Checklist of mammals in Taranga Hill Forest, Gujarat, India

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Abstract

Taranga is one of the famous pilgrim places of North Gujarat. It is located (24º 00' N and 72º 46' E; and 365.76 m above msl) at starting point of the Aravalli ranges in North Gujarat region, India. The Taranga Hill-forest is one of the unclassified reserve forests (under section-IV of Indian Forest Act 1927). Climate of this area is semi-arid with irregular rainfall. Some direct methods like line transect method, roadside surveys, point transects method, water hole technique and indirect methods were used for mammalian survey. The mammalian diversity of Taranga Hill-forest was represented by 25 species of mammals belonging to 16 families and 22 genera. It possess good mammalian diversity due to frequently available diversified habitat and shelter such as hillocks for den, farmlands for feeding, sandy tracts for burrows, riverbed and rocky thorn-scrub forest for foraging and different purposes. This area covers 24.27% mammalian diversity of Gujarat and 6.41% of India. Pesticides used in agricultural fields, local people who are partially dependent on the forest and forest product, mining and allied activities, transportation, illegal cutting of trees and its branches, grazing, grass cutting, tourism and pilgrimage were found causing highest impact to the forest ecosystem and mammalian fauna as well.

Introduction

Diversity is extensively used for environmental monitoring and testing of any region, and its conservation. As the objective of world conservation strategy is to maximise diversity of habitats, these diversity is extensively used to monitor and evaluate habitats. According to Usher (1986), diversity is the most frequently adopted criterion for evaluation of conservation schemes.

Gujarat has a very rich and varied biological diversity. The state is also the only home for the Asiatic Lion (*Panthera leo persica*) and Asian Wild Ass (*Equus hemionus khur*) in the subcontinent. Systematic, scientific and reflective information on bird community was published by Patel and Patel (2010) but no such information is available on mammalian fauna at Taranga Hill-forest. Singh (2001) and Dharaiya (2008, 2009) have made some effort in it. Singh (2001) published a book on Natural Heritage of Gujarat and listed 103 species of mammals. Dharaiya (2008) published report on small mammals in North Gujarat region, has recorded total 27 species large to small sized mammals including 23 genera and 17 families. Further, he also published a report on human-bear conflicts in same region in 2009. Dharaiya (2008) reported the small mammals in general with the distribution showing by forest types and not the region specific for the entire North Gujarat region. But a region and fauna specific study in Taranga Hill-fauna is lacking. In an attempt to fill this lacuna, present study was conducted to prepare a database of common mammalian fauna in and around Taranga Hill-forest. The present study provides an overview of the mammalian diversity in a small unprotected forest patch, based on ecological status of the various species. The study has been carried out during (year to year) with regular field surveys.

Study Area

Gujarat state is characterised by a varied topography. One can divide the state based on its geography in the mainland Gujarat and the peninsular Gujarat. These can be again divided into the North, Central and the South Gujarat (Vyas, 2010). Tropic of Cancer passes through northern part of the state where. Taranga is one of the famous pilgrim places of the North Gujarat region. The Taranga Hill-forest (THf) is located at starting point of the Aravalli ranges and situated at 24º 00' N and 72º 00' E (365.76m above msl). The forest is unclassified reserve forest (under section-IV of Indian Forest Act 1927) with total area of 18.12 km^2. According to Champion and Seth (1968), the Taranga Hill-forest falls in to forest type 5/E2 (*Boswellia* type of forest) of North Gujarat.

North Gujarat falls in semi-arid zone, is strongly periodic and seasonal. There are three main seasons. Winter starts from November and continues to February. Summer season lasts from March to June. As its peak the temperature touches 45ºC. Late summer (May and June) is the period of worm dry weather. The south-west monsoon lashes the state from mid June and continues till September. The monsoon is very irregular and erratic. Heavy rain occurs during July and August but usually remains light during June and September. Post monsoon is a transitional period between the monsoon and winter. Average annual rainfall remains 663.60 mm with about 40 rainy days in the study area. The THf experiences a prolonged dry season. Average temperature remains 19.80ºC to 30.73ºC.

