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Bird diversity of Narmada wetland area and its adjoining habitat of Mathwad Range Alirajpur Division, Madhya Pradesh, India

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Abstract

The Mathwad range is located near to the river Narmada in Alirajpur Forest Division Madhya Pradesh India. In Mathwad range most of the forest area has lying under Deccan Trap, where there are plateaus, ridges, slopes and valleys along the bank of the river Narmada. The altitude of the study area varies from 80m to 800 m above mean sea level. The study area has all types of plant species including trees specially fruiting trees, shrub, herbs, climbers, and grasses. The biodiversity of the study area is observed very rich. The total numbers of 122 birds' species were recorded in the selected study area, during the study period between May 2017 to June 2018. The data were analyzed by using Shannon-Wiener function formula and as the species diversity (H) is recorded as-4.56, maximum diversity (Hmax)-4.80 and evenness (J)-0.95. These data suggest that Mathwad range is suitable habitat for water birds and other bird species because of the good availability of food and nesting ground in the study area. It is very significance factor affecting the abundance of avian fauna.

Keywords: Bird, diversity index, habitat, wetland

Introduction

In an ecosystem, avian fauna play very important role as an ecological indicators to understand the quality of habitats. In present scenario bird diversity is decreasing day by day due to the destruction of natural habitats, over exploitation of forest resources, soil erosion etc. Water pollution and deterioration in quality of water sources is the major issues for decreasing the bird population and also done various anthropogenic activities in natural habitat^[9, 19]. The destruction of different types of habitats by cutting food provider trees and foraging plants for household use of woods and required lands for residential purposes are the main factor responsible for lower down in bird foraging habitat and their nesting sites. Therefore, the majority avian species are unknowingly enters to inhabit in the urban areas. As per the classification of Champion & Seth 1968, the forests in the study area belong to the forest type 5A-Southern Tropical Dry Deciduous Forests^[8]. The study area covers maximum area i.e. as (42.91%) agriculture land, followed by forest land (23.16%), scrub land (17.99%), fallow land and area under wetland mainly, Narmada river (7.20%). It is located between latitude 21°57'1.58"N and longitude 74°15'18.19". Previous record of bird diversity of this area of Mathwad range Alirajpur Division Madhya Pradesh was not found. During the present study, natural habitat near River Narmada, hilly forest area, there are many fruiting plant and fallow lands were selected as observation sites where many species of birds and other wild animals inhabits in the area. Present study will be supportive to prepare a baseline data on avifauna diversity with their relative abundance and occurrence records of resident and migratory birds in different ecological sites of the Mathwad range Alirajpur Division Madhya Pradesh.

Materials and Methods

The study was conducted in the reserve forest area and adjoining habitats of Mathwad range of Alirajpur Forest Division. Mathwad is located at Tri-state boundary Maharashtra, Gujarat and Madhya Pradesh and it gives special importance to the River Narmada rather than its

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ecological & environmental importance. The River Narmada also a popular destination of huge avian fauna. Selected five types of habitats around the study area for the purpose of avian fauna biodiversity exploration. Narmada River is big water bodies which cover the study area, whereas develops huge wetland area (WL) and second has in the agriculture land (AL), which provide food in *Kharif* and *rabi* season in the study area. In forest area have dense trees patches somewhere scattered trees, small bushes, small and big flowering plants and small reservoir passing through the area sampling also done in dense forest (DF), Scrubland (SL) in the study area having small trees and bushes. Fallow land (FL) asylums in between and surrounding all the habitats (Map-1).

