Environment and Ecology 39 (1) : 82—91, January—March 2021
ISSN 0970-0420

A Brief Report on Seasonal Avifaunal Diversities in Purbasthali (Chupir Char) and Their Ecological Interpretation

Kausiki Chakrabarti

Received 16 August 2020, Accepted 24 November 2020, Published on 8 January 2021

ABSTRACT

The present study deals with the pre and post-monsoon diversity and ecology of avifaunal species at Purbasthali Oxbow Lake (23°27'5"N, 88°20'35"E), West Bengal, India. The total number of bird species was 33 (local) and 9 (migratory) in post-monsoon time and 35 (local) and 2 (migratory) in pre-monsoon time recorded during this study. This clearly indicates that the ratio of local/migratory is higher in post monsoon than the pre monsoon time. Local order Accipteformesis only being observed at the time of winter. Among all the species-order Anseriformes, Charadiformes, Gruiformes and Passeriformes have shown to be migratory.

Keywords: Avifauna, Diversity, Wetland, Purbasthali Oxbow Lake, Migratory.

INTRODUCTION

Avifaunal species are one of the main indicators which determine the health of the wetlands (Amat and Green 2010, Anon 2000, Gregory 2006). Bird species play a significant role in many food webs of aquatic system through nutrient cycling and as a part of food web, as potential pollinators and bio-indicators (Jorvinen and Vaisenen 1978, Bowden 1990). Wetlands are important bird habitats for feeding, nesting and breeding of aquatic birds (Rundle 1982, Mcparland and Paszkowski 2007, Schwartz and Schwartz 1951). Now-a-days, avifaunal diversity has been decreasing due to the destruction of natural habitats and anthropogenic interference. The wetlands are facing tremendous anthropogenic pressure, which can greatly influence the population structure of the bird community (Gupta and Singh 2003, Rottenborn 1999, Mckinney 2002, Czech and Parsons 2002).

Purbasthali Oxbow Lake also known as Chupir Char is created by the Ganges River on its Western bank, in Burdwan district of West Bengal, India. This lake harbors a number of aquatic plants in the submerged as well as floating state, on which thrive a large number of organisms. Due to abundant food available throughout the year in the form of aquatic crustaceans, insects, mollusks, fishes the lake attracts a number of birds throughout year. This beautiful lake harbor large populations of migratory water birds during the winter season. Information on distribution and abundance of water birds is essential to provide guidelines for the management and conservation of wetlands (Manakadan and Pittie 2001, Buckland *et al.* 2008, Kumar *et al*. 2005). The present study was conducted to analyze the seasonal (pre and post-monsoon)

Kausiki Chakrabarti
Assistant Professor, Department of Zoology,
Charuchandra College, Kolkata
Email: drkausikichakrabarti@gmail.com

diversity of wetland birds and to identify the consequences of direct and indirect human interferences.

MATERIALS AND METHODS

Study area

The study area is Purbasthali Oxbow Lake (88°19'45" to 88°22' E longitude 23° 26' to 23°26'45" N latitude) also known as Chupir Char (Fig. 1) created by the Ganges River on its Western bank, in Burdwan district of West Bengal, India. This area is only 8 km from the old and holy town of Nabadwip. The lake was formed by the meandering river, over last 40 years, the area has transformed into a closed loop, allowing emergence of the Oxbow Lake. This channel of water course feeds the Oxbow Lake with thin connectivity with the main river with shoals forming at the river mouth. Remote sensing images of the wetland clearly establishes the differences of turbidity between the main river and the wetland which has sandy clay sediment and crystal clear waters because of sedimentation of suspended solid particles in the stagnant stretches. The ongoing sedimentation process threatens to cut off the channel in near future. The Oxbow Lake of Purbasthali sprawls over an area 3.50 km2 .The water depth of this lake varies between is 1.0 m to 4.5 m.

