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DIVERSITY, SEASONAL VARIATION, ABUNDANCE AND MIGRATORY BEHAVIOR OF LOCAL AND MIGRATORY WATER BIRDS OF MUKUTMANIPUR DAM, BANKURA, WEST BENGAL INDIA

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ABSTRACT

Birds have been considered as useful biological indicatorsbecause they are ecologically versatile and inhabit all kinds of habitats. Wetland sare fringe habitats between terrestrialand aquaticeco systems. Wetlands are the most preferred habitats for water birds. They support the birds by way of feeding, roosting, nesting and rearing young ones. Birds are essential animal group of an ecosystem and maintain a tropic level. Bird migration is a phenomenon it includes the regular, seasonal movement of populations from one geographic location to another, and is common among most varieties of birds that has long fascinated scientists and other observers. It is marked by the eventual return to the original place of departure and is most evident among certain bird species that usually follow a yearly cycle. Migratory waterfowls are one of the most remarkable components of global biodiversity. Water birds are not only the most prominent groups which attract people to wetlands, but also are good bio-indicators and useful models for studying a variety of environmental problems. The present investigation was carried out to document the variation of Diversity, Seasonal variation, Abundance and Migratory behavior of Local and Migratory Water birds, Wetland-associated bird species of Mukutmanipur dam, Bankura, West Bengal India, from December 1017- March 2018. The

present study recorded 81 bird's species of 13 families. In which 61% species are migratory of which 59% & 3% species are winter migratory & summer migratory respectively. The maximum tradition of birds are come to the MukutmanipurDam in winter season in the month of December to February. It indicate the high rate of productivity of the wetland. Beside this but 12 Vulnerable, 4 Near Threatened, and also 8 Endangered Species also recorded. This represents the reflection ecological importance of the dam.

KEYWORDS: Water birds Diversity, Seasonal variation, Resource Conservation, Migratory Birds.

INTRODUCTION

Wetlands are specialized ecosystems which perform important ecological functions and have many ecological, socio-economic and cultural values. Wetlands are known to be the most productive and diverse ecosystems on earth because they provide direct and indirect benefits to people as sources of food, recharge of aquifers, regulating water quality, natural purification of waste water, reducing sediment load, water recharge recycling of bio-genic salts as a source of agricultural water, animal husbandry, aquaculture and also as a refuse for rare and endangered species of plants and animals. Wetland supports a good diversity of different species of water birds as it has high nutritional and productivity. Birds are one of the most popular life forms of the planet and its diversity leads to a richness of life and beauty Apart from this, birds have always fascinated mankind with their intrinsically beautiful plumage, melodious songs and artistic behavior. The presence of aerial foraging bird species in any lake depends on certain conditions such as habitat types, climatic conditions and resource stability. Beside this bird migration is a phenomenon it includes the regular, seasonal movement of populations from one geographic location to another, and is common among most varieties of birds that has long fascinated scientists and other observers. It is marked by the eventual return to the original place of departure and is most evident among certain bird species that usually follow a yearly cycle. Migratory waterfowls are one of the most remarkable components of global biodiversity. Water birds are not only the most prominent groups which attract people to wetlands, but also are good bio-indicators and useful models for studying a variety of environmental problems.

Study Area

The Mukutmanipur Dam is a dam in Khatra subdivision of Bankura district in the state of West Bengal, India. Mukutmanipur is a town in Bankura district of West Bengal, India. It

is located at the confluence of the Kangsabati and Kumari rivers close to the Jharkhand border. Mukutmanipur Latitude 22.9570° N, Mukutmanipur Longitude 86.7919° E.

