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Faunal diversity of Sathyamangalam tiger reserve, Tamil Nadu, India

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Abstract

Biodiversity encompasses of variety and variability of all living organisms on the earth. India is one among the 17 mega diverse countries in the world with 2.4% of the land area, accounting for 7-8% of the species of the world. India is one of these mega-diverse countries with 2.4% of the land area, accounting for 7-8% of the species of the world 91,000 species of animals and 45,500 species of plants that have been documented in its ten bio-geographic regions. Sathyamangalam Tiger Reserve encompasses large contiguous Reserve Forests extending over 1455 sq. km with diversity of vegetation types from dry thorn shrub to patches of semi-evergreen forests in the upper regions. It is part of 7th elephant reserve and facilitates annual migration between Eastern Ghats and Western Ghats. In this study the rich Faunal and herpto-Faunal Diversity of the area is assessed. This results revealed that so far 21 mammal species has been recorded in Sathyamangalam Tiger Reserve, through direct and indirect evidences. In that 15 species of herbivores 5 species of carnivores and 1 species of omnivore were recorded. The result shows that mammal population was recorded maximum in December followed by September and March. The herpeto-faunal diversity of Sathyamangalam Tiger Reserve study brought to elucidate the information on 13 species of reptiles and 4 species of amphibians were recorded. Regarding the season, the result shows that reptile population was recorded maximum in September followed by December and March. Regarding the IUCN status of fauna based on the Red Data Book 38 faunal species were recorded in Sathyamangalam Tiger Reserve, 21 species mammals among them 11 are Least Concern, 4 Near Threatened, 3 Vulnerable and 3 Endangered, 13 species of reptiles among them 9 Not Assessed, 2 Least Concern, 1 Near Threatened, 1 Vulnerable and 4 species of amphibians among them 4 Least Concern according to IUCN status.

Keywords: Omnivore, dry thorn shrub, red data book, bio-geographic regions

Introduction

Biodiversity encompasses of variety and variability of all living organisms on the earth. This biodiversity has arisen over the last 3.5 billion years of evolutionary history and its sustainable use has always been a part of the Indian culture. India is home to nearly 1/5th of the World's human population and is rapidly seeing a change in its economy from a predominantly agrarian society into a diversified one resulting in mounting pressures on land use. As a consequence of this is leading to fragmentation of natural habitats, and is a primary threat to biodiversity. Out of the 34 "global biodiversity hotspots" four of the hotspots exist in India. The rapid rate of hotspot degradation makes it imperative that conservation science be pursued immediately and vigorously in these habitats, to devise effective measures which curtail the rapidly diminishing biodiversity, and to protect its unique biota. With respect to the faunal diversity in Tamil Nadu which comprises of 165 species of fresh water Pisces, 76 species of Amphibians, 177 species of reptiles, 454 species of birds and 187 species of mammals. The red-listed species include 126 species of Pisces, 56 species of Amphibians, 77 species of reptiles, 32 species of birds and 40 species of mammals. Tamil Nadu state consists of 4 tiger reserves which are rich in biodiversity. Among them the recently declared Tiger reserve is Sathyamangalam Tiger Reserve. Sathyamangalam Tiger Reserve encompasses large contiguous Reserve Forests extending over 1455 sq. km with diversity of vegetation types from dry thorn shrub to patches of semi-evergreen forests in the upper regions. The present study was under taken for the following objectives.

1. To assess the Mammals diversity in Sathyamangalam Tiger Reserve.
2. To assess the Herpeto faunal diversity in Sathyamangalam Tiger Reserve.

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Materials and Methods

Study area

Field assessment was conducted to get the faunal diversity of Sathyamangalam Tiger Reserve. Sathyamangalam Tiger Reserve encompasses large contiguous Reserve Forests extending over 1455 sq. km with diversity of vegetation types from dry thorn shrub to patches of semi-evergreen forests in the upper regions. This region is rich in biodiversity with appreciable cultural and ethnic values. Sathyamangalam Tiger Reserve is located between the latitudes 11° 29' 15" to 11° 48' 41" and longitude 76° 05' to 77° 02' 22". The Reserve is situated in Erode District of Sathyamangalam Taluk and parts of Erode Forest Circle. Sathyamangalam reserve area covers the lower plains of Sathyamangalam Range, Bhavanisagar Range, Talavadi Range and T.N.Palyaam Range. The rock types of the Sathyamangalam Tiger Reserve mainly common metamorphic derivatives found in the sanctuary are metamorphosed sedimentary rocks such as quartzite, hornblende, amphibolites, pyroxenites and Pyroxene. The average minimum and maximum temperatures are; 21.54° C and 32.84° C was recorded. The average annual rainfall of the sanctuary over a ten year period is 824 mm. A wide variety of habitats can be seen from eastern to western part of the sanctuary.

