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ORIGINAL ARTICLE **OPEN ACCESS**

Monitoring on Aquatic Birds in The NNTR'S Navegaonbandh Reservoir with Reference to Ecological Niche

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ABSTRACT
Navegaonbandh Reservoir is one of the tourist point of Gondia districts. It is a part of Navegaon National Park situated in Arjuni Morgaon subdivision. This is one of the important bird areas in the district and also for diversity of flora and fauna. The Reservoir has a great history, right from construction of the reservoirs to conservation of the biodiversity; allied ecosystem and its habitat niche. Among the varied biodiversity, the avian diversity is one of the important elements to study for assessing the quality of habitat with reference to conservation of that habitat niche. The monitoring and survey on aquatic birds, this crucial ecosystem for avian biodiversity will helps to understand the status of aquatic ecosystem and habitat niche, which acts as a pilot role in maintaining the diverse population of aquatic organism as a trophic level to becomes ecosystem healthy. Because of many anthropogenic activities are found regularly in all the study points, and it seems to be a declining the status of ecosystem therefore the present work was carried out to know the status of habitat. The present study was a long term regular monitoring from 2018 to 2021. In the present investigation the total 84 species of birds belongs to 15 families from 5 orders of aquatic birds are given with their sighting sites in which birds prefer to acquire for feeding habits.
***KEY WORDS**: Monitoring, Aquatic birds, Navegaonbandh, Ecological Niche, Gondia*

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INTRODUCTION

The Navegaonbandh reservoir is a beautiful freshwater body and one of the best picnic spot of Gondia district of Maharashtra. Though this reservoir has esthetic and recreational values, it has one among the best ecosystem for various aquatic flora and fauna. This is oldest ecosystem and rich in nutrients culturally, abundant of all essentialities regarding healthiness of the ecosystem, so that the biodiversity of aquatic birds are attracted in all the seasons particularly in the winter season for migratory birds. This Reservoir traditionally a community asset, which was used as focal point of socio-cultural and economic activities but on the end of twentieth century, the water body getting gradual degradation might be due to the various anthropogenic disturbances, and/or unplanned development; also affect on the biodiversity of flora and fauna of the region. Some of important regulators of ecological consequences are extraordinary population growth, large scale industrialization and intensive agriculture based on large scale input of synthetic fertilizer and insecticide. These factors have adverse impact on the freshwater biodiversity directly due to increasing pollution and unbalance physicochemical aspects of water. The most important the invertebrates present in the littoral zone of water like the insect larvae, pupae, small fish, tadpoles, and benthic biodiversity either littoral or profoundly, have great role to attract the water birds in any ecosystem. In benthic macro-invertebrates, gastropods and pelecepods as a fodder, the birds have always interested in them. The benthos is vital source of food for birds and mammals, reptiles and amphibians. The changes if occur in aquatic habitat leads to changes in invertebrates assemblages which may directly impact over the habitat niches of various organism whose been depends over on it, particularly birds. Birds are always sensitive for their habitat change, any consequent environmental changes exceeded the tolerance limit of species habitat niche change also become an ultimate cause for long term changes in the bird distribution. The population of bird is a sensitive indicator of pollution [1,2] or best indicators of ecosystem, health function as early warning system [3,4]. The present study is to focus on diversity of aquatic birds visited and sighted to the particular sites, the long term regular monitoring for diversity of birds to understand the richness of bird's food source where they visited most.

This study highlighted diversity of birds as per the structure of specific ecological niches, in which it requires special attention for additional long term studies to assess the complete trends and changes on ecological niches.

MATERIAL AND METHODS

The regular fortnightly monitoring/observation on aquatic bids were carried out throughout the year, birds were observed by using binocular. Identification of the birds was done by standard literature [5,6,7]. Observations were made every Sunday throughout the years during 2018 to 2021 from morning to evening. The bird watching was done from following two study sites.

