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Habitat Utilization by the Piscivorous Birds in Thol Bird Sanctuary

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Abstract: ***In the present study, habitat use by bird species at Thol bird sanctuary was recorded on each visit. These categories were - open water, puddles and peripheral region. The activities were categorized as foraging, resting, roosting and breeding. Open water habitat over other categories was used highly by waterfowl like all ducks, storks, herons, egrets, spoonbills, ibises and many waders. Use of edge and puddles by nearly half the species was in accordance with a high diversity of small waders at Thol bird sanctuary, which used this habitat extensively for foraging and roosting. Out of 77 sp. listed (Thol Report – 2002), majority of species used Thol bird sanctuary for foraging and resting (82 % and 75 %) In contrast, only 56 % species used it for roosting. There were some species like egrets, spoonbills, cormorants with confirmed breeding record of Thol bird sanctuary.***

Keywords: Piscivorous birds, Habitat, Vegetation, Wading birds, Wetland, Thol bird sanctuary.

I. INTRODUCTION

Piscivorous birds are essential ecological components of wetland ecosystem, capable of transporting nutrients in a single season, and because of their numbers and mobility, these birds play an important role in energy movement in the wetlands (Kahl 1964, Kushlan 1976b, 1977 and Christy *et al.* 1981). Piscivorous birds occupy a relatively high position in the food of predatory niches (Kushlan 1978b).

Wetland systems are important as they directly and indirectly support lakhs of people, providing goods and services to them. They help check floods by storing water, and is a highly productive ecosystem supporting large aquatic fauna and flora. Hence wetlands play a crucial role in a wetland habitat (R.Roshnath & V.Shruti 2015).

Habitat generally refers to the place where each kind of organism is normally found. In other words it refers to the place where the animal lives. And such an assessment of specific habitat requirement of individual species is vital for the management of a species. Learning the habitat is one of the foremost steps in studying an organism (Odum 1971).

Custer and Osborn (1978) studied the feeding habitat use of colonially-breeding herons, egrets and ibises in North Carolina. Kushlan (1976c) described the feeding and habitat preference of the White Ibis in Southern Florida. Meyerriecks (1962) and Kushlan (1976b) found that longer - legged herons feed in deeper water than shorter- legged ones. Rodgers (1983) described the foraging methods of herons in different habitat in Florida. Food of the Night Heron and Little Egret in different habitat has been studied by Fasola (1981). Fasola (1986) reported the resource use of foraging herons in Agricultural and non-agricultural habitats in Italy. Kushlan *et al.* (1985), studied the foraging niche relations of wading birds in tropical wet Savannas. Habitat use of Herons and Egrets in North America is documented by Recher and Recher (1980). Prey consumption of wood storks in different habitats was reported in Everglades National Park (Ogden *et al.* (1978), Cooper (1985a), Hafner and Brittons (1983), Hafner (1982), Kushlan and Kushlan (1977), Kushlan (1981), Mock and Mock (1980).

II. STUDY AREA

The study was conducted in Thol Bird Sanctuary (TS) famous for its wintering congregation of waterfowl migrating from the Palearctic realm.

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III. LOCATION

Thol bird sanctuary is located about 25 km northwest of Ahmedabad between 23o 15' to 23o 30' N. and 72o 30’ to 72 45’ E. It is 22 km away from the town of Kadi and district in Mehsana.

IV. METHODOLOGY

The study of habitat utilization of wetland birds was done; simultaneously the study of population dynamics and breeding biology was also performed. Total 6 habitats were classified; among these most of the habitats used by wetland birds were observed during the study period. Regular habitat surveys were conducted by walking and recording the number of individuals and the habitat in which they were sited. This study was done continuously for two years. At different sites, different species were also recorded from time to time to study a general preference of a specific water body. Birds were observed from 40-50 m distance by using 20 × 50 binoculars walking slowly 300 to 400 hrs.