The study area was visited every month during the study period. The detailed bird survey was conducted in the early hours (5 am to 9 am) and evening hours (4.00 pm to 6.30 pm) in summer season. And other hand bird survey was conducted in the other season early hours (6 am to 10 am) and evening hours (3.00 pm to 6.00 pm). A total of 60 days were spent for counting birds, observed plants and collecting other ecological data. Avian fauna were counted by transect line, point counting and look and see methods.^[7] A field binocular make (Hawke Nature-track) with magnification 8x42 waterproof were used by all team members to observe and identify bird species. Observations were made by standing and sitting from a hiding place. Photographs were taken with the help of camera (Nikon Coolpix B700), identify birds accurately to the generic and species level, and maintain their visual records permanently^[10, 12]. Within each habitat, four transects were established about 500 m long and 50 m wide in each habitat.^[18] The data were analyzed using by Shannon Wiener function formula;^[21] species diversity (H), maximum diversity (Hmax), and evenness (J)

$$H = \sum_{i=1}^s (P_i * \ln P_i) \quad H_{max} = \log_s J = H' / H_{max}$$

Result and Discussion

In this study total 122 bird species were reported and their IUCN status and residential status from different habitats of the study area Mathwad range of Alirajpur Forest Division shown in Table 1. The outcome of this study shows that bird species diversity was habitually distributed in all the sites and most of bird fauna are resident of that area. Seventeen (17) migratory bird species were also recorded from the study area. As far as study of avian diversity of India is concerned, many workers have made useful contributions in this regard^[1, 3, 5, 11, 13, 20]. Most of the migratory bird species are wetland and shore birds who came to spend winters in India. Similar studies have been carried out by focusing attention on the overall pattern and spectrum of winter migratory birds that arrive in rural ponds, lake, canals, and dams etc in Karnal, Haryana and in contest to the Ramsan conversion^[6, 14, 15]

The number of birds were recorded to be highest in dense forest area (3380) followed by wetland (2894) agriculture land (2702), scrubland (2456), and the lowest in fellow land (699). Species diversity and status of each bird species in five habitats were different as the habitat and vegetation cover.

The study area found rich in aquatic plant species such as *Ipomoea aquatica* is surrounded to both wetland and back

water bodies of Narmada River and other water bodies having varieties of weeds like *Hydrilla verticillata*, *Najas minor*, *Chara zeylennica* and *Spirogyra spp.* many varieties of fishes and water insects, which supports the wetland birds^[15]. Dense forest and scrubland plantation which were mainly dominated by bamboo and other varieties plant species like Salai (*Boswellia serrata*), Semal (*Bombax ceiba*), Neem (*Azadirachta indica*), Amaltas (*Cassia fistula.*), Shisam (*Dalbergia latifolia*), Moyan (*Lannea coromandelica*), Kher (*Acacia catechu*), Palas (*Butea monosperma*) (Flame of forest), Teak (*Tectona grandis*), Anjan (*Hardwickia binata*), Chirol (*Holoptelea integrifolia*), Landia (*Lagerstroemia parviflora*), Peepal (*Ficus religiosa*), Saja (*Terminalia tomentosa*), Koha (*Terminalia arjuna*), Garudfal (*Radermachera xylocarpa*) etc. Agriculture lands and forest area having many varieties of fruiting trees as like Jamun (*Syzygium cumini*), Gullar (*Ficus racemosa*), Chironji (*Bachanania lanzan*), Bel (*Aegle marmelos*), Sitafal (*Annona squamosa*), Mahua (*Madhuca longifolia*) on the other hand *rabi* and *kharif* crops provide food material of many bird species. Fallow land having diverse type of grasses like, *Apluda mutica* *Aristida adscensionis* *Arthraxon hispidus* *Bothriochloa bladhii* *Bothriochloa intrmedia* *Bothriochloa pertusa* *Chloris barbata* *Chloris tenella* *Cymbopogon martini* *Cymbopogon martini* *Dichanthium annulatum* *Eragrostis tenella* *Heteropogon contortus* *Themeda quadrivalvis* which support and fascinate many bird species.

Many tempting habitats of the study area provides a place for nesting and breeding for different tropic levels of central Indian highlands in the state of Madhya Pradesh comprise the

Satpura and Vindhya Ranges which are separated by River Narmada^[16].

