



## Assessment of diversity and threats of avifauna in and around Sonavade village (Tarf-Kalsuli), Dist- Sindhudurg, Maharashtra, India

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### Abstract

The present investigation was carried out in and around Sonavade village, Tarf-Kalsuli, Tal- Kudal, Sindhudurg district of Maharashtra. Sonavade village is located in Sahyadri mountain ranges of Western Ghat. The study area is in the vicinity of the Dajipur Wildlife Sanctuary. During the study period of May 2015 to April 2017 a total number of 136 species from 16 orders and 41 families were recorded. As per the observations of the study conducted, avifauna order Passeriformes is dominant in study area (56%), including 76 bird species in 18 families followed by Coraciiformes (7%), Accipitriformes (6%), Apodiformes, Columbiformes, Piciformes, Galliformes each 4%. Psittaciformes 3%, Capriulgiformes, Charadriiformes, Strigiformes each 2% and Trogoniformes, Bucerotiformes, Falconiformes, Suliformes each 1%. According to 'The IUCN Redlist of Threatened Species List' 130 species of birds observed during the study are found to be listed in Least Concern category, while *Chloropsis cochinchinensis*, *Buceros bicornis*, *Anthraceros coronatus*, *Sterna aurantia* and *Psittacula eupatria* are listed in Near Threaten category (NT). Indian Vulture (*Gyps indicus*) Critically Endangered (CR) species was also observed in hilly part of the area under study. Geographical location of study area provides a healthy habitat for birds. Study area is rich in bird diversity but anthropogenic development, loss of habitat and poaching/hunting are the main threats to the avifauna in the study area. This study was conducted to prepare a baseline data for this region which will be referral document for conservation and research related activities undertaken in future.

**Keywords:** Sonavade village, Dajipur Wildlife Sanctuary, Western Ghats, Sindhudurg.

### Introduction

Western Ghats is one of the twenty five Biodiversity hotspots in the world. The study area is a part of Northern Western Ghat in Konkan region at Sindhudurg district. Recently Sindhudurg district is declared as a tourist district by government of Maharashtra due to its magnificent geographical location and biodiversity richness.

Indian subcontinent harbours about 13% of world's birds species i.e. 1300 species of birds recorded in Indian subcontinent<sup>1</sup>. Total 568 species of birds were reported in Maharashtra state<sup>2</sup> while 580 species found in Western Ghat<sup>3</sup>. Avian diversity of Maharashtra region has been explored by many enthusiasts and researchers since last two decades<sup>4-8</sup>. According to Avibase-Bird checklist of the world a total of 440 bird species are recorded in Sindhudurg district<sup>9</sup>. Dajipur Wildlife Sanctuary lies around 20 km from study location. Indian biodiversity portal documented 60 bird species from Dajipur Wildlife Sanctuary (Earlier known as Radhanagri WLS)<sup>10</sup>.

The present study was aimed to assess diversity of avian species and threats to it due to deforestation and poaching activities in the study area.

### Materials and methods

**Study area:** The project site is located at southern site of Dajipur WLS in the Northern Western Ghat (Lat- 16°11'10.69"N, Long- 73°52'41.61"E). Sonavade village located on the boundary of Kudal tehsil of Sindhudurg District. Nardave, Ghotage, Bharni and Jambhavade are the villages around the study site. Sonavade village is located between two tributaries of Gad River which are seasonal in nature and dry during summer season.

North- east and south side of the village is surrounded by dense forest which is the boundary of Sindhudurg and Kolhapur District.

Study of diversity of avifauna was carried out using Point count method and flying birds, bird calls were also considered to document the bird diversity.

The observations were made mainly during the early morning or in the evening, night surveys were also carried out to document nocturnal birds. Two years period from May 2015 to April 2017 was considered for this study. For identification of birds various field guides were used<sup>1,11,12</sup>.

## Results and discussion

Present study reveals that the study area harbours 136 bird species from 16 orders and 41 families were recorded from May 2015 to April 2017. As per the observations of avifauna order Passeriformes is dominant in the study area (56%), including 76 bird species in 18 families followed by Order Coraciiformes (7%), order Accipitriformes (6%), Apodiformes, Columbiformes, Piciformes, Galliformes each 4%. Psittaciformes 3%, Capriuligiformes, Charadriiformes, Strigiformes each 2% and Trogoniformes, Bucerotiformes, Falconiformes, Suliformes each 1%.

