

proximity. We were returning from the field, all of a sudden we heard a murmuring sound behind us, I turned back and a cow gaur was standing not more than 5-m away from us. I could not stop admiring it, within no time all my tired muscles got their energy back and we decided to follow it.

Non-human primates of TWS

Primates that can be seen at TWS are slow loris, capped langur, phayres' langur, pigtailed macaque, rhesus macaque and hoolock gibbon, the only ape of India. All the monkeys mentioned above are seen often, apart from the slow loris and the hoolock gibbon. Encounter of these species depends completely on the type of vegetation. Where as gibbons are restricted to a small pocket, macaques are spread all over the sanctuary. In almost all the cases one can see the monkeys through branches, leaves, vine tangles and the dense vegetation of the bamboo forest.

Looking into primate behaviour

To preserve what we are currently having, we must understand what the animals require in terms of space, food and organization. To make sure that we leave sufficient wild habitats, or, if absolutely necessary, recreate suitable habitats in captivity knowing the behaviour of target population is very important.

The most rewarding studies for conservation purposes are definitely linked with the studies of the animals in their natural habitat. Behavioural variables form a complex and dynamic web of interactions. And that neatly brings us onto the question of

reproductive strategies, which are otherwise important indicator of population viability. In primates, the goal of maximizing reproductive success is generally achieved in females by having few young, and investing a great deal of time and effort into rearing them.

Body postures, gestures, vocalizations etc. appear to be autonomic responses indicating emotional states like fear, excitement, confidence, anger. Looking at gibbons with binoculars took a long time as they were not comfortable with the appearance probably the reason is that front lenses look bigger than normal eyes and this is seen as the observer being aggressive. Facial expression is also important. You will hear a lot about cultural behaviour, that passes from generation to generation in humans, but it has been observed in primates too.

I am happy that I chose natural habitat to study them. I cannot imagine undertaking this study and experiencing these wonderful moments with some of our world's most beautiful creatures without the help of Makhan-da, Kasemiya and Suman. They helped me from start to finish, in many ways.

FROM THE WILD

The Dancing Deer of Manipur

- S. Singsit

The brow- antlered deer of Manipur, *Cervus eldi eldi*, locally known as Sangai is one of the three species of Elds deer in the world confined to South east Asia. Myanmar's Brow antlered or Thamin, *Cervus eldi*. Thamin is found in upper and lower Myanmar as well as Western Thailand, siamese brow antlered deer, *Cervus eldi Siamensis*, in Eastern Thailand and on the island of Hainan in China are the other two Sub-species. It is believed that the three species of Brow antlered deer originated from single species. Firstly *Cervus eldi Siamensis* was in Thailand and migrated to Myanmar and modified its some

physical characters and its is known as *Cervus eldi*, *Thamin*, which further moved to Manipur and developed local adaptations and then came to be known as *Cervus eldi eldi*. The brow antlered deer or the dancing deer is found in its natural habitat only at Keibul Lamjao National Park over the floating biomass locally called "Phumdi" in the South Eastern part of Loktak Lake. Phumdi is the most important and unique part of the habitat. It is the floating mass of entangled vegetation formed by the accumulation of organic debris and biomass with soil. Its thickness varies from few centimeter to two metres. The humus of phumdi is black in color and very spongy with large number of pores. It floats with 1/5 and 4/5 part above and under water respectively. The cervid number listed in the Red data book was only 14 in the year 1975. Subsequent after the declaration of this area as National park and with strict conservation measures taken up by the Forest Department, the fear of its extinction has been greatly reduced.

The Keibul National Park in loktak lake is a unique natural heritage site in Manipur. It is the only natural home in the world, of the rare and endangered Brow antlered deer, *cervus eldi eldi*, locally known as Sangai. It is also the only floating wildlife reserve in the world. It is located between 24°27'N and 24° 31'N latitude and 93° 53' E and 93° 55' E longitudes. The park covers an area of 40 sq. km. which is a Ramsar site and also one of the biggest freshwater lakes in India. Another unique feature of Keibul Lamjao National Park is the "phumdi". It is the floating mass of entangled vegetation formed by



Hoolock Gibbon



Sangai *Cervus eldi eldi*



View of Keibul Lamjao National Park

accumulation of organic debris and biomass with soil particles. It extends upto two third to three fourth of the total park area.