Thirty three species were commonly found in all the five habitats viz. Ashy crowned sparrow lark (*Eremopterix grisea*) Ashy drongo (*Dicrurus leucophaeus*) Asian pied starling (*Sturnus contra*) Black kite (*Milvus migrans*) Cattle egret (*Bubulcus ibis*) Citrine Wagtail (*Motacilla citreola*) Common myna or Indian myna (*Acridotheres tristis*) Great egret (*Casmerodius albus*) Greater Coucal (*Centropus sinensis*) Green Bee-eater (*Merops orientalis*) Grey francolin (*Francolinus pondicerianus*) Grey Wagtail (*Motacilla cinerea*) House sparrow (*Passer domesticus*) Indian peafowl (*Pavo cristatus*) Indian silverbill (*Lonchura malabarica*) Intermediate egret (*Mesophoyx intermedia*) Jungle babbler (*Turdoides striata*) Large Grey Babbler (*Argya malcolmi*) Lesser whitethroat (*Sylvia curruca*) Little egret (*Egretta garzetta*) Oriental magpie robin (*Copsychus saularis*) Paddy field pipit (*Anthus rufulus*) Plum headed parakeet (*Psittacula cyanocephala*) Red vented bulbul (*Pycnonotus cafer*) Red wattled lapwing (*Vanellus indicus*) Rock pigeon (*Columba livia*) Rose-ringed parakeet (*Psittacula krameri*) Spotted dove (*Stigmatopelia chinensis*) Streak throated swallow (*Hirundo fluviicola*) White Wagtail (*Motacilla alba*) White-browed Wagtail (*Motacilla maderaspatensis*) White-throated kingfisher (*Halcyon smyrnensis*) Yellow wagtail (*Motacilla flava*). Many new species have been added to the Indian checklist^[2, 4, 17]

The Cattle egret (*Bubulcus ibis*) found the most frequent observed bird during the study period in wetland area. The highest numbers of Cattle egret was recorded -300 followed by Indian cuckoo (*Cuculus micropterus*) -93 (DF), Rose-ringed parakeet (*Psittacula krameri*) -108 (AL), Black kite (*Milvus migrans*) -44 (FL), Purple rumped sunbird

(*Nectarinia zeylonica*)-69 (SL), Asian pied starling (*Sturnus contra*) – 02 (WL), Verditer flycatcher (*Eumyias thalassina*) -04 (DF), Grey Heron (*Ardea cinerea*)-02, (AL) Asian-paradise flycatcher (*Terpsiphone paradasi*)-(FL) & Brown shrike (*Lanius cristatus*)-02 (SL).

The data were analyzed using Shannon Wiener function formula and result revealed that the species diversity (H) of the area is recorded -4.56, maximum diversity (Hmax)-4.80, and evenness (J)-0.95 all the habitats i.e. Comparative data of individual five habitats clearly indicates that scrubland has recorded highest diversity (H)-4.47, (J)-0.97 and lowest in wetland (H)-3.60, (J)-0.85 (Table-2 and Graph-1). This study shows positive relationship between healthy ecosystems to bird recorded.

Conclusion

Total 122 species of avian diversity observed in the different

habitats during study period that highlight the bird diversity in study area species diversity (H) was recorded as-4.56, maximum diversity (Hmax)-4.80 and evenness (J)-0.95. The main reason is rhythmically availability of food, suitable places for nesting and breeding, and shelter in almost all the selected habitat types viz. scrubland, wetland, agriculture land, dense forest and fellow land. Healthy ecosystem of these all habitats evenly contributes for conservation of avian fauna and supports significant number of birds' species. All season varieties of fruiting trees and flowering plants attract more and more avian fauna and also offer natural nesting sites to birds. Therefore, it is recommended that regular monitoring of the site should be carried out which will helps to protect the unique and composite ecosystems of the area and also ensure better protection of resource richness and develops on sustainable ground for betterment of avifauna and their utilization.

Table 1: Bird species and their populations in the different types of habitats in the study area of Mathwad range, Alirajpur Division Madhya Pradesh, India.