On the basis of encounter of bird species in each visit, birds are categorised as Rare (R), Uncommon (UC), Common (C) and Very Common (VC). Out of 136 bird species 45% are common, 32% Uncommon 18% Very Common and 5% are of Rare categories. According to 'The IUCN Redlist of Threatened Species List' 130 species of birds were found in Least Concern category, while *Chloropsis cochinchinensis*, *Buceros bicornis*, *Anthracoceros coronatus*, *Sterna aurantia* and *Psittacula eupatria* are of Near Threaten categories. Indian Vulture (*Gyps indicus*) Critically Endangered species was observed in hilly part of the study area.

Malabar pied hornbill (*Anthracoceros cornatus*) and Great hornbill (*Buceros bicornis*) are listed as Near Threatened in IUCN red data book 2017 but both the hornbill species are commonly seen in study area.

**Threats:** Majority of the villagers are from low income group. Agriculture is a main occupation in the village. Total 90% of farming is dependent on monsoon. Due to low water availability only few farmers can produce crops in summer season. Lack of awareness about nature and natural resources amongst the local peoples was observed. Facilities of Higher education are not available in the nearby areas.

Village envisage low job availability. All these condition are directly or indirectly related to the unsustainable use of natural resources and also poaching activities. Poaching is a major threat to the avifauna in the study area.

Grey Jungle fowl (*Gallus sonneratii*), Jungle bush quail (*Perdica asiatica*), Red spur fowl (*Galloperdix spadicea*), Indian peafowl (*Pavo cristatus*), Jungle Babbler (*Turdoides striata*) Spotted dove (*Spilopelia chinensis*), Laughing Dove (*Spilopelia senegalensis*), etc are the major portion of poaching and according to the locals these all species adds to their delicacies. House crow (*Corvus splendens*) and Jungle crow (*Corvus macrorhynchos*) are also being hunted but not for its meat, usually they are killed to hang their carcass on a bamboo pole to keep away crows from the food storage area as well as poultry area.

Similar methods are used for Shikra and kites, but crows are the common subject for this type of practices. Catle Egret (*Ardea*

*Purpurea*) and Intermediate Egret (*Ardea intermedia*) are hunted for its intestine, which then used as a bait for fishing and catching crabs.

During survey villagers also mentioned that 20 years back they could easily find a group of Indian vultures (*Gyps indicus*) feeding on animal carcass. Major reason for decline of vultures was being poached for game hunting. As per the observations it is very difficult to locate an Indian vulture in the study area.

Deforestation is another threat to the avifauna in the study area. Almost 95% locals use firewood as a fuel throughout the year. During Pre-monsoon season villagers store large number of firewood collected from forest for day to day chores during monsoon season. This leads to loss of many trees every year.

Diversity of Malabar pied hornbill (*Anthracoceros cornatus*) and Great hornbill (*Buceros bicornis*) was observed in healthy state in the study area. Authors recorded three breeding site of great hornbills in the month of October. Locals call it as 'Garuda'- peoples believe that the hornbill is a 'vahan' of lord Vishnu and it guards the people.

This religious belief has lead to conservation of these two species. Habitat near Cremation ground of different community in the study area is similar to sacred groves, old and tall trees are conserved un-intentionally in these areas. Hornbills are observed throughout the year around these Cremation ground except during Ganeshotsav (festival of Lord Ganesha).

During this festival not even single hornbill were recorded near the Cremation ground this is due to high volume of loud speaker and firecrackers. This could also be the threat to the avifauna by disturbing them during their breeding season in the study areas.

The alignment of proposed Sonavade-Ghotage, Nardavae - Shivdav road is passing through the dense forest of Sonavade village and other villages. Construction activities of the road will have adverse effect on the existing diversity, distribution and migration pattern of the avifauna.

## Conclusion

Despite of healthy diversity of birds in the study area intensity of threats is more critical to conserve this avifauna. Present study is a short term study but it is necessary to conduct long term study to understand resident, migratory and endemic status of the avifauna and studies targeting spatio-temporal and habitat variables.