Description of Chupir Char and surrounding area

An Oxbow Lake is a U-shaped lake that forms when a wide meander of a river is cut off, creating a free-standing body of water. This landform is so named for its distinctive curved shape, which resembles the bow pin of an Oxbow.

Chupir Char and the surrounding area is known as Oxbow Lake which is formed from cutting out from the River Ganges. The lake is still fed by the River Ganges through a narrow opening channel popularly known as "Chari Ganga River" but the alarm is due to high sedimentation and the gradual changing of the course of river. During monsoon the water level rises and the whole area gets flooded but during pre-monsoon (summer) and post-monsoon (winter) the water levels deplete and many small islands rise up. The depth of water varies from 1.0 m to 4.5 meters. It is a unique ecosystem where tall grasses and shrubs grow in abundance on this island, floating across the length and breadth of the lake are hyacinths and marshlands. The water appears dark apparently but actually it is crystal clear while looking down sitting on a boat and one can also see the bottom of the lake and the water plants and weeds are also visible. Birds fly in from various countries like Mongolia, Siberia.

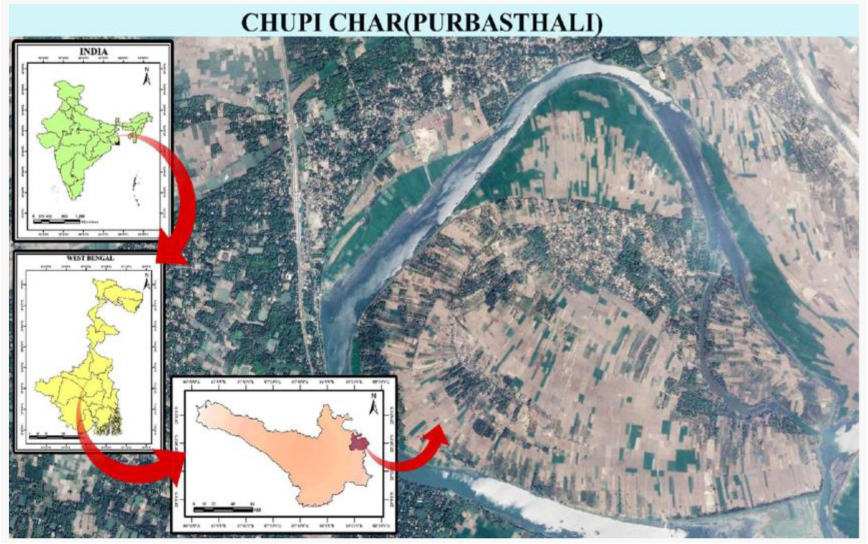

Fig. 1. Chupir Char and surrounding area.

As one sails on the lake the huge variety of both local and migratory birds unfolds before our eyes.

Reasons for selecting Chupir Char and surrounding area

Rich biodiversity : Avifaunal species are one of the main indicators which determines the health of a wetland as they play significant role in the food webs of aquatic system through nutrient recycling, they are potential pollinators and bio indicators. Chupir Char and surrounding area is rich in avifaunal species. This lake is rich in food for birds, as phytoplanktons and algae grow there in abundance, so the birds can successfully complete their nesting, feeding and breeding.

Migratory birds : The main attraction of Purbasthali is the migratory birds which pay their visits during winter (post-monsoon) season. The migratory birds come here from both North pole and south pole to spend their winter.

Low pollution : Pollution of Purbasthali lake areas are quite lower than that of other lakes located in the plain of West Bengal. So now-a-days huge number of birds pay their visit in this lake.

Away from hustle bustle : Purbasthali is a town located about 140 km away from the city of Kolkata. It can be easily reached from Kolkata. The area is less noisy and less polluted.