S. No	Species	Number of birds in different type of habitats					IUCN Status	Residential status M/LM/R
		WL	DF	AL	FL	SL		
1.	Alexandrine parakeet (<i>Psittacula eupatria</i>)	00	05	52	11	22	NT	R
2.	Ashy crowned sparrow lark (<i>Eremopterix grisea</i>)	05	25	09	02	05	LC	R
3.	Ashy drongo (<i>Dicurus leucophaeus</i>)	05	65	20	15	11	LC	R
4.	Ashy prinia (<i>Prinia socialis</i>)	00	10	32	39	14	LC	R/LM
5.	Asian koel (<i>Eudynamis scolopaceus</i>)	00	31	36	08	27	LC	R
6.	Asian Openbill (<i>Anastomus oscitans</i>)	35	00	00	00	00	LC	M
7.	Asian pied starling (<i>Sturnus contra</i>)	02	29	51	02	14	LC	R
8.	Asian-paradise flycatcher (<i>Terpsiphone paradasi</i>)	00	24	05	00	02	LC	R
9.	Barn owl (<i>Tyto alba</i>)	00	24	20	00	07	LC	R
10.	Barn swallow (<i>Hirundo rustica</i>)	00	43	10	00	11	LC	LM
11.	Black drongo (<i>Dicurus macrocercus</i>)	00	50	35	02	25	LC	R
12.	Black headed ibis (<i>Threskiornis melanocephalus</i>)	22	00	00	00	00	NT	M
13.	Black kite (<i>Milvus migrans</i>)	11	40	30	44	21	LC	R
14.	Black Winged Stilt (<i>Himantopus himantopus</i>)	29	00	00	00	00	LC	R
15.	Black-lored tit (<i>Parus xanthogenys</i>)	00	00	09	07	05	LC	R
16.	Blue Rock Thrush (<i>Monticola solitaries</i>)	00	22	12	00	10	LC	M
17.	Blyth's pipit (<i>Anthus campestris</i>)	00	12	10	00	10	LC	R
18.	Booted warbler (<i>Hippolais caligata</i>)	00	34	10	05	11	LC	R
19.	Brahminy starling (<i>Sturnus pagodarum</i>)	00	18	15	05	19	LC	R
20.	Brown fish owl (<i>Bubo zeylonensis</i>)	00	09	08	00	05	LC	R
21.	Brown Shrike (<i>Lanius cristatus</i>)	11	25	36	00	02	LC	M
22.	Cattle egret (<i>Bubulcus ibis</i>)	300	30	91	32	52	LC	R
23.	Chestnut shouldered petronia (<i>Petronia xanthocollis</i>)	01	39	18	00	09	LC	R
24.	Citrine Wagtail (<i>Motacilla citreola</i>)	30	55	32	04	22	LC	M
25.	Common golden back Woodpecker (<i>Dinopium javanense</i>)	00	20	08	00	08	LC	R
26.	Common hoopoe (<i>Upupa epops</i>)	00	60	20	00	22	LC	R
27.	Common kestrel (<i>Falco tinnunculus</i>)	00	23	10	00	11	LC	RM
28.	Common kingfisher (<i>Alcedo atthis</i>)	00	25	32	10	25	LC	R
29.	Common moorhen (<i>Gallinula chloropus</i>)	10	10	08	00	01	LC	R
30.	Common myna or Indian myna (<i>Acridotheres tristis</i>)	42	23	54	12	30	LC	R
31.	Common sandpiper (<i>Actitis hypoleucos</i>)	29	00	00	00	00	LC	M
32.	Common stonechat (<i>Saxicola torquata</i>)	07	14	05	00	18	LC	M
33.	Common Swift (<i>Apus apus</i>)	50	20	11	00	14	LC	R
34.	Common Tailorbird (<i>Orthotomus sutorius</i>)	00	25	24	00	25	LC	R
35.	Common Wood shrike (<i>Tephrodornis pondicerianus</i>)	00	12	05	00	15	LC	R
36.	Coppersmith barbet (<i>Megalaima haemacephala</i>)	00	55	11	00	25	LC	R
37.	Crested Bunting (<i>Melophus lathami</i>)	00	25	11	02	17	LC	R
38.	Desert Wheatear (<i>Oenanthe deserti</i>)	05	30	11	00	15	LC	M
39.	Eurasian collared dove (<i>Streptopelia decaocto</i>)	00	10	25	15	39	LC	R
40.	Great Cormorant (<i>Phalacrocorax carbo</i>)	80	00	00	00	00	LC	M
41.	Great egret (<i>Casmerodius albus</i>)	300	30	29	10	55	LC	R
42.	Great Thick-knee (<i>Esacus recurvirostris</i>)	48	00	00	00	00	NT	R
43.	Great Tit (<i>Parus major</i>)	00	25	00	00	24	LC	R

