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RESEARCH ARTICLE

MIGRATORY WETLAND BIRDS DIVERSITY IN LOWER CHOTA NAGPUR PLATEAU WITH SPECIAL REFERENCE TO PURULIA DISTRICT, WEST BENGAL, INDIA

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Abstract

Lower Chota Nagpur Plateau has several large and small water bodies having diverse aquatic flora and fauna. These wetlands not only provide suitable habitat for resident and as well as migratory avian species but also contribute much to the biodiversity. The present study deals with the diversity, abundance and variations of avian migratory species at wetlands of Purulia district. The study reflects that there are 43 migratory bird species in number in these wetland regions belonging to 8 orders and 12 families. Red-crested Pochard, Tufted Duck, Lesser Whistling Duck, Northern Pintail, Gadwall, Eurasian Wigeon, Common Coot etc. are found in large number in winter season in these wetlands.

Introduction:-

A flock of migratory birds

Wetlands, the marshy areas of land where the soil is saturated with water are crucial incubators of species diversity. Avifaunal species are one of the main indicators which determine the health of wetlands [Ali, S. (2002)]. Migratory

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bird species play a significant role in the aquatic ecosystem and increase faunal diversity. However now-a-days, migratory birds' diversity has been decreasing due to the destruction of natural habitats and anthropogenic interference [Sanderson, E.W. Et al; (2002)]. Avian species of wetlands are facing tremendous pressure due to the unethical behaviour of human beings.

In the Indian subcontinent the majority of migratory birds are winter migrant. It is estimated that over hundred species of migratory birds fly to India, either in search of feeding grounds or to protect themselves from severe winter bite of their native habitat (According to ENVIS Centre of Avian Ecology) .

In West Bengal, District Purulia is an adobe of various migratory as well as residential birds. A trend has been observed that migration of avian species is decreasing year after year (Anandabazar Patrika; 9th January, 2017). Considering this scenario, an effort has been made to study the avifaunal migratory species of the wetlands of this district. Among the major wetlands of Purulia basically eight of them(Baranti Reservoir, Muradi ; Adra Saheb Bandh lake; Purulia Saheb Bandh; Futiyari Dam; Murguma Dam; Jorisha Dam; Kalidaha Jore, Indrabil and Kumari Dam) attract a large number of migratory birds in winter. There are only a few reports available till date about avian species diversity of the entire lower Chotanagpur Plateau region.

Objectives of the Study:-

An effort has been taken to focus on the following objectives through the present study.

1. To focus the geographical position of the study area.
2. To analyse migratory species diversity.
3. To analyse the richness of migratory birds.

Observation Period:

The present study has been conducted for four consecutive years (November 2017 to March 2020) to record avian migratory birds' diversity.

Study area:

Purulia District belongs to Chotanagpur Plateau of western part of West Bengal. Purulia has a sub tropical climate nature and bears low hill, highlands, arid landscape and high vegetation. Due to undulated topography nearly 50% of the rainfall flows away as runoff. The district is covered by mostly residual soil formed by weathering of bed rocks.

