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Research Article

DIVERSITY OF MAMMALIAN FAUNA AND CONSERVATION ISSUES OF THE ANANTAPURAMU DISTRICT OF ANDHRA PRADESH, INDIA

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ABSTRACT

A study on mammals was carried out as part of understanding the diversity and distribution in Anantapuramu district of Andhra Pradesh, India, from August 2015 to August 2017. As documented by the study, a total of thirty four species of mammals belong to twenty families and eight orders were documented. Among 34 recorded species, 14 belong to Carnivorus, 6 each to Cetartiodactyla and Rodentia, 2 each to Chiroptera, Lagomorpha and Primates and 1 species each to Eulipotyphla and Pholidota. The study points to some major threats facing mammals in this district in the form of human- animal conflict, biotic stress, poaching and desertification which need to be addressed.

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INTRODUCTION

Living species have their own space and role in maintaining the ecological balance. Nature, being a dynamic entity never remains the same; it keeps changing, adjusting, evolving in a balanced and harmonious manner. Nature, in fact, promotes evolution and diversity (Wilson and Reeder, 2005; Subramanyam, 2017). The most unique feature of earth is the existence of life, and the most extraordinary feature of life is its diversity. Among the animal kingdom, class Mammalia is regarded highest as a group from the evolutionary point of view. Mammals encompass not only the largest terrestrial species like the elephant and the largest aquatic species like the Blue whale, but also the smallest species like shrew, mice, bat etc. Class mammalian includes the most diverse group of wildlife in terms of species, forms, ecologies, physiologies, life histories and behaviours (Jones and Safi, 2011). They are beneficial to mankind both directly (e.g., as an important protein source for many cultures and rural people) and indirectly (e.g., they play a crucial role in maintaining balanced ecosystems as preys and/or hunters, pollinators, seed conveyers etc. In recent times, naturalists have begun to raise the question of, whether we can afford to treat all species with an equal rating, but what they lack is current scientific data on wildlife

and conservation and as a result, some species have always received a higher priority over others in terms of protection. A taxonomic analysis of available species is still the popular approach in to assessing diversity and measuring species richness, values of plants and animals with respect to a given area, one of the important parameters in conservation programmes (Subramanyam *et al*, 2015). Each species is one unit and the loss of a species signifies that the world is poorer by one unit species, or an area becomes poorer by one unit and hence keeping in view of nearby extinction of mammalian species, we intended to conduct a study of the status of mammalian fauna and wildlife problems in Ananthapuram district and to make recommendations for future conservation policies. Studies on the status of mammalian species in this district are found completely lacking for more than two decades and need a revised documented data for conservation of wildlife, as is evident from the disappearance of Pangolin due to an inadequate data on its status and a complete lack of conservation efforts, for instance. Mammals are extraordinarily diverse, having adapted to almost all the available ecological niches (Eisenberg, 1981; Sinclair, 2003; Ungar, 2010). They also play a key role in the dynamics of ecosystems in which they live (Sinclair, 2003; Jones and Safi, 2011) especially food habits of carnivores are central to the ecological niches they

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occupy, in that they play an important role in explaining their social systems, behavior, and factors affecting population density, and may also have important implications for the life histories of their preys (Mills, 1992).

MATERIALS AND METHODS

Study area: Ananthapuram lies between 13°-40' and 15°-15' Northern Latitude and 76°-50' and 78°-30' Eastern Longitude (Figure 1).

