

Original Research Article

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STUDY ON RESTING, ROOSTING, FORAGING AND NESTING SITES OF FEW BIRD SPECIES AT MYSORE DISTRICT, KARNATAKA, INDIA

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ABSTRACT: Periodic field survey was conducted to record the resting, roosting, foraging and nesting sites and their usage by different bird species amidst ponds and back water of KRS Reservoir of K.R. Nagar Taluk in Mysore District during 2013 to 2015 by employing various standard methods. Altogether 35 bird species, which belong to 18 families in five orders of the class Aves, have offered 14 different sites to conduct resting, roosting, foraging and nesting activities. The Shannon-Weiner Index (H1) of these bird species was in the range of 2.013 to 2.858 and there existed a significant variation (F=3.191; P>0.05) between birds density, village ponds and back water areas. Three migratory bird species, two winter migrants and 30 local bird species were recorded at different sites. Interestingly, character, feeding habit, food, resting, roosting and nesting activities of these bird species was dissimilar. Since, birds are inseparable elements of every ecosystem; their diversity indicates the status of biological activity in the ecosystem and in turn predicts the quality also. In recent past, many aquatic habitats nearby agriculture ecosystems are under severe threat due to anthropogenic interventions one on the other way. Therefore, present study emphasized the need to protect such habitats which are under threat, where avifauna facing problem to conduct normal activities such as resting, roosting, foraging and nesting amidst agriculture ecosystems.

KEYWORDS: Resting, Roosting, Foraging, Nesting sites, Bird species, Mysore District

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Birds are bipedal warm-blooded feathered creatures (Ayyar, 1964), useful to mankind in various ways (Bhat et al., 2009). They constitute one of the diverse and large numbers (Mitra et al., 2011), and proven as a treasury of biodiversity. They live at the vicinity of various habitats (Shivaperuman and Jayson, 2000; Kumar et al., 2005; Basavarajappa, 2006, 2007 and 2009; Urfi et al., 2005; Kumar and Gupta, 2013; Shruthi and Basavarajappa, 2016) and considered them as bio-tools to evaluate the quality of ecosystems (Patil, 2013) which need protection. Ali and Ripley (1983) have identified more than 1, 340 species of birds in India. Kumar et al. (2005) have reported 310 bird species which depend on aquatic or semi-aquatic ecosystems. Recently, Renu Priyadarshini et al. (2016) have provided the check list of avifauna of Rourkela Urban area of Sundargarh District, Odisha. Several ornithologists have reported different species of birds which put together 500 species in Karnataka (Shruthi and Basavarajappa, 2016). Basavarajappa (2006) has reported 27 species of aquatic birds in Maidan region of Karnataka and they played an important role in paddy pest's management under irrigated conditions of Karnataka (Basavarajappa, 2009). Shruthi and Basavarajappa (2016) have reported 49 bird species at few aquatic ecosystems of Mysore District. All these reports highlighted the diversity and distribution of avifauna at different ecosystems. But, reports on resting (cease movement in order to relax), roosting (assemble for rest/sleep), foraging (search widely for food) and nesting (to build nest) sites is lacking. Birds represent several tropic levels and involved in different food chains and food webs of aquatic and terrestrial ecosystems. Several residential and migratory bird species are residing partly or fully during different seasons at various ecosystems, which are experiencing immense anthropogenic intervention (Prasad et al., 2002; Kumar et al., 2003) at their resting, roosting, foraging and nesting sites. Moreover, information especially on abiotic and biotic components which provide suitable conditions for resting, roosting, foraging and nesting activities of birds is fragmentary. Since, river Cauvery is one of the longest Rivers in south India, have several small to medium sized aquatic habitats at its basin. All these habitats are attracting good number of resident and migratory birds year around (Shruthi and Basavarajappa, 2016). Reports on resting, roosting, foraging and nesting sites of resident and migratory bird species which reside nearby agriculture ecosystems amidst River Cauvery basin in Mysore District are scanty. As, quality of local habitats can be understood by studying the structure and its usage by different bird's community (Kattan and Franco, 2004; Shruthi and Basavarajappa, 2016). Interestingly, birds are inseparable elements of every ecosystems (Grimmett et al., 2011), their habitats study is very essential to protect their preferred habitats for normal activities (Rajashekar and Venkatesh, 2010). In this regard, information wants to restore such habitats for the protection of local habitats and their bird species. This has necessitated conducting present study.