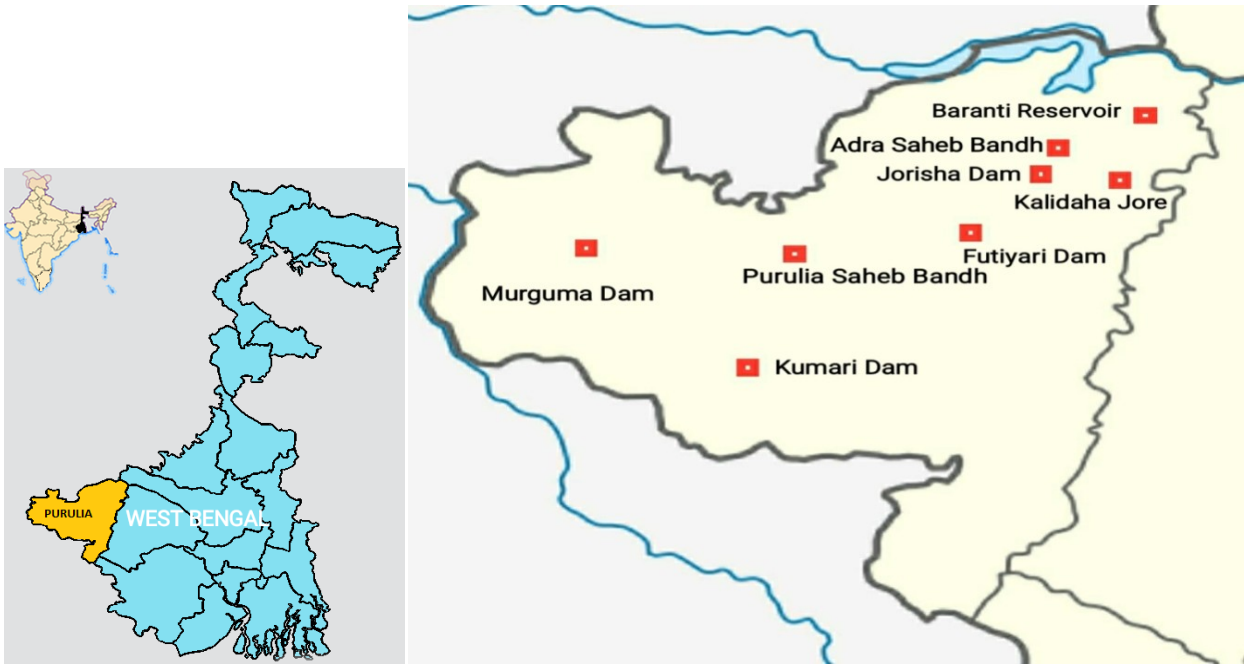


Fig.1:- Location of study area.