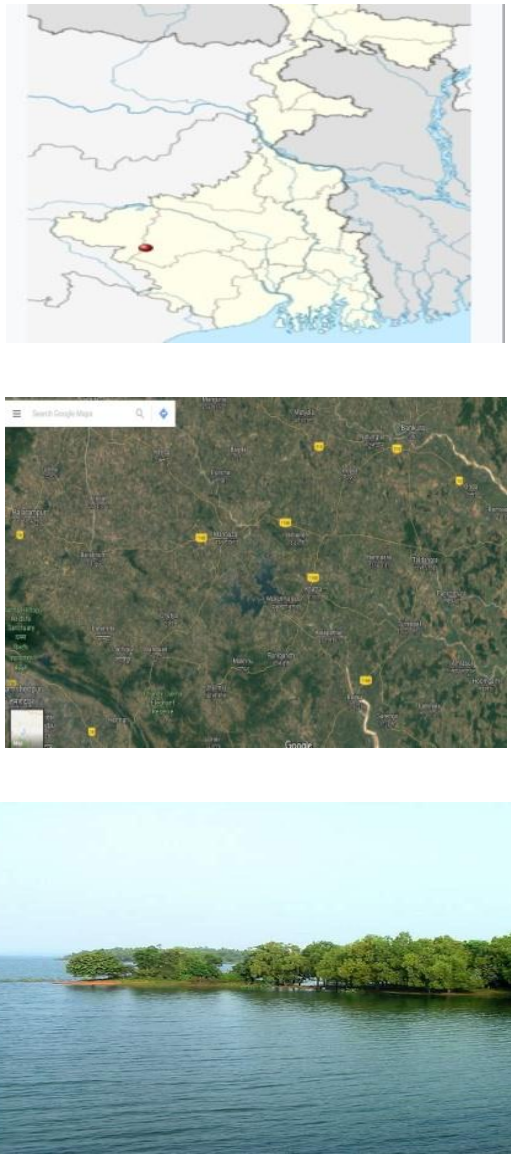


Figure 1: Position of Mukutmanipur Dam in Map and satalight view and real view respectively.

AIMS OF THE STUDY

The foremost aims to identify document and advocate the protection and management of a network of sites that are important for the long-term viability of naturally occurring bird populations across the geographic range of those bird species of Mukutmonipur Dam Wetland. Beside this project work covers all the habitats and species. Given that birds are

good indicators of overall biological diversity. Checklist of birds of Mukutmanipur Dam.Its also highlight the feeding habitat, nesting behavior, and breeding season among water birds.

METHODOLOGY

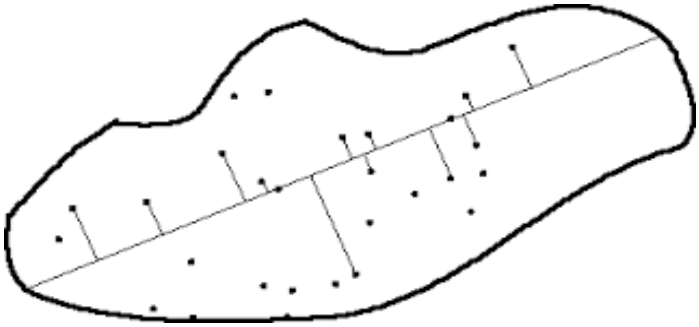
Birds were counted in stands by point surveys. In each selected stand Arc GIS was used to find three points located not closer to each other than 100 meters (to avoid counting the same individuals more than once) and not closer than 50 meters from the stand's edge. In order to ensure this, buffer zones were created in the stand polygons. Subsequently the function "create random points" in Arc Toolbox was used. However this did not generate the required number of points. Even if points were designated without the buffer zone, there were still frequently only one or two points in many stands. In order to obtain the most random placement possible, a raster of squares of 100 meters by 100 meters was generated. This was overlaid with the stand polygons in Arc Map, forming a random pattern of squares inside the polygons.

MATERIALS REQUIRED

Point & Shoot Digital Cameras by Nikon, Olympus Binocular 10x50 dps-1, GPS Navigation Machine, The Book of Indian Birds.