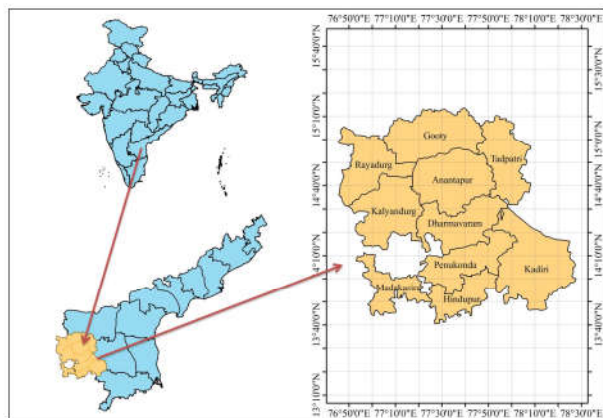


Figure 1 Location Map of Study area

The geographical location of Ananthapuramu district is such that it does not get the full benefit of either of the monsoons. The district falls under the rain shadow area with the normal mean rainfall being 553 mm (IMD, Pune), Dry land farming (128.34 sq.km) (arid agro- ecosystem) is the major agricultural practice noticed in the surrounding landscapes of the study area. Bengal gram, groundnut and paddy are the major crops grown. This region experiences extremes of weather conditions with maximum temperatures fluctuating from 39 to 43°C. In spite of the fact that climatic conditions are very harsh, the extreme xeric region of the country exhibits a vivid and spectacular mammalian biodiversity. Moreover, the abundance of certain insects, mites, arachnids, reptiles and rodents is simply astonishing and speaks of highly specialized deserticolous adaptations. In this district, soils suitable for cultivation are grouped under classes I to IV, while soils not suitable for cultivation but very well suited for forestry, wild life and grassland are under classes V to VIII; less than 4 % is classified as class II; 44% as class III; and 25 % as class IV. This district of Andhra Pradesh is composed of three natural geographical divisions (Table 1) which include northern zone consisting of 12 mandals comprising larger areas of black cotton soils, Central division comprising 15 mandals which are mainly characterized by semi-arid treeless regions of poor red soils and High Level terrain of the district comprising circles 4 mandals which connect with Mysore plateau at a higher elevation of the rest of the district.

This part has average sandy red soils of normal productivity. It is estimated that 63 percent of the total geographical area of the district is covered by sandy loam; 14 percent under rock land; and about 19 percent under clay. The structural complex it is associated with geographical habitats may provide more niches and diverse ways of environmental resources and thereby increasing species diversity (Bazzaz, 1975) in this region.

Table 1 Natural geographical divisions of Anantapuramu district

Northern region mandals (NRM)	Central region mandals (CRM)	High level Land mandals (HLM)
Rayadurg, Kanekal, Beluguppa, Gooty, Guntakal, Vajrakarur, Uravakonda, Vidapanakal, Yadiki, Tadipatri, Putlur and Yellannur containing larger areas of Black Cotton soils.	Kalyandurg, Kambadur, Settur, Brahasamudram, Ramagiri, Kanaganapalli, C.K. Palli, Dharmavaram, Bathalapalli, Tadimarri, Mudigubba, Anantapuramu, Kudair, Pamidi and Peddavadugur which are mainly made up of arid, expanse of poor Red Soils.	Penukonda, Roddam, Gudibanda and Agali which connect with Mysore plateau at a higher elevation of the rest of the District. This part has average sandy red soils of normal productivity.

It is the largest district in terms of areawith 19,130 square kilometers (Srivastava *et al*, 2010).

Methodology

This present study on mammalian fauna was conducted during the period from August 2015 to August 2017 in Anantapuramu district of Andhra Pradesh, India. Standard ecological methods such as counting calls, Line transects, counting footprints, Feeding signs for herbivores and opportunistic sighting (Sutherland, 2006; Nautiyal *et al*, 2015) were used for documenting the Mammalian diversity across various ecosystems of Anantapuramu District. Identification of mammalian fauna was done by using standard field guides (Prater, 1971; Menon, 2003).

RESULTS

Thirty four species of mammalian species were recorded under 8 Orders, 20 Families and 29 genera from the study area. The detailed list of mammalian fauna of Anantapuramu district is presented in table 2. These mammalian orders included Carnivora (7 families and 14 species), Cetartiodactyla (4 families and 6 species), Rodentia (3 families and 6 species), Chiroptera (2 families and 2 species), Lagomorpha (1 family and 2 species), Primates (1 family and 2 species), Eulipotyphla (1 family and 1 species) and Pholidota (1 family and 1 species). The distribution details (Global, Nation and regional) of Mammalian fauna in Anantapuramu district are presented in table 3 (IUCN online).

Habitats of Mammals across Anantapuramu District

Mammalian species of the study area include only two aquatic species i.e., Indian Smooth-coated Otter (*Lutrogale perspicillata*) and Common Otter (*Lutra lutra*), while the remaining species are terrestrial. Among the terrestrial mammals, 4 arboreal species have also been documented - Bonnet Macaque (*Macaca radiate*), Hanuman langur (*Semnopithecus entellus*) three palm squirrel (*Funambulus palmarum*), five striped palm squirrel (*Funambulus pennantii*) and 2 aerial species (Indian flying fox (*Pteropus giganteus*), Indian pipistrelle (*Pipistrellus coromandra*) and the rest use more than one environmental niches as terrestrial habitats. Most of the district's hilly habitat remains fragmented due to the establishment of wind-power projects in the terrain, while blasting activity for the construction of roads in wildlife

Of the recorded mammalian species (34), there are 1 seed-eater (2.94%), 3 frugivores (8.82%), 10 herbivores (29.41%), 3

Table 2 A list of Mammals recorded across Anantapuramu district.