## Acknowledgement

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**Table-1:** Checklist of birds observed in study area,

Sr. no	Common Name	Scientific Name	Family	IUCN Status	Abundance status
Order- Accipitriformes					
1	Black eagle	<i>Ictinaetus malaiensis</i>	Accipitridae	LC	UC
2	Black winged kite	<i>Elanus caeruleus</i>	Accipitridae	LC	UC
3	Crested hawk eagle	<i>Nisaetus cirrhatus</i>	Accipitridae	LC	UC
4	Crested Serpent eagle	<i>Spilornis cheela</i>	Accipitridae	LC	VC
5	Eurasian Sparrow hawk	<i>Accipiter nisus</i>	Accipitridae	LC	UC
6	Indian Vulture	<i>Gyps indicus</i>	Accipitridae	CR	R
7	Pariah Kite	<i>Milvus migrans</i>	Accipitridae	LC	UC
8	Shikra	<i>Accipiter badius</i>	Accipitridae	LC	VC
Order Passeriformes					
9	Clamorous Reed warbler	<i>Acrocephalus stentoreus</i>	Acrocephalidae	LC	C
10	Common Babbler	<i>Turdoides caudatus</i>	Acrocephalidae	LC	C
11	Indian Scimitar Babbler	<i>Pomatorhinus horsfieldti</i>	Acrocephalidae	LC	UC
12	Large grey babbler	<i>Turdoides malcolmi</i>	Acrocephalidae	LC	C
13	Eastern Skylark	<i>Alauda aulaula</i>	Alaudidae	LC	UC
14	Rufus-tailed Finch Lark	<i>Ammomanes phoenicurus</i>	Alaudidae	LC	UC
15	Sykes's Lark	<i>Galerida deva</i>	Alaudidae	LC	UC
16	Ashy prinia	<i>Prinia socialis</i>	Cisticolidae	LC	C
17	Ashy drongo	<i>Dicrurus leucophaeus</i>	Corvidae	LC	C
18	Asian Paradise- Flycatcher	<i>Terpsiohone naradisi</i>	Corvidae	LC	C
19	Black drongo	<i>Dicrurus macro cercus</i>	Corvidae	LC	C
20	Black hooded oriole	<i>Oriolus xanthornus</i>	Corvidae	LC	C
21	Black-naped oriole	<i>Oriolus chinensis</i>	Corvidae	LC	C
22	Common lora	<i>Aegithina tihia</i>	Corvidae	LC	C
23	Greater racket tailed drongo	<i>Dicrurus paradiseus</i>	Corvidae	LC	C
24	House crow	<i>Corvus splendens</i>	Corvidae	LC	VC
25	Indian Golden oriole	<i>Oriolus kundoo</i>	Corvidae	LC	C
26	Jungle Crow	<i>Corvus macrorhynchos</i>	Corvidae	LC	VC
27	Rufous Treepie	<i>Dendrocitta vagabunda</i>	Corvidae	LC	UC
28	Scarlet Minivet	<i>Pericrocotus tlammeus</i>	Corvidae	LC	C
29	Small minivet	<i>Pericrocotus cinnamomeus</i>	Corvidae	LC	C
30	White billed drongo	<i>Dicrurus caerulescens</i>	Corvidae	LC	UC
31	White spotted fantail	<i>Rhipidura albogularis</i>	Corvidae	LC	C

