

Jagannath Kishore College

Purulia, West Bengal

SEM – 6

DSE P5

Animal Behaviour and Chronobiology

Field Trip to Corbett National
Park, Kausani and Nainital

by **Department of Zoology**

Acknowledgement

I am obliged to Dr. Santanu Chattopadhyay, Principal of our Jagannath Kishore College, Purulia for inspiring us and letting us permission for the excursion in Corbett National Park, Kausani and Nainital.

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Student

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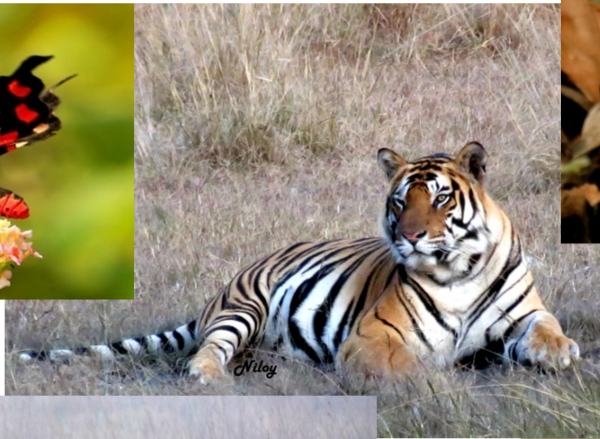
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Preface

“The world is a book, and those who do not travel read only a page” – Saint Augustine

Not what is written in the text books but to gain practical knowledge to see ponder over to investigate to experience to observe to deduce to speak out, to get reenergized- that is the ultimate aim of any educational tour. Visit to Bandhavgarh National Park gave us ample opportunity to investigate certain aspect of nature under the able guidance by teachers, vis-à-vis enjoy limitless natural beauty to our heart's content. Here, we chalk out possible remarks on our observations and get ready for yet more such tours in future.



Members of the Team

Teachers: Dr. Partha Pratim Saha, Dr. Niloy Kundu, Mr. Biswarup Mahato, Mr. Shib Shankar Bhattacharyya, and Ms. Kinjal Dutta.

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Introduction

“Delight..... is a weak term to express the feelings of a naturalist, who for the first time, has wondered by himself in a Brazilian forest.” – Charles Darwin (1832)

Organisms interact with their environment at many levels. The physical condition that surrounds an organism, such as, ambient temperature, moisture and light intensity, all are for survival and growth. The organism must forage to acquire essential resources from the surrounding environment and in doing so much rotate itself from becoming food from other organisms. All of these is an attempt to succeed at the ultimate goal of all living organisms to pass their genes to successive generations.

In the word ecosystem, the word ‘eco’ relates to the environment, whereas the ‘system’ implies a collection of related parts that functions as an unit. Broadly, the ecosystem of 2 basic interacting components – the living or biotic, and the physical or abiotic (Smith and Smith, 2011).

The natural world is dynamic, but it is also stable and self-replenishing. The dead materials are broken down and their component parts are recycled by the community. Therefore, renewal and replenishment are also characteristics of the natural world (Ricklefs and Miller, 2000). The earth holds a vast diversity of living things. Although taxonomists so far have catalogued about 2 million species, but biologists have estimated that as many as 30 million species of animals and plants may inhabit the earth (Wilson, 1992). In addition to great number of different plants, animals and microorganisms, the earth holds on immense variety of habitats and ecosystem. Taken together all of these variations in species and habitats is referred as “Biodiversity” (Ricklefs and Miller, 2000). There is diversity related to the number of an relative abundance of species within a community. These two attributes of the community structure are referred as “species diversity”. The most important attributes in the species richness of higher taxa such as families, orders etc. contributing to taxonomic diversity. When encompasses the great variety of habitat types and biomes, it is called ecosystem diversity (Smith, 1995; Ricklefs and Miller, 2000).

Jim Corbett National Park is a national park in India located in the Nainital district of Uttarakhand state. The first national park in India, it was established in 1936 during the British Raj and named Hailey National Park after William Malcolm Hailey, a governor of the United Provinces in which it was then located. In 1956, nearly a

decade after India's independence, it was renamed Corbett National Park after the hunter and naturalist Jim Corbett, who had played a leading role in its establishment and had died the year before. The park was the first to come under the Project Tiger initiative.

Corbett National Park comprises 520.8 km² area of hills, riverine belts, marshy depressions, grasslands and a large lake. The elevation ranges from 1,300 to 4,000 ft. Winter nights are cold but the days are bright and sunny. It rains from July to September. The park has sub-Himalayan belt geographical and ecological characteristics. Dense moist deciduous forest mainly consists of *Shorea robusta* (the sal tree), haldu, peepal, rohini and mango trees. Forest covers almost 73 per cent of the park, while 10 per cent of the area consists of grasslands. It houses around 110 tree species, 50 species of mammals, 580 bird species and 25 reptile species. The park contains 617 different species of plants and a diverse variety of fauna. The increase in tourist activities, among other problems, continues to present a serious challenge to the park's ecological balance.

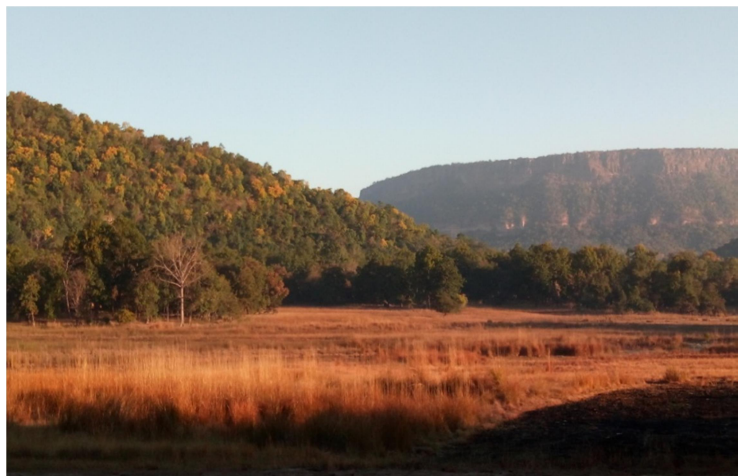
Some areas of the park were formerly part of the princely state of Tehri Garhwal. The forests were cleared by the Environment and Forests Department (Uttarakhand) to make the area less vulnerable to Rohilla invaders. The Raja of Tehri formally ceded a part of his princely state to the East India Company in return for their assistance in ousting the Gurkhas from his domain.

In the early 1900s, several Britishers, including E.R. Stevans and E.A. Smythies, suggested the setting up of a national park on this soil. The British administration considered the possibility of creating a game reserve there in 1907. It was only in the 1930s that the process of demarcation for such an area got underway. A reserve area known as Hailey National Park covering 323.75 km² was created in 1936, when Sir Malcolm Hailey was the Governor of United Provinces; and Asia's first national park came into existence.

The reserve was renamed Ramganga National Park in 1954-1955 and was again renamed in 1955-1956, Corbett National Park, after author and naturalist Jim Corbett. The park fared well during the 1930s under an elected administration. But, during the Second World War, it suffered from excessive poaching and timber cutting. Over time, the area in the reserve was increased 797.72 km² were added in 1991 as a buffer zone to the Corbett Tiger Reserve. The 1991 addition included the entire Kalagarh forest division, assimilating the 301.18 km² area of Sonanadi Wildlife Sanctuary as a part of

the Kalagarh division. It was chosen in 1974 as the location for launching the Project Tiger wildlife conservation project. The reserve is administered from its headquarters in the Nainital district.

The weather in the park is temperate compared to most other protected areas of India. The temperature may vary from 5°C - 30°C during the winter and some mornings are foggy. Summer temperatures normally do not rise above 40 °C. Rainfall ranges from light during the winter to heavy during the monsoonal summer.



Diversity Analysis

The structure of a community may differ with respect to density and diversity of a species. A brief account is described here.

