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## **STATUS OF HOOFED MAMMALS IN THE CONSERVATION AREAS OF RAIPUR DISTRICT, CHHATTISGARH, INDIA**

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### **INTRODUCTION**

Chhattisgarh state, located in Central India, has been carved out of Madhya Pradesh state. It is surrounded by Andhra Pradesh in south, Jharkhand and Orissa in east, Madhya Pradesh and Maharashtra in west and Uttar Pradesh and Jharkhand in the north.

The state is very rich in natural resources, mainly minerals, power and forest products. A large amount of revenue comes from mining (mainly bauxite, limestone, coal and iron ore) and forest products. The well known Bailadila mines are in this state. The steel plant of Bhilai and cement factories generate sizeable revenue for the state.

The total recorded forest area of the state is 59285 sq. km. and is one of the most forested states of India. 44% of the state's geographical area is under forest cover which is about 7.7% of the country's forest area (MOEF 2001).

Forest Survey of India in its report of 2001 has mentioned that in the state 40.4% is reserve forest, 52.5% is protected forest and 7.1% is unclassified forest. The dense forest is about 28.0%, open forest 13.7% and non-forest land 58.2% (MOEF 2001).

The state is having three National Parks and 11 Wildlife Sanctuaries of which 3 Wildlife Sanctuaries are located in Raipur district.

Detailed report on the status of different hoofed species of mammals present within these sanctuaries is not available except for a few scattered publications (Ranjitsinh *et al.*, 2004; Kotwal *et al.*, 2002, 2004).

As a result, Zoological Survey of India, took up this project as a part of the studies on the status of different species of mammals in conservation areas of the country and conducted one field survey during November–December, 2000 and all the sanctuaries were surveyed for six consecutive days.

During this survey attempts were made to identify the existing population trend and factors affecting them. For this purpose, in addition to systematic field observations, necessary discussions were held with local people as well as management authorities. Status of different hoofed mammal species found within the sanctuaries of Raipur district has been discussed along with ecological conditions in this paper.

### PHYSICAL FEATURES

The state falls under the Deccan Biogeographical Zone of Rodgers *et al.*, (2000). Of its forests, 11.0% are under the Protected Area Network.

There are four major forest types, viz. Tropical Moist Deciduous, Tropical Dry Deciduous, Tropical Thorn and Subtropical Broadleaf Hill forest. Forests are mainly distributed in the north and in the southern parts of the state.

There are three seasons, namely monsoon (July to October), winter (November to February) and summer (March to June). The annual temperature ranges from 4° to 45°C and the annual rainfall varies between 800 mm and 1800 mm.

### WILDLIFE SANCTUARIES OF RAIPUR DISTRICT

The district Raipur is situated in the fertile plains of Chhattisgarh. It is surrounded by Bilaspur district in the north, Bastar district and part of Orissa in the south, Raigarh district in the east and the district of Durg in the west. The total geographical area of the district is 1344500 ha.