Methodology

Mammal's diversity assessment

Line transect method (Direct survey)

The basic Line transect method as outlined by Burnham *et al.*, (1980) [2] was followed. The study area divided into 5 ranges and the transects of length 4km is laid out. In order to describe and evaluate the habitats, these line transects were divided into segments of 100m each. Each transect were walked between 7.0 am to 9.0 am. On observing an animal the

transect line was noted using a range finder along with group size. The age and sex of each individual was noted. In Sathyamangalam Tiger Reserve, 25 transect lines with 4 km length were laid out in accordance with forest types, beats and ranges. The transect lines were monitored and observation was recorded in three different seasons viz September 2013, December 2013 and March 2014.

Indirect method

Observing the ecosystem for evidences, for example foot print and pellets, indicating the presence of particular mammals as an indirect method of accounting mammal diversity which was carried out in the study area. (Brookhouse *et al.*, 1996) [1]. The indirect evidences were collected from the both 25 transect lines and 250 sampling plots in the size of 10 m X 10 m of Sathyamangalam Tiger Reserve.

Pug mark census

This method was carried out to enumerate the carnivores in the forest, such as tiger leopard, etc...In this method the pug marks found were recorded and determined, and other extra information like width, length and shape were also be noted.

Dung counts method

Distinct pellet groups were counted. In the field these come in a myriad shapes, sizes, and degree of scatter, age and decomposition. It will be impossible to remove all ambiguity in what is to be counted as a separate pellet group or not and, in practice each observer forms his own mental image pellet groups which should be counted. There is generally less variation within the counts by the same observer. Hence it was preferred for obtaining data on trends that the same areas be repeatedly sampled by the same observer.

$$\text{Density of Mammals} = \frac{\text{Number of individual of a species}}{\text{Total number of transects laid in a particular range}}$$

Herpeto faunal diversity assessment

Line transect method

Visual encounter survey method as described by Campbell and Christmann (1982) [3] was used. Marking one km long transects of 20 m width in the respective habitats which includes various land use types such as various forest types. The microhabitat such as rocks, termite mounds, trees grasses, bushes and other vegetation, burrows, tree trunks, sand, ground, litter was recorded. Data of each and every reptile species was collected, including time of sighting, species, and number of individuals, sex, size (adults, juvenile and hatchling) and type of microhabitat. Around 25 transect lines were laid out and monitored for the reptiles diversity in Sathyamangalam Tiger Reserve.

Quadrat method

The population densities of reptiles and amphibians was assessed using visual encounter survey method involves searching for lizards in each of the habitats (Campbell and Christmann, 1982) [3], and recording all animals visible on the surface (Corn and Bury, 1990) [4]. The quadrats of 10x 10m size were marked with wooden stakes in each of the plots of each habitat. All reptiles sighted in a quadrat were noted and their abundance was estimated as number of individuals per unit area (hectare). Data were recorded on the time of sighting, grid number, and species of lizard, sex, size class (adult, juvenile or hatchling). Microhabitat based on

vegetation and distance from ground, behavior such as basking, resting, moving was collected randomly and its replicates in each of the quadrates was recorded. Around 250 sampling plots in the size of 10 m X 10 m were laid out and monitored for the reptile diversity in Sathyamangalam Tiger Reserve.

Dam site survey method

Random surveys were conducted in foot hill ponds, check dams, hand picking was employed for the collection of species and pitfall traps were tried occasionally in some places. Each of the dams will be visited during night, frogs were hand caught and were either identified on site or returned to the base camp in a plastic bag filled with water and later returned to the site of capture (Brookhouse *et al.*, 1996) [1]. In Sathyamangalam Tiger Reserve, around 14 dam sites were identified and it was monitored in three different seasons and observation was recorded.

Pitfall trap method

Pitfall traps was established at each survey sites. The designation of pitfall trap sighting was entirely subjective and placed in areas where animal tracks will be observed and understory will not impede the construction of the pitfall drift-fence. The drift fence was stretched out and held in place of the fence 5 pitfalls will be dug at intervals of 5 to 10 m.