A. Species Abundance: Species abundance (A) is the commonness of a species.

$$A = \frac{n_i}{x_i}$$

Where, n_i = number of individual of i th species.

x_i = number of samples in which i th species are present.

B. Density: Density (D) is the average number of individuals of a species per sample.

$$D = \frac{n_i}{x}$$

Where, x = total number of samples.

C. Frequency: Frequency (F) is the degree of occurrence and can be expressed as percentage.

$$F = \frac{x_i \times 100}{x}$$

Frequency is the measure of constancy of a species and according to Skubala (1999), it can be classified as –

> 75% = Euconstant species

50.1 - 75% = Constant species

25.1 - 50% = Accessorial species

< 25% = Accidental species

D. Relative Abundance: Relative abundance (RA) is the abundance of species in relation to other species in the community and is expressed as percentage.

$$RA = \frac{n_i \times 100}{N}$$

Where, N = total number of individuals of all the species.

Dominance of a species in a community can be assorted with the help of relative abundance and according to Skubala (1999), it can be classified as –

> 10% = Eudominant species

5.1 – 10% = Dominant species

2.1 – 5% = Subdominant species

1.1 – 2% = Resident species

< 1% = Subresident species

Numbers of diversity indices are available and are useful for analysis for the structure of community, particularly between the comparison of communities (Brower et al., 1997).

E. Shannon-Wiener Diversity Index: Shannon-Wiener Diversity Index (H') is used for making comparison and is independent of the sample size (Shannon and Wiever, 1949).

$$H' = -\sum p_i \ln p_i$$

Where, p_i = proportion of i^{th} species.

F. Species Richness Index: Species richness index (d) can be calculated following Margalef (1957).

$$d = \frac{s - 1}{\log 2N}$$

Where, S = Total number of species.

G. Species Distribution or Evenness Index: Species evenness index (e) can be calculated following Pielou (1957).

$$e = \frac{H'}{\log 2S}$$

H. Species Dominance: the species having greater frequency can play an important role in community dynamics and can be calculated using dominance index (Berger and Parker, 1970).

$$D = \frac{1}{n_{\text{imax}}/N}$$

Where, n_{imax} = Maximum abundance of the species.

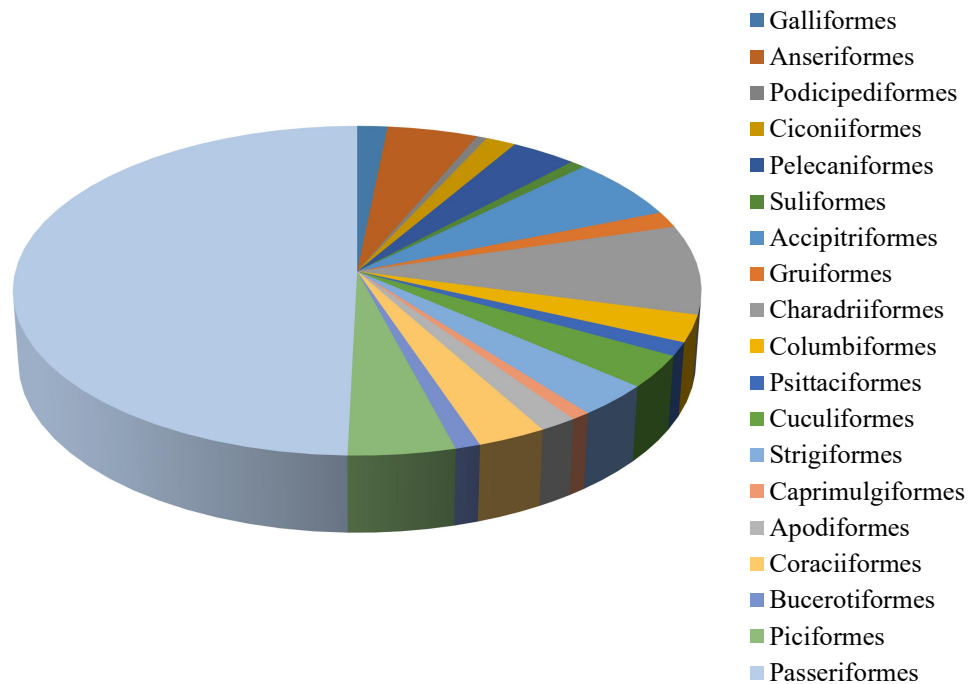


Avifaunal Diversity Analysis

Sampling Procedure

Line transects were undertaken moving along a fixed route. The birds were seen accordingly on the either side of the routes.

At first, the transect routes were needed to be chosen as random as possible. The total routes of transects varies depending upon the study. Several different transects were undertaken on a plot and were sufficient apart to ensure that the same individual was not counted on different transects.

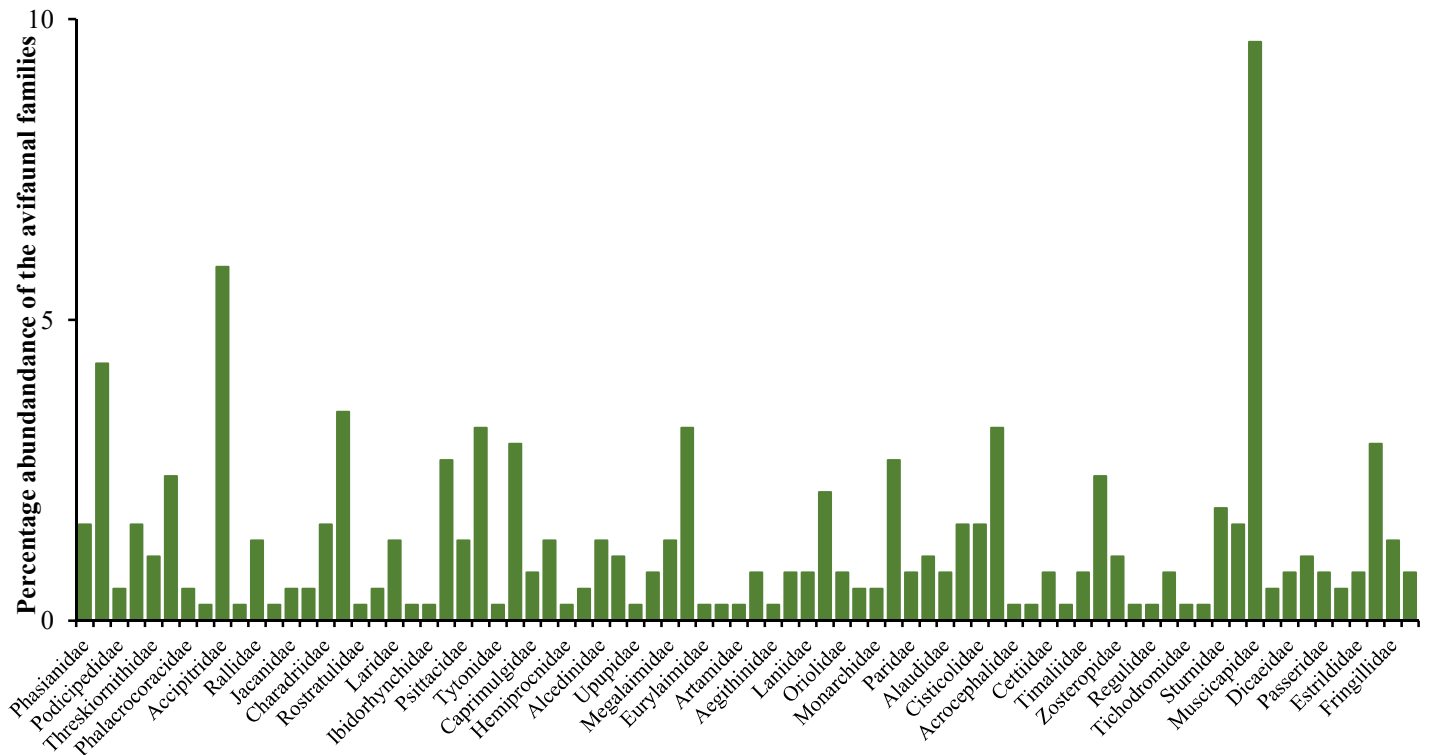


Bird specimens were identified morphologically to the lowest taxonomic level following Grimmett et al. (2011). During our study we observed birds in several transects inside Bandhavgarh National Park. The habitats chosen were mixed vegetation forest, open grassland, bamboo thickets, sal forests and large water bodies.