Basavarajappa and Shruthi RJLBPCS 2017 www.rjlbpcs.com Life Science Informatics Publications **2. MATERIALS AND METHODS**

Study Area: Field observations were conducted at Krishna Raja (KR) Nagar Taluk of Mysore District that lies in between $12^{0}46^{1} 02^{11}$ to $12^{0} 39^{1} 06^{11}$ N longitude and $76^{0} 30^{1} 23^{11}$ to $76^{0} 30^{1} 23^{11}$ E latitude at an altitude of 2,622 ft msl (Kamath, 2001) (Fig. 1). The climate is semi-arid type and the weather is characterized by 10.6 to 36^{0} C temperature, 29 to 83% relative humidity with 748.7mm annual rainfall. The perennial River Cauvery drains here and become life line by providing water source year around to farmers of this region.



Methodology:

The ponds at Kesthuru Koppalu, Saligrama, Yellemuddanahally and Byadarahally villages were selected randomly along with the backwater landscape nearby KR Sagar Reservoir at Sanyasipura, Chandagala and Mullepettalu (Fig. 1). Birds were identified based on their morphological features as per Ali and Ripley (1983), Ali (1941) and Grimmett et al. (2011). Resting, roosting, forging and nesting sites were identified by employing variable width line transect method (VWLTM) as per Burnham et al. (1980) after slight modification for birds study and an all out search method (AOSM). The earmarked resting, roosting, foraging and nesting sites of different bird species were observed twice a day i.e., during morning (7.00 to 12.00hrs) and evening (15.30 to 18.00hrs) with

Basavarajappa and Shruthi RJLBPCS 2017 www.rjlbpcs.com Life Science Informatics Publications on an average three visits per month. Resting, roosting, foraging and nested sites of birds were observed by naked eyes and also with the help of Olympus Binocular (10 x 10) and photographed by using Sony-Cyber shot 14.1 Mega Pixel Camera. The data on bird's visit, purpose of visit, frequency of visit to such sites were collected by following standard methods. Per cent use of sites for resting or roosting or foraging or nesting activity = Site used for resting or roosting or foraging or nesting by no. of bird species /Total no. of sites used by all the bird species X 100. Collected data was systematically complied and analyzed as per Saha (1992).

3.RESULTS AND DISCUSSION

Occurrence of few birds at different village ponds and backwater of KRS Reservoir is depicted in Table 1. Around 35 birds which belong to 18 families and five orders of the class Aves are recorded during the present study. The common name and scientific name of these birds are given in Table 1. The Shannon-Weiner Index indicated that birds ranged from 2.013 to 2.858 H^1 index and there existed a significant variation (F=3.191; P>0.05) between village ponds and back water of KRS Reservoir (Table 2). Table 3 shows the habitats availed for resting, roosting, foraging and nesting by 35 bird species (Table 1) at different village ponds and back water of KRS Reservoir in KR Nagar Taluk of Mysore. Each village pond and back water area is with specific features which were availed for resting, roosting, foraging and nesting by 35 bird species (Tables 1 and 3). However, at few village ponds and backwater areas, certain habitat conditions were not alike and indicated considerable variation (Table 3). Altogether, 14 different objects were used for resting, roosting, foraging and nesting activities by 35 bird species (Table 4 and Fig. 2). Table 5 shows the frequently used sites for resting, roosting, foraging and nesting activities by these birds.