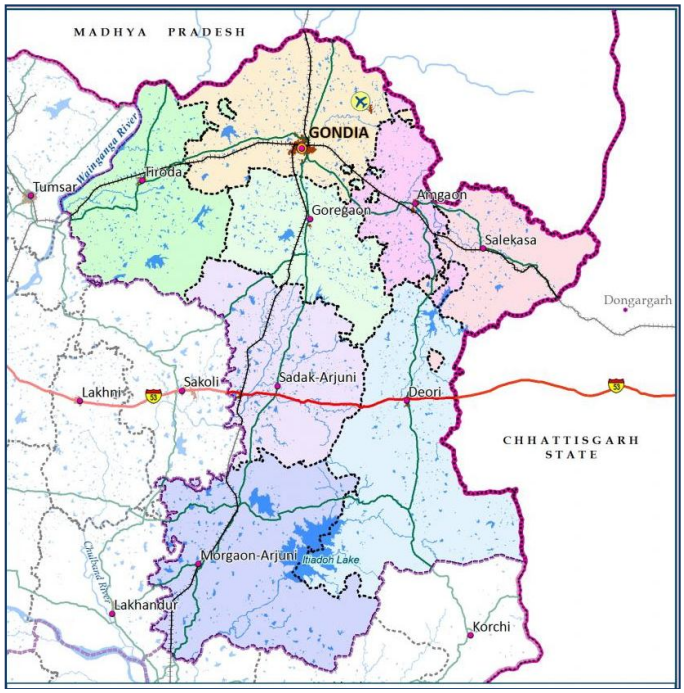
ABOUT NAVEGONBANDH RESERVOIR

It is also known as Navegaon Dam, very adjacent to Navegaonbandh village, situated in Arjuni Taluka of district Gondia, Maharashtra. This dam was built by the Kolu patil in the 18th century. The dam is surrounded by forest from all sides and lies at south-west boundaries of Navegaon National Park. This is popular site for nature lover and tourist destination. The main purpose of the water is for irrigation. The water cover spread over about 122766 hectares.

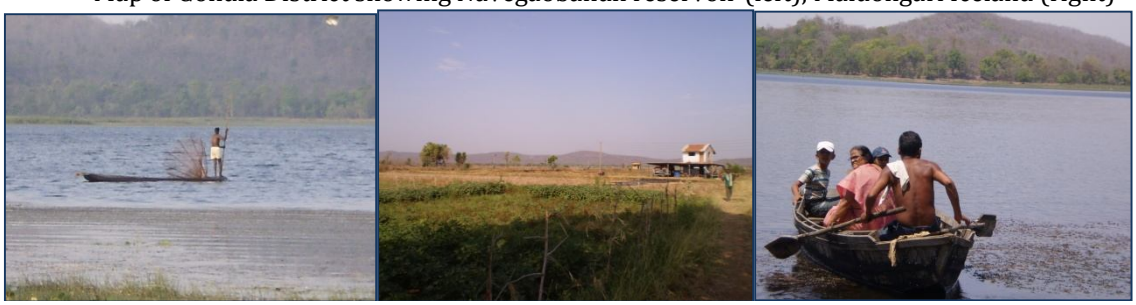
STUDY SITES

S1: Maldongari Iceland area: (20°54'42.3"N 80°07'17.3"E) this site is situated near Sanjivani Kuti rest house. The illegal boating regularly found for tourist. As well as fishing practices by the fish farmers in this area. (PLATE-I)

S2: Rampuri Village area: (20°55'25.4"N 80°07'51.3"E) this site is situated near Rampuri Village, surrounded by paddy field. The littoral area of reservoir is highly infested of the ipomea as well lantana vegetation. (PLATE-I)



Map of Gondia District showing Navegaobandh reservoir (left), Maldongari Iceland (right)



Illegal boating practices | Fishing activities | Farm land at Rampuri

PLATE I: Map and Study areas

RESULT AND DISCUSSION

About 318 birds were recorded from Indian Wetlands, out of which 193 species are completely dependent on Wetland [8]. In the present observation 87 species were reported including some

migratory birds like graylag goose, Red crusted pochard, painted stork and many more. The list of birds is given in Table-1. Total 84 species of birds belongs to 15 families from 5 orders. In the present observation 52 birds species belonging to the order Ciconiformes followed by 17 species from order Anseriformes, order Gruiformes comprise of 8 species of birds, Stringiformes with only 01 while Coraciiformes with 06 species of birds. The most abundant diversity of birds from order Ciconiformes were spotted in both of the sites while less birds spotted in the early monsoon and after monsoon on the other hand large number of birds were spotted in early monsoon and late winter [9,10]. The migratory birds like grey lag goose and painted stork were found in large number in site II. The number of birds of winter migrants was more at site I (Table 1) whereas number of local migrants was found more at Site II at pre-monsoon and winter season [11, 12]. The migratory bird's species population was dominant at site I in both the study period. The local migratory and residents birds also were used this huge water body at site II for breeding purpose particularly in monsoon period. The open bill stork was found abundant at site I and site II due to availability of varied vegetation and availability of mollusks at the littoral area in both the site particularly in summer season. The mollusks like *Pila globosa* and other gastropods were abundant in the area. The birds like River turns and lapwings were spotted abundantly in both the sites. In site I, particularly on Iceland grey heron, Asian open bill stork and lesser whistling duck nesting were observed as this site is safe for their nesting but fishing activities and illegal boating for tourist were observed near the site I throughout the years. The site II was invaded with ipomoea and other vegetation, so that birds get hiding for their safe swarming in the area. As this area has littoral wide water area, birds can acquire their food effortlessly. This area is not much of human conflict even though it is nearer to paddy vegetation. The Site II has good potential and more productive might be due to accumulation of nutrients from surface runoff from adjoin agricultural land contains organic material leading to growth of aquatic weeds, phytoplankton, zooplankton and benthic macroinvertebrates, therefore this site turn into superior ecological niche or microhabitat in favor of availability of food stuff. Therefore more the birds, especially local migrant were spotted in this site.