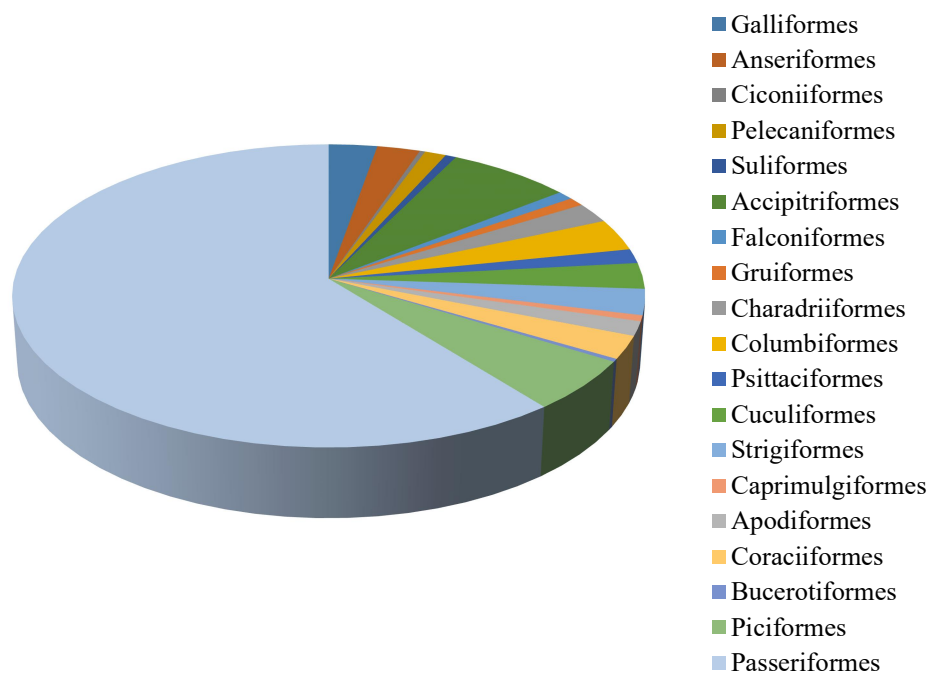
Result and Discussion

In Corbett National Park and Sattal we came across 377 and 327 species of birds (Table 1, Figure 1). The birds we saw can be categorized under 19 Orders and 69 Families in Sattal and 19 Orders and 78 Families in Corbett National Park. Both the areas are dominated by birds of Passariformes Order (39.05%) (Figure 2 and 4). When families are considered, the most abundant Family was Ardeidae (7.198%) (Figure 3 and 5).

Species diversity, richness, evenness as well as dominance was found to be high in Corbett National Park. Shannon-Wiener diversity index in Corbett National Park accounted to 5.083, depicting high diverse avifaunal community.



As diversity is influenced by both species richness and species evenness, species richness was estimated to be quite high in Bandhavgarh National Park (28.336). but species evenness index depicts that most of the species were evenly distributed except few, because the value was little more than 0.68 (0.606).



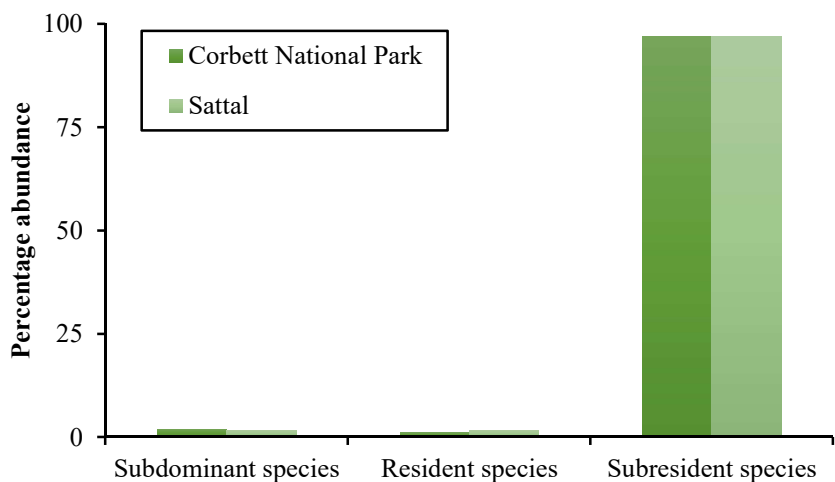
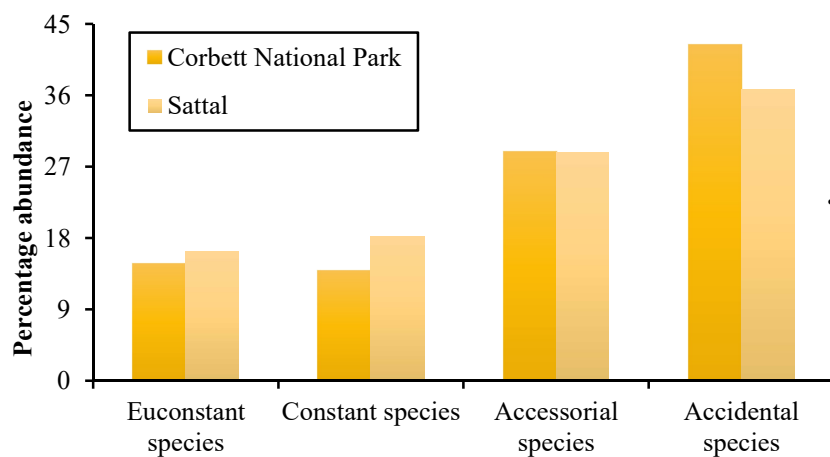
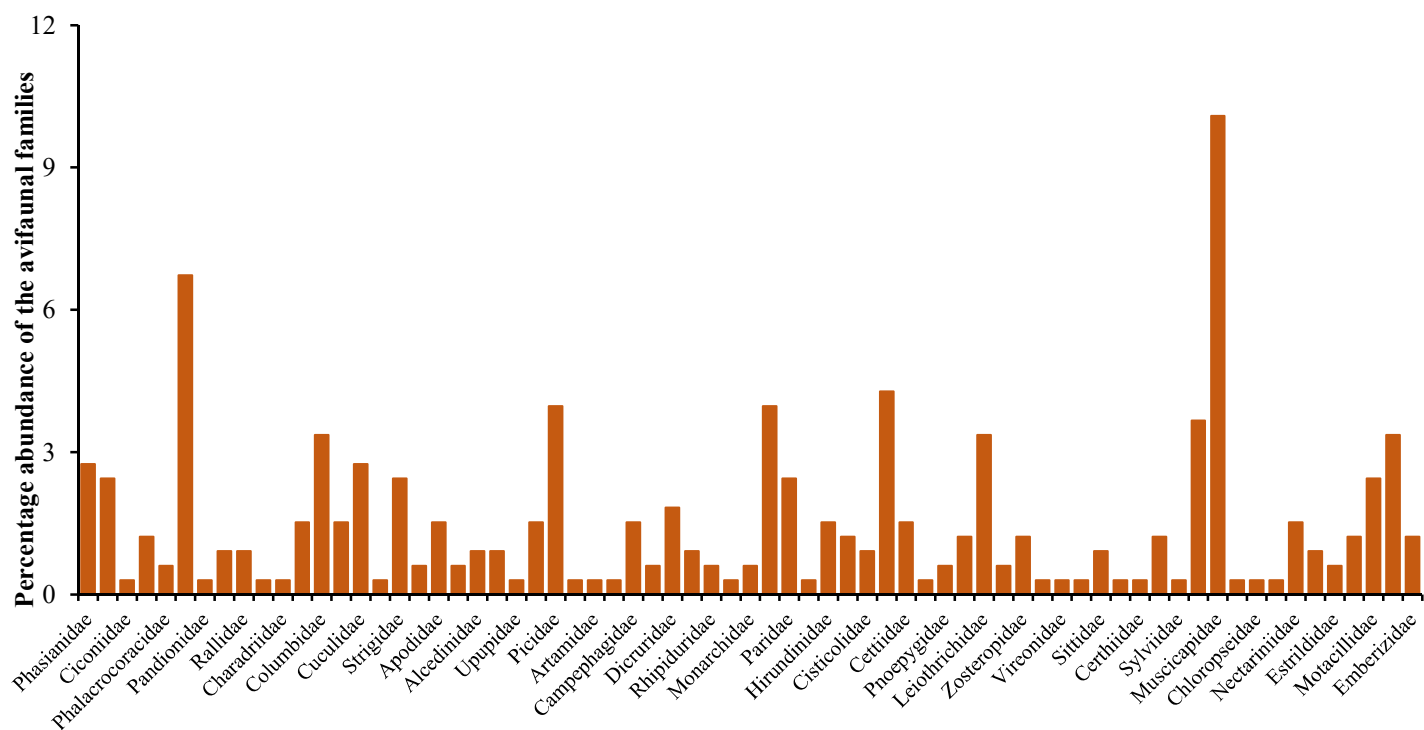