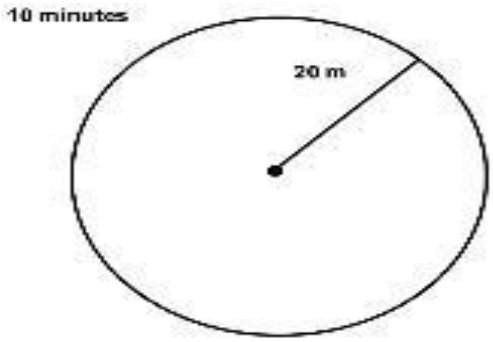
LINE TRANSECT SURVEYS

A transect consists of a person walking from point A to point B along a defined path. He or she counts the number of individual birds (of each species) seen and heard within a certain distance from their path (on both sides). In most cases, especially when gathering data to compare one transect to another, this distance from the path (transect width) should be consistent. But how do you determine what transect width to use? The distance should be as large as possible to maximize information gathering, but not so large that birds cannot be seen or heard along the transect. Also, landscapes are very different from one survey site to the next. It is difficult to select a distance that works for every situation.



A

Figure 2 A: A typical transect survey where a person surveys birds within a 20 meter (m=meter) band on either side of a route. A person counts all the birds seen or heard within a 30 minute period for a 1km route.



B

Figure 2B: B typical 20 m (m=meter) radius point count where one person counts all the birds seen or heard within a 10 minute period.

POINT COUNTS

The simplest method of counting birds is called a "point count", in which a trained observer records all the birds seen and heard from a point count station for a set period of time. A series of point counts completed over a fixed route can then be compared to the results of the same point counts in other seasons or years. A similar method, called an area search, involves searching throughout a fixed area for a set amount of time and recording the number of birds seen and heard. A point count consists of standing in a specific location and counting birds. One counts the number of individual birds (of each species) within a circle of a certain radius. In most cases, especially when gathering data to compare one point count to the next, radius size should be consistent The radius should be as large as possible to maximize information gathering, but not so large that birds cannot be seen or heard throughout the survey area.

Nest monitoring

Nest monitoring is essential for measuring the reproductivesuccess of a population, which is important for identifying changes in a population's birth rate. Nests can be found either through systematic searching of the birds' preferred habitat or by watching birds for behavioral clues. A researcher can then track the success of each nest by regularly checking nests for signs of hatching, fledging, or predation. Nest monitoring can also provide extremely valuable information about nesting behavior, habitat selection, and nest predation.

RESULT AND DISCUSSION

A total of 81 species of water birds belonging to 13 families were recorded in Mukutmanipurdam, Bankura, West Bengal India, from April 1017- March 2018. 81 birds species belong the family, Anatidae contain 31 species, family Alcedinidae contain 06 species, Family Ardeidae contain 08 Species, Family Anhingidae include 01 Species., Family Charadriidae have 02 Species, Family Ciconiidaeinclude 06 Species, Family Jacanidaeinclude 02 Species, Family Laridae 02 Species, Family Hirundinidae only 01 Species, Family Motacillidaeinclude 04 Species, Family Podicipedidae contain 03 Species, Family Phalacrocoracidaeinclude 04 Species, Family Scolopacidae have 10 Species.

The word migration has come from the Latin word migrara which means going from one place to another. Many birds have the inherent quality to move from one place to another to obtain the advantages of the favourable condition. In birds, migration means two-way journeys—onward journey from the 'home' to the 'new' places and back journey from the 'new' places to the 'home'. This movement occurs during the particular period of the year and the birds usually follow the same route. There is a sort of 'internal biological clock' which regulates the phenomenon. Bird migration is a more or less regular, extensive movement between their breeding regions and their wintering regions. Bird migration may be described as changes of habitat periodically recurring and alternating in direction, which tend to secure optimum environmental conditions at all times.