Buckets 250 mm deep and 250 mm in diameter (9 liter bucket) were placed in each of the pitfalls and soil was filled in and around the outer perimeter of the bucket. Soil was also used to cover the lip of the bucket, thus allowing animals to be trapped as a result of small land slips, the bottom of drift fence will be also covered with soil so that small reptiles could not pass under (Brookhouse *et al.*, 1996) [1]. Around 5 pit fall traps were laid in different ranges in Sathyamangalam Tiger Reserve and it was monitored in different season and observation was recorded.

Results and Discussion

IUCN status of fauna in sathyamangalam tiger reserve

The assessment of faunal diversity in Sathyamangalam Tiger reserve was carried out and 21 species of mammals were recorded.

Regarding the IUCN status of fauna, based on the Red Data Book, out of the 21 species of mammals recorded, 3 species were under the 'Endangered' category and 4 species were under "Near Threatened" category. There were 3 species under "Vulnerable" category. The remaining 11 species were categorized under 'Least Concern' category. (Table 1)

With respect to the reptilian IUCN status in Sathyamangalam Tiger Reserve, a total of 13 species were recorded. Out of which, one species each was categorized under "Near Threatened" and "Vulnerable" status. There are 2 species were categorized under "Least Concern". The remaining 9 species were not assessed and they were not categorized under any category. (Table 2)

With regards to amphibian IUCN status in Sathyamangalam Tiger Reserve, total of 4 species were recorded and all the 4 species were categorized "Least Concern" status. (Table 3)

Table 1: IUCN Classification of Mammals

Sl. No	Name of the species	Scientific Name	IUCN
1.	Spotted Deer	<i>Axis axis</i>	Least Concern
2.	Sambar Deer	<i>Cervus unicolor</i>	Vulnerable
3.	Asiatic Elephant	<i>Elephas maximus</i>	Endangered
4.	Indian Gaur	<i>Bos gaurus</i>	Vulnerable
5.	Barking Deer	<i>Muntiacus muntjak</i>	Least Concern
6.	Blackbuck	<i>Antelope cervicapra</i>	Near Threatened
7.	Mouse Deer	<i>Tragulus meminna</i>	Least Concern
8.	Black naped hare	<i>Lepus nigricollis</i>	Least Concern
9.	Wild Boar	<i>Sus scrofa</i>	Least Concern
10.	Indian porcupine	<i>Hysteres indica</i>	Least Concern
11.	Sloth Bear	<i>Melursus ursinus</i>	Vulnerable
12.	Tiger	<i>Panthera tigris</i>	Endangered
13.	Leopard	<i>Panthera pardus</i>	Near Threatened
14.	Wild Dog	<i>Cuon alpinus</i>	Endangered
15.	Striped hyena	<i>Hyaena hyaena</i>	Near Threatened
16.	Malabar Giant squirrel	<i>Ratufa indica</i>	Least Concern
17.	Common mongoose	<i>Herpestes edwardsi</i>	Least Concern
18.	Three striped Palm squirrel	<i>Funambulus palmarum</i>	Least Concern
19.	Hanuman Langur	<i>Semnopithecus entellus</i>	Least Concern
20.	Bonnet Macaque	<i>Macaca radiata</i>	Least Concern
21.	Pangolin	<i>Manis crassicaudata</i>	Near Threatened

Table 2: IUCN classification of reptiles

Sl. No	Name of the species	Scientific Name	IUCN
1.	Skink	<i>Sphenomorphus indicus</i>	Not Assessed
2.	Garden Lizard	<i>Calotes versicolour</i>	Not Assessed
3.	Monitor Lizard	<i>Varanus bengalensis</i>	Least Concern
4.	Agama	<i>Psammophilus dorsalis</i>	Least Concern
5.	Chameleon	<i>Chamaeleo zeylanicus</i>	Not Assessed
6.	Crocodile (Mugger)	<i>Crocodylus palustris</i>	Vulnerable
7.	Cobra	<i>Naja naja</i>	Not Assessed
8.	Saw scaled viper	<i>Echis carinatus</i>	Not Assessed
9.	Striped Keel Back	<i>Amphiesma stolatum</i>	Not Assessed
10.	Common Trinket	<i>Coelognathus Helena</i>	Not Assessed
11.	Rat Snake	<i>Ptyas mucosa</i>	Not Assessed
12.	Vine Snake	<i>Ahaetulla nasuta</i>	Not Assessed
13.	Indian Rock Python	<i>Python molurus</i>	Near Threatened

