



Exploring the Rich Tapestry of Aquatic Bird Life: A Comprehensive Survey of Naaj River in Kathua District, Jammu, India

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Abstract: A preliminary survey of avifauna was carried out along the Naaj River in the Billawar region of the Kathua district in Jammu and Kashmir, aimed at assessing the diversity of aquatic birds. The field study spanned from October 2020 to September 2021, utilizing the point count method to document the diversity and relative abundance of bird species. Results revealed a total of 37 aquatic bird species, distributed across 8 orders and 17 families within the surveyed river. The Shannon Wiener diversity index was employed to calculate bird diversity, ranging from $H' = 2.599 \pm 1.07$ to $H' = 3.343 \pm 1.81$. Species richness, measured by the Margalef index, varied from 6.58 ± 2.41 to 7.18 ± 2.41 . Among the 37 bird species observed, 22 were categorized as common, 8 as rare, and 7 as abundant in the study area.

Key words: Aquatic birds • Diversity • Abundance • Species richness • Naaj River • Kathua

Introduction

Wetland habitats involve temporary or permanent accumulation of water bodies, which are imperative ecosystems that act as important bird areas and provide abundant favorable habitats for aquatic bird populations throughout the year (Wetlands International 2019, Bird Life International, 2007). Unfortunately, currently these habitats are the most threatened habitats due to high anthropogenic activities such as intensive agricultural practices, encroachment, and livestock grazing which adversely affect the diversity, abundance and composition of bird species communities (Evans 1994, Zedler and Kercher 2005). The aquatic birds have always attracted the attention of the public, researchers, ornithologists and scientists just because of their abundance, visibility, beauty and well developed social behavior (Kumar et al 2005). They

represent different guilds and can be used as indicators of environmental changes because they play important roles in the ecosystem as scavengers and long-distance pollinators, as well as bio controlling agents for various crop pests. These guilds plays stunning role in seed dispersal and in balancing aquatic ecosystem and understanding their diversity patterns is important for informing and supporting the conservation management (Paillisson et. al., 2002, Mistry et. al., 2008; Everard and Noble, 2010, Sudesh and Bhandari 2015, 2016, 2019). There are several other important factors affecting the relationship between wetland characteristics and water birds including the availability of diverse habitats, shelter, food, quality water and protection from predators. The loss of natural habitats in recent decades due to increased urbanization, unusual anthropogenic



activities and environmental changes has also been a serious threat to the diversity and distribution of water birds too (Foziah 2009; Wang et al 2018). The involvement of local communities might help to check the anthropogenic activities for aquatic system management and the conservation of water birds. Therefore, conserving the aquatic birds and maintaining the natural balance is our prime goal.

Study area and Methods

The present study was carried out in the Naaj River in Billawar region of district Kathua Jammu lying between 32.613° N, 75.604° E at an altitude of 844m asl. The field study was conducted from October 2020 to September 2021. Point count method (Javed and Kaul, 2002) was used to record the aquatic birds of the study area. During the morning hours (6:00am to 10:00am) and in the evening hours (4:00pm to 7:00pm), frequent visits were made in the Naaj river study area, and birds were recorded. With the help of field binocular (2 x 40x), digital camera (21mp x 63x zoom) and pocket field guides (Gremmitt et. al., 2011, Kazmierczak, 2000, Ali, 2002) each bird was identified and photographed. The diversity index and species richness were calculated by using Shannon and Wiener (1949) and Margalef index (1968) respectively.

Results and Discussion

A total of 37 species of aquatic birds belonging to 08 orders and 17 families were recorded from the study area. The highest number of bird species was observed in the order Passeriformes (13, 35.14 % species composition), followed by Coraciiformes and Pelecaniformes (06 in each order), Suliformes (05), Gruiformes (03), Charadriiformes (02) and the lowest were observed in Podicipediformes and Anseriformes (01 in each order, 02.70% species composition). Among the families, the maximum number of

bird species was observed in Ardeidae (06), followed by Alcedinidae (05) and the minimum species were recorded in Pycnonotidae, Corvidae, Podicipedidae, Anatidae, Oriolidae, Sturnidae and Dicruridae (01 species in each family, 02.70% species composition) (Table 1 and Fig. 1). The relative abundance of individual bird species was observed as common species (22), followed by rare species (08) and abundant species (07). Out of the total birds recorded from the study area, 36 species of birds are least concerned and only one species is critically endangered under the IUCN Red list data (2020). Apart from this, the recorded species of birds are categorized in the different schedules of IWPA (IUCN, 2020 and IWPA, 1972) (Table 1 and Plate 1).