Brow antlered deer is a medium sized deer, with uniquely distinctive antlers, measuring 100-110 cm. in length with extremely long brow tine, which form the main beam. The two tines form a continuous curve at right angles to the closely set pedicels. This signifies its name, brow antlered deer, the forward protruding beam appears to come out from the eyebrow. The antlers of the opposite sides are unsymmetrical with respect to each other. The beams are unbranched initially whereas curvature increases as length increases and they get forked also. The sexes are moderately dimorphic in body size and weight. The height and weight of a fully grown stag may be approximately 115-125 cm at shoulder and 95 to 110 Kgs respectively. The height and weight of the female are shorter and less as compared to the male counterpart. The length of the body from the base to the ear upto the tail is about 145 to 155 cm. in both sexes. The tail is short and rump patch is not pronounced.

The home range of Brow antlered deer in the park is confined to 15-20 Sq. kms. in south-western part of the lake. Due to non availability of phumdi in the north-western part of the park there is absence of sangai in the area. The weighted proportion on the basis of bodies weight of stag, hind and fawn is 4:2:1. Sangai population is high near Toyaching, Pabotching and Yang Kokchambi area therefore it suggests short ranging Sangai. The Sangai distribution seems to

be governed by shelter and availability of food.

The luxuriant vegetation of phumdi include food plants of Sangai. Many of the plants, eg. *Zizania latifolia*, *Saccharum munja*, *S. bengalensis*, *Erianthus procerus*, *E. ravernnae*, etc. are the favorite food plants of Sangai. Feeding behavior of Sangai can be easily seen over new shoots on freshly cut fire line area. It exhibits a bimodal activity pattern. Sangai starts grazing usually early morning approximately 4:30 AM and generally continue upto 8:00 AM. On cloudy morning the period

may extend to 10:00AM. In the evening it starts at 3:00 PM and continue upto 6:00 PM. After feeding it takes rest. During day time it rests under thick and tall reeds and grasses. At night some of them even rest on the hillocks.

Since 1975 the population estimation of Sangai is carried out annually. The population of Sangai has increased from 18 in 1977 to 180 in 2003 over the years, after declaration of the area as National Park.

Problems related with habitat management in KLNP

Habitat of Keibul Lamjao National Park has been affected by high level of water, maintained by Ithai Barrage under Loktak Hydro Electric Project and is affecting the thickness of phumdi. The water level is being maintained between 768 m to 768.5 m above sea level during the month of October to March from the year 1998-2001. Due to high water level the roots of floating biomass of phumdi cannot absorb the nutrients from the soil under water. It may be mentioned that before commissioning of the hydro-electric project phumdi used to sink and float periodically This helped in absorbing nutrition and thereby support vegetation. Now with the changed senario there is no interwinding of roots and poor growth of vegetation. This has lead to fragmentation of phumdi.

The northern side of the national park is connected with the Loktak lake and the flow of water is from the north to the south. The water current runs north due to Loktak Hydro Electric project during August to March. During rainy

season (April to July) the shutter of Ithai barrage is opened. Again the water current changes towards south. This causes movement of phumdi towards north and their movement of the phumdi is not restricted. Hence, the area of phumdi is getting reduced day by day. Earlier, there was only marshy land in the park area but after the commissioning of the hydroelectric project there are two ecosystems, water body (covering 1/3 area) and phumdi (covering 2/3 area), water deteriorating in quality day by day. Its pH value ranges from 4-8.5. The reasons for poor quality are increasing pollutants from the towns draining into the loktak, use of pesticides and insecticides by the villagers, accumulation of water on phumdi and rotting vegetation.

Conservation Issues

The 40 sq. km area of the KLNP in loktak lake has been, the past, the main source of income for the people in the surrounding villages. Some of the surrounding people are still dependent on the park for fishing and collection of vegetables of economic importance.

Since KLNP is the only natural habitat of Sangai in the world, it must have viable population of its flagship species (Sangai). For achieving the objective of increasing the population of Sangai to a viable population *i.e.* 500 for the long term conservation, we may have to enhance the protection of the animal. Further there is need to monitor the condition of habitat and take timely corrective measures particularly with reference to the water level due to Loktak Hydro Electric Power Project. There is urgent need to have high places with adequate protection and food material to provide protection to the animals in case of flash flood. The area



Phumdi in the National Park

under phumdi in the park needs to be increased. Theft of phumdi and flow or part of phumdi towards northern side needs to be checked. The collection of firewood, food, fodder, NWFP's and fishing etc are to be stopped completely. The area of the park has to be increased at the strategic places. Besides, an environmental need is to be created in which local people may volunteer as natural custodian of Sangai and other animals in the park.