The Taranga Hill-forest covers mainly tropical thorn-scrub type vegetation. It is characterized by low altitude hill vegetation. Shrub species are mainly mixed thorny type, which is dominantly present in all parts of the forest. Xerophytic vegetation is dominant. Grassland occasionally present on small part of plain areas. *Anogeissus latifolia, Acacia chundra, Bauhinia recemosa, Butea monosperma, Sterculia urens, Achyranthus aspera, Adhatoda vasica, Calotropis gigantea, Maytenus emarginata, Zizyphus mauritiana, Asparagus racemosus, Cuscuta reflexa, Andrographis paniculata, Bergia capensis, Cassia auriculata* and *Enicostemma hyssopifolium* are common vegetation of THf. Agro-ecosystems exist at the skirt areas of the forest. Crop calendar is fixed as an agro-practice for local farmers. Patel and Patel (2010) recorded total 90 species of birds belonging to 11 orders, 33 families and 68 genera. According to them, Red-vented Bulbul (*Pycnonotus cafer*) and Rock Pigeon (*Columba livia*) were most abundant while Asian Paradise flycatcher (*Terpsiphone paradise*), Crested Bunting (*Melophus lathami*) and European Roller (*Coracias garrulus*) were rare. White-naped Tit (*Parus nuchalis*) a globally threatened and endemic resident has been found as local migrant, scarce in number, common in occurrence and breeder in the tropical thorn-scrub habitat of Taranga Hill-forest.

Methodology

The study was conducted from early December 2006 to late November 2008. The study area was divided into four zones based on its ecological identity *i.e.* I. Agricultural and riverbed area, II. Rocky thorn-scrub forest area, III. Hillocks and foothill site, and IV. Traffic zone (Road site). Each study zone was visited once per month to record the mammals and their related parameters. Total 24 visits were done in each site (*i.e.* total 96 visits were done during study period). Some direct and indirect methods were used for mammalian survey. They were as follows:

Line transects method: In this method, observer walks along a predetermined route by foot at a fixed speed. The different mammalian species encountered were recorded.

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These lines transects were used in different locations to determine the presence or absence of different species in the particular habitats.

Roadside surveys: These surveys were made both on foot and by vehicle. These were successful particularly in case of monkeys, which can tolerate the presence of humans and allow the observations to be made from close quarters. Two Wheeler was used, and the speed was maintained moderately between 8-10 km/hr.

Water hole technique: This method was also applied more efficiently during peak water crisis periods, when water acts as limiting factor. All the methods were applied during early morning hours and late evening hours, except the water hole technique, which was applied during the noon and sometime at night hours in the summer.

Indirect methods: Animal signs such as burrows, quills, bones, scats, pellets, signs of feeding, kill, etc. were carefully observed and recorded during the transect walk. These evidence indicate the presence of an animal in the area. The spot where such evidences were found is then marked and later surveyed intensively for other signs of the animal. Villagers and nomads were also contacted and interviewed over wide areas regarding the presence or absence of mammals by providing them with the pictorial guides and photographs for identification that are likely to be found in the area. To record the observations without any disturb the animal from the distance, binoculars (8X40 Olympus) was used. For identification and classification purposes, colourful plates by Prater (1971) proved helpful.

The survey methods were adopted as per the zone identified. The zone I, II and III were scanned with the line transects on foot and sign survey simultaneously. While for the zone IV (Road site) was applied for vehicular survey. All the systematic survey methods were supported with the water hole technique and considered opportunistic sightings too.

Results and Discussion

Species Richness and Diversity:

Most of fauna were observed in relation to thorn-scrub forest, semi-arid area where constant vehicular disturbance on road site. The present mammalian fauna of the THf consists of 25 species of mammals to 16 families and 22 genera, which shows the mammalian richness and diversity of the area (Table 1). Of the total 25 species, four species were large mammals: Leopard, Sloth Bear, Nilgai and Indian Wild Boar; eight species were medium mammals *i.e.* Common Langur, Jackal, Indian Fox, Striped Hyena, Indian Pangolin and Indian Porcupine; and remaining 13 species were small mammals.

The present study shows that Taranga Hill-forest has good mammalian diversity due to frequently available diversified habitat and shelter such as hillocks for den, farmlands for feeding, sandy tracts for burrows, riverbed and rocky thorn-scrub forest for other purposes. A literature survey shows that Gujarat has 103 mammalian species out of total 390 mammalian species available in India. With respect to this THf harbours 24.27% mammalian diversity of Gujarat and 6.41% of India. Small mammals such as rodents are considered to be especially important components of the ecosystem as they serve as prey for small and medium sized carnivores (Shanker, 2003). The large sized carnivore mammalian species are essential for regulation of herbivores population in forest ecosystem. It is vital for stability of any ecosystem but such healthy condition is not observed in the study area due to lack of thick vegetation canopy in the forest and other factors as given below.

North Gujarat region had very rich forests with high density of wildlife including Tiger (*Panthera tigris*), Sambar (*Rusa unicolor*), Chital (*Axis axis*), etc. in the past but were killed or exterminated due to very high anthropogenic pressure, habitat and forage loss (Dharaiya 2008). Since farmers dominate the region, the agricultural activity has reached up to its peak, which may lead to deforestation of some important forest patches of the region. Although the area still can sustains a good population of Sloth Bear (*Melursus ursinus*), Leopard (*Panthera pardus*) and many other wild animals in their natural habitat, if rich in the vegetation diversity.