The diversity index (H') ranged between 2.599 ± 1.07 to 3.343 ± 1.81 and the average diversity index was recorded as 3.461 ± 1.04 . The species richness index ranged between 6.58 ± 2.41 to 7.18 ± 2.41 with an average of 4.69 ± 1.08 (Table 2).

The present study revealed that River Naaj a wetland system sustains diversity of aquatic birds with the significant inter-specific variation by providing favorable habitats for the variety of their seasonal needs (Ali, 1979). The ecology of aquatic birds has been closely related to the distribution and abundance of diverse food resources and benthic invertebrates are always the major dietary components of these birds and influence the habitat selection. The diverse aquatic plants may be the major cause which influences the birds in Riverine habitats. It was also observed from the results that the vegetation composition of the study sites influence the bird's diversity and abundance (Gucel et al. 2012). The habitat feature such as vegetation composition and cover of the study area is a key factor that affects the habitat selection, distribution, diversity and richness of aquatic birds (Rajpar and Zakaria 2014).



Table 1. List of aquatic bird species recorded in Naaj River of district Kathua (J&K)

S. N.	Name of Bird/Order/Family	Scientific Name	Relative Abundance	(IUCN) Status	(IWPA) Schedule
A)	Coraciiformes				
a)	Alcedinidae				
1.	Common kingfisher	<i>Alcedo atthis</i>	A	LC	Sch IV
2.	White throated kingfisher	<i>Halcyon smyrnensis</i>	A	LC	Sch IV
3.	Pied Kingfisher	<i>Ceryle rudis</i>	R	LC	Sch IV
4.	Lesser pied kingfisher	<i>Ceryle rudis</i>	R	LC	Sch IV
5.	Small blue kingfisher	<i>Alcedo atthis</i>	R	LC	Sch IV
b)	Meropidae				
6.	Little Green Bee-eater	<i>Merops orientalis</i>	C	LC	Sch IV
B)	Gruiformes				
a)	Rallidae				
7.	White breasted water hen	<i>Amaurornis phoenicurus</i>	C	LC	Sch IV
8.	Watercock	<i>Gallicrex cinerea</i>	C	LC	Sch IV
9.	Common Moorhen	<i>Gallinula chloropus</i>	C	LC	Sch IV
C)	Charadriiformes				
a)	Charadriidae				
10.	Yellow wattled lapwing	<i>Vanellus malarbaricus</i>	C	LC	Sch IV
11.	Red wattled lapwing	<i>Vanellus gregarius</i>	A	LC	Sch IV
D)	Suliformes				
a)	Phalacrocoracidae				
12.	Little cormorant	<i>Phalacrocorax niger</i>	C	LC	Sch IV
13.	Great cormorant	<i>Phalacrocorax carbo</i>	C	LC	Sch IV
14.	Indian cormorant	<i>Phalacrocorax fuscicollis</i>	C	LC	Sch IV
b)	Rostratulidae				
15.	Greater painted-snipe	<i>Rostratla benghalensis</i>	C	LC	Sch IV
c)	Scolopacidae				
16.	Common Sandpiper	<i>Actitis hypoleucos</i>	C	LC	Sch IV
E)	Pelecaniformes				
a)	Ardeidae				
17.	Little Egret	<i>Egretta garzetta</i>	R	LC	Sch IV
18.	Cattle Egret	<i>Bubulcus ibis</i>	R	LC	Sch IV
19.	Grey Heron	<i>Ardea cinerea</i>	C	LC	Sch I (Part III)
20.	Indian Pond Heron	<i>Ardeola grayii</i>	C	LC	Sch I (Part III)
21.	Night Heron	<i>Nycticorax nycticorax</i>	R	LC	Sch I (Part III)
22.	Purple Heron	<i>Ardea purpurea</i>	C	LC	Sch I (Part III)
F)	Passeriformes				
a)	Motacillidae				
23.	White Wagtail	<i>Motacilla alba</i>	C	LC	Sch IV
24.	Yellow headed wagtail	<i>Motacilla citreola</i>	C	LC	Sch IV
25.	Yellow wagtail	<i>Motacilla flava</i>	C	LC	Sch IV
26.	Water pipit	<i>Anthus spinoletta</i>	C	LC	Sch IV
a)	Muscicapidae				
27.	White caped redstart	<i>Chaimarrornis leucocephalus</i>	C	LC	Sch IV
28.	Black redstart	<i>Phoenicurus ochruros</i>	C	LC	Sch IV
29.	Blue caped redstart	<i>Phoenicurus caeruleocephala</i>	A	LC	Sch IV
30.	Blackbacked forktail	<i>Enicurus immaculatus</i>	C	LC	Sch IV
b)	Oriolidae				
31.	Black naped oriole	<i>Oriolus chinensis</i>	C	LC	Sch IV
c)	Sturnidae				
32.	Common myna	<i>Acridotheres tristis</i>	A	LC	Sch I (Part III)
d)	Dicruridae				
33.	Black drongo	<i>Dicrurus macrocercus</i>	C	LC	Sch IV
e)	Corvidae				
34.	House crow	<i>Corvus splendens</i>	A	LC	Sch V
f)	Pycnonotidae				
35.	Red-vented bulbul	<i>Pycnonotus cafer</i>	A	LC	Sch IV
G)	Podicipediformes				
a)	Podicipedidae				
36.	Little grebe	<i>Tachybaptus ruficollis</i>	R	CE	Sch IV
H)	Anseriformes				
a)	Anatidae				
37.	Gadwall	<i>Anas strepera</i>	R	LC	Sch IV