Fig. 2. Resting, roosting, foraging and nesting sites of different bird species

Basavarajappa and Shruthi RJLBPCS 2017 www.rjlbpcs.com Life Science Informatics Publications In general, 12 bird species did used Areca nut tree for resting and roosting. But, no single bird species did used this tree for nesting (Tables 1 and 5). The Banyan, Coconut, Jail, Kadu Hunse, Neem and Niligiri trees were used by many bird species for resting, roosting and nesting activities (Tables 1 and 5). Further, weed plants are shrubby in nature, offered mainly by semi-aquatic and aquatic birds during resting, roosting, foraging and nesting (Tables 1 and 5). Interestingly, electric poles/wires become undisturbed resting and roosting sites for six bird species at the vicinity of village ponds and back water areas in this part of the State (Tables 1 and 5). Further, island amidst village ponds and back water area, mud bunds with reeds, grasses, mud bank, river bank and rocks becomes ideal sites for majority of bird species for resting, roosting, nesting and during feeding also (Tables 1 and 5). Overall, biotic components (e.g. trees and weeds) and abiotic components (e.g. island, mud baunds, rocks, river bank, mud bank and electric poles/wires) and per cent dependence by different bird species on these objects are given in Table 6. In general, birds depended on biotic components (e.g. trees and weeds) for resting, roosting, nesting and during foraging was less i.e., 41.1% compared to abiotic components (e.g. island, mud bunds, rocks, river banks, mud banks and electric poles/wires), where it was more i.e., 58.9% (Table 6). Ponds at Kesthuru Koppalu, Saligrama, Yellemuddanahally, Byadarahally and KRS backwater nearby Sanyasipura, Chandagala and Mulepettalu villages (Fig. 1 and Table 2) have connectivity from water canals and sub-canals of KRS Reservoir. Because of this, all these ponds are filled with water during major part of the year (Shruthi, 2014) and encouraged the luxuriant growth of reeds, wild gasses, herbs and shrubby vegetation. The landscapes of these ponds are occupied by rooted and floating vegetation accompanied with Ipomoea species and mud bunds (Shruthi, 2014). Moreover, Niligiri (Eucalyptus sp.), Banayan (Ficus sp.), Jali (Acacia sp.), Kadu Hunse (Tamarindus sp.) and Neem (Azadirachta indica) tree species are present on the bank of these village ponds and back water areas (Shruthi, 2014). Furthermore, these aquatic habitats are surrounded by coconut (Cocus nucifera) and Adike (Areca catechu) plantation along with crops like paddy (Oryza sativa), maize (Zea mays) and pulses. Majority of the farmers grow rain fed crops (e.g. Finger millet) and many farmers grow paddy by using water from River Cauvery and its tributaries. Perhaps, all these conditions might have extended suitable habitat along with good source of food to different bird's species as shown in Tables 4 and 5. The Anatidae (e.g. Spot Billed Duck), Ardeidae (e.g. Pond Heron, Black Crowned Night Heron, Large Egret and Little Egret), Phalacrocoracidae (e.g. Cormorants), Laridae (e.g. River Tern) and Rallidae (e.g. Moore Hen and Water Hen) family members (Table 1) mainly depend on aquatic ecosystems for their resting, roosting, feeding and nesting activities (Basavarajappa, 2009). These species are considered as potential species of aquatic ecosystems because they feed on insect larva, tadpoles, frogs and water snakes etc, amidst aquatic ecosystems. Although, Egrets, Kingfisher are not truly aquatic (Table 1), but they spend some time nearby aquatic bodies or live in association with water ways or marshy areas (Tables 1, 4 and 5). They visit