Meterials and Methods

Post-monsoon and pre-monsoon avifauna in and around Purbasthali Oxbow Lake was recorded during January 2019 and June 2019 respectively. Four times field trips were made throughout in each month. Two different methods were adapted to study avifaunal diversity. The first method was Line transects method and second method was Point count method. Following these methods checklist was prepared. Olympus Binocular 10 × 50, was used for close observation of birds and for photography Cannon-EOS 550 D camera, with sigma Lens 150-500 mm. The check list of species was prepared following Ali (2002), Grimmett *et al.* (2011). The other most important aspect kept in consideration was to make the observations during the peak activity of birds, which is 1 or 2 hours after sunrise or before sunset.

RESULTS AND DISCUSSION

Ecological interpretation on observed birds in the area of Chupir Char and surroundings

Among the bird species, total number of bird species was 33 (local) and 9 (migratory) in post- monsoon time and 35 (local) and 2 (migratory) in pre- monsoon time (Table 1). This clearly indicates that the ratio of local/migratory is higher in post- monsoon than the pre- monsoon time.

Local order Accipteformesis only being observed at the time of winter.

This indicates that the habitat and weather condition of winter is suitable for the birds more than the summer time which reflects in the extended number of birds in post-monsoon time (Table 2).

Among all the species- order Anseriformes, Charadiformes, Gruiformes and Passeriformes have shown to be migratory.

Table 1. Pre-monsoon checklist of bird (June 2019).

Sl. No.	Order	Common name	Residency	Number of individuals	IUCN status
1	Anseriformes	Lesser whisling duck	L	28	T
2	Anseriformes	Cotton pygmy goose	L	10	T
3	Apodiformes	Asian palm swift	L	8	T
4	Ciconiiformes	Asian openbill stork	L	3	LC
5	Charadriiformes	Pacific golden plover	M	1	T
6	Charadriiformes	Bronze winged jacana	L	18	LC
7	Charadriiformes	Pheasant tailed jacana	L	3	LC
8	Columbiformes	Rock pigeon	L	4	LC

Table 1. Continued.

Sl. No.	Order	Common name	Residency	Number of individuals	IUCN status
9	Columbiformes	Eurasian collared dove	L	1	T
10	Columbiformes	Spotted dove	L	9	LC
11	Coraciiformes	White throated kingfisher	L	10	T
12	Coraciiformes	Pied kingfisher	L	1	T
13	Coraciiformes	Green bee eater	L	5	T
14	Coraciiformes	Stork billed kingfisher	L	1	T
15	Gruiformes	Grey headed swamp hen	L	10	T
16	Gruiformes	Common moorhen	L	1	T
17	Passeriformes	Indian Golden oriole	L	2	LC
18	Passeriformes	White throated fantail	L	1	LC
19	Passeriformes	Black drongo	L	5	LC
20	Passeriformes	Rufuostreepie	L	5	T
21	Passeriformes	Common tailorbird	L	2	LC
22	Passeriformes	Red vented bulbul	L	3	LC
23	Passeriformes	Jungle babbler	L	21	LC
24	Passeriformes	Asian pied starling	L	9	LC
25	Passeriformes	Common myna	L	2	LC
26	Passeriformes	Oriental magpie robin	L	2	LC
27	Passeriformes	White rumpedmunia	L	3	LC
28	Passeriformes	White wagtail	M	2	T
29	Pelecaniformes	Yellow bittern	L	2	T
30	Pelecaniformes	Purple heron	L	4	T
31	Pelecaniformes	Intermediate egret	L	5	T
32	Pelecaniformes	Indian pond heron	L	5	T
33	Pelecaniformes	Cattle egret	L	1	T
34	Pelecaniformes	Cinnamon bittern	L	2	LC
35	Pelecaniformes	Black bittern	L	1	LC
36	Podicipediformes	Little grebe	L	3	T
37	Suliformes	Little cormorant	L	5	T

The cause of migration is preferably to avoid harsh condition that the migratory birds bear in their native place. The migratory birds were mainly observed in the post- monsoon time (Table 3), (Figs. 2A, 2B, 3, 4A, 4B, 5).

However, some of themigratory birds though lower in number have also found in the pre- monsoon

Table 2. Post-monsoon checklist of bird (January 2019).

