COMMUNITY PARTICIPATION IN WILDLIFE CONSERVATION WITH SPECIAL EMPHASIS IN SPOTTED DEER IN KODBAHAL FOREST AREA, HEMGIRI, SUNDARGARH FOREST DIVISION, ODISHA

Interim report submitted to

Divisional Forest Officer,
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1. INTRODUCTION

Community participation plays a critical role in the conservation of ecologically important areas. Its significance is even more pronounced given the lack of comprehensive information regarding the biodiversity of various regions within the country. In particular, acquiring baseline data on species distribution and their status is crucial for their conservation. Effective management of conservation efforts requires a thorough understanding of species distribution, including which species are restricted to certain areas and which are adequately protected within those regions. With habitat fragmentation and the subsequent population losses, it is essential to ensure the safety of threatened biodiversity, especially within forested regions.

In the case of Kodbahal, there is a noticeable absence of baseline data regarding the spotted deer population. The Sundargarh Forest Division, however, holds significant promise as a biodiversity reservoir in Odisha. The conservation and scientific study of herbivores and carnivores, such as the spotted deer, jungle cat, leopard, wolf, jackal, otters, and others, have been largely overlooked. Even the distribution of many mammalian species remains poorly understood, with reports of their range extensions still emerging.

As per the working plan, key carnivore species in the Sundargarh division include the tiger (*Panthera tigris*), leopard (*Panthera pardus*), rusty-spotted

cat (*Prionailurus rubiginosus*), jungle cat (*Felis chaus*), Indian grey wolf (*Canis lupus papillaries*), jackal (*Canis aureus*), Indian fox (*Vulpes bengalensis*), small Indian civet (*Viverricula indica*), common palm civet (*Paradoxurus hemaphroditus*), ruddy mongoose (*Herpestes smithii*), grey mongoose (*Herpestes edwardsii*), and sloth bear (*Melursus ursinus*). Herbivore species in the region include elephants (*Elephas maximus*), sambars (*Rusa unicolor*), spotted deer (*Axis axis*), wild pigs (*Sus scrofa*), barking deer (*Muntiacus muntjac*), mouse deer (*Moschiola indica*), four-horned antelope (*Tetracerus quadricornis*), and the Hanuman langur (*Semnopithecus entellus*).

The spotted deer (*Axis axis*), a significant herbivore in this ecosystem, is the third-largest species of deer found in India. Characterized by its reddish fawn coat with white spots, it is known for its graceful movements and is a favorite in zoological parks worldwide.

POPULATION

Chital have declined drastically throughout their range, and are now only locally abundant within 123 Protected Areas of India and some forest tracts (Source: National Wildlife Database, WII). The strongholds of chital where they have been adequately studied are: Corbett (De and Spillit 1966), Kanha (Schaller 1967), Bandipur (Johnsingh 1983), Nagarahole (Karanth and Sunquist 1992), Sariska (Sankar 1994), Gir (Khan et al 1995), Guindy (Raman 1997), Pench (Biswas and Sankar 2002), Ranthambore (Bagchi eta!. 2003) in India, Chitwan (Mishra 1982) and Karnali-Bardia (Dinerstein 1980), in Nepal,

and Wilpattu (Eisenberg and Lockhart 1972) in Sri Lanka. Introduced chital populations occur in USSR, Yugoslavia, USA, Argentina, Brazil, Uruguay, Australia, Hawaii and several private ranches in the Western Cape, South Africa (Lever 1985)

GROUP SIZE AND COMPOSITION

Chital are essentially social animals, rarely seen as solitary individuals. The basic social unit among chital is a matriarchal family group, normally consisting of an adult female, her offspring from the previous year, and a fawn (Ables 1974). The usual herd is composed of two or more such family units and is often accompanied by individual deer of mixed sex and age-classes. Chital is known to exhibit a fission-fusion system or fluid group formation and dissolution (Schaller 1967, Mishra 1982, Barette 1991). Depending on various circumstances, a chital group may consist of one to 150 or more individuals (De and Spillit 1966, Eisenberg and Lockhart 1972, Fuchs 1977, Krishnan 1972, Schaller 1967). The composition of chital groups has been observed to change frequently Spotted deer during feeding periods, during the rut when males frequently join groups of females (Schaller 1967), or while fleeing from predators (Dinerstein 1980). These social groupings of chital do not remain permanent (Schaller 1967, Eisenberg and Lockhart 1972)