The preference for a particular habitat by different species and utilization of each habitat by them were studied. Habitats were classified into the following 6 types according to the dominant plant community and water regime.

1. Open water

This covers comparatively deeper area of the lake spread over on either side of the dykes and towards the middle of the aquatic blocks with submerged vegetation. This area is the front-side of the lake in the open water area beyond 2 meters from the edge of the pond. Dominant submerged vegetations are *Ceratophyllum demersum* and *Hydrilla veorticillata*, free floating vegetation *Eichhornia crassipes* and rooted floating vegetations are *Ipomoea aquatica, Neptunia oleracea*. This serves as the chief attraction for all swimming birds. This habitat was used highly by all ducks storks, herons, egrets, spoonbills, ibises and many waders probably due to the presence of a roosting tree in the water area.

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2. Shallow water with sparse vegetation

This site is located on both the sides of the pathway while entering the sanctuary. While walking along the path wader birds could be observed here. Apart from this such site is also located near Jethlaj villege.

At the edge, the water level is much less and irregularly distributed amongst the patches of grass and open water is areas with sparse vegetation which usually are covered by a film of water. In this habitat, the vegetation is neither very low, nor is the water volume very open. *Ipomoea aquatica* forms the major vegetation in these areas. Shallow water with sparse vegetation attracts Ciconidae family sp. and several wading birds could be seen.

3. Grass patch

This site is located on north central side where cultivation of Acacia is there below which grass patches can be seen. Here wading birds could be observed mostly while walking along the path.

In this type of habitat, the grass grows very thick and forms a kind of mat. This comes up during the monsoon and spring when the grasses are at their peak of vegetative growth. In winter, however, decomposition of grass makes these areas less prominent and attracts several waterfowl species.

4. *Ipomoea* + Grass

This site is also seen both the sides of the sanctuary, mostly camp side. The observation was done mostly in the morning and in the evening while walking and here. Ardeidae family sp. could be seen. It is a mixture of *Ipomoea* sp. and grass. At certain places *Eleocharis* sp. patches are also included. Mostly to be seen in the area of transition between grass and *Ipomoea* patches.

5. Trees and branches hanging over water
(Cultivation area)

This site is situated near Jethlaj village. Where entire area is covered with *Acacia nilotica* trees which could be observed while walking and used binocular.

Tress mainly on the edge of the dyke forms the resting habitat for many birds. The entire aquatic area of the sanctuary is intersected with a number of *Acacia nilotica* planted on dykes. On either side of these dykes, apart from the clumps of Acacia sp., *Salvadora* sp., *Butea* sp., *Cassia* sp., *Prosopis* sp., *Madhuca* sp. and *Manilkara* sp., other bushes are also noticed. This serves as the chief attraction for many diving birds and these trees serve as nesting sites for various aquatic birds.

6. Puddles

This site is located on the front side of the watchtower and the other site is scattered from North side of the sanctuary which could be observed while walking and used binocular.

The water level drops during the dry season (May - June), leaving only a few pools in the deeper areas. Aquatic organisms are concentrated in these increasingly smaller areas and become readily utilizable food for highly mobile predators, particularly wading birds

Table -1 Percentage frequency of Wading birds (Ardeidae) recordedin various habitats

No.	Habitat	Grey Heron	Purple Heron	Pond Heron	Cattle Egret	Median Egret	Little Egret	Large Egret	Night Heron	Total
1.	Open Water	4	5	2	0	5	6	7	6	35
2.	Shallow water + Sparce vegetation	15	12	10	7	25	12	15	5	101
3.	Grassy patch	7	18	3	5	10	6	3	0	45
4.	Grass + Ipomoea	10	11	12	2	9	4	8	0	56
5.	Trees and branch over water	7	7	6	21	6	7	7	28	89
6.	Puddles	3	1	2	6	2	1	2	0	17
7.	Total observations	2388	3211	4217	2120	4258	3310	3720	1017	-