Table 2: Avifaunal diversity of Bandhavgarh Tiger Reserve.

	Common name	Scientific name	Order	Family	Percentage abundance
1	Yellow-footed green pigeon	<i>Treron phoenicoptera</i> (Latham, 1790)	Columbiformes (Co)	Columbidae	1.072
2	Common pigeon	<i>Columba livia</i> Gmelin, 1789		Columbidae	0.459
3	Laughing dove	<i>Spilopelia senegalensis</i> (Linnaeus, 1766)		Columbidae	0.153
4	Spotted dove	<i>Spilopelia chinensis</i> (Scopoli, 1768)		Columbidae	0.766
5	Eurasian collared dove	<i>Streptopelia decaocto</i> (Frivaldszky, 1838)		Columbidae	0.613
6	Oriental turtle dove	<i>Streptopelia orientalis</i> (Latham, 1790)		Columbidae	0.153
7	Alexandrine parakeet	<i>Psittacula eupatria</i> (Linnaeus, 1766)	Psittaciformes (Ps)	Psittaculidae	0.306
8	Rose-ringed parakeet	<i>Psittacula krameri</i> (Scopoli, 1769)		Psittaculidae	1.991
9	Plum-headed parakeet	<i>Psittacula cyanocephala</i> (Linnaeus, 1766)		Psittaculidae	2.910
10	Coppersmith barbet	<i>Psilopogon haemacephalus</i> (Statius Müller, 1776)	Piciformes (Pi)	Megalaimidae	0.153
11	Lesser goldenback	<i>Dinopium benghalense</i> (Linnaeus, 1758)		Picidae	0.153
12	Painted stork	<i>Mycteria leucocephala</i> (Pennant, 1769)	Ciconiiformes (Ci)	Ciconiidae	1.531
13	Asian openbill	<i>Anastomus oscitans</i> (Boddaert, 1783)		Ciconiidae	3.369
14	Black-headed ibis	<i>Threskiornis melanocephalus</i> (Latham, 1790)	Pelecaniformes (Pe)	Threskiornithidae	0.919
15	Red-naped ibis	<i>Pseudibis papillosa</i> (Temminck, 1824)		Threskiornithidae	0.919
16	Glossy ibis	<i>Plegadis falcinellus</i> Linnaeus, 1766		Threskiornithidae	0.153
17	Eurasian spoonbill	<i>Platalea leucorodia</i> Linnaeus, 1758		Threskiornithidae	1.072
18	Indian pond heron	<i>Ardeola grayii</i> (Sykes, 1832)		Ardeidae	2.757
19	Black-crowned night heron	<i>Nycticorax nycticorax</i> (Linnaeus, 1758)		Ardeidae	0.153
20	Grey heron	<i>Ardea cinerea</i> Linnaeus, 1758		Ardeidae	0.613
21	Purple heron	<i>Ardea purpurea</i> (Linnaeus, 1766)		Ardeidae	0.153
22	Great egret	<i>Ardea alba</i> Linnaeus, 1758		Ardeidae	0.766
23	Intermediate egret	<i>Ardea intermedia</i> Wagler, 1827		Ardeidae	0.459

	Common name	Scientific name	Order	Family	Percentage abundance
24	Little egret	<i>Egretta garzetta</i> (Linnaeus, 1766)	Suliformes (Su)	Ardeidae	2.297
25	Darter	<i>Plotus anhinga</i> Linnaeus, 1766		Anhingidae	0.153
26	Little cormorant	<i>Microcarbo niger</i> (Vieillot, 1817)		Phalacrocoracidae	1.378
27	Indian cormorant	<i>Phalacrocorax fuscicollis</i> Stephens, 1826		Phalacrocoracidae	0.153
28	Red-vented bulbul	<i>Pycnonotus cafer</i> (Linnaeus, 1766)	Passeriformes (Pa)	Pycnonotidae	4.594
29	Red-whiskered bulbul	<i>Pycnonotus jocosus</i> (Linnaeus, 1758)		Pycnonotidae	2.144
30	Oriental magpie-robin	<i>Copsychus saularis</i> (Linnaeus, 1758)		Muscicapidae	0.459
31	Indian robin	<i>Copsychus fulicatus</i> (Linnaeus, 1766)		Muscicapidae	0.153
32	Verditer flycatcher	<i>Eumyias thalassinus</i> (Swainson, 1838)		Muscicapidae	0.153
33	Black redstart	<i>Phoenicurus ochruros</i> (S.G. Gmelin, 1774)		Muscicapidae	0.153
34	Blue rock thrush	<i>Monticola solitarius</i> (Linnaeus, 1758)		Muscicapidae	0.153
35	White-bellied drongo	<i>Dicrurus caerulescens</i> (Linnaeus, 1758)		Dicruridae	0.153
36	Greater racket-tailed drongo	<i>Dicrurus paradiseus</i> (Linnaeus, 1766)		Dicruridae	3.675
37	Black drongo	<i>Dicrurus macrocercus</i> (Vieillot, 1817)		Dicruridae	3.063
38	Ashy drongo	<i>Dicrurus leucophaeus</i> Vieillot, 1817		Dicruridae	0.153
39	Black-hooded oriole	<i>Oriolus xanthornus</i> (Linnaeus, 1758)		Oriolidae	0.766
40	Indian jungle crow	<i>Corvus culminatus</i> Sykes, 1832		Corvidae	2.297
41	House crow	<i>Corvus splendens</i> Vieillot, 1817		Corvidae	0.766
42	Rufous treepie	<i>Dendrocitta vagabunda</i> (Latham, 1790)		Corvidae	0.919
43	Barn swallow	<i>Hirundo rustica</i> Linnaeus, 1758		Hirundinidae	1.838
44	Common tailorbird	<i>Orthotomus sutorius</i> (Pennant, 1769)		Cisticolidae	0.153
45	Jungle babbler	<i>Argya striata</i> (Dumont, 1823)		Leiothrichidae	2.144
46	Large grey babbler	<i>Argya malcolmi</i> (Sykes, 1832)		Leiothrichidae	0.153
47	Common myna	<i>Acridotheres tristis</i> (Linnaeus, 1766)		Sturnidae	2.910
48	Asian pied starling	<i>Gracupica contra</i> (Linnaeus, 1758)		Sturnidae	0.459