Some suggested measures for tackling the problems in Conservation

- ◆ Providing effective protection
- ◆ Improving the habitat
- ◆ Encouraging eco-tourism and nature education
- ◆ Carrying out eco-development
- ◆ To undertake, aid, promote and co-ordinate research works
- ◆ Building infra-structure
- ◆ Human resource development planning
- ◆ Preparation of detailed management plan of KLNP
- ◆ Capacity building, training, awareness and extension activities
- ◆ Packaging and publicity campaign
- ◆ Ethnic information & Exhibition etc.
- ◆ Active involvement of surrounding population in management & conservation of brow-antlered deer.

seem to be kissing the mountains and the weather is most unpredictable. The Mother Nature seems to have been particularly lenient towards this region by bestowing the Himalayas with unparalleled wilderness. The deep silence is broken only by the chirruping call of birds, the breeding or alarm calls of the prey of tigers, the gushing sound of river waters or the thundering clouds. It is an important time for the animals too, for they voraciously feed, reenergize and breed.

Visit to Koluchar Reserve Forest

Our journey started with a long drive to the Saneh forest rest house, from where we started our trek. We had equipped ourselves with our brand new binoculars and camera equipments' for we could not simply afford to miss any moment. We had to hire ponies to carry our luggage and rations. The weather was cloudy but fortunately there were no rains. We started our trek at 12:30 p.m. after a short briefing by the Range Officer of the Kotri Forest Range. We kept looking for the animals and we were overjoyed when we spotted three gorals on a mountain slope on the edge of Koluchar River. Gorals prefer open habitats with good grass cover. They are surefooted and prefer to remain on steep slopes while grazing on grasses. We carefully watched this mountain goat for sometime and then carried on our journey through the gentle undulations of the Shiwaliks. We had one more sighting of the Goral after we crossed the Kotri river. The river Kotri is the very essence of life of the area and it fosters the rich flora and fauna of the region. It flows in a zig-zag pattern, silent and unruffled at some places and roaring at other places, carrying with it huge amount of silt which when deposited gives rise to the fertile terai plains. We had to cross the Kotri river several times and crossing it, was a fun and adventure for us as never before we had ventured in such rivers. We also saw a fresh elephant tracks on both sides of the river, which indicated that the animal had crossed over the river. But this seemed to be too less to quench our longing to see the majestic animal in wild and our desire was fulfilled as we spotted two cow elephants with one calf, just 300 meter from the river and less than 50m from us foraging peacefully.



Near Koluchaur river, on way to Chaukhamb (Outer Himalaya)

Sal (*Shorea robusta*) is the dominant species of the forest formation while Jamun (*Syzigium cumini*) dominates the riverain habitat. Jamun is an important food plant for birds and animals and the fruits are relished by ungulates and langurs and it is not uncommon to find herds of Sambhar congregated under the trees and feeding in on the berries dislodged by macaques or langurs. The moist deciduous forest is very rich in vegetation containing several species of trees, shrubs, herbs, grasses, ferns, lichens and orchids. However to our disgust, *Lantana camara* and *Parthenium* has invaded this virgin forest almost everywhere. The *Cassia tora* can also be found encroaching upon the grassland patches thus threatening the ungulates, which depend upon grasslands to a considerable extent both for feeding as well as for breeding. All these weeds are exotics but they have now invaded our forests, woodlands and grasslands so well that they have suppressed the growth and regeneration of the native species. These plants have no known commercial importance and they are not used by wildlife too.

The river Koluchar at several places is fed by small water sources locally called as *sots*. These small water channels contain cool and crystal clear water, which we relished and quenched our thirst. These water channels constantly add fresh water to the river and are very

M.Sc. Orientation Tour

- Rishi Kumar Sharma, IX M.Sc.

Come spring and the mountain ranges of Shiwaliks and the outer Himalayas are soaring with life, lush green, interspersed with the spectacular colors of various flowers and young growth. The clouds



Looking for tracks in Koluchaur