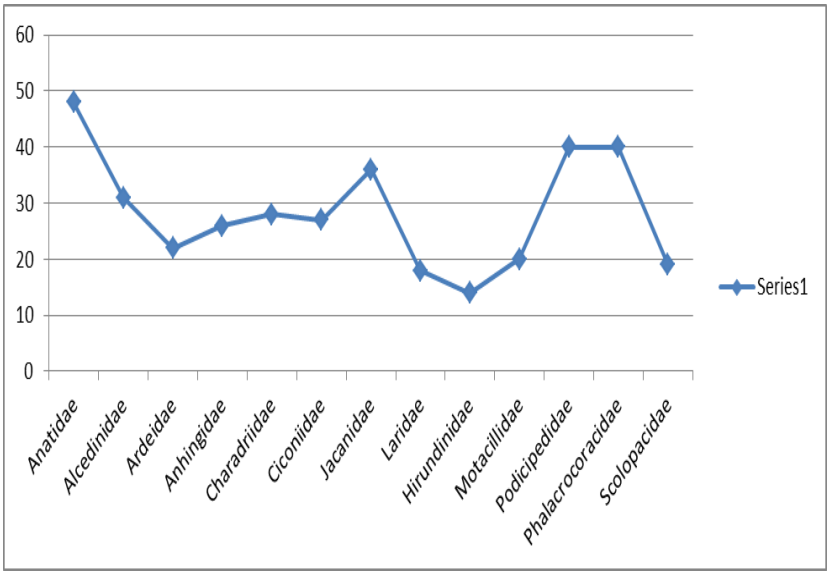


Fig. 3: Average Number of Species present / Km^{2}.

Table 1: At a glance Species distribution.

Sl. No.	Scientific Name	Common Name	Family	Migratory Status	IUCN Category	No. of Species /Km^2
1.	Nettapuscoromandelianus	Cotton Teal	Anatidae	R	V	14
2.	Anseranser	Grey lag goose	Anatidae	R	V	12
3.	Anasstrepera	Gadwal	Anatidae	W	L	19
4.	Anasacuta	Northern Pintail	Anatidae	W	L	31
5.	Anasclypeata	Northern shoveller	Anatidae	W	L	34
6.	Anas Penelope	Eurasian wigeon	Anatidae	W	L	46
7.	Anasquerquedula	Garganey	Anatidae	W	L	52
8.	Aythyaferina	Common pochard	Anatidae	W	L	32
9.	Dendrocygnajavanica	Lesser Whistling Teal	Anatidae	W	L	44
10.	Rhodonessarufina	Red crested pochard	Anatidae	W	E	11
11.	Aythya Nyroca	Ferruginous Pochard	Anatidae	W	L	53
12.	Dendrocygna bicolor	Large whistling teal	Anatidae	W	L	54
13.	Tadornaferruginea	BrahminyShelduck	Anatidae	W	L	67
14.	Dendrocygnajavanica	Lesser Whistling Duck	Anatidae	W	L	52
15.	Anasclypeata	Northern Shoveller	Anatidae	W	L	41
16.	Anaspoecilorhyncha	Spot-billed Duck	Anatidae	W	L	39
17.	Anasquerquedula	Garganey	Anatidae	W	L	74
18.	Anas. crecca	Common Teal	Anatidae	L	L	69
19.	Anasfalcata	Falcated Duck	Anatidae	L	L	68
20.		Red-crested	Anatidae	W	L	40