	Common name	Scientific name	Order	Family	Percentage abundance
49	Chestnut-tailed starling	<i>Sturnia malabarica</i> (Gmelin, 1789)		Sturnidae	0.153
50	Purple sunbird	<i>Cinnyris asiaticus</i> Latham, 1790		Nectariniidae	0.306
51	House sparrow	<i>Passer domesticus</i> (Linnaeus, 1758)		Passeridae	2.757
52	Red avadavat	<i>Amandava amandava</i> (Linnaeus, 1758)		Estrildidae	5.207
53	Scaly-breasted munia	<i>Lonchura punctulata</i> (Linnaeus, 1758)		Estrildidae	0.306
54	Yellow wagtail	<i>Motacilla flava</i> Linnaeus, 1758		Motacillidae	0.153
55	Citrine wagtail	<i>Motacilla citreola</i> (Pallas, 1776)		Motacillidae	0.153
56	White wagtail	<i>Motacilla alba</i> Linnaeus, 1758		Motacillidae	0.459
57	White-browed wagtail	<i>Motacilla maderaspatensis</i> Gmelin, 1789		Motacillidae	0.306
58	Grey wagtail	<i>Motacilla cinerea</i> Tunstall, 1771		Motacillidae	0.153
59	Small minivet	<i>Pericrocotus cinnamomeus</i> (Linnaeus, 1766)		Campephagidae	0.153
60	Brown shrike	<i>Lanius cristatus</i> (Linnaeus, 1758)		Laniidae	0.766
61	Long-tailed shrike	<i>Lanius schach</i> Linnaeus, 1758		Laniidae	0.153
62	Zitting cisticola	<i>Cisticola juncidis</i> (Rafinesque, 1810)		Cisticolidae	0.306
63	Oriental white-eye	<i>Zosterops palpebrosus</i> (Temminck, 1824)		Zosteropidae	0.459
64	Red spurfowl	<i>Galloperdix spadicea</i> (Gmelin, 1789)	Galliformes (Ga)	Phasianidae	0.153
65	Red junglefowl	<i>Gallus gallus</i> (Linnaeus, 1758)		Phasianidae	0.613
66	Grey junglefowl	<i>Gallus sonneratii</i> Temminck, 1813		Phasianidae	0.153
67	Indian peafowl	<i>Pavo cristatus</i> Linnaeus, 1758		Phasianidae	4.441
68	Lesser whistling duck	<i>Dendrocygna javanica</i> (Horsfield, 1821)	Anseriformes (An)	Anatidae	3.982
69	Ruddy shelduck	<i>Tadorna ferruginea</i> (Pallas, 1764)		Anatidae	0.766
70	Gadwall	<i>Mareca strepera</i> (Linnaeus, 1758)		Anatidae	0.306
71	Indian spot-billed duck	<i>Anas poecilorhyncha</i> Forster, 1781		Anatidae	0.306
72	Northern shoveler	<i>Spatula clypeata</i> (Linnaeus, 1758)		Anatidae	0.459
73	Northern pintail	<i>Anas acuta</i> Linnaeus, 1758		Anatidae	0.306

	Common name	Scientific name	Order	Family	Percentage abundance
74	Ferruginous duck	<i>Aythya nyroca</i> (Güldenstädt, 1770)		Anatidae	0.459
75	Black-winged kite	<i>Elanus caeruleus</i> (Desfontaines, 1789)	Accipitriformes (Ac)	Accipitridae	0.459
76	White-rumped vulture	<i>Gyps bengalensis</i> (Gmelin, 1788)		Accipitridae	0.153
77	Crested serpent eagle	<i>Spilornis cheela</i> Latham, 1790		Accipitridae	0.153
78	Indian spotted eagle	<i>Clanga hastata</i> (Lesson, 1834)		Accipitridae	0.306
79	Booted eagle	<i>Hieraaetus pennatus</i> (Gmelin, 1788)		Accipitridae	0.153
80	Changeable hawk-eagle	<i>Nisaetus cirrhatus</i> (Gmelin, 1788)		Accipitridae	0.153
81	White-breasted waterhen	<i>Amaurornis phoenicurus</i> Pennant, 1769	Gruiformes (Gr)	Rallidae	0.459
82	Purple swamphen	<i>Porphyrio porphyrio</i> (Linnaeus, 1758)		Rallidae	0.919
83	Common moorhen	<i>Gallinula chloropus</i> (Linnaeus, 1758)		Rallidae	0.613
84	Eurasian coot	<i>Fulica atra</i> Linnaeus, 1758		Rallidae	1.531
85	Demoiselle crane	<i>Grus virgo</i> (Linnaeus, 1758)		Gruidae	2.757
86	Pheasant-tailed jacana	<i>Hydrophasianus chirurgus</i> (Scopoli, 1786)	Charadriiformes (Ch)	Jacanidae	0.153
87	Bronze-winged jacana	<i>Metopidius indicus</i> (Latham, 1790)		Jacanidae	0.153
88	Red-wattled lapwing	<i>Vanellus indicus</i> (Boddaert, 1783)		Charadriidae	1.531
89	Common ringed plover	<i>Charadrius hiaticula</i> Linnaeus, 1758		Charadriidae	0.459
90	Eurasian curlew	<i>Numenius arquata</i> (Linnaeus, 1758)		Scolopacidae	0.153
91	Black-winged stilt	<i>Himantopus himantopus</i> (Linnaeus, 1758)		Recurvirostridae	1.531
92	River tern	<i>Sterna aurantia</i> (J.E. Gray, 1831)		Laridae	1.225
93	Black-headed gull	<i>Chroicocephalus ridibundus</i> (Linnaeus, 1766)		Laridae	0.459
94	Asian koel	<i>Eudynamis scolopacea</i> (Linnaeus, 1758)	Cuculiformes (Cu)	Cuculidae	0.306
95	Southern coucal	<i>Centropus (sinensis) parotti</i> (Stephens, 1815)		Cuculidae	0.153
96	Barn owl	<i>Tyto alba</i> (Scopoli, 1769)	Strigiformes (St)	Tytonidae	0.153
97	Jungle owlet	<i>Glaucidium radiatum</i> (Tickell, 1833)		Strigidae	0.153
98	Indian scops owl	<i>Otus bakkamoena</i> (Pennant, 1769)		Strigidae	0.306

	Common name	Scientific name	Order	Family	Percentage abundance
99	Hoopoe	<i>Upupa epops</i> Linnaeus, 1758	Bucerotiformes (Bu)	Upupidae	0.459
100	Malabar pied hornbill	<i>Anthracoceros coronatus</i> (Boddaert, 1783)		Bucerotidae	0.459
101	Indian grey hornbill	<i>Ocyrceros birostris</i> (Scopoli, 1786)		Bucerotidae	0.613
102	Indian roller	<i>Coracias benghalensis</i> (Linnaeus, 1758)	Coraciiformes (Cor)	Coraciidae	1.378
103	White-throated kingfisher	<i>Halcyon smyrnensis</i> (Linnaeus, 1758)		Alcedinidae	0.766
104	Pied kingfisher	<i>Ceryle rudis</i> (Linnaeus, 1758)		Alcedinidae	0.153
105	Common kingfisher	<i>Alcedo atthis</i> (Linnaeus, 1758)		Alcedinidae	0.306
106	Green bee-eater	<i>Merops orientalis</i> Latham, 1801		Meropidae	4.747
107	Blue-tailed bee-eater	<i>Merops philippinus</i> Linnaeus, 1766		Meropidae	0.153