Table 3: IUCN classification of amphibians

Sl. No	Name of the species	Scientific Name	IUCN
1.	Common Indian frog	<i>Rana tigrina</i>	Least Concern
2.	Common Indian toad	<i>Bufo melanstictus</i>	Least Concern
3.	Indian Skipper Frog	<i>Polypedates leucomystax</i>	Least Concern
4.	Common Indian frog	<i>Euphylyctis cyanophlyctis</i>	Least Concern

Mammal diversity of sathyamangalam tiger reserve

With respect to mammal diversity, so far 21 mammal species has been recorded in Sathyamangalam Tiger Reserve, through direct and indirect evidences. In that 15 species of herbivores and 6 species of carnivores and 1 species of omnivore was recorded. Regarding the season, the result shows that mammal population was recorded maximum in December. Regarding the density of herbivores in direct observation (Table 4), Spotted Deer (10.92) scored maximum and Wild Dog (1.56) scored maximum density in carnivores. And the density of herbivores in indirect observation (Table 5), Spotted Deer (10.92) scored maximum and Wild Dog (1.56) scored

maximum density in carnivores Fig.1&2.

The more number of mammal diversity might be due to maximum floral diversity in Sathyamangalam Tiger Reserve and this region is also having 5 major types of forest which starts form dry thorn forest and its gradually changes to mixed moist forests then finally semi evergreen forest. This findings are similar with the results revealed by Kumaraguru *et al.* (2010) that because of the floral diversity, density analysis showed a considerable variation with Dindugul forest division (0.76 elephants/km²) having more than double the density of Theni forest division (0.26 elephants/km²).

Table 4: Mammal diversity by direct observation

Sl. No.	Common Name	Scientific Name	No. of Individuals Direct Observation	Density
1.	Spotted Deer	<i>Axis axis</i>	273	10.92
2.	Sambar Deer	<i>Cervus unicolor</i>	143	5.72
3.	Asiatic Elephant	<i>Elephus maximus</i>	119	4.76
4.	Indian Gaur	<i>Bos gaurus</i>	114	4.56
5.	Barking Deer	<i>Muntiacus muntjak</i>	12	0.48
6.	Blackbuck	<i>Antilope cervicapra</i>	41	1.64
7.	Mouse Deer	<i>Tragulus meminna</i>	6	0.24
8.	Black naped hare	<i>Lepus nigricollis</i>	110	4.40
9.	Wild Boar	<i>Sus scrofa</i>	24	0.96
10.	Sloth Bear	<i>Melursus ursinus</i>	4	0.16
11.	Tiger	<i>Panthera tigris</i>	8	0.32
12.	Leopard	<i>Panthera pardus</i>	0	0
13.	Wild Dog	<i>Cuon alpinus</i>	39	1.56
14.	Striped hyena	<i>Hyaena hyaena</i>	3	0.12
15.	Malabar Giant squirrel	<i>Ratufa indica</i>	6	0.24
16.	Common mongoose	<i>Herpestes edwardsi</i>	23	0.92
17.	Three striped Palm squirrel	<i>Funambulus palmarum</i>	28	1.12
18.	Indian porcupine	<i>Hysteris indica</i>	60	2.40
19.	Pangolin	<i>Manis crassicaudata</i>	6	0.24
20.	Common Langur	<i>Semnopithecus entellus</i>	5	0.20
21.	Bonnet Macaque	<i>Macaca radiata</i>	0	0
Total Mean				1.95