SEX RATIO

Invariably, the adult sex ratio of chital is biased towards females. Schaller (1967) reported sex ratio of 0.6 male :1 female in Corbett National Park, 0.7 : 1 in Keoladeo Sanctuary, Bharatpur, and 0.7:1 in Kanha. Dinerstein (1980) reported a sex ratio of 0.5 males:1 female, and 1 : 0.5 as female to fawn ratio in Royal-Karnali Bardia. In Bandipur, the average male : female ratio was 0.6 : 1, and the female : young ratio was 1 : 0.4 (Johnsingh 1983). The male : female ratio in Nagarahole (Karanth and Sunquist 1992) was 0.7 : 1. In Sariska, the average male : female ratio was 0.4 : 1, and the female: fawn ratio was 1 : 0.2 (Sankar 1994). Also, new-born fawns were seen all through the year with a peak fawning period from December to February. In Gir, the average male : female ratio was 0.4 : 1, and the female : young ratio was 1 : 0.2 (Khan et al. 1995). The ratio of males to females in Hawaii was 0.7 : 1 (Graf and Nichols 1966).

PREDATION AND MORTALITY

The main causes of death in chital are predation, diseases and accident. Occasionally, stags kill each other when fighting. Humans avidly hunt and poach chital throughout their range. Chital are known to be susceptible to livestock-borne diseases such as rinderpest (Schaller 1967) and foot-and-mouth disease (Sankar 1994). Accidents especially from speeding vehicles are a cause of chital mortality but occur rarely within protected areas. Predation is by far the major cause of chital mortality. Older chital stags are more susceptible to predation than younger stags (Johnsingh 1983, Patel 1992, Karanth and Sunquist 1995). This may be due to

their being less vigilant during rut, separation from the group after rut, or weakening from injuries from conflicts.

FOOD HABITS

Chital are known to feed on more than 160 species of plants (Schaller 1967, Johnsingh and Sankar 1991). Schaller (1967) showed that graze formed the bulk of the feed of chital, while Mishra (1982) considered chital primarily a grazer. On the basis of morpho-physiological ruminant feeding types, Hofmann (1985) classified chital as an intermediate/mixed feeder. Rodgers (1988) had categorised chital as a generalist feeder, with a diet consisting of grasses, forbs, and leaves of woody plants. In Sariska, chital was a grazer as long as green grasses were available (monsoon and post-monsoon seasons), but switched over to fallen leaves, flowers and fruits in winter (Sankar 1994).

HOME RANGE

In Sariska the mean home range of male chital stag was around 3.5 km2, and that of a chital doe was around 2.5 km2. The estimated annual home range of a chital doe was around 16 km2 (Sankar 1994). Annual mean home range of chital does in Karnali-Bardia was about 1.4 km2, and that of stags was about 2 km2 (Moe and Wegge 1994).

WATER USE

Chital usually drink water once a day, and more frequently in summer. This has made them inhabitants of forest tracts with widely scattered but assured presence of water.

BEHAVIOUR

Chital spend a major portion of their life in foraging, resting , and wandering within their ranges , with the extent of these activities determined by season (Schaller 1967). In a day, peak feeding times are around dawn and dusk. They usually have two major resting periods- before dawn and mid-day.

2. STUDY AREA

The Sundargarh Forest Division, located in western Odisha, spans an area of 3576.39 km² and lies between 21°47′7″–22°32′2″ N and 83°32′19″–84°34′18″ E. It includes reserved forests (RF) and protected forests (PF) like Dhanubaunsha RF, Garjanpahar RF, Chhengapahar RF, Garjanjor RF, Rohini RF, Barghumra RF, Kanthidungri PF, and Kharudaldali PF. The division shares borders with Chhattisgarh and Jharkhand. The predominant forest types in this region are tropical dry-deciduous, northern tropical dry-deciduous, and northern dry-mixed deciduous forests. The area experiences a mean annual rainfall of 1,100–1,500 mm, with distinct seasons: summer (March to June), rainy (July to October), and winter (November to February).