Family	Scientific Name	Common Name	IWPA Status	IUCN Status	CITES Appendix	Foraging type
Order: Carnivora						
Canidae	<i>Canis aureus</i>	Golden Jackal	II	LC	III	Omnivorous
Canidae	<i>Canis aureusindicus</i>	Indian jackal	II	LC	NL	Omnivorous
Canidae	<i>Canis lupus pailipes</i>	Indian wolf	I	LC	I&II	Omnivorous
Felidae	<i>Felis chaus</i>	Jungle cat	II	LC	II	Carnivorous
Herpestidae	<i>Herpestes edwardsii</i>	Indian grey mongoose	NL	LC	III	Omnivorous
Hyaenidae	<i>Hyaena hyaena</i>	Indian striped hyena	III	NT	III	Carnivorous
Ursidae	<i>Melurs usursinus</i>	Sloth bear	I	VU	I	Omnivorous
Felidae	<i>Panthera pardus</i>	Leopard	I	VU	I	Carnivorous
Viverridae	<i>Paradoxurus hermaphrodites</i>	Common palm civet	II	LC	III	Omnivorous
Viverridae	<i>Viverricula indica</i>	Small Indian civet	II	LC	III	Omnivorous
Canidae	<i>Vulpes bengalensis</i>	Indian fox	II	LC	III	Omnivorous
Herpestidae	<i>Herpestes smithii</i>	Small Indian mongoose	II	LC	III	Carnivorous and insectivorous
Mustelidae	<i>Lutrogale perspicillata</i>	Indian Smooth-coated Otter	II	VU	II	Omnivorous
Mustelidae	<i>Lutra lutra</i>	Common Otter	NL	NT	I	Omnivorous
Order: Cetartiodactyla						
Bovidae	<i>Antelope cervicapra</i>	Black buck	I	LC	III	Herbivorous
Cervidae	<i>Axis axis</i>	Spotted Deer	III	LC		Herbivorous
Bovidae	<i>Gazella bennettii</i>	Chinkara	NL	LC	III	Herbivorous
Suidae	<i>Sus scrofa</i>	Wild boar	III	LC	NL	Omnivorous
Tragulidae	<i>Moschiola meminna</i>	Indian Chevrotain	NL	NT	NL	Frugivores
Cervidae	<i>Rusa unicolor</i>	Sambar	III	VU	NL	Herbivorous
Order: Chiroptera						
Vespertilionidae	<i>Pipistrellus coromandra</i>	Indian pipistrelle	NL	LC	NL	Nectivorous
Pteropodidae	<i>Pteropus giganteus</i>	Indian flying fox	V	LC	II	Nectivorous and Frugivores
Order: Eulipotyphla						
Soricidae	<i>Suncus murinus</i>	House shrew	NL	LC	NL	Omnivours
Order: Lagomorpha						
Leporidae	<i>Lepus nigricollis</i>	Indian hare	IV	LC	NL	Herbivorous
Leporidae	<i>Lepus nigricollisdayanus</i>	Black naped hare	NL	LC	NL	Herbivorous
Order: Pholidota						
Manidae	<i>Manis crassicaudata</i>	Indian pangolin	I	EN	I	Both insectivorous and mymecophage
Order: Primates						
Cercopitheciidae	<i>Macaca radiate</i>	Bonnet macaque	II	LC	II	Omnivorous
Cercopitheciidae	<i>Semnopithecus entellus</i>	Hanuman Langur	II	LC	I	Herbivorous
Order: Rodentia						
Muridae	<i>Funambulus palmarum</i>	Three-striped palm Squirrel	IV	LC	NL	Both herbivorous and omnivorous species
Hystriidae	<i>Hystrix indica</i>	Indian porcupine	IV	LC	NL	Herbivores' and insectivores
Muridae	<i>Rattus rattus</i>	House Rat	IV	LC	NL	Granivorous
Muridae	<i>Tatera indica</i>	Indian gerbil	NL	LC	NL	Omnivorous.
Muridae	<i>Millardia meltada</i>	Soft-furred Metad	V	LC	NL	Omnivours
Sciuridae	<i>Funambulus pennantii</i>	Five-striped Palm Squirrel	IV	LC	NL	Omnivore

