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The Central Indian Highlands : A Study on Gaur Ecology

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Pench Tiger Reserve (PTR), situated 120 km north of Nagpur, lies in the south-western region of M.P. This part of Central India has been a major attraction for naturalists as well as sport hunters in the past. Descriptions of its natural wealth and richness appear in writings dating back to 14th Century. Ain-I-A-Akbari and the references available on Deogarh Kingdom of the 16th century also give a passing remark on the wildlife of this area. Eminent naturalists like, **Forsyth, Sterndales** and **Brander** have given a detailed account of the distribution of the flora, fauna and the local inhabitants of Central Indian Highlands in and around this tract. The famed work of **Kipling** "The Jungle Book" too revolves around this tract of Satpura.

The Pench River, from which the reserve derives the name, flows through the center of the park dividing it into the west Chindwara and the east Seoni block. The total area of the National Park is 292.85 sq. km. out of which 145.24 sq. km. lies in Seoni District and the rest in Chindwara District. On the southern end of the river stands a hydroelectric dam. As a result of the construction of the dam, 74 sq. km forest has been submerged, of which 54 sq. km. lies in PTR (Madhya Pradesh State) and rest in the State of Maharashtra. The dam marks the State boundary of the two states. The dam has been built for the generation of 180 MW electricity and irrigation facility for both the States of Madhya Pradesh and Maharashtra.

Several tribes, among whom the Gonds are most prominent, inhabit this part of the central Indian highlands. In early 17th century the Gonds were politically very active and ruled much of this tract. The first Gond king was Jataba who built the Deogarh fort and formed the Gond Kingdom. **Captain J. Forsyth** mentions in his writings that it was after the Gonds this tract of the country got the name "Gondwana Land". He further goes on to explain about lingual similarity between Gonds and Tamil folks of southern India, and stated that this bears the testimony that the Gonds are a part of same lineage as the Dravidians of south India. **Strendales** in his book 'The camp life of Seoni' had given the most explicit account of true Gonds and their life style.

Presently most of them are agrarian by occupation but still to a large part of their needs rest on the forest and its produce. Presently there are 99 villages within 10 km radius of the periphery of PTR. The total population of these villages is 50,000.

PTR is a part of Indo-Malayan region floristically and a member of Oriental region zoogeographically. The vegetation of PTR is tropical dry and moist deciduous type. In addition to gaur *(Bos gaurus)* the other wild herbivores found in Pench are *chital (Cervus axis*), sambar (*Cervus unicolor*), nilgai (*Boselaphus tragocamelus*), barking deer (*Muntiacus muntjack*), chousinga (*Tetroceros quadricornis*) and chinkara (*Gazella benetti*). The predators and scavengers found in PTR are Tiger (*Panthera tigris*), leopard

(*Panthera pardus*), wild dog (*Cuon alpinus*), hyena (*Hyena hyena*), jackal (*Canis aureus*), jungle cat (*Felis chaus*) and sloth bear (*Melursus ursinus*). In addition to this, 272 species of birds, 25 species of reptiles, 40 species of butterflies and 13 species of arachnids have been documented from this area. The amalgamation of rich ecological and cultural diversity makes this land of Gond and gaur a significant place in Central India.

Previous studies on gaur

Several natural history observations and anecdotal notes, on gaur are available which date back to early 1800's. But most of these can be classified as hunting memoirs. It's only in the last decade that the research on the ecological aspects of gaur has picked up some pace in India. George Schaller 1(967) in his book 'The Deer and the Tiger' talks about gaur in Kanha (Madhya Pradesh) and M. Krishnan a fine naturalist and writer is among a very few, who has written about gaur with eloquence.

Status, distribution and conservation importance of gaur

Gaur (*Bos gaurus gaurus*), wild cattle, belongs to the group of wild oxen. In all there are 9 species and 21 subspecies of wild oxen in the world belonging to four genera. These include Asiatic buffalo, African buffalo, true cattle and bison. The ancestors of wild oxen are known to have evolved in Asia some 20 million years ago.