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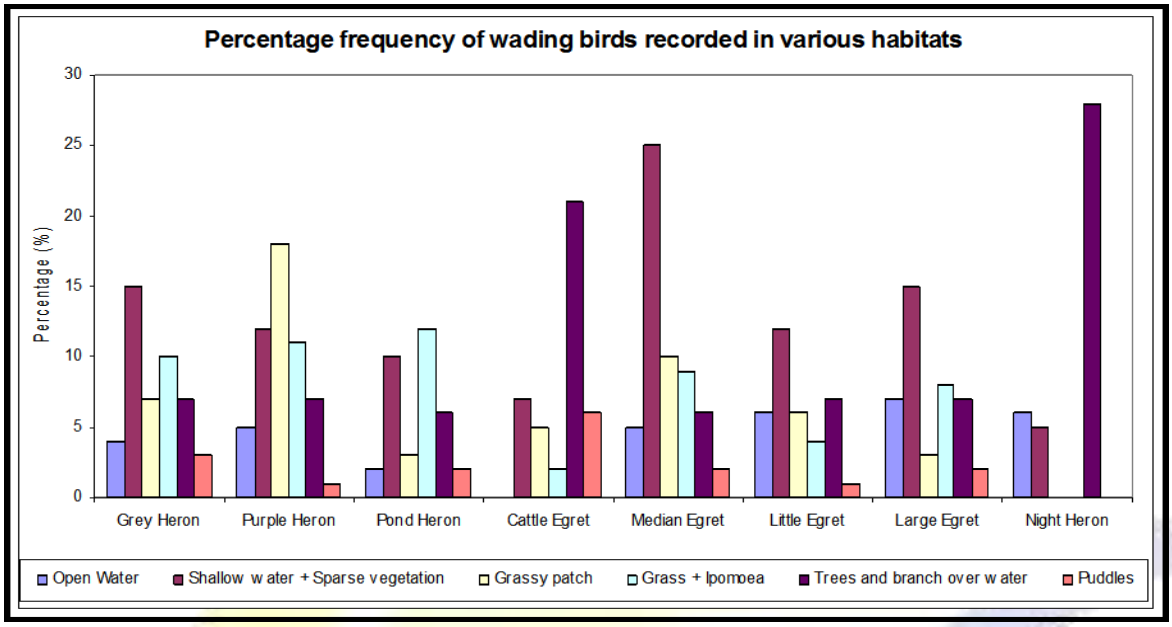


Table-2 Percentage frequency of Wading birds (Ciconiidae)recorded in various habitats

No.	Habitat	Painted Stork	Openbill Stork	White Ibis	Glossy Ibis	Spoonbill	Total
1.	Open Water	4	0	3	0	12	19
2.	Shallow water + Sparce vegetation	12	2	15	10	35	74
3.	Grassy patch	5	1	10	07	0	23
4.	Grass + Ipomoea	4	1	8	5	10	28
5.	Trees and branch over water	20	4	18	7	12	61
6.	Puddles	2	3	2	2	1	10
7.	Total observations	2530	760	3578	2722	4329	-