Table 1: Aquatic birds from Site I and II at Navegaonbandh Reservoir.

Sr.	Order	Family	Scientific Name	Common Name	Site I	Site II
1	Ciconiformes	Podicipedidae	*Tachybaptus ruficollis*	Little grebe	+	+
2		Phalacrocoracidae	*Phalacrocorax carbo*	Great cormorant	+	+
3		Phalacrocoracidae	*Phalacrocorax fuscicollis*	Indian cormorant	+	+
4		Phalacrocoracidae	*Phalacrocorax niger*	Little cormorant	+	+
5		Anhingidae	*Anhinga malanogaster*	Oriental darter	+	-
6		Ardeidae	*Ardea cinerea*	Grey heron	+	-
7		Ardeidae	*Ardea purpurea*	Purple heron	-	+
8		Ardeidae	*Ardeola grayii*	Indian pond heron	+	+
9		Ardeidae	*Bubulcus ibis*	Cattle egret	-	+
10		Ardeidae	*Casmerodius albus*	Great egret	-	+
11		Ardeidae	*Egretta garzetta*	Little egret	-	+
12		Ardeidae	*Egretta intermedia*	Mediun egret	-	+
13		Ardeidae	***Ixobrychus cinnamomeus***	Cinnamon bittern	+	+
14		Ardeidae	*Ixobrychus sinesis*	Yellow bittern	-	+
15		Ardeidae	*Nycticorax nycticorax*	Black crown night heron	-	+
16		Ardeidae	*Butoridus stiatus*	Little green heron	+	-
17		Ciconiidae	*Anastomus ocitans*	Asian open bill	+	+
18		Ciconiidae	*Ciconia episcopus*	Wooly nacked stork	+	-
19		Ciconiidae	*Ciconia nigra*	Black stork	-	+
20		Ciconiidae	*Leptoptilos javanicus*	Lesser adjutant stork	-	+
21		Ciconiidae	*Mycteria leucocephala*	Painted stork	-	+
22		Threskiornithidae.	*Platalea leucorodia*	Eresian spoon bill	-	+
23		Threskiornithidae.	*Plegadis falcinellus*	Glossy ibis	+	+
24		Threskiornithidae.	*Pseudibis papillosa*	Red naped ibis	-	+
25		Threskiornithidae.	*Threskiornis melanocephalus*	Black headed ibis	-	+
26		Jacanidae	*Hydrophasianus chirurgus*	Pheasant tailed jacana	+	+
27		Jacanidae	*Metopidius indicus*	Bronze winged jacana	+	+
28		Charadriidae	*Himantopus himantopus*	Black winged stilt	+	+
29		Charadriidae	*Vanellus indicus*	Red wattled lapwing	+	+