44.	Greater Coucal (<i>Centropus sinensis</i>)	01	64	37	15	34	LC	R
45.	Green Bee-eater (<i>Merops orientalis</i>)	39	80	44	12	48	LC	R
46.	Grey bellied cuckoo (<i>Cacomantis passerines</i>)	00	26	11	00	12	LC	R
47.	Grey francolin (<i>Francolinus pondicerianus</i>)	11	36	66	43	22	LC	R
48.	Grey Heron (<i>Ardea cinerea</i>)	48	05	02	00	04	LC	R
49.	Grey necked bunting (<i>Emberiza buchanani</i>)	00	00	22	00	18	LC	M
50.	Grey Wagtail (<i>Motacilla cinerea</i>)	12	39	20	08	29	LC	M
51.	House crow (<i>Corvus splendens</i>)	00	35	18	02	38	LC	R
52.	House sparrow (<i>Passer domesticus</i>)	11	80	47	10	28	LC	R
53.	Indian Black Ibis (<i>Pseudibis papillosa</i>)	39	00	00	00	00	LC	R
54.	Indian cormorant (<i>Phalacrocorax fuscicollis</i>)	50	00	00	00	00	LC	R
55.	Indian cuckoo (<i>Cuculus micropterus</i>)	00	93	38	10	27	LC	R
56.	Indian golden oriole (<i>Oriolus kundoo</i>)	00	64	22	00	27	LC	R
57.	Indian Jungle Crow (<i>Corvus culminatus</i>)	00	39	23	11	24	LC	R
58.	Indian peafowl (<i>Pavo cristatus</i>)	09	34	11	21	25	LC	R
59.	Indian pond heron (<i>Ardeola grayii</i>)	80	00	00	00	00	LC	R
60.	Indian robin (<i>Saxicoloides fulicata</i>)	00	28	25	10	33	LC	R
61.	Indian roller or Blue joy (<i>Coracias benghalensis</i>)	00	79	22	02	45	LC	R
62.	Indian Silver bill (<i>Euodice malabarica</i>)	00	80	22	05	29	LC	R/LM
63.	Indian silver bill (<i>Lonchura malabarica</i>)	01	29	43	02	31	LC	R/LM
64.	Indian Spot billed Duck (<i>Anas poecilorhyncha</i>)	28	00	00	00	00	LC	R
65.	Intermediate egret (<i>Mesophoyx intermedia</i>)	289	31	68	22	29	LC	R
66.	Jungle babbler (<i>Turdoides striata</i>)	20	55	44	10	47	LC	R
67.	Jungle Bush quail (<i>Perdicula asiatica</i>)	12	00	07	00	00	LC	R
68.	Knob billed duck (<i>Sarkidiornis melanotos</i>)	32	00	00	00	00	LC	R
69.	Large Grey Babbler (<i>Argya malcolmi</i>)	10	34	15	06	29	LC	R
70.	Laughing dove (<i>Streptopelia senegalensis</i>)	00	05	18	05	10	LC	R
71.	Lesser whistling duck (<i>Dendrocygna javanica</i>)	30	00	00	00	00	LC	M
72.	Lesser white throat (<i>Sylvia curruca</i>)	18	76	53	20	58	LC	M
73.	Little cormorant (<i>Phalacrocorax niger</i>)	20	00	00	00	00	LC	R
74.	Little egret (<i>Egretta garzetta</i>)	31	65	78	29	38	LC	R
75.	Little grebe (<i>Tachybaptus ruficollis</i>)	32	00	00	00	00	LC	M
76.	Little Ringed Plover (<i>Charadrius dubius</i>)	72	00	00	00	00	LC	R
77..	Little Stint (<i>Calidris minuta</i>)	10	00	00	00	00	LC	M