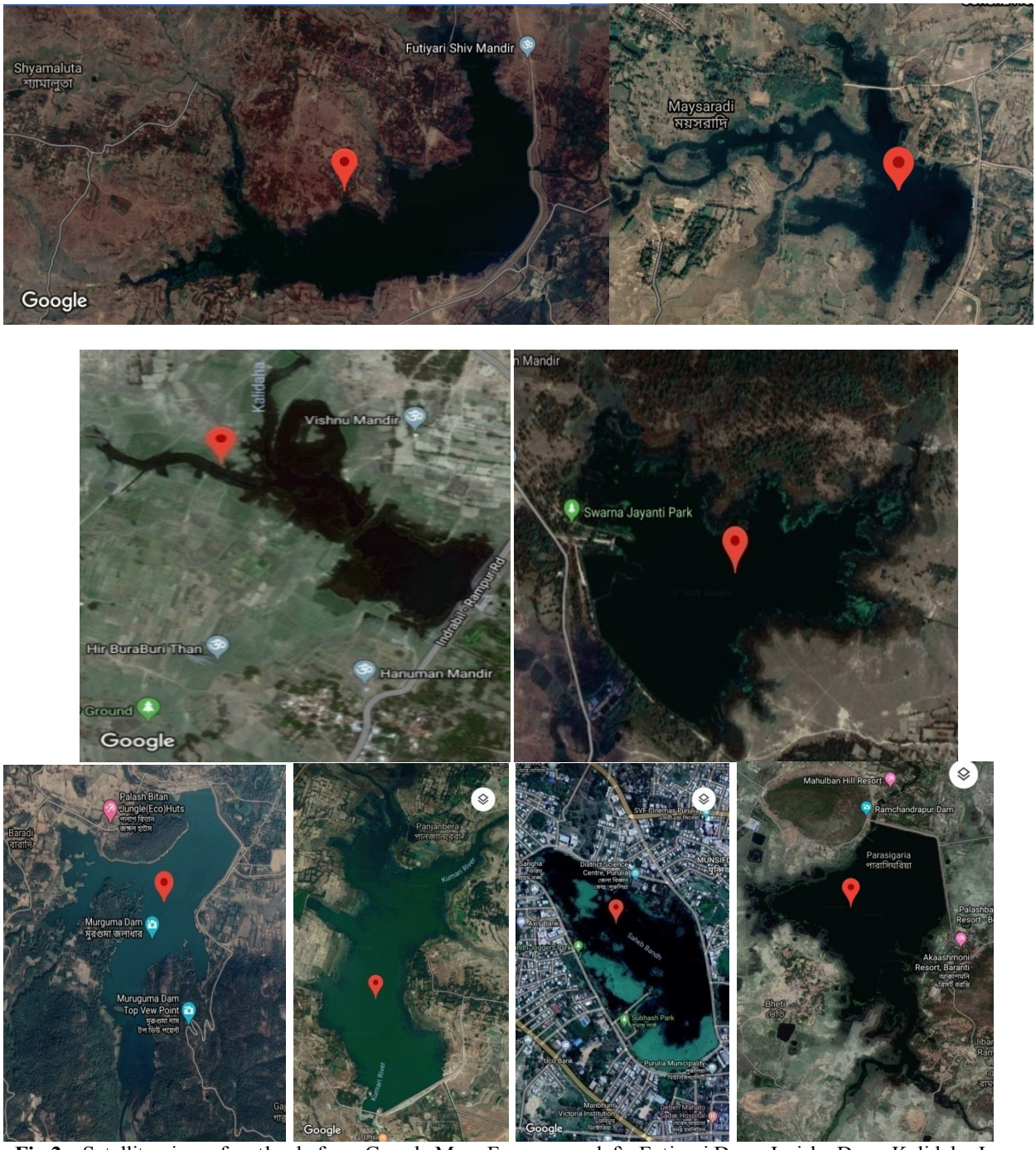


Fig.2:- Satellite view of wetlands from Google Map, From upper left- Futiyari Dam; Jorisha Dam; Kalidaha Jore; Saheb Bandh Lake, Adra; Murguma Dam; Kumari Dam, Puruliya Saheb Bandh, & Baranti Reservoir.

Physiographical Profile of Purulia district, West Bengal

Parameter	Purulia District
Area(in sq.km)	6259
Altitude	$20^0$49'-$23^0$12'N
Latitude	$85^0$49'-$86^0$54'E
Temperature(^{0}C) Summer Winter	 30-45 06-18

Rainfall(cm)	137.5
Humidity	50-65%
Landscape	Low hill, highland and plateau
Soil Type	Western Part- laterite Major Part-old alluvial and sand mixed red soil
Vegetation type	Dry deciduous type [predominated by sal (Shorea robusta), palash (Butea monosperma), mohua (Madhuca longifolia)].
Forest Area(ha)	Reserve forest-10760 Protected forest-56264
Hill System	Ajodhya pahar, Panchet pahar, Bero pahar, Joychondi pahar
Rivers	Damodar, Darkeswar, Kangsaboti
Water resource(ha)	3707.29

(**Source:** Nandi,N.C. Et al 2004)

The present study has been conducted in eight important wetlands spread over Purulia district of West Bengal (Fig. 1 and Fig.2). The observed region is divided into three areas (urban, semi urban and rural). Purulia Saheb Bandh is situated in urban area; Adra Saheb Bandh is located in semi-urban area and rest six are located in rural belt.

Adra Saheb Bandh:
It was constructed by British administration of Bengal Nagpur Railway in the period 1901-1902. Now the owner of the lake is South Eastern Railway. Located at $86^0$70'E longitude and $23^0$48'N latitude and it is 3km northeast of Adra Railway Station. Total area of the lake is 6.31sq.km. Lake water is used mainly for supplying potable water to Adra Township.