Sr. no	Common Name	Scientific Name	Family	IUCN Status	Abundance status
32	White-browed Fantail	<i>Rhoidura aureola</i>	Corvidae	LC	C
33	Asian koel	<i>Eudynamys scolopaceus</i>	Cuculidae	LC	VC
34	Common cuckoo	<i>Cuculus canorus</i>	Cuculidae	LC	VC
35	Common hawk Cuckoo	<i>Hierococcyx varius</i>	Cuculidae	LC	C
36	Jacobin cuckoo	<i>Clamator jacobinus</i>	Cuculidae	LC	C
37	Plain Martin	<i>Riparia paludicola</i>	Hirundinidae	LC	UC
38	Wire tailed swallow	<i>Hirundo smithii</i>	Hirundinidae	LC	C
39	Asian fairy blue bird	<i>Irena puella</i>	Irenidae	LC	R
40	Golden-fronted leafbird	<i>Chloropsis aurifrons</i>	Irenidae	LC	UC
41	Gold-mantled Chloropsis	<i>Chloropsis cochinchinensis</i>	Irenidae	NT	UC
42	Bay backed shrike	<i>Lanius vittatus</i>	Laniidae	LC	UC
43	Long-tailed Shrike	<i>Lanius schuch</i>	Laniidae	LC	C
44	Jungle Babbler	<i>Turdoides striata</i>	Leiotrichidae	LC	VC
45	Quaker Babbler	<i>Alcippepoioicepha/a</i>	Leiotrichidae	LC	UC
46	Rufous Babbler	<i>Turdoides subrufa</i>	Leiotrichidae	LC	C
47	Spotted Babbler	<i>Pellorneum ruficeps</i>	Leiotrichidae	LC	UC
48	Black Naped monarch	<i>Hypothymis azurea</i>	Monarchidae	LC	UC
49	Blue-capped Rock Thrush	<i>Monticola cinclorhyncha</i>	Muscicapidae	LC	C
50	Brown Rock-Chat	<i>Cercomela fusca</i>	Muscicapidae	LC	UC
51	Common bush chat	<i>Saxicola caprata</i>	Muscicapidae	LC	C
52	Indian robin	<i>Saxicoloides fulicatus</i>	Muscicapidae	LC	C
53	Malabar Whistling Thrush	<i>Myophonus horsfieldii</i>	Muscicapidae	LC	UC
54	Orange headed thrush	<i>Zoothera citrina</i>	Muscicapidae	LC	C
55	Oriental Magpie- Robin	<i>Cotivachus saularis</i>	Muscicapidae	LC	VC
56	Pied Chat	<i>Oenanthe picata</i>	Muscicapidae	LC	C
57	Rufous-tailed Flycatcher	<i>Muscicapa ruficauda</i>	Muscicapidae	LC	C
58	Tickell's Blue Flycatcher	<i>Cvornis tickelliae</i>	Muscicapidae	LC	C
59	White rumped shama	<i>kittacincla malabaricus</i>	Muscicapidae	LC	UC
60	Crimson-backed Sunbird	<i>Nectarinia minima</i>	Nectariniidae	LC	UC
61	Jerdons leafbird	<i>Chloropsis jerdoni</i>	Nectariniidae	LC	UC
62	Plain flowerpicker	<i>Dicaeum minullum</i>	Nectariniidae	LC	C
63	Purple rumped sun bird	<i>Leptocoma zeylonica</i>	Nectariniidae	LC	C
64	Purple Sunbird	<i>Nectarinia asiatica</i>	Nectariniidae	LC	C
65	Tickell's Flowerpecker	<i>Dicaeum ervthrorhynchos</i>	Nectariniidae	LC	UC

Sr. no	Common Name	Scientific Name	Family	IUCN Status	Abundance status
66	Great tit	<i>Parus major</i>	Paridae	LC	UC
67	Yellow-cheeked Tit	<i>Parus xanthoaevus</i>	Paridae	LC	UC
68	Baya weaver	<i>Ploceus philippinus</i>	Passeridae	LC	VC
69	Indian silver bill	<i>Euodice malabarica</i>	Passeridae	LC	UC
70	Paddy field Pipit	<i>Anthus rutulus</i>	Passeridae	LC	C
71	Red Avadavat	<i>Amandava amandava</i>	Passeridae	LC	UC
72	Scaly breasted munia	<i>lonchura punctulata</i>	Passeridae	LC	UC
73	White rumped munia	<i>Lonchura striata</i>	Passeridae	LC	UC
74	White Wagtail	<i>Motacilla alba</i>	Passeridae	LC	UC
75	white-browed wagtail	<i>Motacilla maderaspatensis</i>	Passeridae	LC	UC
76	Yellow Wagtail	<i>Motacila lava</i>	Passeridae	LC	C
77	Yellow-throated Sparrow	<i>Petronia xanthocollis</i>	Passeridae	LC	C
78	Indian pitta	<i>Pitta brachyura</i>	Pittidae	LC	R
79	Black Bulbul	<i>Hvnsinetes leucocephalus</i>	Pycnonotidae	LC	UC
80	Red-vented Bulbul	<i>Pycnonotuscafer</i>	Pycnonotidae	LC	VC
81	Red-whiskered Bulbul	<i>Pycnonotusjocosus</i>	Pycnonotidae	LC	VC
82	Yellow-browed Bulbul	<i>Iole indica</i>	Pycnonotidae	LC	C
83	Common myna	<i>Ascridotheres tristis</i>	sturnidae	LC	VC
84	Jungle myna	<i>Acridotheres fuscus</i>	sturnidae	LC	VC
Order: Trogoniformes					
85	Malabar trogon	<i>harpactes fasciatus</i>	trogonidae	LC	R
Order: Bucerotiformes					
86	Common Hoopoe	<i>Upupa epops</i>	Upupidae	LC	UC
Order: Coraciiformes					
87	Black caped kingfisher	<i>halcyon pileata</i>	Alcedinidae	LC	R
88	Common kingfisher	<i>Alcedo atthis</i>	Alcedinidae	LC	VC
89	oriental dwarf kingfisher	<i>Ceyx erithaca</i>	Alcedinidae	LC	R
90	Stork billed kingfisher	<i>pelargopsis capensis</i>	Alcedinidae	LC	R
91	White-breasted Kingfisher	<i>Halcvon smyrnensis</i>	Alcedinidae	LC	VC
92	Pied Kingfisher	<i>Ceryle rudis</i>	Alcedinidae	LC	C
93	Indian Roller	<i>Coracias benahalensis</i>	Coraciidae	LC	C
94	Chestnut bee eater	<i>Merops leschenaulti</i>	Meropidae	LC	C
95	Green Bee-eater	<i>Merops orientalis</i>	Meropidae	LC	VC