78.	Little swift (<i>Apus affinis</i>)	10	00	00	00	39	LC	R
79.	Long tailed shrike (<i>Lanius schach</i>)	00	39	05	00	25	LC	R
80.	Mottled wood owl (<i>Strix ocellata</i>)	00	21	42	00	19	LC	R
81.	Oriental magpie robin (<i>Copsychus saularis</i>)	10	37	16	10	32	LC	R
82.	Oriental white eye (<i>Zosterops palpebrosus</i>)	00	28	10	00	22	LC	R
83.	Paddy field pipit (<i>Anthus rufulus</i>)	20	74	29	18	38	LC	R
84.	Pied bushchat (<i>Saxicola caprata</i>)	04	65	54	00	45	LC	R
85.	Pied kingfisher (<i>Ceryle rudis</i>)	38	00	00	00	00	LC	R
86.	Plain prinia (<i>Prinia inornata</i>)	00	46	15	10	37	LC	LM
87.	Plum headed parakeet (<i>Psittacula cyanocephala</i>)	16	28	38	10	31	LC	LM
88.	Purple heron (<i>Ardea purpurea</i>)	73	00	00	00	00	LC	R
89.	Purple rumped sunbird (<i>Nectarinia zeylonica</i>)	00	71	38	00	69	LC	LM
90.	Purple sunbird (<i>Nectarinia asiaticus</i>)	00	69	11	00	49	LC	R
91.	Purple swamphen (<i>Porphyrio porphyrio</i>)	00	52	65	00	37	LC	LM
92.	Red avadavat (<i>Amandava amandava</i>)	00	12	28	10	25	LC	R
93.	Red throated flycatcher (<i>Ficedula parva</i>)	05	28	10	00	14	LC	LM
94.	Red vented bulbul (<i>Pycnonotus cafer</i>)	10	65	30	18	55	LC	R
95.	Red wattled lapwing (<i>Vanellus indicus</i>)	90	10	38	05	14	LC	R
96.	River Lapwing (<i>Vanellus duvaucelii</i>)	88	00	00	00	00	NT	R
97.	River Tern (<i>Sterna aurantia</i>)	85	00	00	00	00	NT	R
98.	Rock pigeon (<i>Columba livia</i>)	28	22	90	27	08	LC	R
99.	Rose-ringed parakeet (<i>Psittacula krameri</i>)	28	88	108	25	57	LC	M
100.	Ruddy Shelduck (<i>Tadorna ferruginea</i>)	36	00	00	00	00	LC	M
101.	Rufous tailed lark (<i>Ammonomanes phoenicurus</i>)	04	65	30	00	55	LC	R
102.	Rufous treepie (<i>Dendrocitta vagabunda</i>)	00	67	20	00	48	LC	R
103.	Scaly breasted munia (<i>Lonchura punctulata</i>)	00	47	32	00	12	LC	RM
104.	Shikra (<i>Accipiter badius</i>)	00	27	34	00	11	LC	R
105.	Small minivet (<i>Pericrocotus cinnamomeus</i>)	00	35	18	10	28	LC	R
106.	Southern coucal (<i>Centropus sinensis</i>)	00	16	19	00	28	LC	R
107.	Spotted dove (<i>Stigmatopelia chinensis</i>)	25	23	51	35	11	LC	R
108.	Spotted owl (<i>Athene brama</i>)	00	20	43	00	20	LC	R
109.	Streak throated swallow (<i>Hirundo fluvicola</i>)	12	43	73	11	38	LC	R
110.	Striated heron (<i>Butorides striata</i>)	38	00	00	00	00	LC	LM
111.	Sykes's lark (<i>Galerida deva</i>)	00	25	10	00	14	LC	R