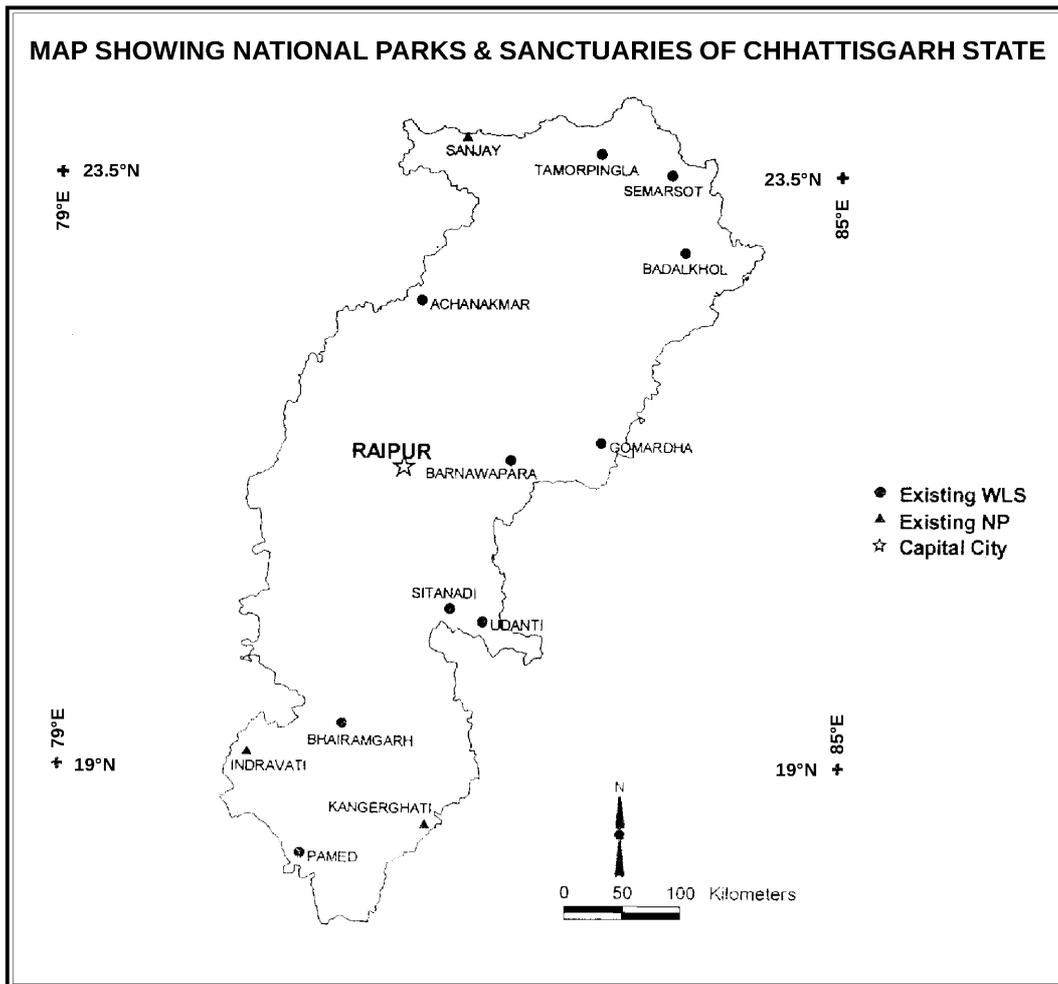
The district has three Wildlife Sanctuaries as detailed below :

#### 1. BARNAWAPARA WILDLIFE SANCTUARY

Established in July, 1976 the sanctuary with an area of 24466 ha lies between 21°25'16" N latitude and 82°26'36" E longitude. The sanctuary falls within the Biogeographic Zone of Deccan Peninsula with Tropical Dry Deciduous Forests.

The name Barnawapara has been derived from Bar and Nawapara forest villages which are close to each other and situated in the middle of the sanctuary. It falls under Raipur Forest Division and includes reserve forests of Lawan and Sonakhan Forest Ranges. It is situated 15 km north of block headquarters Pithora on National Highway 6, 100 km from Raipur town, and is approachable in all seasons.

The terrain is generally flat, with some hills varying between 265 & 400 m in altitudes. There are numerous perennial and seasonal streams which are all tributaries of Mahanadi River. Most of these streams dry out during summer. Forest Department has constructed number of waterholes, where most of the wildlife concentrate during summer.



According to Champion and Seth (1968) the forest can be classified as Dry Teak, Dry Sal and South Indian Dry Deciduous Mixed Forest. Teak occurs mainly in Schistose Rock and in alluvial banks around rivers and streams, the important area being Tenduchua hills. Sal is found mainly around village Gidpuri. Mixed forest areas harbour Bamboo, *Terminalia* sp. and other species.

## 2. GOMARDA WILDLIFE SANCTUARY

Established in August 1975, the sanctuary with an area of 27791 ha lies between 21°30'24" N latitude and 83°06'47" E longitude. The sanctuary falls within Biogeographic zone of Deccan Peninsula having Tropical Dry Deciduous Forest.

The name Gomarda has been derived from the village Gomarda in Saranath tehsil of Raipur district. The sanctuary is 15 km south of Saranath on Raigarh–Saranath–Saraipali State Highway

which bisects the sanctuary. The terrain is gently undulating, with numerous boulders and rocks, unfit for cultivation, hence naturally protected. The main water source is the perennial Lath Nullah, a natural stream and two medium sized tanks.

The vegetation of the sanctuary is typical Tropical Dry Deciduous Forest with predominance of Teak, Bamboo (*Dendrocalamus strictus*) and *Terminalia* sp.