Sr. no	Common Name	Scientific Name	Family	IUCN Status	Abundance status
Order: Apodiformes					
96	House Swift	<i>Apus aftinis</i>	Apodidae	LC	C
97	Cattle egret	<i>Ardea Purpurea</i>	Ardeidae	LC	VC
98	Indian Pond Heron	<i>Ardeola aravii</i>	Ardeidae	LC	VC
99	Intermediate egret	<i>Ardea intermedia</i>	Ardeidae	LC	VC
100	Little Egret	<i>Egretta garzetta</i>	Ardeidae	LC	VC
Order: Bucerotiformes					
101	Great Hornbill	<i>Buceros bicornis</i>	Bucerotidae	NT	C
102	Malabar grey hornbill	<i>Ocyrceros griseus</i>	Bucerotidae	LC	C
103	Malabar Pied Hornbill	<i>Anthracoceros coronatus</i>	Bucerotidae	NT	C
Order: Caprimulgiformes					
104	Indian Nightjar	<i>Caprimulgus asiaticus</i>	Caprimulgidae	LC	UC
105	Sykes's Nightjar	<i>Caorimulauis mahrattensis</i>	Caprimulgidae	LC	UC
106	Greater Coucal	<i>Centronus sinensis</i>	Centronodidae	LC	C
Order: Charadriiformes					
107	Red-wattled Lapwing	<i>Vanellus indicus</i>	Charadriidae	LC	C
108	River Tern	<i>Sterna aurantia</i>	Laridae	NT	C
109	Common Sandpiper	<i>Actitis hypoleucos</i>	Scolonacidae	LC	UC
Order: Columbiformes					
110	Blue Rock Pigeon	<i>Columba livia</i>	Columbidae	LC	VC
111	Emerald Dove	<i>Chalcophaps indica</i>	Columbidae	LC	C
112	Laughing Dove	<i>Spilopelia senegalensis</i>	Columbidae	LC	VC
113	Oriental Turtle Dove	<i>Streptaoelia orientalis</i>	Columbidae	LC	C
114	Spotted dove	<i>Spilopelia chinensis</i>	Columbidae	LC	VC
115	Yellow footed green pigeon	<i>Treron Phoenicopterus</i>	Columbidae	LC	C
Order: Falconiformes					
116	Common kestrel	<i>Falco tinnunculus</i>	Falconidae	LC	UC
117	Peregrine Falcon	<i>Falco peregrinus</i>	Falconidae	LC	UC
Order: Piciformes					
118	Brown-headed Barbet	<i>Psilooaon zevlanicus</i>	Megalaimidae	LC	C
119	Coppersmith barber	<i>Megalaima haemacephala</i>	Megalaimidae	LC	C
120	White Cheeked barbet	<i>Megalaima zelyanica</i>	Megalaimidae	LC	UC
121	Brown headed barbet	<i>Meqaloima viridis</i>	Megalaimidae	LC	C
122	Common flame back	<i>Dinopium javanense</i>	Picidae	LC	VC
123	Rufous woodpecker	<i>Micropternus brachyurus</i>	Picidae	LC	UC

