



RESEARCH ARTICLE

THE PREY OF TIGERS AND THEIR FOOD IN TIGER ZONE OF PERIYAR TIGER RESERVE: DIVERSITY AND CONSERVATION

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ABSTRACT

Study of the food habits of the large mammals is a prelude to any conservation strategies. Tiger is an endangered species of the country and is also considered as a flagship species in conservation. It occupies highest position in the Food Pyramid. Keeping this in mind, an attempt has been made to study the prey base of Tiger and the food habits of the prey base in Periyar Tiger Reserve (PTR), India. Standard methods for field survey were adopted to ascertain the prey base of the Tigers in PTR. Enumeration of most common flora and fauna of the Tiger Zone of PTR was carried out. The results of field survey revealed that, of the 8 most preferred common prey of tigers, 3 belong to vulnerable, 4 belong to least concern and 1 belongs to endangered categories of species. It was observed that 23 % of the prey base was herbivorous. The most common flora (43 numbers) and fauna (54 numbers) of the Tiger zone of PTR were also documented in the present study. The Present work highlights the importance of prey base as well as associated flora and fauna in the conservation of Tigers in PTR.

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INTRODUCTION

Sustainability of prey is very important for the large carnivorous mammals like Tiger. The food habits of prey affects directly or indirectly the population of large mammals. Most of the prey of large carnivores depends on the plants and very few are animals. Sometime, they also show the amphibious food habits. They use plant parts as well as animals in their food. The food of prey plays a central role in determining the predators-prey interactions and the kinetics of the competitions between the species (Pianka 1981; Sih *et al.*, 1985). The availability and range of diet play an important role in determining the dynamics of competition at inter- and intraspecific levels. An understanding of diets, and ideally, an ability to predict the diet shifts in response to changes in prey biomass or prey availability are thus major issues, especially in the conservation of tigers (Mukherjee and Sarkar 2013). The tiger is always found to be associated with large mammalian herbivorous prey species in all its habitat ranges across the globe. These include wild buffalo, gaur, nilgai, swamp deer, sambar, barking deer, spotted deer and wild boar (Shukla and Babu 2013). This prey base is quite different from the parallel

predators of tiger like Leopard, Wild dog and Sloth bear. Keeping this in view an attempt has been made to document the prey base of Tigers in Periyar Tiger Reserve along with associated flora and fauna. PTR is different from any other Tiger Reserve in the country and the world because of its contiguous and unique landscapes in the Western Ghats with a mosaic of vegetations types. The present paper highlights the importance of food habits of prey for making conservation strategies of Tigers in PTR.

MATERIALS AND METHODS

Study area

Periyar Tiger Reserve (PTR) is one of the important protected areas with its large tract of continuous forest and a breeding population of Tigers. It is situated in the Cardamom Hills of the southern Western Ghats of peninsular India. The major portion of the Reserve forms the catchment of the river Periyar and the rest that of river Pamba. PTR is the 10th Tiger Reserve of the country. It lies between 9^o17'-9^o 37'N and 76^o56'-77^o 25'E. It covers 925 Km² having 881 Km² of core, 44 Km² of buffer. The Periyar Lake, which was formed as a result of the construction of the Mullaperiyar Dam, has a total area of 26

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km² and a maximum depth of 46m at the highest water level. Along with River Periyar, the River Pamba and its main tributary, Azhutha also drain into the Reserve. PTR enjoys the Precambrian crystalline rocks which belong to the Charnockite-Khondalite-Migmatite complex. The beauty of PTR is reflected in its undulating terrain between 750 MSL to 1500 MSL along with numerous natural mountain streams. The area enjoys the clayed mixed vstic haplohumults and fine loamy mixed oxic Humitropets occupying major parts. The annual precipitation from 1400 mm to 4500 mm. The temperature varies from 11⁰ C to 27⁰ C. The unique landscapes of PTR provide a untamed diversity of flora and fauna. It gives four types of vegetations; Tropical Evergreen Forest, Semi-Evergreen Forest, Moist deciduous Forest and Evergreen Forest. It also enjoys the Savana Grasslands. Twenty two plant species were found to the Western Ghats of which six are found in Periyar only. The fauna of the Reserve is represented by 66 species of mammals, 323 species of birds including 21 species of raptors, 48 species of reptiles, 29 species of amphibians, 45 species of fishes and 180 species of butterflies (Shukla and Babu 2013; Verma *et al.*, 2015; IEPR 2013).

Field Observation

The prey base of tiger was noted through direct sightings and scats analysis. Tiger scats were collected in the study area and were identified on the basis of standard methods. The associated flora and fauna was enumerated with published literature (Floyd *et al.*, 1978; Ackerman *et al.*, 1984).