Sl. No.	Order	Common name	Residency	Number of individuals	IUCN status
1	Acipitriformes	Eurasian Marsh Harrier	L	1	T
2	Anseriformes	Garganey	M	1	T
3	Anseriformes	Cotton pygmy goose	L	8	T
4	Anseriformes	Lesser whisling duck	L	32	T
5	Anseriformes	Northern pintail	M	5	T
6	Anseriformes	Ferruginous duck	M	4	NT
7	Apodiformes	Asian palm swift	L	14	T
8	Ciconiiformes	Asian openbill stork	L	4	LC
9	Charadriiformes	Small pratincole	M	3	LC
10	Charadriiformes	Pheasant tailed jacana	L	7	LC
11	Charadriiformes	Bronze winged jacana	L	15	LC
12	Columbiformes	Spotted dove	L	4	LC
13	Columbiformes	Rock pigeon	L	5	LC
14	Coraciiformes	Green bee eater	L	6	T

Table 2. Continued.

Sl. No.	Order	Common name	Residency	Number of individuals	IUCN status
15	Coraciiformes	Pied kingfisher	L	1	T
16	Coraciiformes	Stork billed kingfisher	L	2	T
17	Coraciiformes	White throated kingfisher	L	10	T
18	Coraciiformes	Common kingfisher	L	3	LC
19	Gruiformes	Common moorhen	L	4	T
20	Gruiformes	Eurasian coot	M	13	LC
21	Gruiformes	Grey headed swamp hen	L	13	T
22	Passeriformes	Citrine wagtail	M	1	T
23	Passeriformes	Yellow wagtail	M	1	T
24	Passeriformes	Black drongo	L	4	LC
25	Passeriformes	Barn swallow	M	17	LC
26	Passeriformes	Red vented bulbul	L	5	LC
27	Passeriformes	Rufuostreepie	L	5	T
28	Passeriformes	Common tailorbird	L	1	LC
29	Passeriformes	Jungle babbler	L	10	LC
30	Passeriformes	Asian pied starling	L	12	LC
31	Passeriformes	Common myna	L	4	LC
32	Passeriformes	White wagtail	M	4	T
33	Passeriformes	Oriental magpie robin	L	2	LC
34	Pelecaniformes	Black headed ibis	L	7	NT
35	Pelecaniformes	Yellow bittern	L	2	T
36	Pelecaniformes	Purple heron	L	2	T
37	Gruiformes	Purple swamp hen	L	6	T
38	Pelecaniformes	Intermediate egret	L	4	T
39	Pelecaniformes	Indian pond heron	L	6	T
40	Pelecaniformes	Cattle egret	L	2	T
41	Podicipediformes	Little grebe	L	4	T
42	Suliformes	Little cormorant	L	19	T

time. This indicates that though the migration was constricted only in the time of post-monsoon, but some species missing the flocks have shown accidentally in the pre- monsoon time. The local versus migratory bird ratio was as follows based on their order during pre and post- monsoon time (Table 4).

Table 3. Probable cause of bird migration.

Name of order	Migratory route	Cause
Anseriformes	Generally, from Central Asia, Northern Europe, Palearctic region	
Charadiformes	Temperate region of Europe and Asia	To avoid harsh abiotic condition and resource unavaility
Gruiformes	From Eastern Europe, Central Asia	
Passeriformes	Western and Norther Europe, Iberian Peninsula, Northern Africa	

Analyzing the data, it was revealed that Order Passeriformes is the predominant one having the most species as migratory and therefore altering the local: Migratory bird ratio most significantly. Beside this, Order Anseriformes also bears relevant migratory species than the local having the ratio of 2:3 in the post monsoon time.Analyzing the other orders, it was also revealed that Order Charadiformes and Gruiformes have almost equal number of ratio between local and migratory. Therefore, it can be hypothesized that maximum portion of migratory order included mainly the Order Passeriformes and Anseriformes.