Sr. no	Common Name	Scientific Name	Family	IUCN Status	Abundance status
Order: Suliformes					
124	Indian cormorant	<i>Phalacrocorax fuscicollis</i>	Phalacrocoracidae	LC	C
Order: Galliformes					
125	Grey Junglefowl	<i>Gallus sonneratii</i>	Phasianidae	LC	C
126	Indian peafowl	<i>pavo cristatus</i>	Phasianidae	LC	C
127	jungle bush quill	<i>perdicula asiatica</i>	Phasianidae	LC	C
128	Red Spurfowl	<i>Galloperdix spadicea</i>	Phasianidae	LC	C
129	White breasted water hen	<i>Amaurornis Phoenicurus</i>	Rallidae	LC	C
Order: Pittaciformes					
130	Alexandrine Parakeet	<i>Psittacula eupatria</i>	Psittacidae	NT	C
131	plum headed parakeet	<i>Psittacula cyanocephala</i>	Psittacidae	LC	C
132	Rose-ringed Parakeet	<i>Psittacula krameri</i>	Psittacidae	LC	C
133	vernal hanging parrot	<i>Loriculus vernalis</i>	Psittacidae	LC	UC
Order: Strigiformes					
134	Spotted owlet	<i>Athene brama</i>	Strigidae	LC	UC
135	Indian Eagle Owl	<i>Bubo bengalensis</i>	Strigidae	LC	UC
136	Common Barn owl	<i>Tyto alba</i>	Tytonidae	LC	C

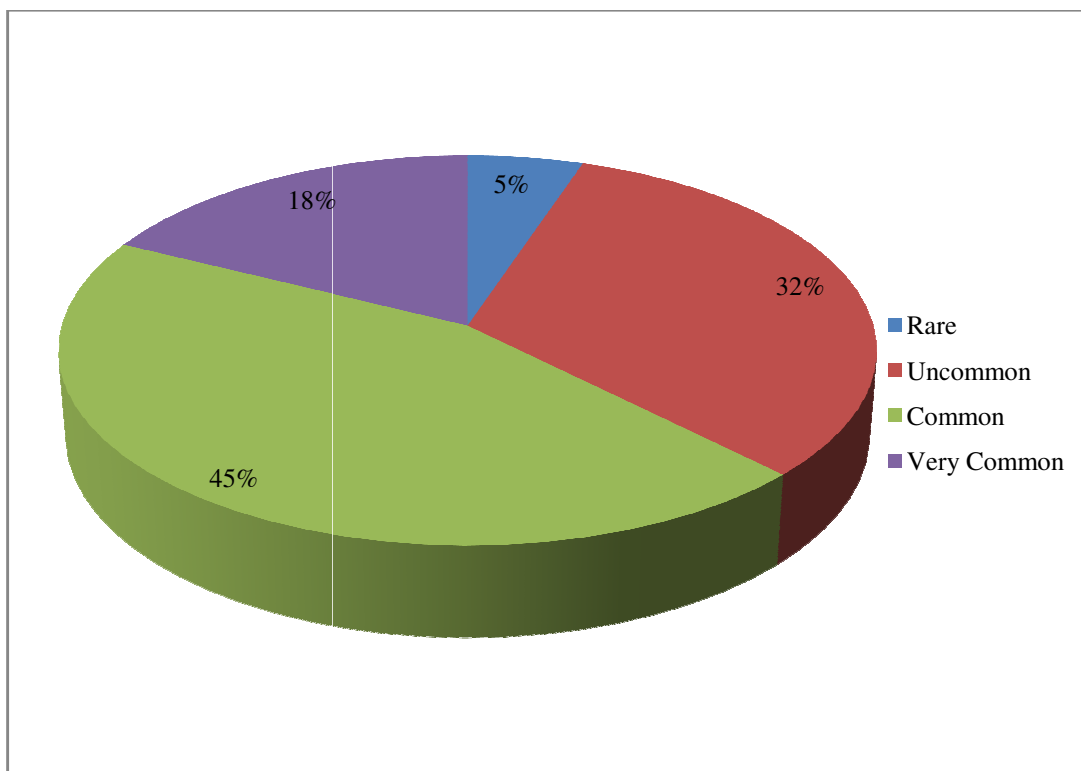


Figure-1: Representing abundance status of birds.