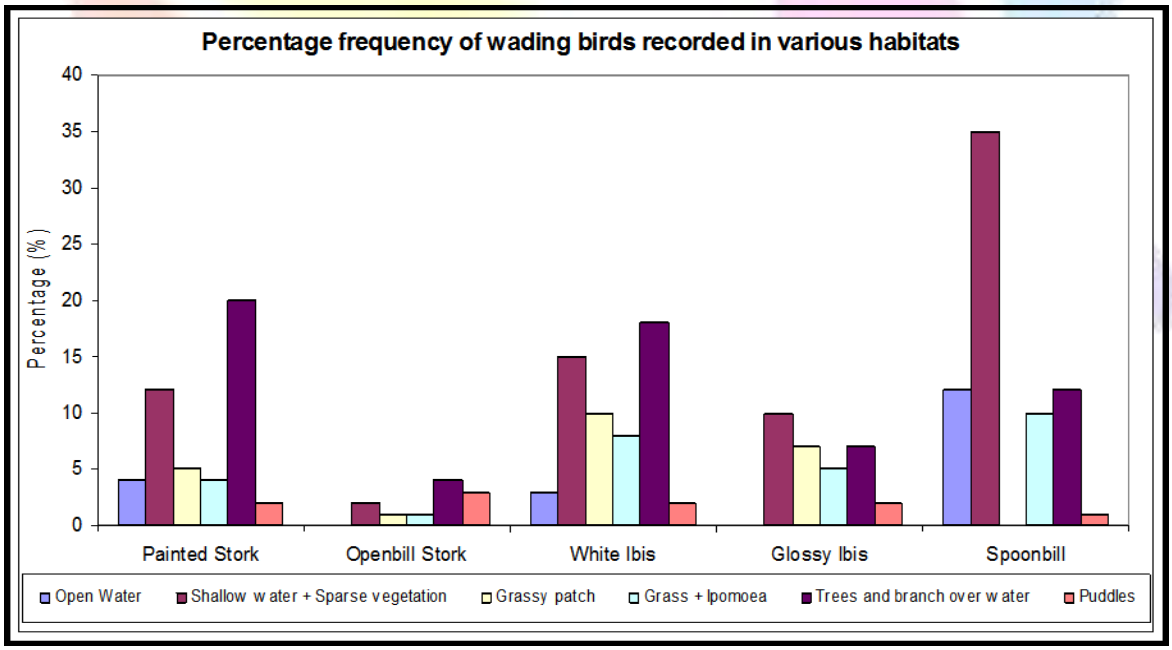


Table-3: Percentage frequency of swimming birds recorded in various habitats

No.	Habitat	Large Cormorant	Indian Shag	Little Cormorant	Darter	Pelicans
1.	Open Water	35	38	40	7	70
2.	Shallow water + Sparse	20	22	25	2	0

	vegetation					
3.	Grassy patch	2	3	2	1	0
4.	Grass + Ipomoea	3	4	4	1	0
5.	Trees and branch over water	5	4	2	1	3
6.	Puddles	8	6	7	1	2
7.	Total observation	2720	2350	2620	1240	600