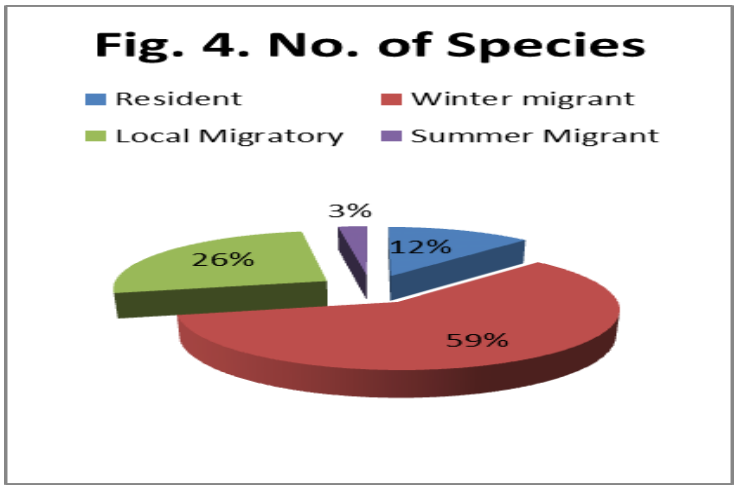
	Rhodonessarufina	Pochard				
21.	Aythyaferina	Common Pochard	Anatidae	W	L	52
22.	Aythyanyroca	Ferruginous Pochard	Anatidae	L	L	36
23.	Aythyafuligula	Tufted Pochard	Anatidae	L	L	65
24.	Anasstrepera	Gadwall	Anatidae	L	L	47
25.	Anasfalcata	Falcated Duck	Anatidae	W	L	65
26.	Anaspenelope	Eurasian Wigeon	Anatidae	W	L	49
27.	Anasclypeata	Northern Shoveller	Anatidae	W	L	74
28.	Anasacuta	Northern Pintail	Anatidae	W	L	18
29.	Anasquerquedula	Garganey	Anatidae	L	L	38
30.	Anas. crecca	Common Teal	Anatidae	W	L	74
31.	Nettapuscoromandelianus	Cotton Teal	Anatidae	R	V	19
32.	Halcyon smyrensis	White throated kingfisher	Alcedinidae	R	V	18
33.	Cerylerudis	Pied kingfisher	Alcedinidae	L	L	39
34.	Alcedoatthis	Common Kingfisher	Alcedinidae	R	E	08
35.	Alcedoatthis	Small BlueKingfisher	Alcedinidae	W	L	46
36.	Cerylerudius	Lesser pied kingfisher	Alcedinidae	R	V	19
37.	Halcyon capensis	Stork billed kingfisher	Alcedinidae	R	L	34
38.	Ardeolagrayii	Indian pond heron	Ardeidae	R	L	36
39.	Egrettagarzetta	Little Egret	Ardeidae	R	L	34
40.	Bubulcus ibis	Cattle Egret	Ardeidae	R	V	14
41.	Casmerodiusalbus	Intermediate Egret	Ardeidae	R	V	18
42.	Ardeacinerea	Grey Heron	Ardeidae	R	L	38
43.	Ardeapurpurea	Purple Heron	Ardeidae	W	L	31
44.	Casmerodiusalbus	Large Egret	Ardeidae	R	L	29
45.	Ixobrychussinensis	Yellow Bittern	Ardeidae	L	V	37
46.	Anhinga melanogaster	Darter	Anhingidae	L	L	14
47.	Vanellusindicus	Red-wattled Lapwing	Charadriidae	S	L	28
48.	Vanellus. cinereus	Grey-headed Lapwing	Charadriidae	W	L	28
49.	Anastomusoscitans	Asian Openbill-stork	Ciconiidae	L	L	36
50.	Ciconusnigra	Black stork	Ciconiidae	L	L	36
51.	Mycterialeucocephala	Painted Stork	Ciconiidae	L	L	37
52.	Ephippiorhynchusasiaticus	Black necked stork	Ciconiidae	L	L	31
53.	Anastomusoscitans	Asian Openbill-Stork	Ciconiidae	L	V	10
54.	Ciconiaepiscopus	White-necked Stork	Ciconiidae	L	L	25
55.	Hydrophasianuschirurgus	Pheasant-tailed	Jacanidae	S	E	18