Basavarajappa and Shruthi RJLBPCS 2017 www.rjlbpcs.com Life Science Informatics Publications regularly to water bodies for feeding on aquatic organisms (e.g. Kingfisher). Surprisingly, Spot Billed Pelican (Pelecanus philippensis), Painted Stork (Mycteria leucocephala), Glossy Ibis (*Plegadis falcinellus*) (Table 1) are migrants, visit this region during winter season and stay for long period for breeding (Tables 4 and 5). Since these species are most remarkable components of global biodiversity their preservation is very essential. Other bird species (Table 1) are local residents visiting this place frequently for resting, roosting, feeding and nesting purpose. Further, bunds are made of mud or small to medium sized boulders and pebbles. Islands are established due to elevated landscape amidst pond water, dominated with reedy vegetation along with scattered small sized mud bunds. All these places are ideal resting and roosting grounds for Herons, Egrets Asian Open Billed Stork, Red Wattled Lapwing, Ibises and Wagtails (Tables 3, 4 and 5). Rocks on the bank of ponds or nearby ponds, electric poles with wires are used more often by few bird species (e.g. King fisher and River tern). The trees like Coconut, Jali, Neem, Banyan, Adike, Kadu Hunse and Nilgiri are very common nearby Kesthuru Koppalu, Saligrama, Yellemuddanahally ad Byadarahally ponds and back water nearby Sanyasipura, Chandagala and Mulepettalu (Shruthi, 2014). Ramified tall branches with thick foliage of Jali, Neem, Banyan, Kadu Hunse and Niligiri trees have provided a good protective cover during resting and roosting of few bird species. Moreover, Coconut tree along with other scrubby vegetation is used for nesting by few bird species (e.g. Egrets, Herons, Ibises and Wagtails). Usually, paddy fields are always with water that would support the survival of planktons, aquatic insects, larval forms, crabs, mollusks, fishes, tadpoles, frogs and small to medium sized water snakes (Basavarajappa, 2009; Kumar and Gupta, 2013). Further, aquatic insects, insect larval forms, certain species of mollusks and amphibians are commonly occur in these habitats, which become good source of food to several bird species (Table 1). Moreover, growing buds and roots of different aquatic plants becomes good food for several aquatic or semi-aquatic birds (e.g. Porphyrio porphyrio, Gallinula chloropus and Amauronis phoenicurus etc.) (Grimmett et al., 2011). Perhaps, all these diversified conditions at village ponds and backwater of KRS Reservoir (Table 3 and Fig. 2) might have extended congenial conditions for resting, roosting, foraging and breeding activities partly of fully to these bird species. Our observations are on par with the observations of Newton (1995), Shivaperuman and Jayson, (2000), Kumar et al. (2005), Basavarajappa (2006), Grimmett et al. (2011), Basavarajappa (2009), Bhat et al., 2009; Dayananda (2009), Rajashekar and Venkatesh (2010), Mitra et al. (2011), Joshi (2012), Bhadja and Vaghela (2013), Jeevan et al. (2013), Kumar and Gupta (2013), Patil (2013), Urfi et al. (2005), Manjunath and Joshi (2014), Renu Priyadarshini et al. (2016). Birds need undisturbed habitats for attending resting, roosting, feeding, nesting activities during their normal survival. Therefore, habitat must be less intervened with human being besides good place/site for shelter, abundant food source and congenial breeding ground to conduct reproduction and nesting. It is true with all these bird species also. Since, birds require diversified habitat conditions, depend variedly

Basavarajappa and Shruthi RJLBPCS 2017 www.rjlbpcs.com Life Science Informatics Publications on different components (Tables 3 and 6) prevailed at village ponds and back water areas. These components must be protected so as to extend congenial conditions suitably for different bird species inhabitation. Similar types of observations were made by Newton (1995) and Kumar et al. (2005). Diversified avifauna composition become important biotic component of every ecosystem (Rajashekar and Venkatesh, 2010; Patil, 2013), which is useful to man (Mitra et al., 2011) in various ways (Basavarajappa, 2009; Bhat et al., 2009; Dayananda, 2009; Renu Priyadharshni et al., 2016). Since, bird species are excellent indicators of environmental quality and measure of biodiversity of the ecosystem (Shivaperuman and Jayson, 2000; Basavarajappa, 2006; Grimmett et al., 2011; Joshi, 2012; Jeevan et al., 2013; Bhadja and Vaghela, 2013; Patil, 2013; Urfi, 2013; Manjunath and Joshi, 2014; Renu Priyadarshini et al., 2016). Because of these reasons, they are considered as good species for ecological and scientific values (Ali and Ripley, 1996). Hence, birds need quality of habitat with minimum human intervention. Publishing scientific information on avifauna and their biological activity at village ponds and backwater areas of this kind would help reveal the quality of habitats. It could useful to instigate protection of ecosystems which are under severe anthropogenic interventions for various reasons. Therefore, through this communication it is emphasized deeply to protect resting, roosting, foraging and nesting sites amidst village ponds and back water areas of major/minor water reservoirs at the vicinity of agriculture ecosystems.

CONFLICT OF INTEREST

The authors have no conflict of interest.