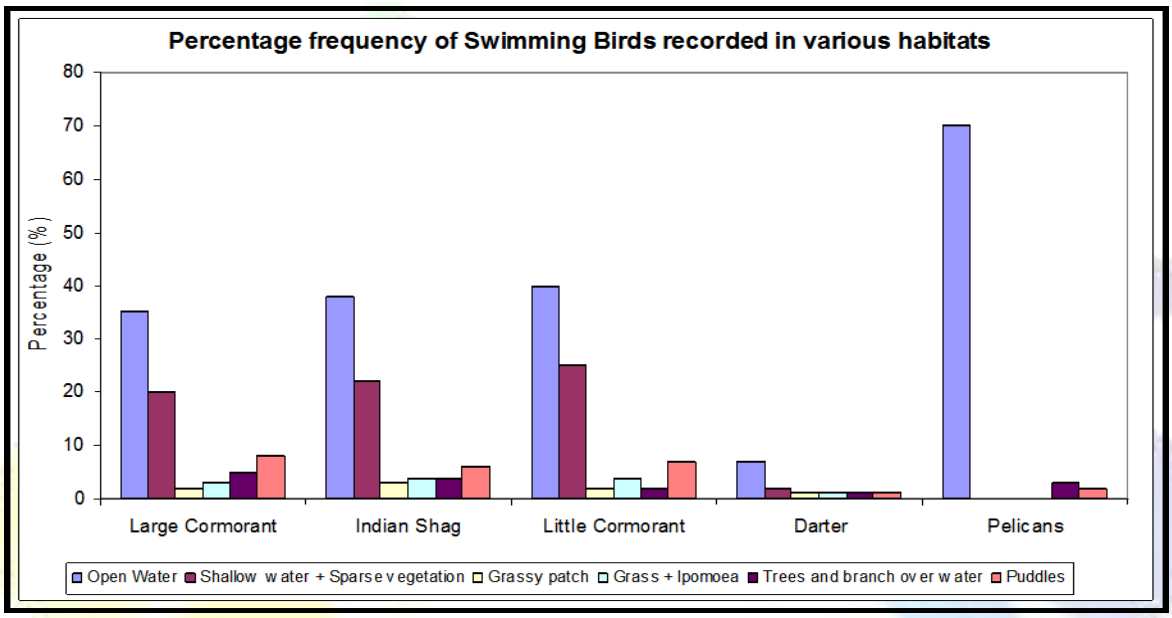
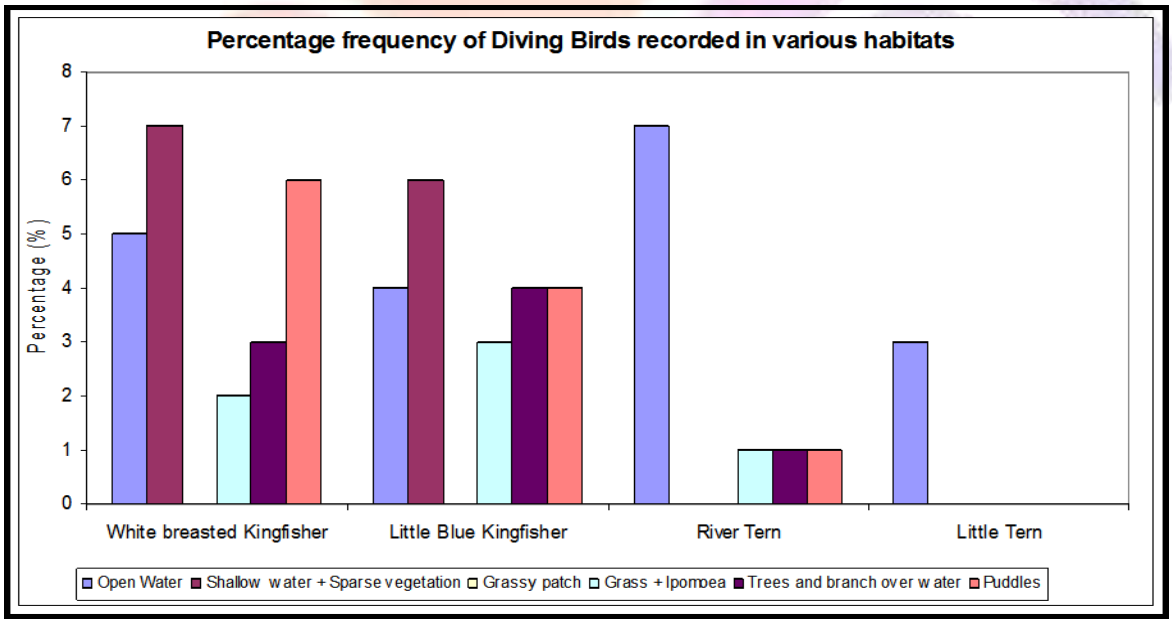


Table – 4 Percentage frequency of Diving birds recorded in various habitats

No.	Habitat	White breasted Kingfisher	Little Blue Kingfisher	River Tern	Little Tern
1.	Open Water	5	4	7	3
2.	Shallow water + Sparse vegetation	7	6	0	0
3.	Grassy patch	0	0	0	0
4.	Grass + Ipomoea	2	3	1	0
5.	Trees and branch over water	3	4	1	0
6.	Puddles	6	4	1	0
7.	Total observation	2503	2304	1891	1087



V. RESULTS AND DISCUSSION

A total of 06 habitat types were considered of which two, namely tree and branch over water and grass mound were purely nesting habitats. Hence, only the remaining 04 habitats were utilized for feeding by the Piscivorous birds.