Avifaunal specimens found in Bandhavgarh Tiger Reserve



Yellow-footed green pigeon



Common pigeon



Laughing dove



Spotted dove



Eurasian collared dove



Oriental turtle dove



Alexandrine parakeet



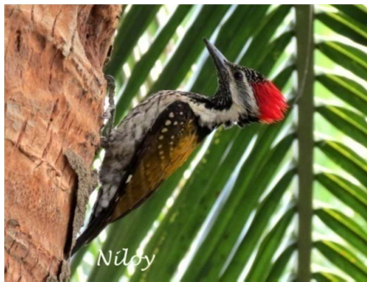
Rose-ringed parakeet



Plum-headed parakeet



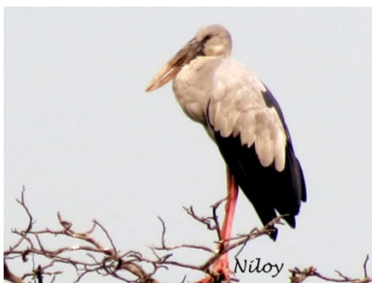
Coppersmith barbet



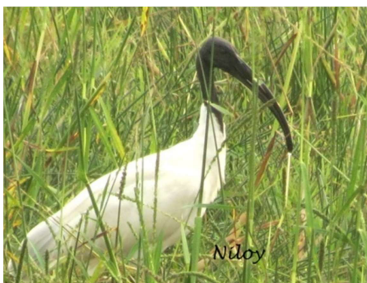
Lesser goldenback



Painted stork



Asian openbill



Black-headed ibis



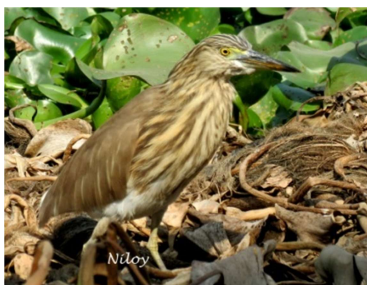
Red-naped ibis



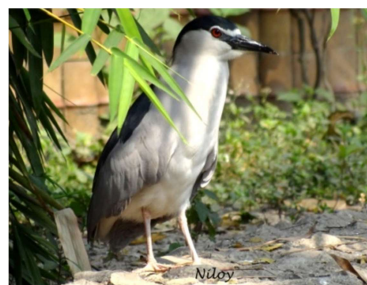
Glossy ibis



Eurasian spoonbill



Indian pond heron



Black-crowned night heron



Grey heron



Purple heron



Great egret



Intermediate egret



Little egret



Darter



Little cormorant



Indian cormorant



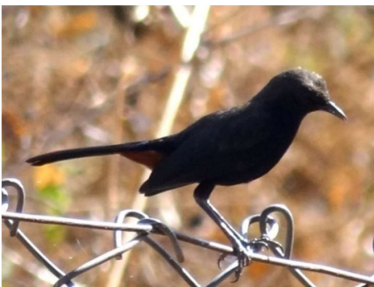
Red-vented bulbul



Red-whiskered bulbul



Oriental magpie-robin



Indian robin



Verditer flycatcher



White-bellied drongo



Black redstart



Black drongo



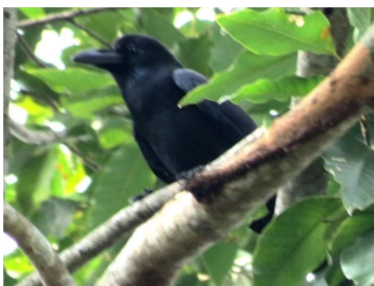
Blue rock thrush



Ashy drongo



Black-hooded oriole



Indian jungle crow



House crow



Rufous treepie



Barn swallow



Common tailorbird



Jungle babbler



Large grey babbler



Common myna



Common myna



Asian pied starling



Purple sunbird



House sparrow



Red avadavat



Scaly-breasted munia



Yellow wagtail



Citrine wagtail



White wagtail



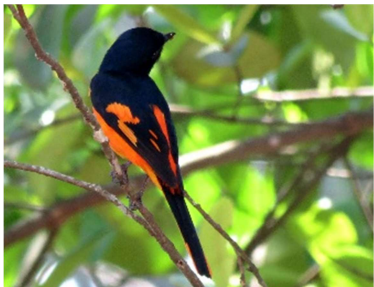
White-browed wagtail



Long-tailed shrike



Brown shrike



Small minivet



Zitting cisticola



Lesser whistling duck



Ruddy shelduck



Gadwall



Indian spot-billed duck



Northern shoveler



Northern pintail



Purple swamphen



Common moorhen



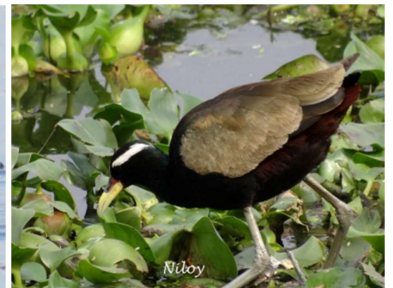
Eurasian coot



Demoiselle crane



Pheasant-tailed jacana



Bronze-winged jacana



Red-wattled lapwing



Common ringed plover



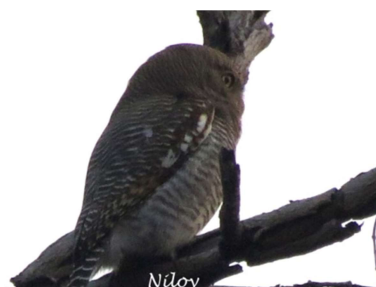
Eurasian curlew



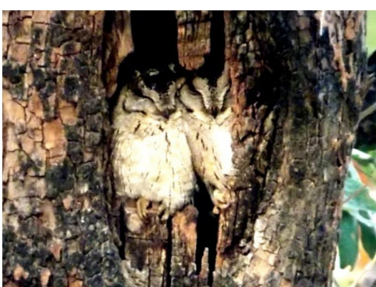
Black-winged stilt



River tern



Jungle owlet



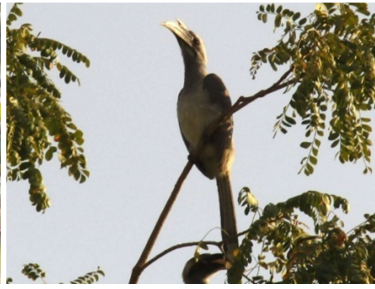
Indian scops owl



Hoopoe



Malabar pied hornbill



Indian grey hornbill



Indian roller



White-throated kingfisher



Pied kingfisher



Common kingfisher



Green bee-eater



Blue-tailed bee-eater



Asian koel



Southern coucal



Black-headed gull



Indian peafowl



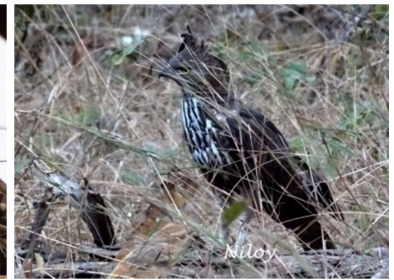
Black-winged kite



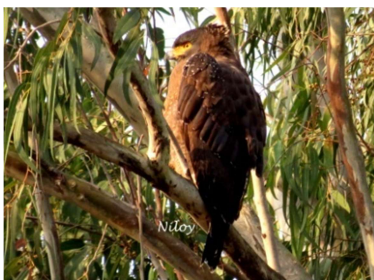
White-rumped vulture



Indian spotted eagle



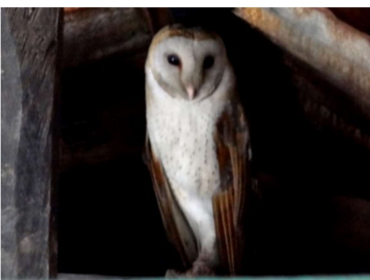
Crested hawk eagle



Crested hawk-eagle



Booted eagle



Barn owl



Ferruginous duck



Red junglefowl



Grey junglefowl



Oriental white-eye



Red spurfowl



Grey wagtail



Greater racket-tailed drongo



White-breasted waterhen

Mammalian Diversity Analysis

Sampling Procedure

India is one of the most biodiverse regions of the world and hosts three of the world's 35 biodiversity hotspots or treasure houses. India is one of the 17 megadiverse country and home to about 7.6% of world's mammalian species.

Although some animals are easily sighted, many species are highly sensitive, often hidden from view. Moreover, mammals under conservation interest are very low in density. Therefore, apart from visual sightings in the forest areas examining the poops, footprints and calls, the abundance of the mammalian species can be quantified (Sutherland, 2007).