### 3. UDANTI SANCTUARY

Established in March 1983, the sanctuary with an area of 24760 ha lies between 19°55'30"–20°11'15" N latitude and 82°11'10"–82°24'10" E longitude. The sanctuary falls within the Biogeographic zone of Deccan Peninsula having Tropical Dry Deciduous Forest.

The name Udanti has been derived from the river Udanti which flow through the sanctuary. The sanctuary is located in the Brindanawagarh tehsil of Raipur district and 210 km southeast of Raipur. The eastern boundary of the sanctuary is the interstate boundary between Chhattisgarh and Orissa.

The habitat of the sanctuary is representative of Mixed Dry Deciduous Forest (Champion and Seth 1968). The dominant plant species are Sal mixed with species *Terminalia*, *Anogeissus*, *Pterocarpus* and bamboo. Teak has been introduced by State Forest Department. The main water source is the Udanti River and its tributaries. The river is not perennial but small pools always retain water even in summer.

## METHODOLOGY

Observations were made while moving on foot and in vehicle, visiting different places in the early morning, at noon and in the evening. All possible areas of ungulate habitats were surveyed. Observations were also made from temporary observation towers built on trees at selected places near drinking, feeding and resting places. The animals were observed with the help of 7 × 50 binoculars. For estimating the population dung density and hoof marks were also taken into consideration.

## STATUS OF HOOFED MAMMALS IN DIFFERENT SANCTUARIES

Order ARTIODACTYLA

Family SUIDAE

Subfamily SUINAE

1. *Sus scrofa* Linnaeus, 1758

1758. *Sus scrofa* Linnaeus, *Syst. Nat.*, 10<sup>th</sup> ed., 1 : 49.

*Common names* : Wild Boar (Eng.); Suar, Barba, Bad Janwar, Bura Janwar (Hin.).

*Remarks* : In Barnawapara 50 animals were seen in three herds; in Gomarda 40 animals were seen in four herds and in Udanti 45 animals were seen in three herds. From the above observation it is quite evident that this species is most common and the sanctuaries maintain a good population.

Family CERVIDAE

Subfamily CERVINAE

2. *Axis axis* (Erxleben, 1777)

1777. *Cervus axis* Erxleben, *Syst. Regn. Anim.*, 1 : 312.

*Common names* : Spotted Deer, Axis Deer (Eng.); Chital, Chitra, Jhank (Hin.).

*Remarks* : In Barnawapara 15 animals were seen in three herds, in Gomarda 8 animals were seen in two herds and in Udanti 12 animals were seen in three herds. Though this animal was seen in less number but from hoof marks and dung density found at different places it can be concluded that all the sanctuaries are having good population of this deer.

3. *Cervus unicolor* Kerr, 1792

1792. *Cervus unicolor* Kerr, *In. Linnaeus, Anim. Kingdom*, p. 300.

*Common names* : Sambar (Eng.); Sambhar, Samar (Hin.).

*Remarks* : In Barnawapara 18 animals were seen in four herds, in Gomarda 12 animals were seen in two herds and in Udanti 15 animals seen in five herds. From actual sighting, hoof marks and dung density found at different places it can be concluded that a good population of this deer exists in the three sanctuaries.

Subfamily MUNTACINAE

4. *Muntiacus muntjak* (Zimmermann, 1780)

1780. *Cervus muntjak* Zimmermann, *Geogr. Gesch. Mensch. Vierf. Thiere.*, 2 : 131.

*Common names* : Indian Muntjak, Barking Deer, Rib-faced Deer (Eng.); Kakar (Hin.).

*Remarks* : In Barnawapara 10 animals were seen in total, in Gomarda 9 animals were seen in total and in Udanti 12 animals were seen in total. From actual sighting of animals and also from dung density and hoof marks found at different places it appeared that the population of this deer species is less in comparison to viz. Spotted Deer and Sambar populations found in these three sanctuaries.

Family BOVIDAE  
Subfamily ANTILOPINAE

5. ***Gazella bennettii*** (Sykes, 1831)

1831. *Anilope bennettii* Sykes, *Proc. Zool. Soc. London*, **1830-31** : 104 (1831).

*Common names* : Indian Gazelle, Chinkara (Eng.); Chinkara, Kal Punch (Hin.).