RESULTS AND DISCUSSION

The sustainability of prey reflects on the sustainability of Tigers. PTR is one of the most importance contiguous landscapes for the conserving a breeding populations of Tiger. The field survey in PTR reveals that, there are 8 common preys which have been fed by Tigers. They are Sambar (Fig 3.2), Gaur (Fig 3.1), Wild Boar, Porcupine (Fig 3.5), Barking Deer (Fig 3.4), Mouse Deer, Elephant calf (Fig 3.3) and Nilgiri Langur (Table 1). Among them 13 % belongs to endangered, 37 % belongs to vulnerable and 50 % belongs to least concern categories of the species (Fig 1). It was also observed that the prey base can be categorized as carnivorous, herbivorous and omnivorous. Among them, 6 % belongs to Carnivorous, 6 % belongs to omnivorous, 23 % of herbivorous, 17 % of fruit eaters, 14 % of tuber eaters, 17 % of leaves eaters and 17 % of grass eaters (Table 2; Fig 2).

Present study also revealed that about 43 plant species are associated with the Tiger zone of PTR and also it was observed that about 22 birds, about 14 reptiles & amphibians and 18 mammals along with other flora and fauna (Table 3). Other researchers also reported the prey base of Tigers in PTR. Srivastava *et al.* (1996) reported that the most common prey of tigers in PTR are Nilgiri Langur, Elephant calf and Varanus while present study did not sight the Varanus as a prey in PTR. Mukherjee and Sarkar (2013) reported that wild buffalo, gaur, nilgai, swamp deer, sambar, barking deer, spotted deer and wild boar are common prey of tiger in Sundarban, West Bengal.

Table 1. Prey of Tiger in Periyar Tiger Reserve, Kerala

Name	Scientific name	Family	Group ^a	Source
Sambar	<i>Rusa unicolor</i>	Cervidae	Vulnerable	PS
Gaur	<i>Bos gaurus</i>	Bovidae	Vulnerable	PS
Wild Boar	<i>Sus scrofa</i>	Suidae	Least Concern	PS
Porcupine	<i>Erethizon dorsatum</i>	Erethizontidae	Least Concern	PS
Barking Deer	<i>Muntiacus muntjak</i>	Cervidae	Least Concern	PS
Mouse Deer	<i>Moschiola meminna</i>	Tragulidae	Least Concern	PS
Elephant (calf)	<i>Elephas maximus indicus</i>	Elephantidae	Endangered	PS
Nilgiri Langur	<i>Trachypitecus johnii</i>	Cercopithecidae	Vulnerable	PS

(PS: Present Study; a: IUCN 3.1)

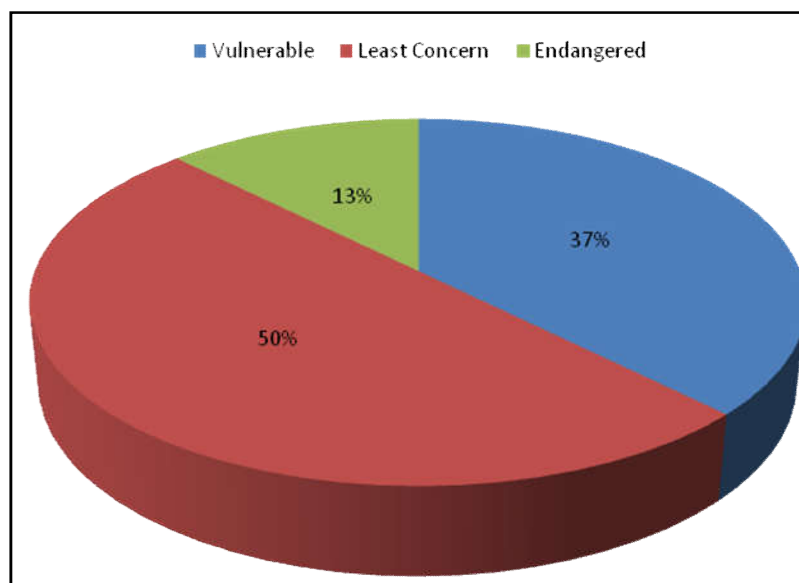


Fig. 1. Prey base of Tiger in PTR as per the conservation status

Table 2. Diversity of Prey as per food habit of Tiger in Periyar Tiger Reserve

Prey	Carnivorous	Herbivorous				Omnivorous
		Fruit eaters	Tuber eaters	Leaves eaters	Grass eaters	
Sambar	---	✓	---	✓	✓	---
Gaur	---	---	---	✓	✓	---
Wild Boar	✓	---	✓	---	---	✓
Porcupine	✓	✓	✓	---	---	✓
Barking Deer	---	✓	✓	✓	✓	---
Mouse Deer	---	✓	---	✓	✓	---
Elephant (calf)	---	✓	✓	✓	✓	---
Nilgiri Langur	---	✓	✓	✓	✓	---