Baranti Reservoir:
It is situated between Muraddi Hill and Baranti Hill near Ramchandrapur, 3KM from Muraddi Rail Station in Saturi Block of Purulia. Its location is 23.5778^0N 86.8450^0E. It had been constructed for irrigation project in 1975.It is commonly known as Muraddi Lake. Total area of the lake is 6sq.km, surrounded by forest area. It has rich biodiversity with large number of flora and fauna.

Futiyari Dam:
Is situated 23km from Purulia town. Coordinates: 23.3833^0N 86.5577^0E. Total Volume of the Dam is 533TCM. It was operated in 1980s and maintained by I&W Dept., Govt of West Bengal to develop agriculture.

Jorisha Dam:
It is also known as Beko Dam. The dam is situated at Jorisha, 4km from Adra rail town with coordinates: 23°28'46"N 86°37'16"E. It was operated in the year 1990 and maintained by I&W Dept., Govt of West Bengal. Total area of the reservoir is 1.2sq.km.

Kalidaha Jore:
Kalidaha Jore is located at $23^0$37'N 86075'E in Kalidaha near Indrabil in Kashipur Block. To interconnect nearby villages through waterway Govt. constructed this wetland in 1964-65. It is occupies about 9 acres of land. Water of the perennial wetland is used for domestic, irrigation, fishing etc.

Kumari Dam:
The dam is situated on Kumari River at Dubrajpur, 26km from Puruliya with coordinates: $23^0$9'54''N $86^0$17'10''E. It was operated in the year1984 and maintained by I&W Dept., Govt of West Bengal. The dam is mainly used for the purpose of irrigation. Total area of the reservoir is 21 acres.

Murguma Dam:
The dam is located in the north of Begunkodar within Jhalda Block at the northern foot of Ayodha Hill and is about 55 kms from Purulia town. The dam is on the tributary of Kangsabati River. Coordinates: $23^0$19'10.03''N, $86^0$3'7.6''E. It was operated in 1982 and maintained by I&W Dept., Govt of West Bengal. Total area of the lake is 2sq.km, surrounded by forest area.

Purulia Saheb Bandh:
It is the lung of Purulia town. Size of the wetland is around 70 acres with 23.3395^0N, 86.3586^0E. It was constructed by the then British administration during 1838-1843 for supplying drinking water. It is also named as Nibaronsayar in accordance with the name of Nibaran Chandra Dasgupta, a freedom fighter and great patriot of Purulia.

Data Source & Methodology:-

This study is mainly based on primary and secondary data sources. For primary data, avian species have been observed and recorded directly in the field. Different research papers, Wikipedia, different books, internet access have been used as secondary data sources. Regular field trips were made throughout this period. Two different methods have been adopted to study avifaunal diversity. First one is Line Transects Method and second one is Point Count Method. Through these said methods, a checklist is prepared. Nicon Aculon Binocular A211 10-22x50 has been used for close observation of birds and Nicon D7200 camera, with Nikkor Lens 70-300 mm for photography. The check list of species has been prepared following Ali(1996), Grimmett and Inskipp(2011). To get better response in observations relating to peak behavioral activities of birds, suitable time (1 or 2 hours after sunrise or before sunset) has been considered.