Threats:

There are several potential threats identified to mammalian diversity at Taranga Hill-forest listed below:

• The Taranga Hill-forest is covered with farmlands and is dominated by agricultural practice. Farmers use pesticides in agricultural fields which may have direct impact on herbivores and finally on carnivores.

• There are 14 villages around forest area. The local people are partially dependent on the forest and forest products, which may be responsible for habitat loss. Their frequent movement might be disturb the mammals particularly carnivores in this forest.

• The forest area is also facing a severe problem of mining in the vicinity; these mining and allied activities are one of the most dangerous threats to the wildlife in the area.

• Transportation in and around the forest was also considered as one of the major threats; during the present study we recorded total 18 cases of road accident of wild mammals. In these road accidents, Small Indian Mongoose, Common Mongoose, Indian Fox, Pale Hedgehog and Fivestriped Palm Squirrel were recorded as victims. The maximum accidents were recorded during post monsoon.

• Illegal cutting of trees and its branches are the major threats.

• Apart from these, grazing, grass cutting, tourism and pilgrimage were reported with highest impact to the forest ecosystem.

All above facts reflect that forest habitats of the study area should be protected. To protect mammalian fauna, the forest conservation and management programmed should base on the following principles.

• Maintenance of long-term ecological balance through protection and restoration, conservation of forest cover, and control of illicit cutting of trees and its branches.

• Modern methods of forest management should be adopted. These include: Breeding of elite trees, control of weeds, pest management, traffic control, awareness to local people and application of laws or to improve the laws related to recent scenario.

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Table 1: Mammalian diversity of Taranga Hill-forest with their status recorded during study period

Family/Common name	Scientific name	Status
Cercopithecidae		
1. Common Langur	*Semnopithecus entellus*	A, VC
Felidae		
2. Leopard*	*Panthera pardus*	S, r
Canidae		
3. Jackal	*Canis aureus*	Lf, VC
4. Indian fox	*Vulpes bengalensis*	S, C
Hyaenidae		
5. Striped Hyena*	*Hyaena hyaena*	S, r
Herpestidae		
6. Common Mongoose	*Herpestes edwardsi*	Lf, VC
7. Ruddy Mongoose	*Herpestes smithi*	Lf, VC
8. Small Indian Mongoose	*Herpestes auropunctatus*	Lf, VC
Ursidae		
9. Sloth Bear*	*Melursus ursinus*	S, r
Bovidae		
10. Nilgai or Blue bull	*Boselaphus tragocamelus*	A, VC
Suidae		
11. Indian Wild Boar	*Sus scrofa*	A, VC
Manidae		
12. Indian Pangolin*	*Manis crassicaudata*	S, r
Erinaceidae		
13. Longeared Hedgehog	*Hemiechinus auritus collaris*	Lf, VC
14. Pale Hedgehog	*Paraechinus micropus micropus*	S, VC
Soricidae		
15. Grey Musk Shrew	*Suncus murinus*	S, O
Leporidae		
16. Indian Hare	*Lepus nigricollis ruficaudatus*	A, VC
17. Desert Hare	*Lepus nigricollis dayanus*	S, C
Hystricidae		
18. Indian Porcupine*	*Hystrix indica*	S, r
Sciuridae		
19. Fivestriped Palm Squirrel	*Funambulus pennanti*	A, VC
Muridae		
20. Indian Desert Gerbille	*Meriones hurrianae*	A, VC
21. Longtailed Tree Mouse	*Vandeleuria oleracea*	Lf, VC
22. Bandicoot Rat	*Bandicota indica*	S, r
Pteropodidae		
23. Indian Flying Fox	*Pteropus giganteus*	Lf, VC
24. Fulvous Fruit Bat	*Rousettus leschenaultii*	F, VC
25. Shortnosed Fruit Bat	*Cynopterus sphinx*	F, VC

Status: **Abundance Status:** A = Abundant (More than 100 AMP), F = Frequent (AMP between 50 to 100), LF = Less frequent (between 20 to 50), S = Scarce (AMP less than 20); **Occurrence status:** VC =Very common (Recorded during 22 to 24 visits out of 24 visits), C = Common (Recorded during 14 to 21 visits out of 24 visits), O = Occasional (Recorded during 5 to 13 visits out of 24 visits) and r = Rare (Recorded during less than 5 visits out of 24 visits). " * " = Sign recorded.