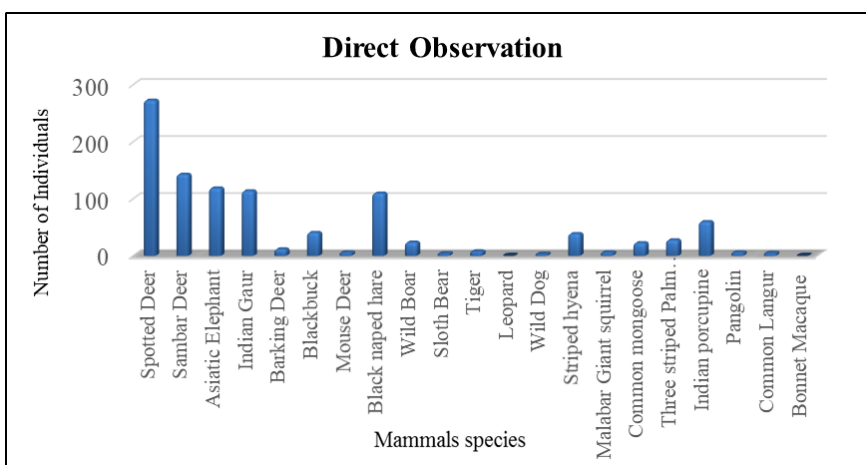


Fig 1: Mammal diversity by direct observation

Table 5: Mammal diversity by Indirect observation

Sl. No.	Common Name	Scientific Name	No. of Individuals Indirect Observation	Density
1.	Spotted Deer	<i>Axis axis</i>	410	16.4
2.	Sambar Deer	<i>Cervus unicolor</i>	197	7.88
3.	Asiatic Elephant	<i>Elephus maximus</i>	221	8.84
4.	Indian Gaur	<i>Bos gaurus</i>	155	6.20
5.	Barking Deer	<i>Muntiacus muntjak</i>	37	1.48
6.	Blackbuck	<i>Antilope cervicapra</i>	39	1.56
7.	Mouse Deer	<i>Tragulus meminna</i>	10	0.4
8.	Black naped hare	<i>Lepus nigricollis</i>	113	4.52

9.	Wild Boar	<i>Sus scrofa</i>	64	2.56
10.	Sloth Bear	<i>Melursus ursinus</i>	29	1.16
11.	Tiger	<i>Panthera tigris</i>	126	5.04
12.	Leopard	<i>Panthera pardus</i>	23	0.92
13.	Wild Dog	<i>Cuon alpinus</i>	25	1
14.	Striped hyena	<i>Hyaena hyaena</i>	109	4.36
15.	Malabar Giant squirrel	<i>Ratufa indica</i>	16	0.64
16.	Common mongoose	<i>Herpestes edwardsi</i>	0	0
17.	Three striped Palm squirrel	<i>Funambulus palmarum</i>	16	0.64
Total Mean				3.74

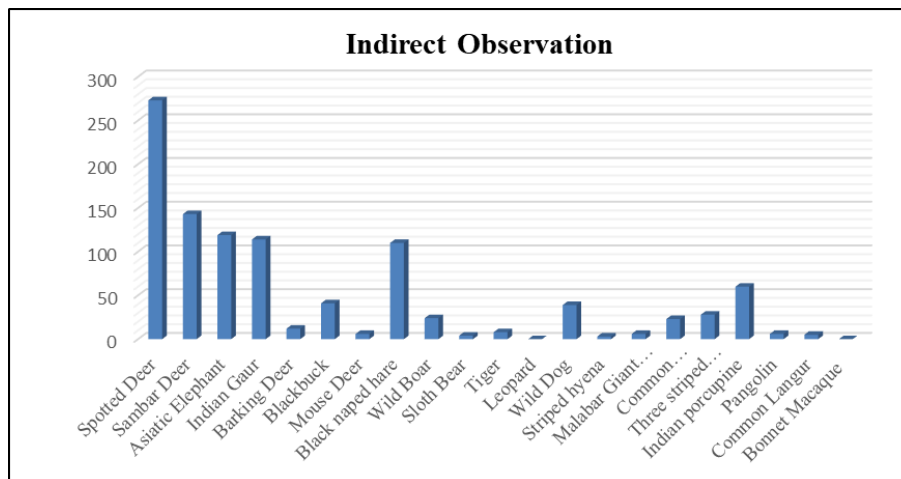


Fig 2: Mammal diversity by Indirect observation

Herpeto-faunal diversity of sathyamangalam tiger reserve

The herpeto-faunal diversity of Sathyamangalam Tiger Reserve study brought to elucidate the information on 13 species of reptiles and 4 species of amphibians were recorded. Regarding the season, the result shows that reptile population was recorded maximum in September it was followed by December and March. Since the amphibians are associated with water bodies for their survival, the population was high during December. Among the reptile diversity, the Indian Forest Skink has scored maximum density (2.23) in this Tiger Reserve. Regarding the amphibian diversity, Common Indian Frog has scored the maximum density in this Tiger Reserve (2.42). Fig.3&4.

The less number of reptile diversity might be due to the timings when the study was carried out and may be because of the high sensitivity of these animals to avoid human contact. Mukherjee, and Bhupathy, (2004) also quoted the

similar findings in their study carried out to determine Snake diversity in Anaikatti hills of Western Ghats, India. They mentioned that number of sightings of snakes was poor in transect, quadrat and visual encounter sampling, and this could be due to the rarity, sensitivity to disturbance and escape capability of the species.