habitats has led to soil erosion and a rapid degradation of the upper canopy and thereby posing a severe threat to the arboreal species in the study area. Vehicular movements in windmill area also disturb large terrestrial large mammals like sloth bear. Endangered species in the study area include Indian pangolin (*Manis crassicaudata*) which has apparently disappeared from mandals in the central region with reasons attributed being loss of habitat and human interference. On the other side, vulnerable species include Sloth bear (*Melurs usursinus*), Leopard (*Panthera pardus*) and Indian Smooth-coated Otter (*Lutrogale perspicillata*).

Feeding niches of mammals in Ananthapuram District

Mammals occupy a wide spectrum of feeding niches in the study area. In most terrestrial and some aquatic communities, carnivorous mammals happen to be the top predators while herbaceous mammals are the primary feeders in the study area.

carnivores (8.82%), 4 insectivores (13.79%), 2 mixed feeders (5.87%) and 15 omnivores (44.11%). Omnivore species of mammals from the district account for the highest number recorded.

Major threats to Mammalian Fauna in Ananthapuram District

Primary threats (Human-animal conflict): Incidents of human-animal conflict have, of late, increased considerably. Important reasons attributed among others, include a considerable increase in the wild animal species population such as Black Buck, Sambar and Spotted Deer observed in the northern region mandals of the district; changes in the cropping pattern and also an adequate increase in the ground water table. Linking of the river system (Handrineeva canal to Krishna river) to the local reservoirs and tanks is the key reason for a consequent rise in groundwater levels in the semi-arid region

which, in turn has caused changes in flora and the nature of agricultural practices being followed, while increased

Table 3 Global, National and regional wise (Anantapuramu district) distribution of Mammalian Species