The forests are home to a diverse range of flora, including Sal (*Shorea robusta*), Arjuna (*Terminalia arjuna*), Babul (*Acacia nilotica*), Mahua (*Madhuca latifolia*), Tamarind (*Tamarindus indica*), and several others. The undergrowth is composed of species like *Flemingia chappar*, *Indigofera pulchela*, and *Desmodium* species. The area also features bamboo forests, which play a crucial role in sustaining local wildlife, including herbivores such as the spotted deer.

3. METHODOLOGY

I. Secondary Data

a. Literature Survey: An extensive literature review was conducted to gather relevant information from both peer-reviewed sources and grey literature. These materials were compiled and categorized to produce an annotated bibliography.

b. Study of Departmental Records: Various unpublished materials, such as sighting registers and census data sheets, were collected and analyzed to derive additional insights into the wildlife of the Sundargarh Forest Division.

c. Structured and Semi-structured Interviews:
Interviews were conducted with experienced staff members of the forest division and local community elders, including former hunters, to gather anecdotal information about the region's biodiversity.

II. Primary Data

a. Mammals

Transect surveys were conducted on foot and by vehicle to assess ungulate populations. These surveys were supplemented by block counts for small ungulates, giant squirrels, and pellet counts for ungulates. For carnivores, pugmark impression pads and water-hole counts were employed, while Shermann traps and mist-netting were used to capture rodents and bats, respectively.

b. Occurance of Mammals

Transects were walked through various blocks based on natural and manmade barriers. Both fixed and random searches were conducted to gather data on mammal occurrences. Indirect methods such as identifying footprints and feces were also used to document the presence of species.

4. RESULTS AND DISCUSSION

The spotted deer is a common species across Odisha, as indicated by the IUCN Red List, and is frequently found in dry and mixed deciduous forests interspersed with grasslands. Camera trap data from the forest department and literature indicate a steady increase in spotted deer populations in Kodbahal, with a peak in the number of photo captures in 2022. However, threats such as road accidents, predation by feral dogs, and Indian grey wolves contribute to population declines. The population dynamics reveal that females consistently outnumber males.

In addition to spotted deer, wild boar was another frequently detected herbivore, while the four-horned antelope was more widespread than the northern red muntjac, which was previously thought to dominate the region. The four-horned antelope, endemic to the Indian subcontinent, has a patchy distribution, and its presence in the study area is noteworthy.

The social structure of the spotted deer is matriarchal, with groups typically composed of adult females, their offspring, and fawns. While these groups are not permanent and may fluctuate based on seasonal factors, they form the basic social units of the species.

5. CONSERVATION IMPLICATIONS

The spotted deer serves as an essential prey species for large carnivores, making its conservation crucial for maintaining the balance of the ecosystem. Efforts to conserve this species include maintaining the grassland-woodland interface and preventing livestock grazing in areas where chital is found, as livestock can compete with them for forage during critical periods.

Consistent monitoring and habitat restoration are necessary to ensure the sustainability of spotted deer populations. Furthermore, strong collaborations with local communities will enhance the success of conservation programs, as they can provide support through livelihood enhancement and participation in anti-poaching measures.

The Kodbahal forest area has significant potential for ecotourism, with the spotted deer serving as an umbrella species for broader wildlife

conservation efforts. Revenue from ecotourism can support further conservation initiatives and raise awareness about the region's biodiversity. Educational programs focused on the local community's understanding of wildlife diversity will play an important role in fostering long-term conservation success.

By continuing these efforts, we can ensure that the Sundargarh Forest Division remains a thriving habitat for the spotted deer and other wildlife species, contributing to both biodiversity conservation and community development.

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