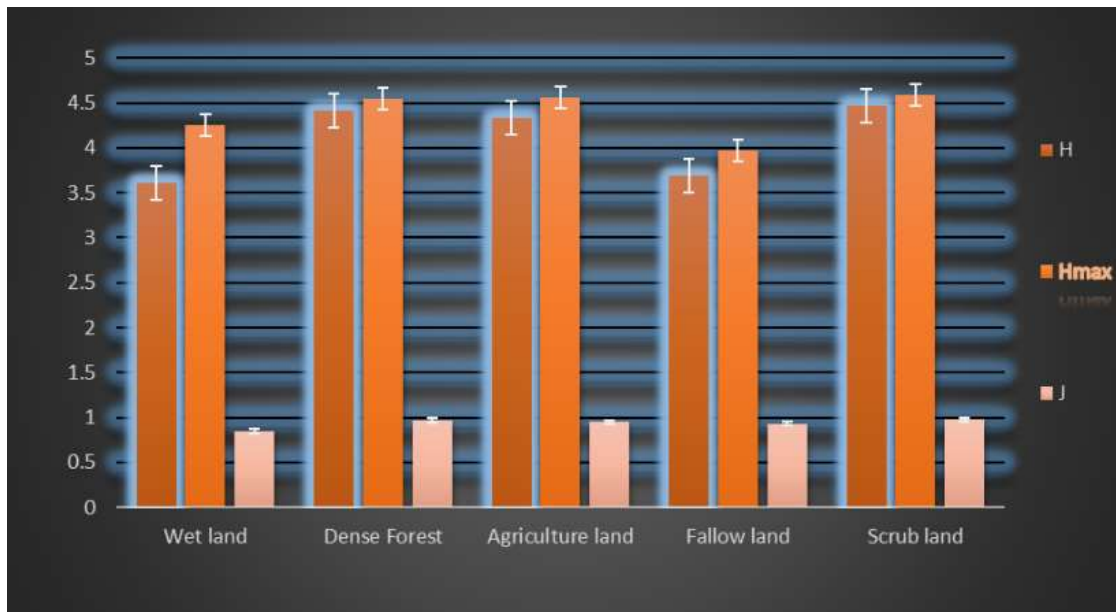
112.	Tickell’s blue flycatcher (<i>Cyornis tickelliae</i>)	00	25	00	00	22	RC	LM
113.	Tickell’s leaf warbler (<i>Phylloscopus affinis</i>)	00	47	21	00	28	LC	R
114.	Tree pipit (<i>Anthus trivialis</i>)	00	78	35	00	49	LC	R
115.	Verditer flycatcher (<i>Eumyias thalassina</i>)	00	04	16	00	12	LC	R
116.	White Wagtail (<i>Motacilla alba</i>)	18	28	15	10	30	LC	M
117.	White-browed Fantail (<i>Rhipidura aureola</i>)	00	20	33	00	11	LC	R
118.	White-browed Wagtail (<i>maderaspatensis</i>)	10	40	11	08	29	LC	R
119.	White-eyed Buzzard (<i>Butastur teesa</i>)	10	28	10	00	14	LC	R
120.	White-throated kingfisher (<i>Halcyon smyrnensis</i>)	28	38	18	14	21	LC	R
121.	Wooly necked Stork (<i>Ciconia episcopus</i>)	29	00	00	00	00	V	LM
122.	Yellow wagtail (<i>Motacilla flava</i>)	18	48	25	10	22	LC	LM
		2894	3380	2702	699	2456		