S.No	Name of the Species (Scientific Name)	Worldwide distribution	Distribution in India	Regional distribution in Anantapuramu District
1	<i>Antelope cervicapra</i>	Introduced to Argentina and United States	Rajasthan, Punjab, Madhya Pradesh, Maharashtra, and Gujarat	NRM
2	<i>Axis axis</i>	Bangladesh; Bhutan; India (Andaman Is. - Introduced); Nepal; Sri Lanka, Introduced: Argentina; Armenia (Armenia); Australia; Brazil; Croatia; Moldova; Pakistan; Papua New Guinea; Ukraine; United States (California, Florida, Hawaiian Is., Texas); Uruguay	Eastern Rajasthan Sariska, Ranthambore and Keoladeo Ghana and Gujarat--. Sasan Gir. Bhabar-terai belt of the foothills of the Himalaya from Uttar Pradesh and Uttarakhand through Nepal, northern West Bengal and Sikkim to western Assam and the forested valleys of Bhutan	NRM
3	<i>Canis aureus</i>	Native: to India Afghanistan; Albania; Algeria; Bahrain; Bhutan; Bosnia and Herzegovina; Bulgaria; Central African Republic; Croatia; Djibouti; Egypt; Eritrea; Ethiopia; Greece; India; Iran, Islamic Republic of; Sri Lanka; Sudan;	Kutch, Maharashtra, Rajasthan, and Haryana. In all semi-arid regions of India protected in Velavadar National Park.	NRM
4	<i>Canis aureus indicus</i>	Native: to India Afghanistan; Albania; Algeria; Bahrain; Bhutan; Bosnia and Herzegovina; Bulgaria; Central African Republic; Croatia; Djibouti; Egypt; Eritrea; Ethiopia; Greece; India; Iran, Islamic Republic of; Sri Lanka and Sudan	Kutch, Maharashtra, Rajasthan, and Haryana. In all semi-arid regions of India protected in Velavadar National Park.	NRM
5	<i>Canis lupus pallipes</i>	Native: to India Afghanistan; Albania; Algeria; Bahrain; Bhutan; Bosnia and Herzegovina; Bulgaria; Central African Republic; Croatia; Djibouti; Egypt; Eritrea; Ethiopia; Greece; India; Iran, Islamic Republic of; Sri Lanka and Sudan	Throughout the country except extreme south Canis lupus chanco : Jammu & Kashmir and Himachal Pradesh Canis lupus dingo : Throughout the country except extreme south Canis lupus pallipes : From the plains of Northern India, from Karnataka to West Bengal south	NRM
6	<i>Felis chaus</i>	Native to India also found in Afghanistan; Armenia (Armenia); Azerbaijan; Bangladesh; Bhutan; Cambodia; China; Egypt; Georgia; Iran, Islamic Republic of; Iraq; Israel; Jordan; Kazakhstan; Lao People's Democratic Republic; Lebanon; Myanmar; Nepal; and Pakistan;	Extensively studied in Pench Tiger Reserve, Madhya Pradesh, found in all parts of semi arid regions of Indian subcontinent	NRM
7	<i>Funambulus palmarum</i>	This species is endemic to southern India and Sri Lanka	Coringa Wildlife Sanctuary, Etumagaram Wildlife Sanctuary, Gundla Brahmeshwaram Metta Wildlife Sanctuary, Kasu Brahmananda Reddy National Park, Kawal Wildlife Sanctuary, Mahaveer Harina Vanasthali National Park, Manjira Wildlife Sanctuary, Nagarjunsagar-Srisailem Tiger Reserve, Nelapattu Bird Sanctuary, Pranahita Wildlife Sanctuary, Pulicat Bird Sanctuary, Siwaram Wildlife Sanctuary, Sri Lankamalleshwara National Park and Sri Venkateshwara National Park in Andhra Pradesh; Kanha National Park and Satpura National Park in Madhya Pradesh; Indravathi National Park in Chhattisgarh; Chandaka-Dampara Wildlife Sanctuary in Orissa; Kumbhalgarh Wildlife Sanctuary and Phulwari Wildlife Sanctuary in Rajasthan	NRM
8	<i>Gazella bennettii</i>	Native to India; Iran, Islamic Republic of; Pakistan	Found in more than 80 protected areas in India	NRM
9	<i>Herpestes edwardsii</i>	Native to India; Afghanistan; Bahrain; Bangladesh; Bhutan; India; Iran, Islamic Republic of; Kuwait; Nepal; Pakistan; Saudi Arabia; Sri Lanka; Turkey	Semi-synanthropic species, It has been recorded disturbed even in urban areas, in dry secondary forests, and thorn-forests in central India	NRM
10	<i>Hyaenahyaena</i>	Native to India; Afghanistan; Algeria; Armenia (Armenia); Azerbaijan; Burkina Faso; Cameroon; Chad; Djibouti; Egypt; Ethiopia; Georgia; India; Iran, Islamic Republic of; Iraq; Israel; Jordan; Kenya; Lebanon; Libya; Mali; Mauritania; Morocco; Nepal; Niger; Nigeria; Oman; Pakistan; Saudi Arabia; Senegal	Found in open habitats or light thorn bush regions across the entire arid to semi-arid environments of India	HLM
11	<i>Hystrix indica</i>	Native to India; Afghanistan; Armenia (Armenia); Azerbaijan; China; Georgia; Iran, Islamic Republic of; Iraq; Israel; Jordan; Kazakhstan; Nepal; Pakistan; Saudi Arabia; Sri Lanka; Syrian Arab Republic; Turkey; Turkmenistan; Yemen	Occupying rocky hillsides, tropical and temperate scrublands, grasslands, forests, arable land, plantations throughout India	HLM
12	...	Native to India; Bangladesh; India; Indonesia	There are many sub species in India occupying different regions and habitat types. There are seven recognized sub	...