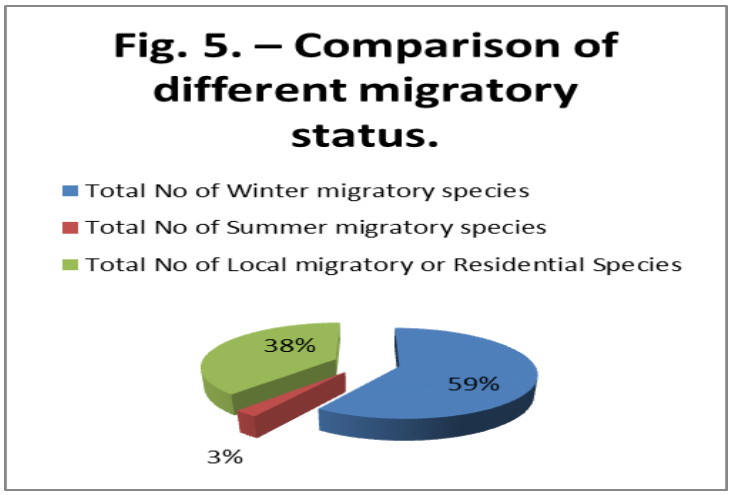
		Jacana				
56.	Metopidiusindicus	Bronze-winged Jacana	Jacanidae	R	L	36
57.	Sterna aurantia	River Tern	Laridae	R	L	27
58.	Chlidoniashybridus	Whiskered Tern	Laridae	R	L	22
59.	Hirundorustica	Common Swallow	Hirundinidae	L	E	14
60.	Motacillamaderaspatensis	Large Pied Wagtail	Motacillidae	W	L	08
61.	Motacilla alba	White Wagtail	Motacillidae	W	N	11
62.	Motacillacitreola	Citrine Wagtail	Motacillidae	W	V	14
63.	Motacillaflava	Yellow Wagtail	Motacillidae	W	V	22
64.	Podicepsruficollis	Little Grebe (blackk)	Podicipedidae	L	L	36
65.	Tachybaptusruficollis	Little Grebe	Podicipedidae	L	L	19
66.	Podicepscristatus	Great Crested Grebe	Podicipedidae	W	V	09
67.	Phalacrocoraxniger	Little cormorant	Phalacrocoracidae	L	L	51
68.	Phalacrocoraxfuscicollis	Great cormorant	Phalacrocoracidae	L	L	20
69.	Phalacrocoraxfuscicollis	Indian Shag	Phalacrocoracidae	L	L	20
70.	Phalacrocoraxcarbo	Great Cormorant	Phalacrocoracidae	W	L	17
71.	Tringanebularia	Wood sandpiper	Scolopacidae	W	E	15
72.	Actitishypoleucos	Common Sandpiper	Scolopacidae	W	N	14
73.	Limosalimosa	Black-tailed Godwit	Scolopacidae	W	N	12
74.	Tringanebularia	Common Greenshank	Scolopacidae	W	L	22
75.	Actitishypoleucos	Common Sandpiper	Scolopacidae	W	E	25
76.	Tringastagnatilis	Marsh Sandpiper	Scolopacidae	W	E	25
77.	Tringaochropus	Green Sandpiper	Scolopacidae	W	L	36
78.	Actitishypoleucos	Common Sandpiper	Scolopacidae	W	L	48
79.	Tringaglareola	Wood Sandpiper	Scolopacidae	W	N	16
80.	Gallinagomegala	Swinhoe's Snipe	Scolopacidae	W	L	55
81.	Tringatotanus	Common Redshank	Scolopacidae	W	L	50

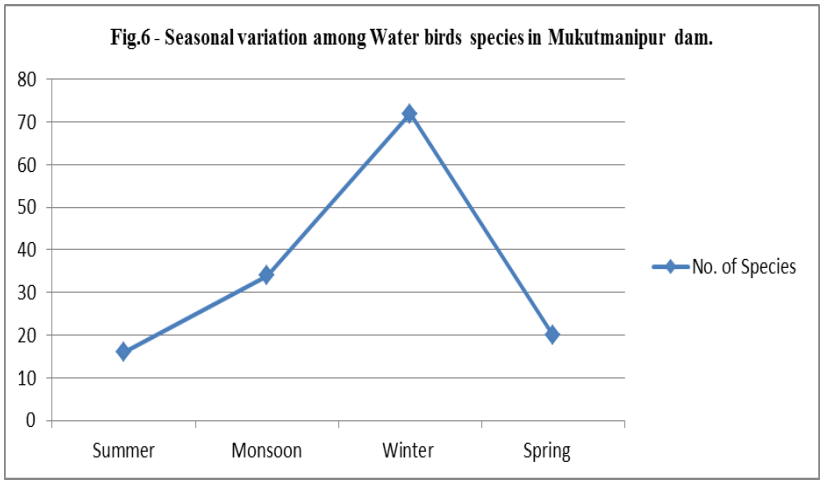
Endangered- E, Vulnerable – V, Near threatened – N, Least concern– L, Winter migratory - W, Summer migratory-S, Resident- R, Local migratory –L.