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Table 1. Occurrence of few bird species at village ponds and backwater of KRS Reservoir in

| SI. | Order | SI. | Family | SI. | Common Nama | Scientific Name | |
|-----|---------------|----------|-------------------|-----|---------------------------|------------------------|--|
| No. | Oldel | No. | | No. | Common Name | | |
| 1. | Anseriformes | 1. | Anatidae | 1. | Spot billed Duck | Anas poecilorhyncha | |
| | | 2. | Anhingidae | 2. | Snake bird/Darter | Anhinga melanogaster | |
| | | | | 3. | Grey Heron | Ardea cinerea | |
| | | | | 4. | Pond Heron | Ardeola grayii | |
| | | | | 5. | Purple Heron | Ardea purpurea | |
| | | 3 | Ardaidaa | 6. | Black crowned night Heron | Nycticorax nycticorax | |
| | | 5. | Ardeidae | 7. | Median Egret | Mesophoyx intermedia | |
| | | | | 8. | Cattle Egret | Bubulcus ibis | |
| | | | | 9. | Little Egret | Egretta garzetta | |
| | | | | 10. | Large Egret | Casmeridius alba | |
| | | | Charadridaa | 11. | Red wattled Lapwing | Vanellus indicus | |
| | | 4. | Charadridae | 12. | Crab Plover | Dromas ardeola | |
| | Ciconiiformes | 5. | Ciconidae | 13. | Asian open billed Stork | Anastomu oscitans | |
| | | | | 14. | Painted Stork | Mycteria leucocephala | |
| 2. | | 6. | Pelicanidae | 15. | Spot billed Pelican | Pelecanus philippensis | |
| | | 7. | Phalacrocoracidae | 16. | Little Cormorant | Phalacrocorax niger | |
| | | | | 17. | Great Cormorant | Phalacrocorax carbo | |
| | | 8. 9. | Podicipedidae | 18. | Little Grebe | Tachybaptus ruficollis | |
| | | | Jacanidae | 19. | Dhassant tailed Issans | Hydrophasianus | |
| | | | | | r neasant taneu Jacana | chirurgus | |
| | | | | 20. | Bronze winged Jacana | Metopidius indicus | |
| | | 10. | Laridae | 21. | River Tern | Sterna aurantia | |
| | | 11. | Recurvirostridae | 22. | Black winged Stilt | Himantopus | |
| | | | Kecurvirostridae | | black whiged 5th | himantopus | |
| | | 12. | Charadriidae | 23. | Common Sandpiper | Actitis hypoleucos | |
| | | | Threskiornithidae | 24. | Oriental white Ibis | Threskiornis | |
| | | 13. | | | orientar white 1015 | melanocephala | |
| | | | | 25. | Glossy Ibis | Plegadis falcinellus | |

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| | | | | 26. | Black Ibis | Pseudibis papillosa |
|--------------|-----------------|----------------|-------------|-----|---------------------------|---------------------|
| 3. | | | | 27. | Purple Moorhen | Porphyrio porphyrio |
| | | | | 28. | Common Moorhen | Gallinula chloropus |
| | Grusiformes | 14. | Rallidae | 29. | White broosted Water Hen | Amauronis |
| | | | | | while breasted water Hen | phoenicurus |
| | | | | 30. | Common Coot | Fulica atra |
| 4 | 4 Passariformas | | | 31. | Yellow Wagtail | Motacilla flava |
| Passentormes | | 15. Passeridae | | 32. | White Wagtail | Motacilla alba |
| | | | Cerylidae | 33. | Lesser pied Kingfisher | Ceryle rudis |
| 5. | Coraciformes | 17. | Daceloidae | 34. | White breasted Kingfisher | Halcyon smyrnensis |
| | | 18. | Alcedinidae | 35. | Small blue Kingfisher | Alcedo atthis |

Note : Each value is a total of 16 observations.