*Remarks* : In Barnawapara 3 animals were seen in total, in Gomarda not a single specimen were seen and in Udanti only two animals could be seen. From actual sighting and also from hoof marks and dung density found at different places it appeared that the population of this bovid species in Barnawapara and Udanti is very meagre. In Gomarda existence of this bovid species could not be established.

Subfamily BOVINAE

6. ***Tetracerus quadricornis*** (Blainville, 1816)

1816. *Cerophorus quadricornis* Blainville, *Bull. Sci. Soc. Philom*, p. 75.

*Common names* : Four-horned Antelope (Eng.); Chausingha, Chowka, Doda (Hin.).

*Remarks* : In Barnawapara 6 animals were seen in total, in Gomarda 4 animals were seen in total and in Udanti 5 animals were seen in total. From actual sighting of animals and also from hoof marks and dung density found at different places it appeared that the three sanctuaries maintain a thin population of this bovid species.

7. ***Boselaphus tragocamelus*** (Pallas, 1766)

1766. *Antilope tragocamelus* Pallas, *Misc. Zoo/.*, p. 5.

*Common names* : Blue Bull (Eng.); Nilgai, Nil, Rojh, Roz, Rozra (Hin.).

*Remarks* : In Barnawapara 6 animals were seen in two herds, in Gomarda 4 animals were seen in a single herd and in Udanti 16 animals were seen in three herds. From actual sighting and also from hoof marks and dung density found at different places it appeared that the three sanctuaries maintain a good population of this animal, the maximum concentration being found at Udanti followed by a lesser concentration at Barnawapara; but a very thin population at Gomarda.

8. ***Bos frontalis*** Lambert, 1804

1758. *Bos frontalis* Lambert, *Tram. Linn. Soc. London*, **7** : 57.

*Common names* : Indian Bison (Eng.); Gaur, Gaur Gai (Hin.).

*Remarks* : In Barnawapara 38 animals were seen in three herds and 4 animals in a single herd at Gomarda. At Udanti we could not see any animal. From actual sighting and also from hoof

marks and dung density found at different places it appeared that Barnawapara sanctuary maintains a very viable population of this animal followed by a very thin population at Gomarda sanctuary. Existence of this animal at Udanti sanctuary could not be established.

### 9. *Bubalus bubalis* (Linnaeus, 1758)

1758. *Bos bubalis* Linnaeus, *Syst. Nat.*, 10<sup>th</sup> ed., 1 : 72.

*Common names* : Water Buffalo, Indian Buffalo (Eng.); Arna [Male], Arni [Female] (Hin.).

*Remarks* : Only in Udanti sanctuary we could see 50 animals in four herds. Not a single animal could be seen in rest of the sanctuaries. According to the records of the Udanti Forest Department 78 animals exist in the sanctuary. Kotwal *et al.*, (2002) have reported to have seen 27 animals in 6 herds. Ranjitsinh *et al.*, (2004) have assessed about 42-44 buffaloes while Kotwal *et al.*, (2004) have assessed 35-40 buffaloes in the sanctuary. Sitanadi Sanctuary of Dhamtari district is located at a distance of about 30 km from Udanti Sanctuary having a corridor of good forest cover. Both these sanctuaries form a compact forest for free movement of wildlife, particularly the buffaloes which is the State mammal. This may be the prime cause for difference in estimation of this animal by different workers. To have a correct estimation of the population of this animal these two sanctuaries are to be surveyed together for the purpose during a particular period.

## DISCUSSION

The survey conducted revealed that a very good population of *Sus scrofa* Linnaeus, *Axis axis* (Erleben) and *Cervus unicolor* Kerr exists followed by a comparatively lesser population of *Muntiacus muntjak* (Zimmermann). A very thin population of *Gazella bennettii* (Sykes) was observed in Barnawapara and Udanti only. *Tetracerus quadricornis* (Blainville) is represented there by a very thin population. *Boselaphus tragocamelus* (Pallas) is represented by a good population in Udanti followed by a lesser population in Barnawapara and Gomarda. *Bos frontalis* Lambert is represented by a good population in Barnawapara followed by a thin population in Gomarda but found absent in Udanti. *Bubalus bubalis* (Linnaeus) is represented by a good population only in Udanti.

## THREATS

The sanctuaries of the district were found to have different kind of problems which pose threat to the existence of the wild animals. The same is discussed below separately for the individual sanctuary.