From the study it has been found that the lake is a vulnerable wetland harboring plenty of winter migratory, resident and few local migratory birds. These winter birds migrate from Central Asia and Mangolia have been frequently visiting this place for over 20 years. Among

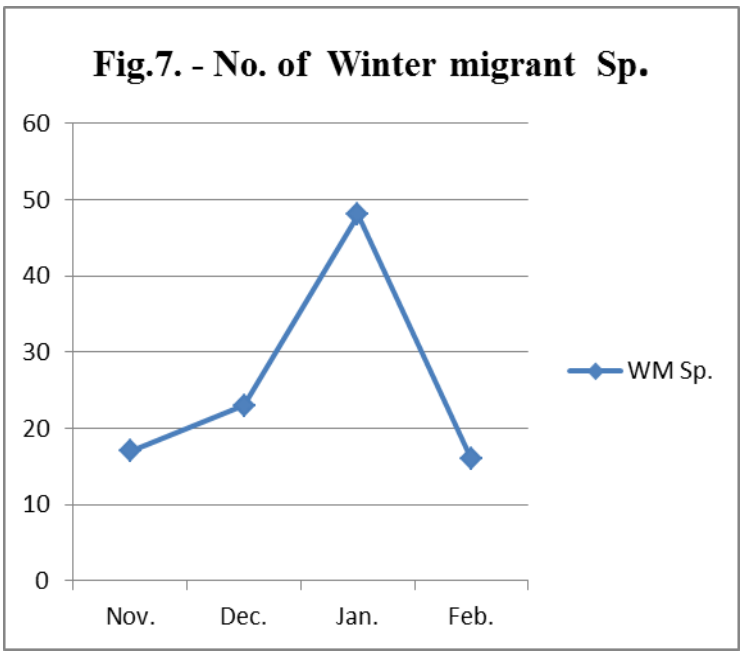
them Bar-headed Goose, BrahminyShelduck, Northern Shoveller, Garganey, Demoiselle Crane, Common Coot, Black-tailed Godwit, Common Greenshank, Common Sandpiper, Marsh Sandpiper, Green Sandpiper, Wood Sandpiper, Common Snipe, Little Stint, White Wagtail, Yellow Wagtail, Glossy Ibis and Grey Wagtail are important wetland migratory birds species. These winter migratory avifauna exhibit a distinct species specific pattern for arrival at and departure from the wetland (Fig.-4). Among the migratory species, Bar-headed geese arrive from Mangolia during winter was the most predominant to occupy this wetland in large number, arrival of this further adds to increase of abundance and diversity of total avifaunal population in the study area.