Table 2. Shannon-Weiner Index & ANOVA of avifauna at different village ponds and back water landscape

| Sl. | Name of Pond/Back water landscape | 'H' | 'F' value |
|------|---|-------|------------|
| INO. | | Index | |
| 1. | Kesthuru Koppalu Pond | 2.858 | |
| 2. | Saligrama Pond | 2.398 | |
| 3. | Yellemuddanahally Pond | 2.556 | 3 101* |
| 4. | K.R. S. Reservoir back water nearby Sanyasipura | 2.756 | (P>0.05) |
| 5. | K.R. S. Reservoir back water nearby Chandagala | 2.360 | (1 > 0.05) |
| 6. | Byadarahally Pond | 2.417 | |
| 7. | K.R. S. Reservoir back water nearby Mulepettalu | 2.013 | |

Note: Each value is a total of 28 observations and data is based on Table 1.

(Source: Shruthi and Basavarajappa, 2016).

| Basavarajappa and Shruthi RJLBPCS 2017 | www.rjlbpcs.com | Life Science Informatics Publications | | | | |
|--|-----------------|---------------------------------------|--|--|--|--|
| Table 3. Habitats availed for resting, roosting, foraging and nesting by avifauna amidst village ponds | | | | | | |
| and back water landscape | | | | | | |

| Sr.No. | Name of the Pond/wetland | Type of habitat | % Occurrence | Total |
|--------|-----------------------------------|-----------------|--------------|-------|
| | | Bunds | 33.3 | |
| | | Island | 16.7 | |
| 1. | Kesthuru Koppalu Pond | Coconut Tree | 16.7 | 100 |
| | | Acacia Tree | 8.3 | |
| | | Rocks | 25.0 | |
| | | Neem Tree | 8.3 | |
| | | Coconut Tree | 16.7 | |
| 2. | Saligrama Pond | Bunds | 25.0 | 100 |
| | | Island | 16.7 | |
| | | Acacia Tree | 33.3 | |
| | | Weed Plant | 36.3 | |
| 3 | Vellemuddanahally Pond | Coconut Tree | 27.3 | 100 |
| 5. | reliemuddananally Pond | Bunds | 27.3 | 100 |
| | | Acacia Tree | 9.0 | |
| | KRS Backwater nearby Sanyasipura | Banyan Tree | 10.0 | |
| | | Acacia Tree | 40.0 | |
| 4. | | Rocks | 30.0 | 100 |
| | | Arecanut tree | 10.0 | |
| | | Mud bank | 10.0 | |
| | | Coconut Tree | 16.7 | |
| | | Electric wire | 16.7 | |
| 5 | KRS Backwater nearby Chandagala | Bunds | 41.7 | 100 |
| | KKS Backwater nearby chandagara | Mud bank | 8.3 | 100 |
| | | Kadu Hunse mara | 8.3 | |
| | | Weed Plant | 8.3 | |
| | | Kadu Hunse mara | 6.3 | |
| | Puedershelly Dond | Bunds | 31.2 | |
| 6 | | Rocks | 43.7 | 100 |
| 0. | byuduruhuhy rohd | Electric wire | 6.3 | 100 |
| | | Coconut Tree | 6.3 | |
| | | Nilgiri tree | 6.3 | |
| | | River Bank | 20.0 | |
| 7. | KRS Backwater nearby Mullepettalu | Bund | 60.0 | 100 |
| | | Coconut Tree | 20.0 | |