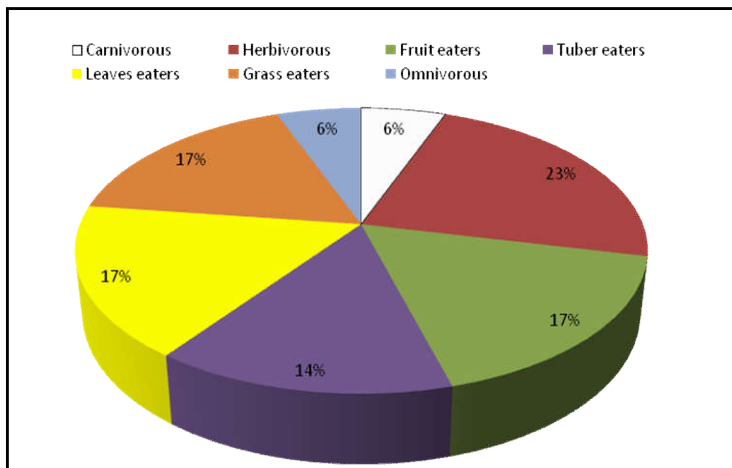


Fig. 2. Prey base diversity as per food habits of Tiger in Periyar Tiger Reserve



Fig. 3. The Prey of Tigers in Periyar Tiger Reserve, 1: Indian Bison; 2) Sambar; 3) Elephant calf; 4) Barking deer; 5) Porcupine

Table 3. Most common associate floral and faunal diversity of the Tiger zone in Periyar Tiger Reserve

Floral diversity		
Name	Family	Habitat
<i>Clematis gouriana</i>	Ranunculaceae	Climber
<i>Naravelia zeylanica</i>	Ranunculaceae	Climber
<i>Dillenia pentagyna</i>	Dilleniaceae	Tree
<i>Uvaria hookeri</i>	Annonaceae	Climber
<i>Cissampelos pareira</i>	Menispermaceae	Climber
<i>Cleome viscosa</i>	Capparaceae	Herb
<i>Flacourtia Montana</i>	Flacourtiaceae	Shrub
<i>Portulaca oleracea</i>	Portulacaceae	Herb
<i>Mesua ferrea</i>	Clusiaceae	Tree
<i>Abelmoschus manihot</i>	Malvaceae	Shrub
<i>Sida cordifolia</i>	Malvaceae	Herb
<i>Bombax ceiba</i>	Bombacaceae	Tree
<i>Helicteres isora</i>	Sterculiaceae	Shrub
<i>Sterculia urens</i>	Sterculiaceae	Tree
<i>Biophytum sensitivum</i>	Oxalidaceae	Herb
<i>Toddalia asiatica</i>	Rutaceae	Shrub
<i>Toona ciliata</i>	Meliaceae	Tree
<i>Celastrus paniculatus</i>	Celastraceae	Climber
<i>Zizphus oenoplia</i>	Rhamnaceae	Shrub
<i>Lee indica</i>	Leeaceae	Tree
<i>Harpullia arborea</i>	Sapindaceae	Tree
<i>Atylosia scarabaeoides</i>	Fabaceae	Climber
<i>Dalbergia latifolia</i>	Fabaceae	Tree
<i>Cassia fistula</i>	Caesalpiniodeae	Tree
<i>Albizia lebeck</i>	Mimosoideae	Tree
<i>Drosera burmanii</i>	Droseraceae	Herb
<i>Terminalia chebula</i>	Combretaceae	Tree
<i>Syzygium cumini</i>	Myrtaceae	Tree
<i>Passiflora foetida</i>	Passifloraceae	Climber
<i>Diplocyclos palmatus</i>	Cucurbitaceae	Climber
<i>Solena amplexicaulis</i>	Cucurbitaceae	Climber
<i>Ageratum conyzoides</i>	Asteraceae	Shrub
<i>Diospyros montana</i>	Ebenaceae	Tree
<i>Polygonum hydropiper</i>	Phytolaccaceae	Herb
<i>Piper longum</i>	Piperaceae	Climber
<i>Santalum album</i>	Santalaceae	Tree
<i>Mallotus philippensis</i>	Euphorbiaceae	Tree
<i>Ficus hispida</i>	Moraceae	Tree
<i>Costus speciosus</i>	Zingiberaceae	Shrub
<i>Dioscorea bulbifera</i>	Dioscoreaceae	Climber
<i>Smilax zeylanica</i>	Smilacaceae	Climber
<i>Cyperus rotundus</i>	Cyperaceae	Herb
<i>Saccharum spontaneum</i>	Poaceae	Herb
Faunal Diversity		
Avifauna		
Common name	Scientific name	Status
Little grebe	<i>Tachybaptus ruficollis</i>	LC
Little cormorant	<i>Microcarbo niger</i>	LC
Darter	<i>Anhinga melanogaster</i>	NT
Cattle egret	<i>Bubulcus ibis</i>	LC
Red spurfowl	<i>Galloperdix spadicea</i>	LC
Emerald dove	<i>Chalcophaps indica</i>	LC
Common Indian Nightjar	<i>Caprimulgus asiaticus</i>	LC
Indian roller	<i>Coracias benghalensis</i>	LC
Malabar grey hornbill	<i>Ocyrceros griseus</i>	LC
Malabar pied hornbill	<i>Anthraceroceros coronatus</i>	NT
Great hornbill	<i>Buceros bicomis</i>	NT
Brown headed barbet	<i>Psilopogon zeylanicus</i>	LC
Rufous woodpecker	<i>Microptemus brachyurus</i>	LC
Black drongo	<i>Dirurus macrocercus</i>	LC
Greater Racket tailed drongo	<i>Dicrurus paradiseus</i>	LC
Red whiskered bulbul	<i>Pycnonotus jocosus</i>	LC
Red vented bulbul	<i>Pycnonotus cafer</i>	LC
Verditer flycatcher	<i>Eumyias thalassinus</i>	LC
Asian Paradise Flycatcher	<i>Terpsiphone paradise</i>	LC
Paddyfield Pipit	<i>Anthus rufulus</i>	LC
Black kite	<i>Milvus migrans</i>	LC
Oriental Honey Buzzard	<i>Pernis ptilorhynchus</i>	LC
Reptiles & Amphibians		
Spotted tree lizard	<i>Varanus macraei</i>	NE
Common skink	<i>Lampropholis guichenoti</i>	NE
Monitor lizard	<i>Varanus bengalensis</i>	LC
Indian python	<i>Python molurus</i>	NT
Rat snake	<i>Coluber mucosus</i>	LC
Green keelback	<i>Macropisthodon plumbicolor</i>	LC
Indian cobra	<i>Naja naja</i>	NT
King cobra	<i>Ophiophagus hannah</i>	VU