Migratory Birds at Adra Saheb Bandh Lake and A flock of Gadwall duck

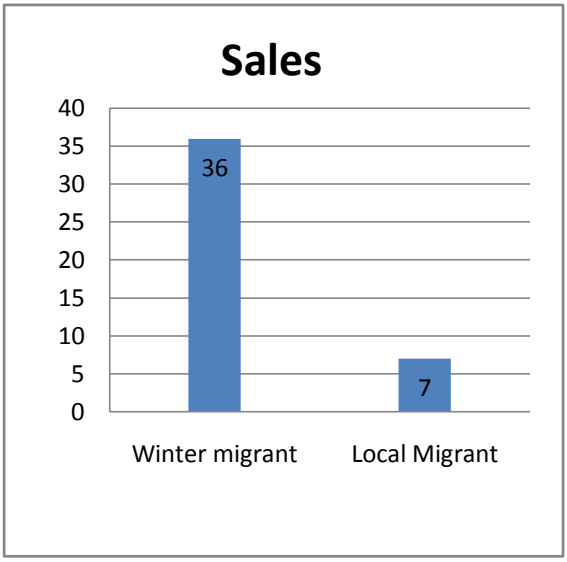
Result and Discussion:-

Species diversity is a measurement of an ecosystem's species richness and species evenness. More species richness will contribute to increase in biodiversity also which is an important aspect on biodiversity conservation.

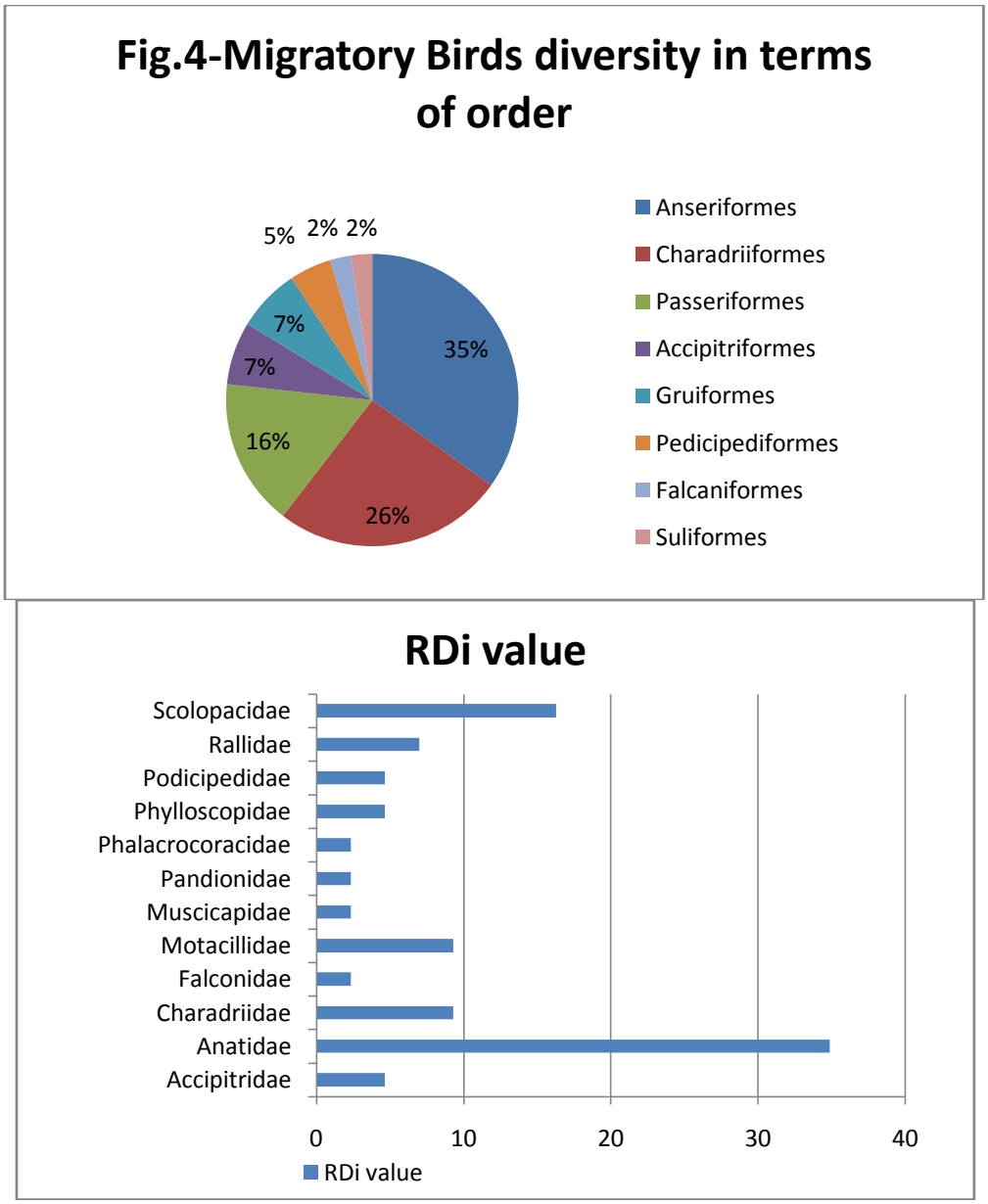
The checklist of observed migratory avian species in Purulia District along with their order, common name, scientific name, families, habit location, visibility, from where they migrate and IUCN status are given in **Table 1**. In total, 43 species of birds belonging to 8 orders and 12 families have been observed. Out of total 43 migratory bird species, 83.72% are winter Migrant and 16.28% Local Migrant **(Fig 3)**. Order Passeriformes are dominant in wetlands of Purulia, including 3 families and 7 species. Family Anatidae (34.88%) are dominant with 15 no of species, followed by Scolopacidae (16.28%), Charadriidae (9.30%) and Motacillidae (9.30%). Migratory birds' diversity in terms of different order is given in **Fig.4**.