Gaur commonly referred as the Indian bison belongs to the subfamily Bovinae of the order Artiodactyla. The largest living bovine, it is confined to the Oriental biogeographic region of the world. *Bos gaurus gaurus* (India and Nepal), *Bos gaurus readei* (Myanmar and Indochina) and *Bos gaurus hubbacki* (Thailand south of the isthmus Kra and West Malaysia) are the commonly recognized three subspecies of gaur.

Gaur population in India occurs in more or less isolated pockets largely corresponding to the major mountain systems of the Western Ghats, the Central Indian highlands and the North-Eastern Himalayas. Apart from this gaur are also found in forests of South Bihar and West Bengal and South-Eastern Peninsula. As diverse as their distribution their habitats are diverse too. Their habitats range from evergreen and bamboo forests in the Northeast to dry deciduous in Central India to moist deciduous in the Western Ghats. In these areas gaur are known to occur, in relatively undisturbed habitats, up to elevations of 2000m.

Gaur is an endangered animal as per the Schedule – I of the Indian Wildlife Protection Act (1972) and is included in the Appendix I of the Conservation on International trade in Endangered Species of Wild Fauna and Flora (CITES). According to the Action Plan of IUCN, of 1997, for Asian Wild Cattle and Buffaloes the estimated population of gaur in India is between 5,000 –10,000 animals.

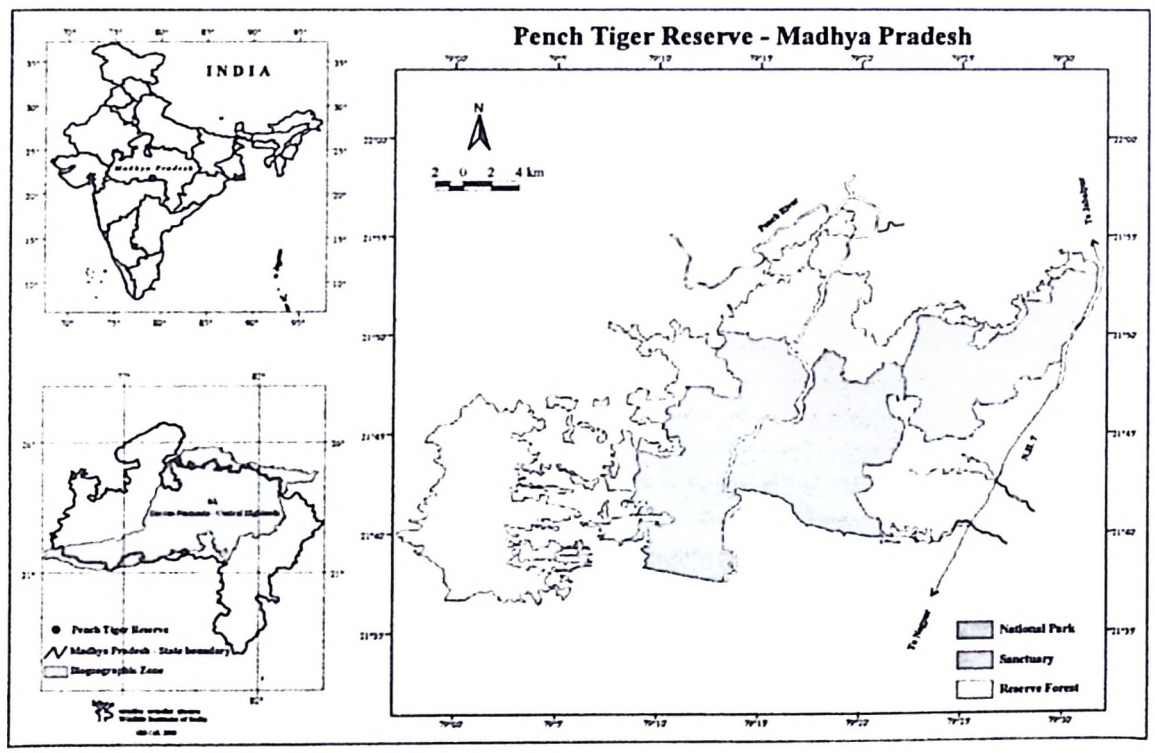
The Central Indian Highlands harbour approximately one fourth of the present gaur population surviving in the country. But the exact status of the present thriving populations and the condition of their habitat is not known. In Madhya Pradesh the gaur population is found in ten districts, and they are geographically isolated from one another. Past records indicate that populations of gaur have succumbed to epidemics of foot and mouth disease (FMD), rinderpest and anthrax in many areas of distribution. This is largely due to the fact that gaur has little immunity to some cattle diseases. In fact no wild animal in India is so profoundly influenced by transmitted infections from domestic livestock as gaur.