IUCN status: LC- Least concern V- Vulnerable, NT- Near threatened,
 Residential Status: R-Resident, LM- Local Migratory, M-Migratory

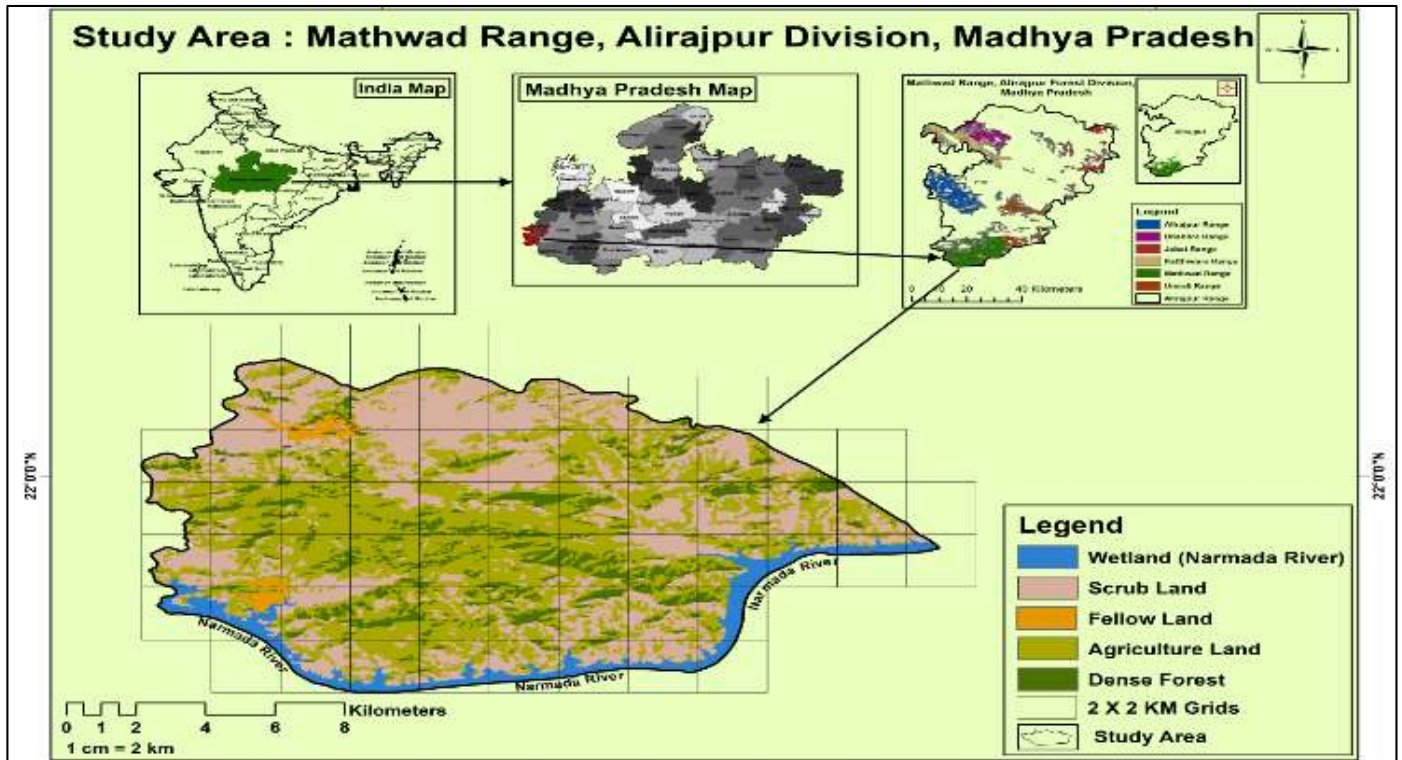
Table 2: Comparison of the Shannon-Wiener Index for birds found under different habitats in the study area of Mathwad range, Alirajpur Division Madhya Pradesh, India

S. No.	Habitats	H	Hmax	J
1.	Wetland	3.6047	4.2485	0.8485
2.	Dense Forest	4.4119	4.5539	0.9688
3.	Agriculture land	4.3313	4.5643	0.9489
4.	Fallow land	3.6939	3.9703	0.9304
5.	Scrub land	4.4692	4.5850	0.9747

H- Species Diversity Hmax-Maximum Diversity J- Evenness



Graph 1: Comparison of the Shannon-Wiener Index for birds found under different habitats around the study area of Mathwad range, Alirajpur Division Madhya Pradesh, India



Map 1: Location of study area and depiction of all habitats- 1-Wetland, 2- Scrubland 3- Fallow land 4-Agriculture land 5- Dense Forest

Migratory bird species recorded in Study Area



White Wagtail (*Motacilla alba*)



(Ruddy Shelduck *Tadorna ferruginea*)



Great Cormorant (*Phalacrocorax carbo*)



Common Sandpiper (*Actitis hypoleucos*)

Lesser white throat (*Sylvia curruca*)Black Headed Ibis (*Threskiornis melanocephalus*)Asian Openbill (*Anastomus oscitans*)River Tern (*Sterna aurantia*)River Lapwing (*Vanellus duvaucelii*)Grey Wagtail (*Motacilla cinerea*)

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