The formula **[Relative species diversity (RD) = (no. of species of each family/total number of species)x100]** is used for determining percentage of occurrence or relative diversity (RD) of Families [Basavarajappa.S, 2006]. Anatidae is found to be the most dominant family in this region (RD Index value = 34.88) followed by Scolopacidae (RD Index value = 16.28). According to survey, Lesser Whistling Duck is dominant(77%) followed by Red-crested Pochard(7%), Northern Pintail(2%), Common Teal(2%), Common Coot(2%) and Great Crested Grebe(2%). Two near threatened (Ferruginous Duck and Pallid Harrier) and one vulnerable (Common Pochard) species according to IUCN red data book have been found in those areas during winter season. Remaining all other species found during this survey are categorized as least concerned according to IUCN red data book.

A winter migratory bird generally arrives in the month of November and stays up to end of March every year. Overall Status of bird recorded at the wetlands of Purulia is given in **Table 2**. In the wetlands migratory birds coexist with lot of residential bird species like Bronze winged jacana, Pheasant tailed jacana, Intermediate Egret, little Egret, Asian Openbill Stork, Grey headed Swamphen, Little Cormorant, Common kingfisher, Indian Pond Heron etc. According to visibility 26 species are common and 17 species uncommon. Winter migratory birds, local migratory birds and residential birds all of them play important role in wetland's ecosystem.



From left to right-Red-crested Pochard, Northern Pintail and Lesser Whistling Duck



Migratory Birds diversity in terms of order & Relative Diversity of Birds Families

