity of preserving their flora and fauna and of obeying the rules and regulations established for their protection.

8. That a new tourist lodge be constructed on the western side of the sanctuary near the Holong River, as has been proposed by the Forest Department. However, private enterprise, supervised by the Forest Department, should be encouraged not only to construct and maintain these facilities but also to operate them for the convenience of visitors.

9. That information concerning the sanctuary (i.e. pamphlets, folders, post cards etc.) be compiled and made available to the Department of Tourism so that tourists will become aware of the Jaldapara Wild Life Sanctuary and the facilities which are available for their use.

10. That the Home and Political Department of the State be encouraged to expedite permits for foreign visitors wishing to visit Jaldapara.

11. That the Commanding Officer of the military units at Baradabri be requested to restrict the activities of military personnel (i.e. bathing and laundering) to specified areas along the boundary of the sanctuary.

12. That wild life enumerations in the sanctuary be conducted on a yearly basis as they have been during the past three years.

13. That scientific studies of the sanctuary's wild life species by qualified personnel be encouraged and that facilities (i.e. use of Forest Rest House, etc.) be provided for their use whenever possible.

14. That wild life observations by both visitors and Forest Department personnel be kept in a permanent record at the sanctuary.

VI. Acknowledgements

First I would like to commend the Forest Department of West Bengal and members of its staff for the fine work they are doing in wild life conservation in the Jaldapara Wild Life Sanctuary. I also wish to thank the Forest Department and particularly Messrs. K. L. Lahiri (Chief Conservator of Forests), J. N. Bhadury (Cooch Behar Divisional Forest Officer), H. P. Talukder (Jaldapara Range Officer), and S. K. Gupta

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VII. Glossary of Local Terms

basti	..	a settlement of cultivators.
chak	..	a village land surrounded by Reserved Forests.
jhora	..	a stream or water-course.
khola	..	a stream or water-course.
khasmahal	..	land owned by the Government.
kutcha	..	thatch hut, the wall of which may or may not be plastered with mud or a mixture of mud and cow dung.
kukat	..	any local tree species other than *sal* or teak.
makhna	..	a male elephant without tusks.
nadi	..	a river.
nala	..	a ravine.
paddy field	..	rice field (paddy is unhusked rice).
taungya	..	sowing and tending of forest tree species in conjunction with agricultural crops.

Wild Life Conservation in Nepal

BY

J. Juan Spillett and Kirti Man Tamang[1]

(*With two plates and one map*)

I. Introduction

The two major industries in Nepal are the production of agricultural and forest products. Wild life is under the jurisdiction of the Forest Department and should probably be considered as an integral part of the forests. Most wild animals in Nepal are also forest or forest-edge dwellers and their basic requirements of food and shelter are usually provided on Forest Department lands. Therefore, generally speaking, the problems confronting the forests in this country are also the problems confronting the wild life.

[1] Forest Inventory Specialist for the Forest Department of Nepal, Kathmandu, Nepal.