Swimming birds

Among 06 habitat types, Cormorants used the open water habitat and puddles for both feeding and non-feeding activities. Six habitats were used for feeding while only two habitats namely edge of the dykes trees and branch over water and cultivation area and grassy patch with sparse vegetation were used for nesting. All species of cormorants preferred open water + sparse vegetation for feeding. Darter used 3 habitats for feeding and only one habitat namely trees and branch over water for roosting. Among feeding habitats, the highest number of birds like Pelicans were observed in open water. The preference of open water for feeding is mainly due to the feeding behavior of diving birds.

Wading birds

Herons & Egrets

Except the Night-Heron, all the other herons used all habitats for feeding and non-feeding activities (Table – 1) The Night Heron used mostly used three habitats. The highest used habitat was Trees and branch over water. The highest used habitat was shallow water with sparse vegetation for the Grey Heron, Purple Heron, Pond Heron and all types of Egrets. Second preferred habitat was Grassy patch and Grass + Ipomoea. The highest preference of this habitat reflects the feeding behavior of these species. The Grey, Purple Herons and Large Egret are long-legged birds and hence capable of wading through the shallow water and feed. Whereas, the Pond Heron and Night Heron, as they are short legged birds, prefer to wait at the edge of the water and strike when the prey appears. Thus, the Grey and Purple Heron preferred shallow water + sparse vegetation and Night Heron and Pond Heron did so mainly on the edge of the dykes for feeding.

Storks

The open water habitat mostly was never used by openbill stork whereas both the storks used all the habitats for feeding. Trees and branch over water were used in nesting. During monsoon, they fed in the puddles available in land area and during summer, they utilized the puddles available in the drying aquatic area. In winter, they used shallow water + sparse vegetation and grassy patch habitat for feeding.

Ibis and Spoonbill

Large number of white Ibis feed in various microhabitats such as shallow water + sparse vegetation, grass patch and grass + Ipomoea. The highest numbers of spoonbill were in shallow water + sparse vegetation. Large numbers of birds were observed in reed, open water and edge of the habitat (Table-2). The selection of habitat for feeding reflects the feeding behavior of each species. The spoonbill was seen to feed in shallow water with sparse vegetation and edge of the dyke, their nesting site was upon trees and branches hanging over water and in cultivation area.

Diving birds

Diving birds include two species of kingfishers, namely the common kingfisher and white breasted kingfisher and two species of terns. River Tern and Little Tern. The common kingfisher preferred shallow water + sparse vegetation and white breasted kingfisher, the reed. The terns are large birds as compared to the kingfisher and hence their highly preferred habitat was open deep water for feeding. The white breasted kingfisher utilized mostly reed as feeding perch.

VI. CONCLUSION

This work concludes that Thol sanctuary is dominated by residential and migratory piscivorous birds. Habitats were classified into 6 types according to the dominant plant community and water regime. The preference for a particular habitat by different species and utilization of each habitat by them were studied by visiting various habitats regularly and recording the occurrence of each species of swimming birds that preferred open water the most, followed by shallow water + sparse vegetation for feeding. The Grey Heron and Purple Heron preferred shallow water + sparse vegetation and the Night Heron and Pond Heron did so mainly the edge of the dykes and mounds for feeding. All egrets except the Cattle Egret preferred mainly shallow water + sparse vegetation for feeding. In the case of the Cattle Egret the most preferred habitats were newly flooded area and grassy patch. Painted Stork used mainly the sparse vegetation for feeding. The Openbill Stork preferred mainly puddles for feeding. Large number of white Ibis, few of in shallow water + sparse vegetation, grassy patch and Grass + Ipomea. The highest numbers of Spoonbill were in shallow water. Common Kingfisher preferred shallow water + sparse vegetation and the white breasted Kingfisher the reed beds. Among 12 species of wading birds, the Open bill Stork had more specific habitat requirement while Large Egret, Little Egret and Pond Heron had more flexibility in their habitat.

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