Winter Migratory Birds								
Order	**Common Name**	**Scientific Name**	**Families**	**Location**	**Habitat Location**	**Visibility**	**Migrate From**	**IUCN Status**
Charadriiformes	Green Sandpiper	Tringa ochropus	Scolopacidae	ASB,BR, FD,MG	Water Edge	Uncommon	Subarctic Europe And Asia	Least Concern
	Common Sandpiper	Actitus hypoleucos	Scolopacidae	ASB,KD, PSB, BR, KJ, JR, MG	Water Edge	Common	Subtropical Europe And Asia	Least Concern
	Marsh Sandpiper	Tringa stagnatilis	Scolopacidae	ASB, BR	Water Edge	Uncommon	Western Europe And Central Asia	Least Concern
	Wood Sandpiper	Tringa glareola	Scolopacidae	MG	Water Edge	Uncommon	Eurasia	Least Concern
	Temminck's stint	Calidris temminckii	Scolopacidae	MG	Water Edge	Uncommon	Arctic Europe and Asia	Least Concern
	Little stint	Calidris minuta	Scolopacidae	MG	Water Edge	Uncommon	Arctic Europe and Asia	Least Concern
	common snipe	Gallinago gallinago	Scolopacidae	MG	Water Edge	Uncommon	European Russia and Siberia.	Least Concern
	Little Ringrd Plover	Charadrius dubius	Charadriidae	BR,KD, PSB,MG	Water Edge	Common	Europe And Western Asia	Least Concern
	Golden Plover	Pluvialis fulva	Charadriidae	KD,MG	Water Edge	Uncommon	Eurasia	Least Concern
Anseriformes	Red-Crested Pochard	Netta Rufina	Anatidae	All	Open Water	Common	Southern Europe And Central Asia	Least Concern
	Gadwall	Mareca strepera	Anatidae	All	Open Water	Uncommon	Central Europe And Asia	Least Concern
	Garganey	Spatula querquedula	Anatidae	BR, KJ, JR ASB, PSB	Open Water	Common	Europe And Western Asia	Least Concern
	Tufted Duck	Aythya fuligula	Anatidae	BR,ASB	Open Water	Uncommon	Northern Eurasia	Least Concern
	Common Pochard	Aythya farina	Anatidae	All	Open Water	Common	Northern Europe And Asia	Vulnerable

	Eurasian Wigeon	Mareca Penelope	Anatidae	All	Open Water	Common	Northern Europe And Asia	Least Concern
	Northern Pintail	Anas acuta	Anatidae	PSB,JR KJ,ASB,BR, KD,MG	Open Water	Common	Northern Europe And Asia	Least Concern
	Northern Shoveler	Spatula clypeata	Anatidae	PSB	Open Water	Common	Northern Europe And Asia	Least Concern
	Common Teal	Anas crecca	Anatidae	BR,KD, ASB, KJ, JR	Open Water	Common	Northern Europe And Asia	Least Concern
	Greylag Goose	Anser anser	Anatidae	BR, KJ, JR	Open Water	Common	Middle Asia	Least Concern
	Ruddy Shelduck	Tadorna ferruginea	Anatidae	BR,MG	Open Water	Common	South-eastern Europe And Central Asia	Least Concern
	Ferruginous Duck	Aythya nyroca	Anatidae	FD, ASB	Open Water	Common	Eurasia	Near Threatened
Podicipediformes	Great Crested Grebe	Podiceps cristaus	Podicipedidae	All	Open Water	Uncommon	Middle Asia	Least Concern
Gruiformes	Common Coot	Fulica atra	Rallidae	All	Water Edge	Common	Eurasia	Least Concern
	Baillon's Crake	Zapornia pusilla	Rallidae	PSB, BR, KD	Water Edge	Uncommon	Western Eurasia	Least Concern
Passeriformes	Common Chiffchaff	Phylloscopus collybita	Phylloscopidae	KD, BR	Tree	Common	Temperate Europe And Asia	Least Concern
	Greenish Warbler	Phylloscopus trochiloides	Phylloscopidae	BR, MG	Tree	Uncommon	Northeastern Europe And Central Asia	Least Concern
	Siberian rubythroat	Calliope calliope	Muscicapidae	BR	Water Edge	Uncommon	Siberia	Least Concern
	Citrine Wagtail	Motacilla citreola	Motacillidae	All	Water Edge	Uncommon	North Central Asia	Least Concern
	Yellow Wagtail	Motacilla flava	Motacillidae	BR	Water Edge	Uncommon	Temperate Europe And Asia	Least Concern
	Grey Wagtail	Motacilla cinerea	Motacillidae	BR,MG	Water Edge	Uncommon	Temperate Europe	Concer