### a) Barnawapara Wildlife Sanctuary :

The sanctuary was found to have 25 forest villages inside with a human population of about 7000 (Tiwari 1997) and livestock population of about 8500. These livestock share the forest and

its products with wildlife resulting in disturbance to the natural ecosystems. Man-animal conflict was found to be very common involving Sloth Bear and Leopard. The site being a major attraction for tourists and pilgrims its natural habitat was found to be deteriorating progressively.

Man-made forest fires also found to pose a threat to the site. These fires are started to facilitate the collection of Mahua flowers and Tendu leaves, for which the local inhabitants are allowed and they were found to collect these from all over the sanctuary. Unfortunately, the time of their collection coincides with the breeding season of certain ungulates and causes disturbance.

#### **b) Gomarda Wildlife Sanctuary :**

The area was found to have 6 villages well within and 24 villages around it with total human populations of about 7000 and more than 10000 cattles. These cattles were found to compete with the wildlife to share the limited forest resources.

Villagers are allowed to collect forest products like Tendu leaves, honey, fallen timber, grass, etc. The head loads of wood which are allowed to be collected to be used as fuel were found to land up in the market. Villagers start fires to facilitate collection of forest produces, unfortunately, coincides with the main breeding time for certain ungulates. Crop damage by ungulates is quite common, especially in forest villages.

Poaching of ungulates was found still to be a problem at the periphery of the sanctuary, which was completely surrounded by human habitations. The wild ungulates were found to fall into traps and snares when they were going out in search of food.

#### **c) Udanti Sanctuary :**

The sanctuary was constituted mainly to protect the remnant population of Wild Buffalo. But about 50 villages with more than 16000 human population and more than 10000 cattle still live within the sanctuary ( Kotwal *et al.*, 2002 ). Since they are totally dependent on the sanctuary for fuel wood, timber, *etc.*, several conflicts were found to occur between locals and the wild ungulates. Many villages were found to be located in the prime wild buffalo habitat where the people were found to move continuously.

The plain area where grasses can grow were found to be encroached by local villagers for agriculture and as a result due to paucity of grasses, the wild ungulates sometimes found to be grazing on agriculture land. While trying to save the crops people at times were found to injure the wild ungulates.

Water was found to be a limiting factor and as a result sharing of water holes by livestock and wild ungulates was found to be a cause of conflicts and conveyance of diseases. According to the local Forest Officials the common diseases reported from the area are rinderpest, foot and mouth disease and some bacterial diseases. It was found that the diseased domestic cattle graze in the

grassland where wild ungulates also graze and thus the contagious diseases are transferred from one to other. Besides it also poses a problem of genetic swarming.

However, the long-term and irreversible threat comes from the plans for diamond mining. B. Vijaykumar Chhattisgarh Exploration Co. has already dug out samples from the sanctuary, and has also set up its own Kimberlite Sample Processing Laboratory near Mainpur Village.

Finally, Man-made forest fire is also causing a serious problem and resulting in habitat destruction.

### **RECOMMENDATIONS**

1. An updated management plan has to be prepared for all the sanctuaries.
2. Wild ungulates need large tract of undisturbed forest with grassy opening preferably with moist and marshy patches and perennial water. This need be ensured in all management applications and disturbance factors should not be ignored.
3. The possibility of shifting forest villages from the sanctuary need be explored as it will be good for wild ungulates.
4. There should be restriction on the number of livestock and these should be fed rather than allowed to graze freely in the forest.
5. The water tanks that have been made for wild ungulates must be kept free from human and livestock disturbances.
6. Cultivation of fodder in the wasteland may be initiated to minimize the grazing pressure.
7. All the domestic cattle around the sanctuary must be inoculated every year to minimize spreading of contagious diseases.
8. Eco-development programme should be taken up in the buffer area of the sanctuaries to reduce the biotic pressure and shifting of the inhabitants by providing alternatives.
9. Forest corridor around the sanctuaries need to be strengthened.
10. The interface conflicts within the sanctuary need be monitored regularly.
11. The local inhabitants should be involved in several management activities of the sanctuary leading towards conservation of nature.
12. Man-made forest fire during summer has been reported to be a common feature. Due to lack of proper antifire measures, lot of habitat is getting destroyed. Proper measures may be initiated to protect the habitat for better survival of the wild ungulates.

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