Further, poaching of animals and sport hunting in the past and habitat degradation are mainly responsible for the decline or extinction of small local populations. For these reasons the distribution of gaur has been altered in places in the last 30 years. This has led to the isolation of gaur population into small fragments in the areas of its distribution. Thus the records given by Schaller (1967) and M.Krishnan (1971) on gaur may not necessarily hold true now.

Why the present study in PTR?

PTR offers a unique opportunity for research into the aspects of both the ecology and the management of gaur populations and their habitats. This is due to, both, the diverse pattern of habitat, as a result of rich floral composition and varied topology, and gaur populations that can readily be seen almost throughout the year.

As an area under Project Tiger, Pench has embarked on an ambitious programme of reserve development and habitat restoration, including village and cattle camp removal, reduction of domestic livestock pressures and in dry season provision of water resources. It was thus important to conduct a detailed appraisal of how the gaur population has reacted to the change in habitat. This would enable to study the response of gaur to future developments, and in what way the population of gaur is likely to be affected.



As the summer advances congregation of gaur can be noticed around Pench

Pench Tiger Reserve, Madhya Pradesh

Location: 77°55'E to 79°35'E & 21°08'N to 22°00'N.

Area: 757.85 sq. km. *[Sanctuary - 118 sq. km; National Park - 292.85 sq. km; and Buffer Zone / Reserve Forest - 347 sq. km]*

Altitude: 200m – 650m

Distance : The nearest Railway Station and the airport is Nagpur 120 km due south.

Climate: Four seasons summer (March-June), monsoon (July-August), short post-monsoon (September-October) and winter (November-February).

Temperature: -2°C in peak winter to 49°C in peak summer.

Rainfall: 1400 mm average annual.

Geology: Archean and Pre-Cambrian in formations & extension of the Satpura-Mahadeo-Maikal Scarps.

Pench Reservoir: For the Pench Hydroelectric Power Project

Submergence Area : 54 sq. km due to the construction of Pench Hydroelectric Dam at Totladoh.

19th Tiger Reserve of India – 1992

reservoir. During the onset of monsoon many herds are known to move into Maharashtra area of Jawaharlal Nehru National Park and south Seoni Forest Division of Madhya Pradesh. Important feeding and breeding grounds were to be identified for gaur. It was not known what are the key ecological factors that affected the dispersal of gaur in the study area and thus radio telemetry studies on gaur were required, which would give an insight detail about the movement pattern of the species.

About the ongoing project

A project funded by Wildlife Institute of India, on **'Ecology Of Gaur'** was launched in February 1996 in PTR, Madhya Pradesh. The project embarked on the collection of information on patterns and requirements of diet, ranging and feeding ecology, behaviour, and the threats posed to gaur population. The other aspects that are being investigated are – the study on floristic composition of the area, nutrient dynamics, the role of fire in dry forest ecosystems and anthropogenic pressures prevalent in the area.

S9 Activity radio-collars have been fitted on three gaurs (2male & 1 female) to gather information on their movement pattern and home ranges, group size and composition.

The data collected from this study will be extremely useful in planning for long term conservation of gaur throughout it's range in the Central Indian Highlands and other similar habitats. This will also be of great significance to the existing fauna and flora within the distributional range of gaur. Lastly the study will help in formulation of a strategy for the conservation of the natural resources in and around PTR with gaur as an umbrella species. Thus the study has the potential of going much beyond the interest of gaur as a species and its conservation.