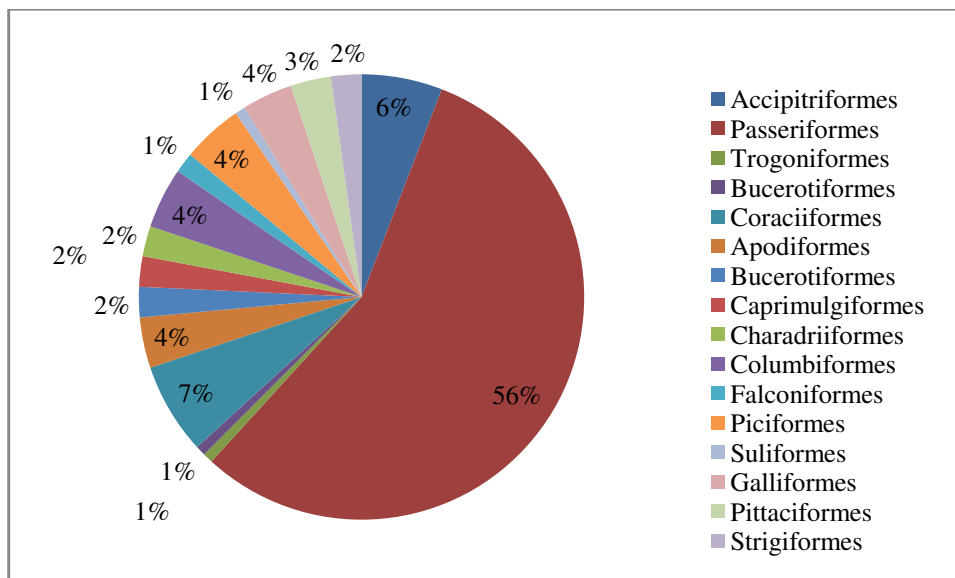


Figure-2: Representing percent of birds occurrence in particular order.

**Abbreviations used:** WLS: Wild Life Sanctuary, IUCN: International Union for Conservation of Nature, LC: Least Concern, NT: Near Threatened, VU: Vulnerable, CR: Critically Endangered, R: Rare, C: Common, UC: Uncommon, VC: Very Common.

## References

- Grimmett R., Inskipp C. and Inskipp T. (2013). Pocket guide to the Birds of Indian subcontinent. Oxford university press, New Delhi, India, 1-226, ISBN: 9781408162644
- Pritesh Ghadigaonkar (2016). Avian diversity in and around Ajoba fort, Thane District, Maharashtra. *International research Journal of biological science*, 5(2), 7-15.
- Farheen Khan (2016). Seasonal variation of avifaunal diversity of wetland near new VIVA college, Virar West, District Palghar, Maharashtra India. *International research Journal of Environmental science*, 5(11), 47-55.
- Pawar P.R. (2011). Species diversity of birds in mangroves of Uran (Raigad), Navi Mumbai, Maharashtra, West coast of India. *Journal of Experimental Sciences*, 2(10), 73-77.
- Walmiki N. (2013). Avian diversity in and around Bassein Fort and Creek, Dist. Thane, Maharashtra. *International Journal of Advanced Research*, 1(3), 73-85.
- Dekate H.M. and Baviskar R.M. (2016). Biodiversity of avifauna in Mumbri creek of south Konkan, Deogad Taluka Maharashtra. *Int. J. of Life Science*, 4, 145-147.
- Patil A.J., Rao G.B., Shirke B., Babu S. and Quadros G. (2015). Diversity of avifauna in the shallow pat lake in Kudal taluka of sindhudurga district. UGC sponsored National seminar on 'Wetland- Present status ,ecology and conservation, 20-25.
- Varkey J., Pandirkar A.H., Fernandes B., Pathak K., Khadye P. and Ghadigaonkar P. (2015). Threats to the existing diversity of avifauna of Gogte salt plant, Mumbai. Suburb Proceedings of the UGC Sponsored National Seminar on Wetlands: Present Status, Ecology and Conservation, India, 1-8.
- Avibase-Bird checklist of the world (Sindhudurga) (2017), <http://avibase.bsc-eoc.org/checklist.jsp?region=INswmhsi&list=howardmoore>, 18 Aug 2017
- Indian biodiversity portal (2017). Checklist of birds of Radhanagari Wildlife sanctuary. [http://oldwww.wii.gov.in/nwd\\_birds/rad.htm](http://oldwww.wii.gov.in/nwd_birds/rad.htm), 18 Aug 2017
- Ali S. and Dillon R. (2003). A pictorial Guide to the Birds of the Indian Subcontinent, Oxford, India. 1-466, ISBN: 0195665236
- Bikram Grewal (2016). A pictorial field guide to Birds of India, pakistan, Nepal, Bhutan, Shrilanka and Bangladesh. Om Book International, India, 789, ISBN: 10987654321