Abbreviations: A= Abundant, C= Common, R= Rare, LC= Least concern, CE= Critically endangered, Sch= Schedule

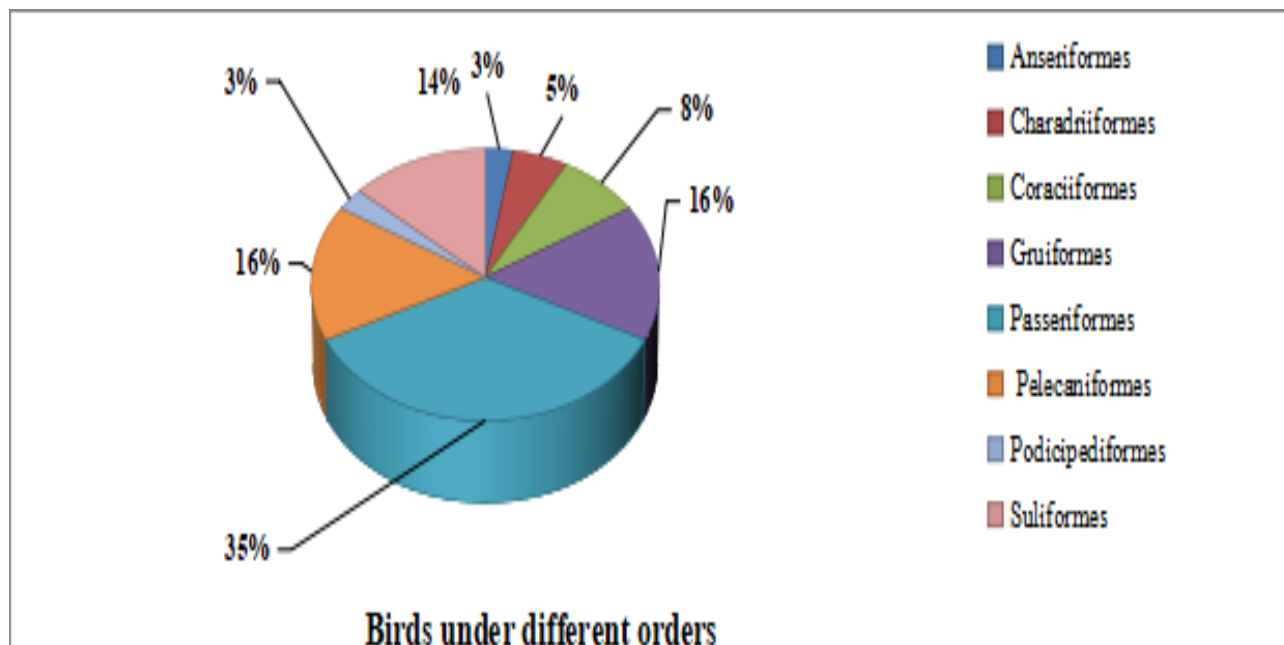


Figure 1. Aquatic birds of Naaj River under different orders

Table 2. Species Diversity and Species richness of aquatic birds of the Naaj River of district Kathua