The species were identified following Menon (2014). The threat status of the mammals was obtained from IUCN Red List Categories. The species were categorized as Not Evaluated (NE), Least Concerned (LC), Near Threatened (NT), Vulnerable (VU), Endangered (EN) and Critically Endangered (CR) (IUCN Criteria Version 3.1, 2001).

Result and Discussion

Among 42 species of mammals present in Bandhavgarh National Park, we encountered only 23 species (Table 3, Figure 9). Elusive big cats like Tigers and Leopards are sighted along with their pugmarks and their growls. Carnivorous Dhole, Golden jackal, Bengal fox, Smooth-coated otter, Small Indian civet, Indian grey mongoose and Sloth bear were also seen.

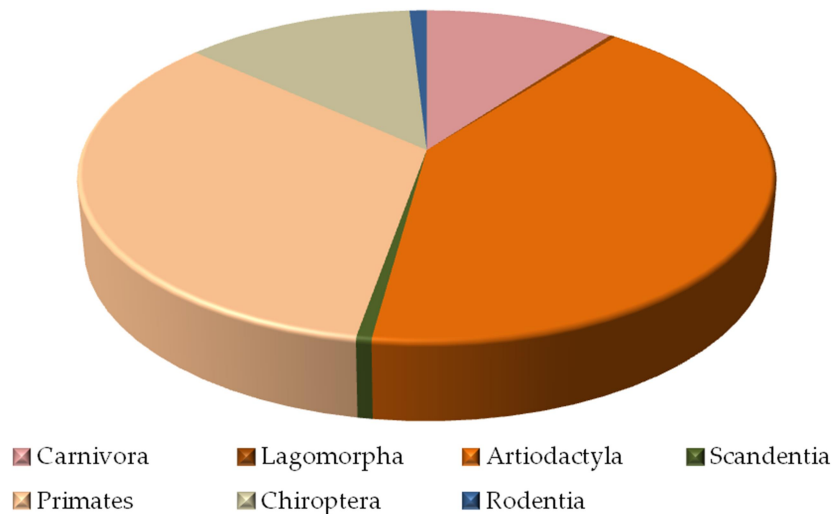


Figure 9: Taxonomic diversity of mammalian species according to Orders.

When Shannon-Wiener diversity index was calculated, it accounted to 2.358 which depicts the mammalian species diversity to be moderately good. This corroborated with species richness index which accounted to 2.641. Species evenness was found less (0.521), because the mammalian community was dominated by Chitals and Western Hanuman Langur. 23 mammalian species were categorized under 7 Orders – Carnivora, Artiodactyla, Primates, Chiroptera, Rodentia, Lagomorpha and Scandentia. Invariably Artiodactyla and Primates dominated the community (Figure 9). Within 7 Orders, 15 Families were identified which was dominated by Cercopithecidae and Cervidae (Figure 10).

Though, Chital, Gaur and Sambar deer are the dominant herbivores, lesser abundance of Nilgai depicts the forest to be healthy and growing. Tree shrew, Small Indian civet and Golden jackal are quite unique.

As the community is dominated by herbivores, therefore, various species of carnivores like Bengal tiger, Indian leopard, Dhole, Sloth bear were observed. Presence of shy Barking deer and lesser number of Nilgai evoked the forest to be healthy.

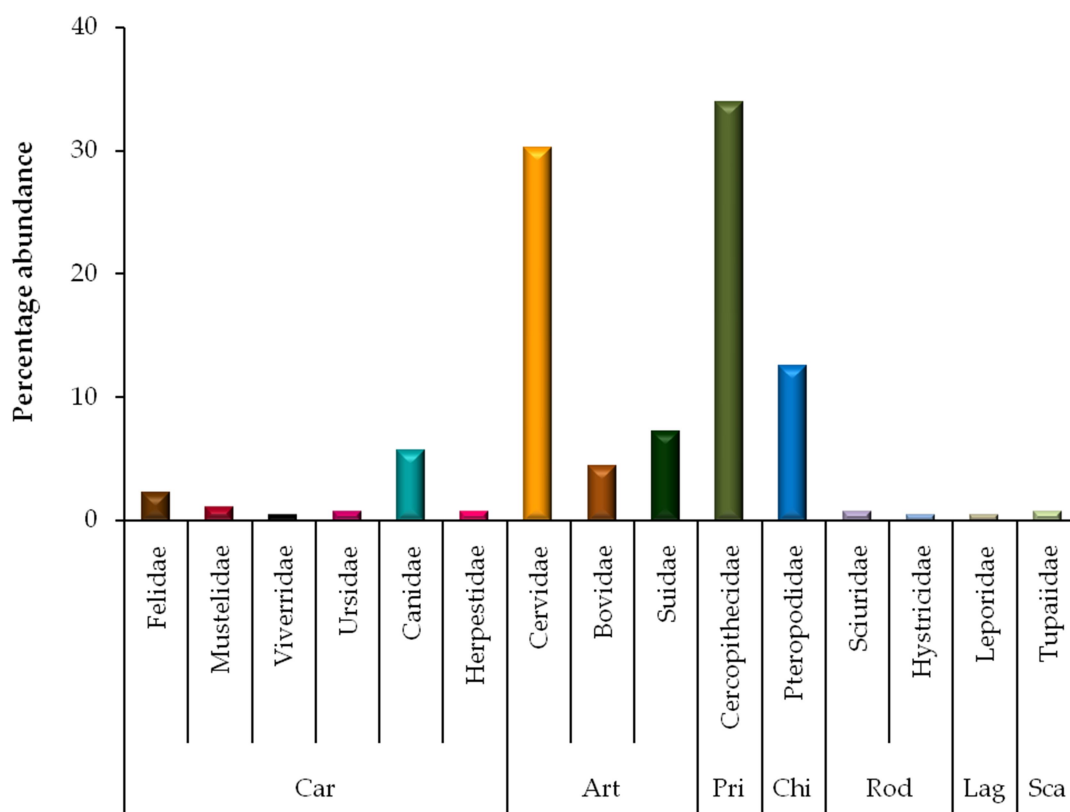


Figure 10: Taxonomic diversity of mammalian species according to Families.

Table : Mammalian species found in Bandhavgarh Tiger Reserve.

	Common name	Scientific name	Order	Family	Relative abundance	IUCN Red List status
1	Bengal tiger	<i>Panthera tigris tigris</i> (Linnaeus, 1758)	Carnivora (Car)	Felidae	1.553	CR
2	Indian leopard	<i>Panthera pardus fusca</i> (Meyer, 1794)		Felidae	0.621	VU
3	Smooth-coated otter	<i>Lutrogale perspicillata</i> (Geoffroy Saint Hilaire, 1826)		Mustelidae	0.932	VU
4	Small Indian civet	<i>Viverricula indica</i> Geoffroy Saint-Hilaire, 1803		Viverridae	0.311	LC
5	Sloth bear	<i>Melursus ursinus</i> (Shaw, 1791)		Ursidae	0.621	VU
6	Golden jackal	<i>Canis aureus</i> Linnaeus, 1758		Canidae	0.621	LC
7	Dhole	<i>Cuon alpinus</i> (Pallas, 1811)		Canidae	4.348	EN
8	Bengal fox	<i>Vulpes bengalensis</i> (Shaw, 1800)		Canidae	0.621	LC
9	Indian grey mongoose	<i>Herpestes edwardsi</i> É. Geoffroy Saint-Hilaire, 1818		Herpestidae	0.621	LC
10	Chital	<i>Axis axis</i> (Erxleben, 1777)	Artiodactyla (Art)	Cervidae	21.118	LC
11	Sambar deer	<i>Rusa unicolor</i> (Kerr, 1792)		Cervidae	8.696	VU
12	Indian muntjac	<i>Muntiacus muntjak</i> (Zimmermann, 1780)		Cervidae	0.311	LC
13	Nilgai	<i>Boselaphus tragocamelus</i> (Pallas, 1766)		Bovidae	2.484	LC
14	Gaur	<i>Bos gaurus</i> (Smith, 1827)		Bovidae	1.863	VU
15	Indian wild boar	<i>Sus scrofa cristatus</i> Wagner, 1839		Suidae	7.143	LC
16	Western hanuman langur	<i>Semnopithecus achates</i> (Pocock, 1978)	Primates (Pri)	Cercopithecidae	20.497	LC
17	Deccan hanuman langur	<i>Semnopithecus anchises</i> (Geoffroy, 1843)		Cercopithecidae	3.106	LC
18	Indian rhesus macaque	<i>Macaca mulatta mulatta</i> (Zimmermann, 1780)		Cercopithecidae	10.248	LC
19	Indian flying fox	<i>Pteropus medius</i> (Temminck, 1825)	Chiroptera (Chi)	Pteropodidae	12.422	LC
20	Northern palm squirrel	<i>Funambulus pennantii</i> Wroughton, 1905	Rodentia (Rod)	Sciuridae	0.621	LC
21	Indian crested porcupine	<i>Hystrix indica</i> Kerr, 1792	Lagomorpha (Lag)	Hystricidae	0.311	LC
22	Indian hare	<i>Lepus nigricollis</i> F. Cuvier, 1823		Leporidae	0.311	LC
23	Indian tree shrew	<i>Anathana ellioti</i> (Waterhouse, 1850)	Scandentia (Sca)	Tupauidae	0.621	LC