Note: Each value is a total of 28 observations

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| Sr. | Common Nomo | Scientific Nome | Places used for Roosting, Foraging & | | |
|-----|---------------------------|--------------------------|--------------------------------------|--|--|
| No. | Common Name | Scientific Name | Nesting | | |
| 1. | Spot billed Duck | Anas poecilorhyncha | MB, MBRG & I | | |
| 2. | Snake bird/Darter | Anhinga melanogaster | R, MB, AT, NT& KHM | | |
| 3. | Grey Heron | Ardea cinerea | I, MB, AT, RB & NiT | | |
| 4. | Pond Heron | Ardeola grayii | MBRG, WP, BT & KHM | | |
| 5. | Purple Heron | Ardea purpurea | MBRG, WP, BT & KHM | | |
| 6. | Black crowned night Heron | Nycticorax nycticorax | I, MBRG, MB, RB & WP | | |
| 7. | Median Egret | Mesophoyx intermedia | I, MB, CT, AT, NT, BT, KHM & NiT | | |
| 8. | Cattle Egret | Bubulcus ibis | I, MB, CT, AT, NT, BT, KHM & NiT | | |
| 9. | Little Egret | Egretta garzetta | I, MB, CT, AT, NT, BT, KHM & NiT | | |
| 10. | Large Egret | Casmeridius alba | I, MB, CT, AT, NT, BT, KHM & NiT | | |
| 11. | Red wattled Lapwing | Vanellus indicus | MB, R, MBRG & RB | | |
| 12. | Crab Plover | Dromas ardeola | RB, MB & I | | |
| 13. | Asian open billed Stork | Anastomu oscitans | MB, I, R, MBRG, BT, RB, | | |
| 14. | Painted Stork | Mycteria leucocephala | I, CT, NiT, BT, NT, KHM, MB & R | | |
| 15. | Spot billed Pelican | Pelecanus philippensis | I, CT, NiT, BT, NT, KHM, MB & R | | |
| 16. | Little Cormorant | Phalacrocorax niger | CT, BT, R, MB & I | | |
| 17. | Great Cormorant | Phalacrocorax carbo | CT, BT, R, MB & I | | |
| 18. | Little Grebe | Tachybaptus ruficollis | I, WP | | |
| 19. | Pheasant tailed Jacana | Hydrophasianus chirurgus | I, WP & MBRG | | |
| 20. | Bronze winged Jacana | Metopidius indicus | I, WP & MBRG | | |
| 21. | River Tern | Sterna aurantia | At, BT, NT, NiT & KHM | | |
| 22. | Black winged Stilt | Himantopus himantopus | I, MB & RB | | |
| 23. | Common Sandpiper | Actitis hypoleucos | I, MB & RB | | |
| 24. | Oriental arbita Ibia | Threskiornis | CT, BT, NT, NiT, WP, MB & RB | | |
| | Oriental winte Ibis | melanocephala | | | |
| 25. | Glossy Ibis | Plegadis falcinellus | CT, BT, NT, NiT, WP, MB & RB | | |
| 26. | Black Ibis | Pseudibis papillosa | CT, BT, NT, NiT, WP, MB & RB | | |
| 27. | Purple Moorhen | Porphyrio porphyrio | I, WP, MB & MBRG | | |
| 28. | Common Moorhen | Gallinula chloropus | I, WP, MB & MBRG | | |
| 29. | White breasted Water Hen | Amauronis phoenicurus | I, WP, MB & MBRG | | |
| 30. | Common Coot | Fulica atra | I, RB & MB | | |

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 31.
 Yellow Wagtail
 Motacilla flava
 MB, I, WP & MBRG

 32.
 White Wagtail
 Motacilla alba
 MB, I, WP & MBRG

| 51. | Tenow wagtan | Molacilla flava | |
|-----|---------------------------|--------------------|------------------|
| 32. | White Wagtail | Motacilla alba | MB, I, WP & MBRG |
| 33. | Lesser pied Kingfisher | Ceryle rudis | EPW, MB, RB & AT |
| 34. | White breasted Kingfisher | Halcyon smyrnensis | EPW, MB, RB & AT |
| 35. | Small blue Kingfisher | Alcedo atthis | EPW, MB, RB & AT |

Note: Data is based on Tables 1 and 3.

CT: Coconut Tree; JT: Jali Tree; NT: Neem Tree; BT: Banyan Tree; AT: Arecanut Tree

NiT: Nilgiri Tree; KHM: Kadu Hunse Mara; WP: Weed Plants; I: Island; MB: Mud Bunds with pebbles; R: Rocks; RB: River Bank; MBRG: Mud Bank with reeds and grasses and EPW: Electric Poles/Wires.