13	<i>Macaca radiata</i>	Native to India	Found in peninsular India (Andhra Pradesh, Goa, Gujarat, Karnataka, Kerala, Maharashtra and Tamil Nadu). It is found in the major portion of the species range south to the Palni Hills and southeast as far as Timbale, inland of Pondicherry.	NRM
14	<i>Manis crassicaudata</i>	Native to India; Nepal; Pakistan; Sri Lanka	Kerala and Tamil Nadu; Delhi; Madhya Pradesh (Gwalior and Achanakur Wildlife Sanctuaries, Chambal National Park and Achanakur Wildlife Sanctuary); Karnataka (Bandipur, Bhadra, Dalma and Dandeli Wildlife Sanctuaries; Bandipur Tiger Reserve); West Bengal (Buxa Tiger Reserve, Singalila Wildlife Sanctuary); Goa (Catugao Wildlife Sanctuary); Gujarat (Gir National Park); Rajasthan (Keolodeo Ghana Wildlife Sanctuary); Orissa including Kotgarh and Kuldiha Wildlife Sanctuaries and the Sunabedh Plateau, Himalayan	HLM
15	<i>Melurs usursinus</i>	Native to India; Nepal; Sri Lanka	Exist in 174 Protected Areas (PAs) in India, which include 46 National Parks and 128 Wildlife Sanctuaries	NRM & HLM
16	<i>Panthera pardusfusca</i>	Native to India and also Afghanistan; Angola (Angola); Armenia (Armenia); Azerbaijan; Bangladesh; Benin; Bhutan; Botswana; Burkina Faso; Burundi; Cambodia; Cameroon; Central African Republic; Chad; China; Congo; Congo, The Democratic Republic of the; Côte d'Ivoire; Djibouti; Egypt; Equatorial Guinea; Eritrea; Ethiopia; Gabon; Ghana; Guinea; Guinea-Bissau; India; Indonesia (Jawa); Iran, Islamic Republic of; Iraq; Kenya; Liberia; Malawi; Malaysia; Mali; Mozambique; Myanmar; Namibia; Nepal; Niger; Nigeria; Oman; Pakistan; Russian Federation; Rwanda; Saudi Arabia; Senegal; Sierra Leone; Somalia; South Africa; South Sudan; Sri Lanka; Sudan; Swaziland; Tanzania, United Republic of; Thailand; Turkey; Turkmenistan; Uganda; Yemen; Zambia; Zimbabwe	Leopards have survived outside of the protected areas in many parts of India and even today a high density of Leopards does occur among high human densities. Occupancy survey found Leopards occupying 174,066 km ² of forest habitat in India Despite a widespread occurrence, they are killed in very large numbers in India	NRM
17	<i>Paradoxurus hermaphroditus</i>	Native to India also found in Afghanistan; Bangladesh; Bhutan; Brunei Darussalam; Cambodia; China; India; Indonesia (Jawa, Kalimantan, Lesser Sunda Is. - Introduced, Maluku - Introduced, Papua - Introduced, Sulawesi - Introduced, Sumatera); Lao People's Democratic Republic; Malaysia (Peninsular Malaysia, Sabah, Sarawak); Myanmar; Nepal; Pakistan; Singapore; Thailand; Viet Nam	Almost throughout the country excepting the desert parts of Rajasthan and Gujarat Paradoxurushermaphroditushermaphroditus : South India and Madhya Pradesh Paradoxurushermaphroditusbondar : North India, West Bengal and Bihar Paradoxurushermaphroditusnicitans : North East India and West Bengal Paradoxurushermaphrodituspallasii : North East India and Sikkim Paradoxurushermaphroditusscindiae : Central India and OdishaParadoxurushermaphroditussetosus : Central India Paradoxurushermaphroditusvellerosus : North West India and Kashmir	HLM
18	<i>Pipistrellus coromandra</i>	Native to India and also Afghanistan; Bangladesh; Bhutan; Cambodia; China; India; Lao People's Democratic Republic; Myanmar; Nepal; Pakistan; Sri Lanka; Viet Nam	Andaman & Nicobar Is., North East and South India, Bihar, Goa, Gujarat, Jammu & Kashmir, Jharkhand, Madhya Pradesh, Maharashtra, Odisha, Sikkim, Uttarakhand, Uttar Pradesh and West Bengal	NRM
19	<i>Pteropus giganteus</i>	Native to India and also Bangladesh; Bhutan; China; India; Maldives; Myanmar; Nepal; Pakistan; Sri Lanka	Almost throughout the country. Pteropusgiganteusgiganteus : Andaman & Nicobar Is., North India, Sikkim and West Bengal; Pteropusgiganteusleucocephalus : North East and South India	NRM
20	<i>Rattus rattus</i>	Native to India; Pakistan	Almost throughout the country	NRM
21	<i>Rusa unicolor</i>			NRM
22	<i>Sus scrofa</i>	All continents excepting Antarctica, and on many oceanic islands <i>Sus scrofa</i> ristatus : Nepal, Myanmar and western Thailand to Isthmus of Kra <i>Sus scrofa</i> adavidi : Iran, Myanmar and Pakistan	Throughout the country <i>Sus</i> scrofa <i>ristatus</i> : Central, North, North West, North East and South India <i>Sus</i> scrofa <i>adavidi</i> : North West India	NRM
23	<i>Tatera indica</i>	Native to India and also Afghanistan; India; Iran, Islamic Republic of; Iraq; Kuwait; Nepal; Pakistan; Sri Lanka; Syrian Arab Republic; Turkey	Throughout India excepting North East India and Sikkim	ARD
24	<i>Viverricula indica</i>	Native to India and also Bangladesh; Bhutan; Cambodia; China; India; Indonesia (Bali, Jawa, Lesser Sunda Is. - Introduced); Lao People's Democratic Republic.	Throughout the country in suitable habitats; <i>Viverriculaindicaindica</i> : South India <i>Viverriculaindicabaptistae</i> : North East India and West Bengal; <i>Viverriculaindicadeserti</i> : North West India; <i>Viverriculaindicawellsii</i> : North India	HLM
25	<i>Vulpes bengalensis</i>	Native to India and also Bangladesh; Nepal; Pakistan	Throughout the country	CRM