30		Charadriidae	*Vanellus malabaricus*	Yellow wattled lapwing	+	+
31		Charadriidae	*Charadrius alexandrinus*	Kantish Plower	-	+
32		Charadriidae	*Charadrius dubius*	Little ringed plower	-	+
33		Rostratulidae	*Rostrutula benghalensis*	Greater painted snipe	-	+
34		Scolopecidae	*Gallinago gallinago*	Common snipe	+	+
35		Scolopecidae	*Gallinago stenura*	Pintail snipe	-	+
36		Scolopecidae	*Lymnocryptes minimus*	Jack snipe	-	+
37		Scolopecidae	*Numenius arquata*	Erasian curlew	+	-
38		Scolopecidae	*Limosa limosa*	Black tailed godwit	+	-
39		Scolopecidae	*Tringa totanus*	Common redshank	-	+
40		Scolopecidae	*Tringa stagnatilis*	Marsh sandpiper	+	+
41		Scolopecidae	*Tringa glareola*	Wood sandpiper	-	+
42		Scolopecidae	*Tringa hypoleucos*	Common sandpiper	+	+
43		Scolopecidae	*Tringa nebularia*	Common greenshank	-	+
44		Scolopecidae	*Tringa cinerea*	Terek sandpiper	-	+
45		Scolopecidae	*Calidris minuta*	Little stint	+	+
46		Scolopecidae	***Calidris ferruginea***	Curlew sandpiper	+	-
47		Laridae	*Chlidonias hybrida*	Whiskered tern	+	-
48		Laridae	*Sterna albifrons*	Little tern	+	-
49		Laridae	*Sterna aurantia*	River tern	+	-
50		Laridae	*Sterna hirundo*	Common tern	-	+
51		Laridae	*Larus brunnicephalus*	Brown headed gull	+	-
52		Laridae	***Larus ridibundus***	Black headed gull	+	-
53	Anseriformes	Anatidae	*Anas acuta*	Northern pintail	+	+
54		Anatidae	*Anas clypeata*	Northern shoveler	+	+
55		Anatidae	*Anas crecca*	Common teal	+	-
56		Anatidae	*Anas penelope*	Eurasian wigeon	+	-
57		Anatidae	*Anas platyrhinchos*	Mallard	+	-
58		Anatidae	*Anas poecilorhyncha*	Spot billed duck	+	+
59		Anatidae	*Anas querquedula*	Garganey	+	+
60		Anatidae	*Anas strepera*	Gadwall	-	+
61		Anatidae	*Ansar ansar*	Greylag goose	+	+
62		Anatidae	*Aythya ferina*	Common pochard	+	+
63		Anatidae	*Aythya fuligula*	Tufted duck	+	-
64		Anatidae	*Netta rufina*	Red crested pochard	+	+
65		Anatidae	*Aythya nyroca*	Ferruginous duck	+	-
66		Anatidae	*Nettapus coromandelianus*	Cotton pygmy goose	+	-
67		Anatidae	*Sarkidiornis melanotos*	Comb duck	+	-
68		Anatidae	*Tadorna ferruginea*	***Ruddy shelduck***	+	+
69		Anatidae	*Dendrocygna javanica*	***Lesser whistling duck***	-	+
70	Gruiformes	Rallidae	*Amaurornis akool*	Brown crake	-	+
71		Rallidae	*Amaurornis phoenicurus*	White-breasted waterhen	+	+
72		Rallidae	***Gallicrex cinerea***	Watercock	+	+
73		Rallidae	*Fulica atra*	Common coot	+	+
74		Rallidae	*Gallinula chloropus*	Common moorhen	+	+
75		Rallidae	*Porphyrio porphyrio*	Purple swamhen	+	+
76		Rallidae	*Rallus aquaticus*	water rail	-	+
77		Rallidae	*Porzana parva*	Little crake	-	+
78	Strigiformes	Strigidae	*Ketupa zeylonensis*	Brown fish owl	-	+
79	Coraciformes	Alcedinidae	*Alcedo atthis*	Common kingfisher	+	+
80		Alcedinidae	*Ceyx erithaca*	***Black-backed kingfisher***	+	+
81		Alcedinidae	*Ceryle rudis*	Pied kingfisher	+	+
82		Alcedinidae	*Halcyon smyrnensis*	White-throated kingfisher	+	+
83		Alcedinidae	*Pelargopsis capensis*	Stork-billed kingfisher	+	+
84		Alcedinidae	*Halcyon pileata*	Black-capped kingfisher	+	+

PLATE-II: Some of aquatic birds from Navegaonbandh Reservoir during study period.

CONCLUSION

The site I hosted with most of migratory birds in late winter season as they prefer the site for nesting and feeding ground while site II has both migratory as well as local migratory birds throughout the year as they have good breeding ground with huge vegetation and ample food material. It is suggested to conserve all the sites as birds ecological niches in which the site I from human disturbances like illegal boating and regular fishing activities by the local formers while site II from the weeds like lantana and excessive ipomoea.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

Author's Contribution

Gopal Paliwal: Monitoring of Birds, Bird identification, paper writing,
Dinesh Tidke: Monitoring of Birds, references collection, etc
Sudhir Bhandarkar: Monitoring of Birds, Paper writing, Bird identification, photography

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ETHICS STATEMENT

The paper is based on the observation of birds with the help of binoculars and photography, hence there is no animal experiment takes place during study.

INFORMED CONSENT

The paper is based on the observation of birds with the help of binoculars and photography, hence there is no animal experiment takes place during study.

DATA AVAILABILITY

The databases are not included in the work/paper.

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