| Table 5. Frequently used sites for various activities by bird species amidst | Village ponds and back water |
|--|------------------------------|
|--|------------------------------|

landscape Site/Place used for/during Name **Resting/**Roosting Foraging Nesting 1. Areca nut Tree (AT) 2,3,4,7,8,9, 11, 16,33,34 & 35 2. Banyan Tree (BT) 2,3,4,5,7,8,9,10, 3.4.7.8.9. 13,14,15,17,22 & 26 24 & 26 Coconut Tree (CT) 3,5,7,8,9,24 3. 4,5,7,8,9,11,13, 14,15,24,25 & 26 & 26 4. Jali Tree (JT) 3,4,5,7,8,9,13,14,15, 3,5,7,8,9,24 Tree 17,24,25, 26,33 & 34 & 26 5. Kadu Hunse Mara 3,4,5,7,8,9,10,13, 3,4,5,7,8,9,24 (KHM) & 26 15,24,25 & 26 6. Neem Tree (NT) 2,3,4,5,7,8,9,11,13,14, 8,9,10,24 -15,16,17,24, 25,26,33 & 34 & 26 7. Nilgiri Tree (NiT) 3,4,5,7,8,9,11,12,13,14,15, -3,4,5,7,8,9,10 13,14,24 & 26 16,17,24,25,26,33 & 34 8. Weed Plants (WPs) 1,6,12,18,19,20,23, 1,12,18,27,28 11,12,19,20,23, Shrub 27,28 & 29 & 29 27,28,29 & 30 9. **Electric Poles/Wires** 2,16.21.33.34 & 35 (EPW) 10. Island (I) 1,2,3,4,5,6,7,8,9,10,11,12,16,17,1 1,2,3,4,5,6,7,8,9,10, 1,11,12,18,19, 20,22,23,27,28 8,22,23,27,28,29,30,31 & 32 11,12,16,17,18,22,23,27, 28,29,30,31& 32 29 & 30 11. Mud Bunds with Reeds 1,3,4,5,6,7,8,9,10,11,12,18,19,20, 3,4,5,7,8,9,11,12,13,18,1 1,11,12,18,19,20,22, 9,20,23,24,25,26,27,28,2 Other & Grasses (MBRG) 22,23,24,25.26.27,28,29,31 & 32 23,27,28,29,31,32,3 Objects 9.31 & 32 3,34 & 35 12. Mud Bank (MB) 2,3,4,5,7,8,9,10,13,14,16, 1,8,12,13,23,29,31 11,12,23,31, 17,24,25 & 26 & 32 32,33,34 &35 13. River Bank (RB) 2,3,4,5,7,8,9,10,12,13,14,16,17, 12,16,17,21,23,31,32,33, 12,23,33,34& 35 21.24.33 & 34 34 & 35 14. 2,3,4,5,7,8,9,10,13,14,16,17, 24, 11 & 21 Rocks (R) 33,34 &35

Note: Data is based on Tables 3 and 4. Numbers presented in the column 3, 4 & 5 represent the bird species as is

depicted in Table 1.

| Water fundscape | | | | | | | |
|-----------------|-----------------------|-------------------|-------|-----|---------------------|-------|--|
| SI. | Name of | Scientific Name | % | SI. | Other | % | |
| No. | tree | | Usage | No. | objects | Usage | |
| 1. | Coconut Tree (CT) | Cocos nucifera | 14.8 | 1. | Island (I) | 4.8 | |
| 2. | Jali Tree (JT) | Acacia sp. | 12.9 | 2. | Mud Bunds (MB) | 31.2 | |
| 3. | Neem Tree (NT) | Azardichta indica | 1.2 | 3. | Rocks (R) | 14.1 | |
| 4. | Banyan Tree (BT) | Ficus sp. | 1.4 | 4. | River Bank (RB) | 2.9 | |
| 5. | Arecanut Tree (AT) | Areca catucha | 0.9 | 5. | Mud Bank (MB) | 2.6 | |
| 6. | Nilgiri Tree (NiT) | Eucalyptus sp. | 1.4 | 6. | Electric Poles/Wire | 3.3 | |
| | | | | | (EPW) | | |
| 7. | Kadu Hunse Mara (KHM) | | 2.1 | | Total | 58.9 | |
| | | Tree species | 34.7 | | | | |
| 8. | Weed Plants (WP) | Weed sp. | 6.4 | | | | |
| | | Total | 41.1 | | | | |

 Table 6. Percent dependence for various activities by birds amidst village ponds and back

 water landscape

Note: Data is based on Tables 3 and 5.