Only 4 species of amphibians were recorded along the water bodies. This shows their association with the water bodies for their survival. The presence of perennial source of water is less in the Tiger Reserve resulting in less amphibian diversity. And the reserve is dominated by open area which might also be the reason for less amphibian diversity. This study is in consonance with Malu and Ramaswamy, (1997), who revealed that medium dense area and dense area were the richest and open area was poor in the distribution of amphibian species.

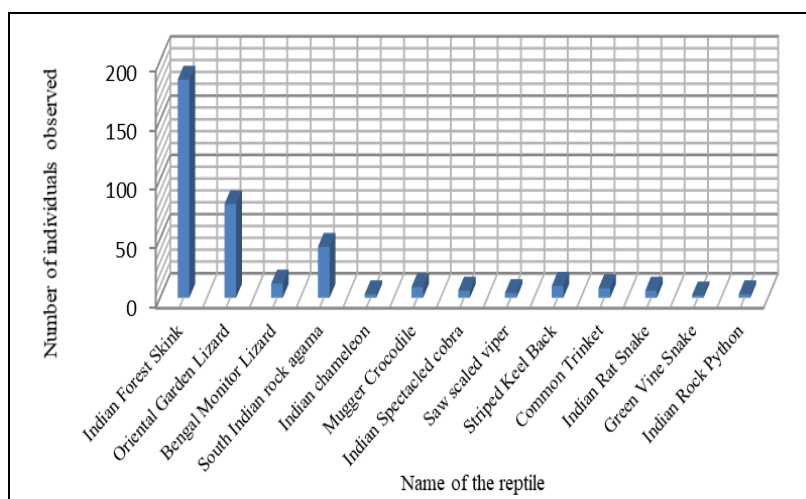


Fig 3: Reptile diversity in Sathyamangalam Tiger reserve

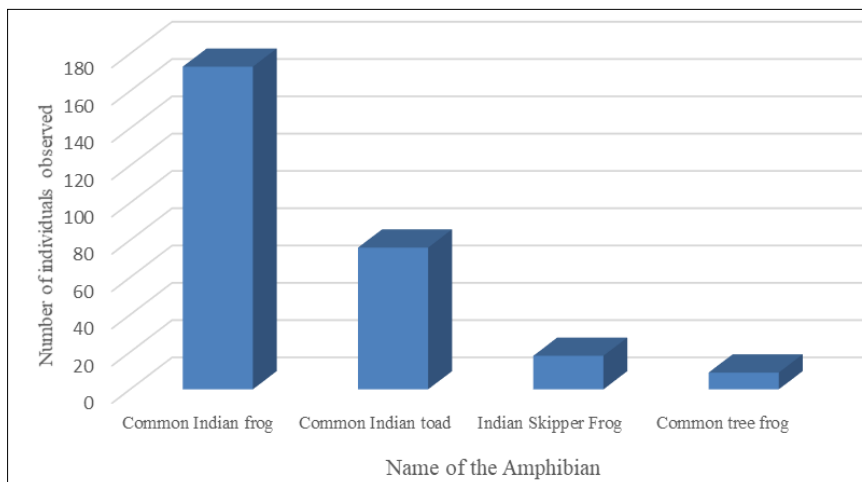


Fig 4: Amphibian diversity in Sathyamangalam Tiger reserve

Conclusion

The results revealed that so far 21 mammal species has been recorded in Sathyamangalam Tiger Reserve, through direct and indirect evidences. In that 15 species of herbivores 5 species of carnivores and 1 species of omnivore were recorded. Regarding herpeto-faunal diversity of Sathyamangalam Tiger Reserve study brought to elucidate the information on 13 species of reptiles and 4 species of amphibians were recorded. Regarding the IUCN status of fauna based on the Red Data Book 38 faunal were recorded in Sathyamangalam Tiger Reserve, 21 species mammals among them 11 are LC, 4 NT, 3 VU and 3 EN, 13 species of reptiles among them 9 NA, 2 LC, 1NT, 1 VU and 4 species of amphibians among them 4 LC according to IUCN status. This study reveals that the study area is rich in mammal's diversity and the herpeto- faunal diversity. And based on the IUCN status the VU and EN can be given high protection to prevent them from extinction. Based on this result, the area can be protected for its high faunal and herpeto faunal diversity.

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