26	<i>Herpestes smithii</i>	Native to India and also Nepal; Sri Lanka	South India, Madhya Pradesh, Rajasthan and Uttar Pradesh; <i>Herpestessmithiismithii</i> : Madhya Pradesh, Rajasthan and Uttar Pradesh; <i>Herpestessmithiithysanurus</i> : North West India	NRM
27	<i>Millardia meltada</i>	Native to India and also Nepal; Pakistan; Sri Lanka	Throughout the country, excepting North East India	NRM
28	<i>Suncus murinus</i>	Native to India and also Afghanistan; Bangladesh; Bhutan; Brunei Darussalam; Cambodia; China; Indonesia; Lao People's Democratic Republic; Malaysia; Myanmar; Nepal; Pakistan; Singapore; Sri Lanka; Taiwan, Province of China; Thailand; Viet Nam	Almost throughout the country	NRM
29	<i>Semnopithecus entellus</i>	Native to India	Found in western Bangladesh and eastern India (in Andhra Pradesh, Bengal, Bihar, Chattisgarh, Jharkhand, Madhya Pradesh, Maharashtra, Orissa, and West Bengal. Almost throughout the country; they are adapted to living even in the semi-arid region of northwestern India and Deccan plateau (Prater 1971). Generally, it uses large rivers and lakes, peat swamp forests, mangroves and estuaries; and it even uses rice fields for food foraging	NRM
30	<i>Lutrogale perspicillata</i>	Native to India Bangladesh; Bhutan; Brunei Darussalam; Cambodia; China; Indonesia; Iraq; Lao People's Democratic Republic; Malaysia; Myanmar; Nepal; Pakistan; Thailand; Viet Nam	GundlaBrahmeshwaramMetta Wildlife Sanctuary, KasuBrahmananda Reddy National Park, Kawal Wildlife Sanctuary, MahaveerHarinaVanasthali National Park, Manjira Wildlife Sanctuary, Nagarjunsagar-Srisailam Tiger Reserve, Nelapattu Bird Sanctuary, Pranahita Wildlife Sanctuary Pocharam Wildlife Sanctuary and Siwaram Wildlife Sanctuary in Andhra Pradesh	NRM
31	<i>Funambulus pennantii</i>	Native to India Bangladesh; India; Iran, Islamic Republic of Pakistan and Nepal.	North East and South India, Himachal Pradesh, Jammu & Kashmir, Maharashtra, Punjab, Sikkim, Uttarakhand and West Bengal Lutralutraaurobrunneus : North West India and UttarakhandLutralutrakutab : North West India, Jammu & Kashmir and UttarakhandLutralutramonticolus : North East India, Sikkim and UttarakhandLutralutranair : South India	HLM
32	<i>Lutra lutra</i>	Native to India and also Afghanistan; Albania; Algeria; Andorra; Armenia (Armenia); Austria; Azerbaijan;; Lebanon; Liechtenstein; Lithuania; Luxembourg; Macedonia, the former Yugoslav Republic of; Moldova; Mongolia; Montenegro; Morocco; Myanmar; Nepal; Netherlands; Norway; Pakistan; Poland; Portugal.	Tamil Nadu and Kerala	CRM
33.	<i>Moschiola meminna</i>	Found in India and Sri Lanka	Maharashtra: Sanjay Gandhi NP, Chandoli National Park, Tamil Nadu: Mudumalai Wildlife Sanctuary, KalakadMundanthurai Tiger Reserve, Karnataka: Bhadra Wildlife Sanctuary, Talakaveri Wildlife Sanctuary, Pushpagiri Wildlife Sanctuary, Sharavathi Valley Wildlife Sanctuary, Nagrhole National Park, Bandipur National Park, Kerala: Periyar Tiger Reserve, Eravikulam NP. Goa: BhagwanMahaveer Wildlife Sanctuary	CRM
34.	<i>Lepus nigricollisdayanus</i>	Endemic to South Asia		CRM