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Bamboo pit viper	<i>Trimeresurus gramineus</i>	LC
Malabar pit viper	<i>Trimeresurus malabaricus</i>	LC
Common Indian toad	<i>Duttaphrynus melanostictus</i>	LC
Indian pond frog	<i>Euphlyctis hexadactylus</i>	LC
Indian bullfrog	<i>Hoplobatrachus tigerinus</i>	LC
Russell's viper	<i>Daboia russelii</i>	LC
Mammals		
Lion tailed macaque	<i>Macaca silenus</i>	Endemic to WG
Nilgiri Langur	<i>Trachypithecus johnii</i>	Endemic to WG
Fruit bat	<i>Latidens salimalii</i>	Endemic to WG
Indian wild Dog	<i>Cuon alpinus</i>	EN
Common Mongoose	<i>Herpestes edwardsii</i>	LC
Smooth coated Otter	<i>Lutrogale perspicillata</i>	VU
Leopard	<i>Panthera pardus</i>	VU
Fishing cat	<i>Prionailurus viverrinus</i>	EN
Jungle cat	<i>Felis chaus</i>	LC
Wild boar	<i>Sus scrofa</i>	LC
Asian Elephant	<i>Elephas maximus</i>	EN
Mouse deer	<i>Moschiola meminna</i>	LC
Sambar deer	<i>Rusa unicolor</i>	VU
Gaur	<i>Bos gaurus</i>	VU
Indian pangolin	<i>Manis crassicaudata</i>	EN
Malabar Giant squirrel	<i>Ratufa indica</i>	LC
Common house rat	<i>Rattus rattus</i>	LC
Indian porcupine	<i>Hystrix indica</i>	LC

(LC: Least Concern; EN: Endangered; VU: Vulnerable; NT: Near threatened; NE: Not evaluated; WG: Western Ghats)

Conclusion

Periyar Tiger Reserve being one of the prime Tiger Reserves of the country, conservation of Tigers in PTR is of utmost importance. However, the conservation strategies of Tiger can be designed by taking various parameters into consideration of which, conserving the prey base is of prime importance. 8 visible prey species were found in PTR and their food habits were noted. The primary data indicates that by conserving the food plants of the prey species of tiger, associated flora and fauna, the tigers in PTR can be conserved effectively along with other management strategies in the conservation.

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