Mammalian specimens found in Bandhavgarh Tiger Reserve



Bengal tiger



Indian leopard



Golden jackal



Dhole



Smooth-coated otter



Sloth bear



Indian grey mongoose



Small Indian civet



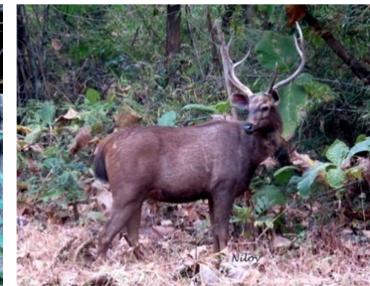
Bengal fox



Chital



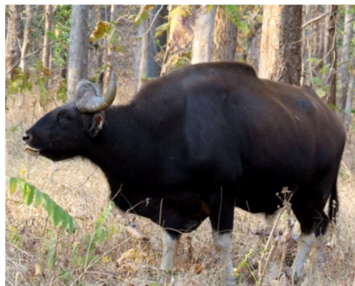
Indian muntjac



Sambar deer



Nilgai



Gaur



Indian wild boar



Western hanuman langur



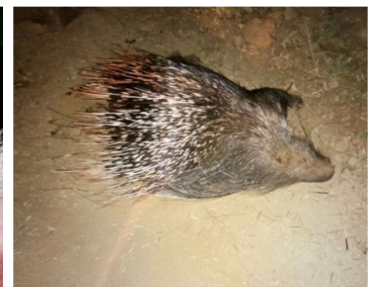
Deccan hanuman langur



Indian rhesus macaque



Northern palm squirrel

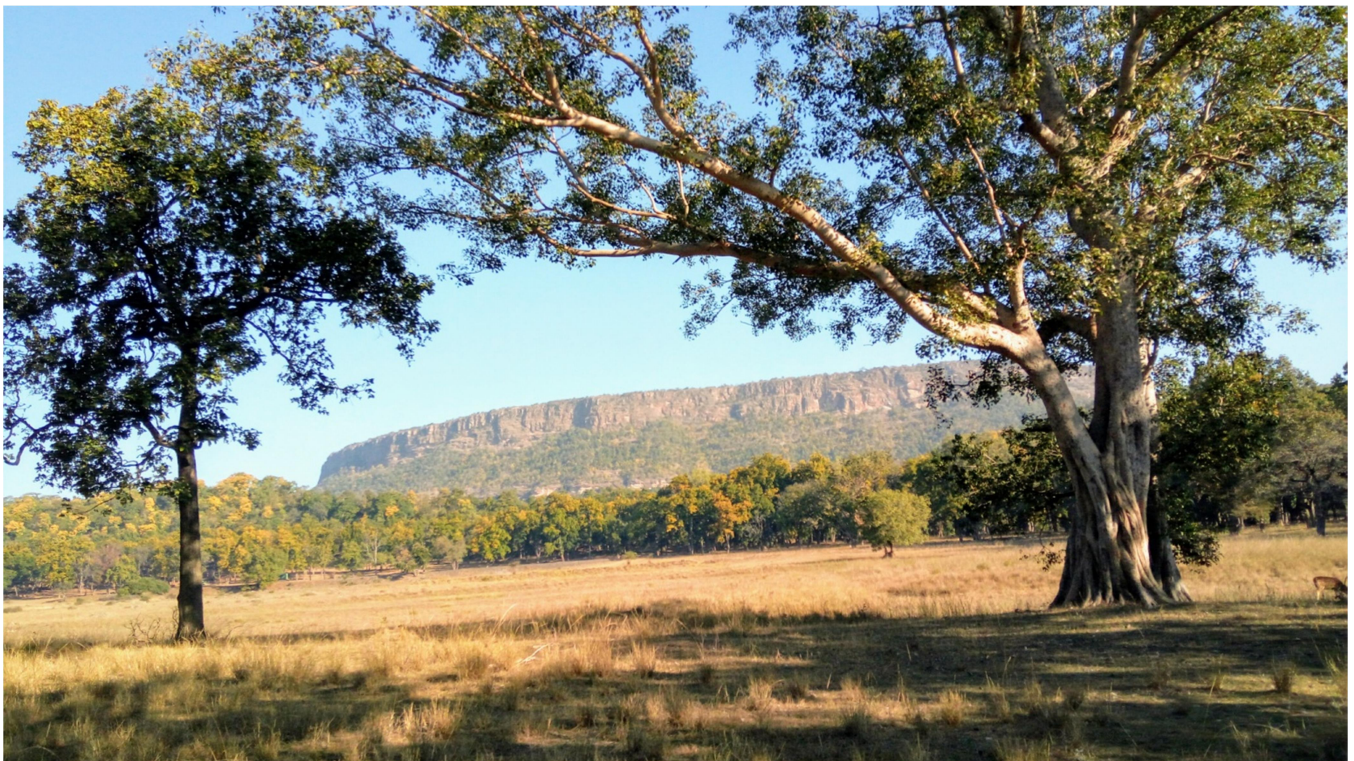


Indian crested porcupine

Discussion

From our short trip in wilderness of Corbett National Park, we came across variety of organisms both invertebrates and vertebrates. This tiger reserve is fragmented habitat of both tigers and other animals and acts as corridors for large animals. The survival of other mammals and tigers is small and fragmented landscape is difficult and uncertain. 2 or more large patches of forests are connected with corridor landscapes that could enable tigers and other animals to cross. This phenomenon ensures a healthy genetic turnover in the population as a whole.

During our field trip, we primarily assessed the terrestrial ecosystem of 2 distinctly different habitats which has a great impact on the vegetation in the forest floor and subsequently on the invertebrates' diversity there. This invertebrate diversity regulates the presence or absence of the avifaunal species. Thus Corbett National Park serves as an amphitheater to the mingling wildlife population and also called paradise of birds.



Conclusion

“..... Its not just learning that's important. Its learning what to do with you learn and learning, why you learn things that matters.” – Norton Juster

Visit to Corbett National Park meant a lot to all of us. We learnt to appreciate nature and its resources from a scientific view point. Diversity studies offered a clear statistical conception and educated us about application of different ecological techniques. The panorama of life inside forest made interesting about animal behavior. A glimpse of rut in deers, allogrooming in macaques, immediately made us feel we are part of nature and they are fellow inhabitants of the globe. This expedition ushered in us an interest to study nature and natural resources in future. In that way, end of the tour was not the real end but a glorious beginning.



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