Major findings

The four-year study on gaur in PTR has brought to light some interesting findings. Gaur showed varying degree of utilization of different habitats. The low lying areas close to the reservoir are utilized more during summer compared to the high hill tops which are predominantly used more during monsoon. The dietary pattern of gaur varies with the phenological patterns of trees, shrubs, and climbers and grasses, that gaur feed upon. The miscellaneous forests, high in plant productivity, attract gaur throughout the year as compared to other habitats. Another highlight of this study is the information collected on the debarking habits of gaur on teak (*Tectona grandis*) trees. Elsewhere gaur is known to feed on bark of *Holarrhena antidysentrica*, *Adina cordifolia*, *Emblica* spp. and *Wendlandia natoniana*. A total of 77 food plant species for gaur were recorded. Gaur is found to be sensitive to fire and other anthropogenic disturbances and apparently shifted their feeding sites as a result of occurrence of any of these.

Gaur is a gregarious animal. The group structure of gaur in PTR was found to be very fluid. The group size ranges from 2 to 20 animal. A large group usually consists of cows and few calves, one to two adult bulls and sub adults. Younger bulls sometimes join to form a bachelor herd, especially during the monsoon. Old males are generally solitary in nature and only join the herd during the rut. Adult cows usually lead the herd. In a way gaur can be termed as matriarchal. Cows and young usually stay in-group.

The study showed that, gaur is a generalist feeder but prefers to browse in dry season and predominantly graze in monsoon. Their diet chiefly includes, shoots and foliage of trees, shrubs and, buds, fruits like *Diospyros melanoxylon* and *Aegale marmalos*, tender seeds of bamboo, herbs, grasses and bark of *Tectona grandis*. Being an obligatory drinker, gaur visit water holes every day and during the hottest periods some animals are noticed around the water bodies twice a day. During the hot hours of the day gaur retire to the shelter under thick tree cover and ruminate. Feeding is more predominant during the early morning and evening hours. On an average they feed for 15-18 hours a day. The movement pattern and ranging habits of gaur vary seasonally. Radio telemetry studies revealed that an adult male had an annual home range of about 250 sq. km and a cow had 150 sq. km annual home range.

Gaur are shy by nature. The bulls rarely enter into a fight, only occasionally during the peak rutting season. They mostly exhibit lateral displays in times of confrontation. During the rut the males produced rutting calls with very high pitch which can be herd at long distances. The time of mating season or rut varies across its distribution ranges but has definite peaks. In PTR the peak rutting period was from March to May. But some individuals bred throughout the year. This was witnessed by the presence of the calves almost throughout the year. Cows are known to give birth to a single calf after a gestation period of eight to nine months. During the entire study tenure twins were never encountered. It was noticed that the cow moved away from the herd before giving birth and remained with the calf for a few days before rejoining the herd. The newly born calf became active after a few hours of birth and stayed with the mother. For almost 5-8months the young suckled milk from mother and then switched over to green feed.

The natural predator of gaur in PTR is tiger, but leopard also predated on calves and yearlings of gaur.

Threats to the ecosystem

Illegal fishing in the Pench reservoir, grazing and anthropogenic pressure around the tiger reserve are some of the major threats to

Bos gaurus gaurus

Bulls: Weigh 600-1000kg and stand 1.6 to 1.9m at shoulder

Cows: Relatively shorter and weigh about one fourth less than the males.

Dorsal ridge: The most striking features among gaur.
Horns: Present in Both sexes.
Acute olfactory sense.
Visual senses relatively less developed.

- **Dewlap:** Well developed in males
- **Forehead:** Ashy

Stockings: Both hind and forelegs, white or slightly yellowish colour up to the knees, found in both sexes.