Month	DI±SE	SR±SE
October 2020	3.234±1.02	6.85±1.75
November	3.222±1.60	6.61±1.26
December	3.262±1.57	6.78±2.13
January	3.116±0.46	6.70±1.46
February	3.223±0.67	6.93±2.36
March	3.060±1.33	6.90±1.18
April	2.699±1.98	7.18±2.41
May	3.310±0.14	7.07±2.34
June	2.599±1.07	7.16±2.10
July	3.211±1.26	6.98±2.21
August	3.187±1.65	6.66±1.08
September 2021	3.343±1.81	6.58±2.41
Average	3.461±1.04	4.69±1.08

Abbreviations: DI- Diversity index, SR- Species richness, SE- Standard error



Cattle egret



White wagtail



Red vented bulbul



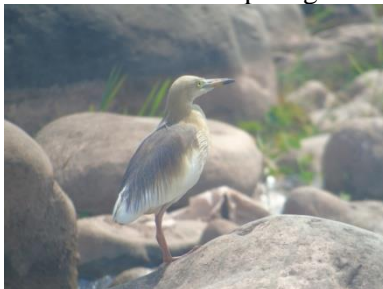
Red wattled lapwing



Black drongo



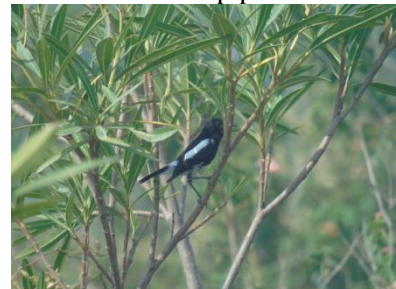
Water pipit



Indian pond heron



White throated kingfisher



Blue caped redstart



Indian cormorant



Black redstart



Yellow wagtail

Plate 1. Some of the common birds of the study area (Naaj river)

The results of the study further more showed that in natural habitats where human interference was observed as less, the avian species diversity and evenness was higher at those regions as compared to the disturbed sites (Sudesh et. al., 2021 and 2022). The present study is in compliance with the earlier work on aquatic

avifaunal diversity from different water bodies of India carried out by some researchers, Ghosal (1995): Wani et. al., (2020). Similar studies were made by the researchers, Sohil and Sharma (2019) recorded 207 bird species belonging to 63 families and around Jammu (J&K); Malik and Sheikh (2020) recorded 64 species of birds belonging to 34 families in Tehsil Gool, district



Ramban (J&K). Sharma et al., (2018) during their avifaunal studies across the union territory of Jammu and Kashmir revealed the dominance of family Muscicapidae. It was observed from the previous studies that the unpolluted wetland always maintained rich diversity and density of aquatic bird's than polluted ones (Nikunj, et. al., 2012). The useful attraction and response of aquatic birds to water and food availability of the study area is conspicuous indication that reflects the health status of diverse suitable habitats at a given time of a particular wetland. However, the increase in rapid growth of human population makes a large scale changes in the land use pattern, land cover and unusual development due to anthropogenic activities which affect the habitat structure of an area and the major cause of substantial loss of wetland resources leads to the decline of biodiversity at an alarming rate. Thus, for the effective management system and conservation of Riverine system and their inhabitants with special reference to the aquatic birds, there is much needed requirement of further research work on the impact of anthropogenic pressure, ecology of feeding and breeding sites of these birds which may be helpful to sustain these creatures on the planet.

Conclusion

The inaugural study underscores the area's abundant and thriving population of aquatic birds, emphasizing the imperative for the government to adopt proactive measures in conserving their habitat. Urgent action is required to safeguard against potential losses in the future. Consequently, there is a pressing need for sustained, long-term investigations to discern the impact of climate changes and human activities on the distribution of aquatic bird species, both in natural and artificial wetlands.'

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