							And Asia	n
	Tree Pipit	Anthus trivialis	Motacillidae	FD, BR, MG	Water Edge	Uncommon	Europe And western Asia	Least Concern
Suliformes	Great Cormorant	Phalacrocorax carbo	Phalacrocoracidae	All	Tree	Common	Western Europe And Central Asia	Least Concern
Accipitriformes	Osprey	Pandion haliaetus	Pandionidae	BR, ASB, FD, KD, MG	Tree	Common	Central Asia	Least Concern
	Marsh Harrier	Cirus aeruginosus	Accipitridae	BR, FD	Tree	Common	Western Europe	Least Concern
	Pallid Harrier	Cirus Harrier	Accipitridae	FD	Tree	Common	Eurasia	Near Threatened
Falconiformes	Peregrine Falcon	Falco peregrinus	Falconidae	BR	Tree	Common	Northern Europe And Asia	Least Concern

Local Migratory Birds

Order	**Common Name**	**Scientific Name**	**Families**	**Location**	**Habitat Location**	**Visibility**	**IUCN Status**
Charadriiformes	Yellow-wattled Lapwing	Vanellus malabarius	Charadriidae	ASB,BR, KD,MG	Water Edge	common	Least Concern
	Red-wattled Lapwing	Vanellus indicus	Charadriidae	ASB,BR,KD,MG	Water Edge	Common	Least Concern
Anseriformes	Lesser Whistling Duck	Dendrocygna javanica	Anatidae	All	Open Water	Common	Least Concern
	Indian spot-billed duck	Anas poecilorhyncha	Anatidae	BR	Open Water	Common	Least Concern
	Cotton Pygmy Goose	Nettapus coromandelianus	Anatidae	PSB, KD, BR, KJ, JR, MG	Open Water	Common	Least Concern
Gruiformes	Common Moorhen	Gallinula chloropus	Rallidae	PSB,ASB,BR,KD, MG	Open Water	Common	Least Concern
Podicipediformes	Little Grebe	Tachybaptus ruficollis	Podicipedidae	All	Open Water	Common	Least Concern

ASB-Adra Saheb Bandh, BR-Baranti Reservoir, FD-Futiyari Dam, JR-Jorisha Dam, KJ-Kalidaha Jore, KD-Kumari Dam, MG-Murguma Dam, PSB-Purulia Saheb Bandh

Table-2:-

Sl.No	Order	Number of Families	No of Species	Visibility		Migratory Status	
				Common	Uncommon	Local Migrant	Winter Migrant
1	**Charadriiformes**	2	11	4	7	2	9
2	**Anseriformes**	1	15	13	2	3	12
3	**Podicipediformes**	1	2	1	1	1	1
4	**Gruiformes**	1	3	2	1	1	2
5	**Passeriformes**	3	7	1	6	0	7
6	**Suliformes**	1	1	1	0	0	1
7	**Accipitriformes**	2	3	3	0	0	3
8	**Falconiformes**	1	1	1	0	0	1
Total-		12	43	26	17	7	36

Conclusion:-

Present study reveals that the wetlands harbour a large number of migratory birds especially in winter season and play a crucial role to enrich the biodiversity. It is observed that the wetlands are undergoing unwanted change in biodiversity due to anthropogenic pressure which creates terrible effect on migratory birds. Notably, the number of migratory birds in Purulia Saheb Bandh is reducing severely. To come back the earlier well favourable or more favourable environment to the migratory bird species, first of all it is needed to develop awareness among civilized being like human. To aware in depth awareness programme to be run periodically containing the facts like why people should safeguard wetlands, socio-economic value of wetlands in continuous way. Identifying the specific goal of specific wetland, decision against some infrastructure development may be taken for healthy and flourish environment in the wetlands such as building up watch tower. Activities of the tourists are also causing disturbances to the lake ecosystem. There should be strict management rules for visitors for the conservation of biodiversity in the wetlands and the area should be announced as a polythene free zone. Govt. should take further steps to protect wetlands' diversity. A sustainable and holistic management planning is necessary for conservation of wetlands.

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