*Source: Field visit and IUCN online NRM- Northern region mandal, CRM-Central region mandal, HLM-High level land mandal.

productivity of agricultural crops has led to increase in the population of herbaceous animals, as they keep visiting crop lands causing massive damages to major cereals and millets like jowar (*Sorghum vulgare*) and bajra (*Pennisetum typhoides*), moong (*Phaseolus mungo*) and various oil seeds throughout the area. Killing wild animals by electrocution is a regular practice in the rural parts as part of controlling wildlife population, but in the process, non-targeted animals also get killed indiscriminately. Casualties of Black Bucks in the study area are more pronounced during the monsoon season.

An abundant sloth bear population is seen in the forest areas of Kalyanadurg and Rayadurg Mandals of Ananthapuram district. However, in view of an extensive damage caused to an already degraded habitat, bears face an acute shortage of food resources resulting in a direct competition with humans for common food resources (Murthy and Sankar, 1995; Rajpurohit and Chauhan, 1996). Bears frequently explore human habitations and cultivated areas in search of food which, in turn, results in increased encounters with humans, occasional injury or death, and an extensive damage to agricultural or horticultural crops (Bargali, 2003). Farmers, as a solution to this problem, kill sloth bears and hang on a tree branch so as to scare off other sloth bears.

Fragmentation of habitats, non-availability of food and water, degradation and disturbance of habitats due to developmental activities like windmill establishment in hilly terrains, regular droughts are the main reasons attributed to increasing human-animal conflicts.

Secondary threats (Biotic stress and poaching): Destruction of forests by overgrazing of invasive species and continuous wood gathering resulting in the loss of habitat, frequent forest fires which adversely affect the regeneration of native species of flora, poaching and illegal trading of wild animals for skin and horns of Sambar, spotted deer, and blackbuck, trading of live animals like startortoise, sand boa are the silent threats to wildlife. Similarly, trading in bear cubs in the rural areas of Ananthapuramu district, especially near the forest areas a major source of revenue to the villagers is another threat to the wildlife in the study region.

Tertiary threats (Desertification): Drought and desertification are at the core of serious challenges and threats facing the sustainable development of wildlife biodiversity. A hard fact that all the 63 mandals in Ananthapuramu district have been declared drought-hit by the State Government for the last four consecutive years with the average annual rainfall ranging from

520 mm to 552 mm, while the district as a whole has witnessed 65 drought years in the last 125 years. Moreover, its frequency may have increased over time. For the record, Ananthapuramu receives the second lowest rainfall in the country after Jaisalmer in Rajasthan, Frequent droughts and a reduction in rainfall, reduced cloud cover invariably result in a greater evaporation of soil water which in turn, reduces water retention capacity of the soil systems and disrupts the natural cycle of water and nutrients of the soil, resulting ultimately in the formation of sand dunes. AP State Remote Sensing Applications Centre has recorded an alarming increase in the spread of sand dunes over the last decade. As much as 0.32 sq. km of land is being covered by sand dunes every year since the last 10 years. The presence of sand dunes at DhargaHonnur in Kanekalmandal in Rayadurg of northern region mandals is an indication of the desertification of Ananthapuramu district.

DISCUSSION

Previously, researchers had identified and documented only 21 mammalian species of the district to which 13 more species have been added to the existing checklist of district mammals, which include Otter (*Lutrogale perspicillata*) and Common Otter (*Lutra lutra*, Indian Chevrotain (*Moschiola meminna*), Chinkara (*Gazella bennettii*), Sambar (*Rusa unicolor*), House shrew (*Suncus murinus*), Black naped hare (*Lepus nigricollisdayanus*), Hanuman Langur (*Semnopithecus entellus*), Soft-furred Metad (*Millardia meltada*), House Rat (*Rattusrattus*), Three-striped palm Squirrel (*Funambulus palmarum*), Small Indian mongoose(*Herpestes smithii*), Golden Jackal (*Canis aureus*). Further present study has also identified the disappearance of *Manis crassicaudata* of order Pholidota in the district. Keeping this present study results as a baseline data, future conservation strategies can be devised aimed at conserving mammalian fauna of Anantapuramu district.

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