PTR. Apart from this the other major threat is forest fire. This is an annual phenomenon during dry season, which is largely an intervention of mankind. The fires are to a large extent detrimental to the ground dwelling flora and fauna. The environmental stocasticities coupled with these anthropogenic pressures are the focus of immediate attention in the park. The PTR management has taken several measures to mitigate these problems under the GEF-India Ecodevelopment Project and has chalked out a strategy for effective management and conservation of PTR. The major recommendations that are likely to emerge out from the ongoing gaur project will be of immense help to the PTR management authorities for the effective conservation of gaur in PTR and other similar habitats in central India.

An Assessment of Tourism in Corbett National Park

by Bitapi C. Sinha, Manisha Thapliyal and Kaustubh Moghe

Introduction

Increasing world population with concomitant shrinking of natural habitats continues to threaten the survival of life forms. To safeguard and conserve their natural heritage, which of late has acquired tremendous value and significance, most countries have set up national parks and sanctuaries. In India too, this process gained momentum after the National Wildlife Action Plan was formulated in 1983 to put a stop to the fast dwindling natural resources of the country. As a result, the protected area network has expanded from 10 national parks and 127 sanctuaries in 1970 covering 25,000 sq. kms. to 87 National Parks and 479 Wildlife Sanctuaries with an area of 154231.73 sq. kms in 2000.

In parallel, increased leisure , higher incomes and greatly enhanced mobility has contributed to these protected haven being seen as key tourist destinations providing visitors with recreation, enjoyment of natural aesthetic resources and relaxation. The widespread encouragement and support from government departments and private sponsorship has generated an optimism whereby tourism is seen as a powerful and beneficial agent for social and economic change. Protected area managers also realize that the value of tourism in protected areas is in providing an opportunity to build up a sizeable public support in favour of protected areas specifically and to the ethos of conservation generally.

Recent decades have seen a sharp increase in the number of tourists visiting Indian National Parks and Wildlife Sanctuaries. Corbett National Park, named as a fitting tribute to the legendary hunter turned conservationist, Edward James Corbett and located in the Terai region of western Uttar Pradesh has one of the highest visitation amongst protected areas in India. Close to 50,000 visitors come to the park annually with a sizeable chunk comprising of foreigners. This has necessitated that appropriate long term planning for tourism becomes a pre-requisite to achieve harmony between tourism in Corbett National Park and its primary objectives. It was to further this aim that a study was undertaken to assess the Impact of Toursim in Corbett N.P. The broad objectives of the study were:

1. To gather information about the present status of tourism and its management in the reserve.
2. To identify and quantify the impacts of tourism on the habitat and wildlife.
3. To provide management recommendations for planning conservation compatible and sustainable tourism within the reserve.

Visitor Management Techniques utilized in Corbett

A variety of management practices are used in Corbett to deal with visitors. Visitor management techniques deal with the amount, type and behaviour of user's in order not only to effectively reduce recreational impact on the resource, but also to maximize visitor satisfaction. Most direct management tactics involve programs designed to enforce compliance in one way or the other. The two tactics used is a reservation system for Dhikala and limiting the amount of time visitors can spend in the area for Bijrani.

(*i) Zoning:*The tourism zone of Corbett extends over an area of 115.096 km^2 in which Dhikala and Bijrani are open for tourists. At Dhikala, night stay is mandatory while in Bijrani day visitation is allowed. Initially only Dhikala was open for tourist but in view of the heavy tourist traffic in Dhikala, the steering committee on Project Tiger recommended development of alternate site for day visitation and subsequently Bijrani, on the edge of Corbett and 9 kms from Ramnagar, was developed. Visitors are also allowed to Jhirna, Lohachaur and Sonanadi WLS. Paterpani is a closed area and visitors are not allowed in there.

*(ii) Use of Guides:*To guarantee the security of visitors and to ensure that they find the desired resources it is necessary that they are accompanied by guides. In 1993 an in house training was organized in Corbett to train the unemployed educated youths as nature guides and thus take off the pressure from the park employees engaged in protection and management. Currently 25 registered free-lance guides are working in Corbett. It is mandatory for each vehicle entering Bijrani and going around in Dhikala to be accompanied by a guide.