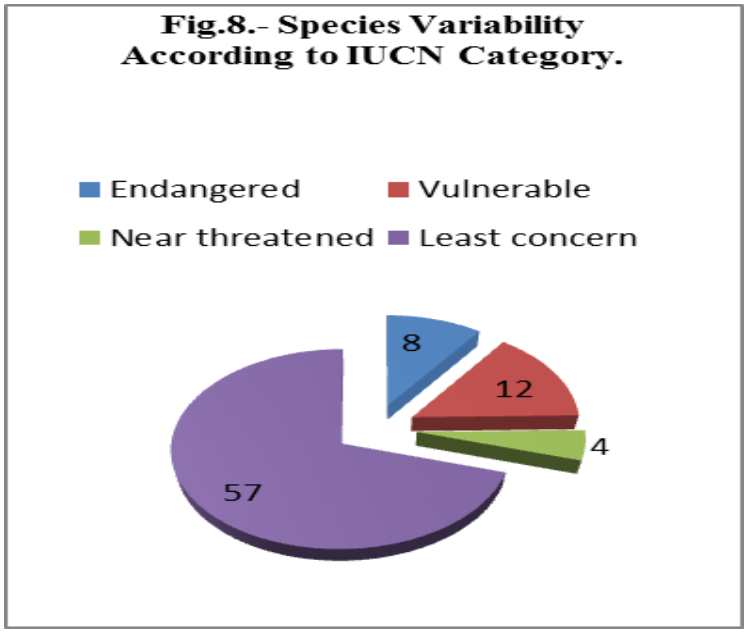






Among all Species (Fig. 5) 61% species are migratory of which 59% & 3% species are winter migratory & summer migratory respectively. Hence for this water body major portion of birds migrate from different places. That indicate this water body is much more productive, which provide sufficient food, and nesting places for all birds. This graph shows that maximum number of species visit in winter, of which in the month of January.(Fig.6) in the present study, highest bird density and diversity was recorded during winter months, when the anthropogenic activities are minimum, also because of availability of varied sources of feed as well as foraging and safety, almost all of them leave the wetland by March-end or early April.





The tradition of migratory bird come from November to February in January maximum number of species variability present. According to IUCN category most of the species are least concern, but 12 Vulnerable, 4 Near Threatened, and also 8 Endangered Species present in this Dam. The Presence of 4 Near Threatened is need to be bothered thus they get facility to increase in number.

CONCLUSION

The seasonal variation in the abundance of food resources result in seasonal changes in the species abundance of birds. The distribution and abundance of many bird species aredetermined by the composite on of the vegetation that forms a major element of their habit ats. As vegetation changes along complex geographical and environmental gradients, a particular bird species may appear, increase or decrease in number, and disappear as the habitat changes. These reservoirs are also an important site for observing some birds listed as near threatened species of IUCN Red list. The occurrence of the migratory birds in the area indicates that the critical habitat is important for the organisms. Likewise, the occurrence of these birds in the area suggests that the area provides a favorable condition for the bird's breeding, feeding and nesting. Studies have shown that birds migrate to different areas because of seasonal changes. Availability of food And threat ofpredation. The relatively high diversity of birds observed in the present study suggests that the habitat of the area is suitable for birds. However, increasing anthropogenic activities are a matter of great concern when considering the future existence of these species. Sudan has lost a number of wildlife species in the last two decades and this is mostly due to habitat destruction; several varieties of

grasses and herbs have disappeared due to overgrazing, and repeated droughts and fires. The study concluded that is very important for the bird communities. There was greater variation in species composition between terrestrial and aquatic habitats. Terrestrial habitat contributed much in terms of species composition than aquatic habitat. Thus, if the amount and quality of Reservoir is substantially reduced, population's birds in the area also can be expected to decrease. Further studies to cover the nocturnal birds to generate a comprehensive list of bird species diversity in and around the Mukutmanipur Dam is vital. Land use planning protects the area and emphasizes bird-friendly land-scape design around Sothuparai reservoir may enhance avian diversity and abundance within the area.

Recommendation

This study suggests that assessment of a combination of the migratory and residential bird's diversity indicate the high production rate of the water body. It needs to conserve after proper utilization, in a scientific manner. So that the increased productivity directly facilitate the production rate. The managed plantation will also assist the nesting of birds. The chemical composition of water directly facilitates the plankton growth, and increased productivity. It is therefore recommended that the management programmers for the Mukutmanipur dam should incorporate avian conservation in the area.

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We are grateful to the chairman of West Bengal Biodiversity Board for necessary permission to carry out the fieldwork. We also wish to thank the D.F.O. Bankura (South) for giving necessary permission to undertake census inside the protected area. We also acknowledge the Forest Officer of Banpukuria Deer Park. We also wish to thank the unknown referee for improving this paper.

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