Analyzing local/migratory bird species ratio (within order)

As the migratory species shows almost equal in num-

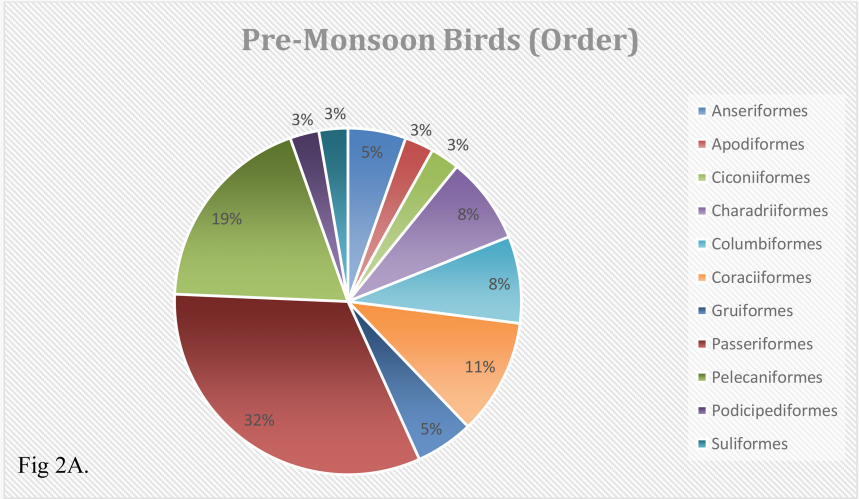

Fig 2A.

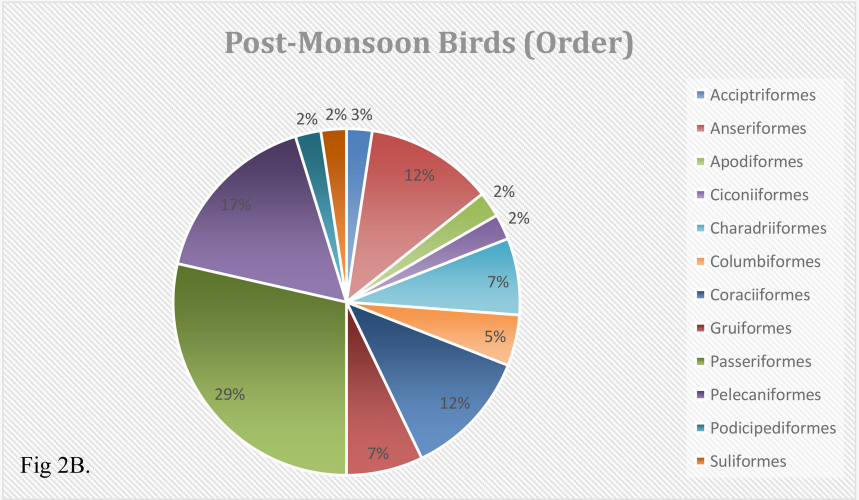

Fig 2B.

Fig. 2A and 2B. Pie chart analysis showing different % of bird of pre and post- monsoon respectively (upto Order).

ber over the local one in post-monsoon time, therefore partitioning the resource and habitat does not have any effect or so in this. One of the reasons of this may be the huge availability of resource in this area that bears both the presence of local and migratory birds.

The resource choice of local and migratory birds are as follows in Table 5.

Table 4. Local: Migratory bird's ratio on the basis of Order.

Name of Order	Local: Migratory birds	
	Pre-monsoon	Post-monsoon
Anseriformes	2:0	2:3
Charadiformes	2:1	2:1
Gruiformes	2:0	2:1
Passeriformes	11:1	8:4

Segregation of resource was found to be negligible in the orders as both the local and migratory birds take similar kind of resources as their food choices are almost same. However, in the Order Passeriformes, resource choice seems to be partially segregated between local and migratory ones. As the migratory birds under this order generally feeds on aquatic insects but the local birds under this order feeds on

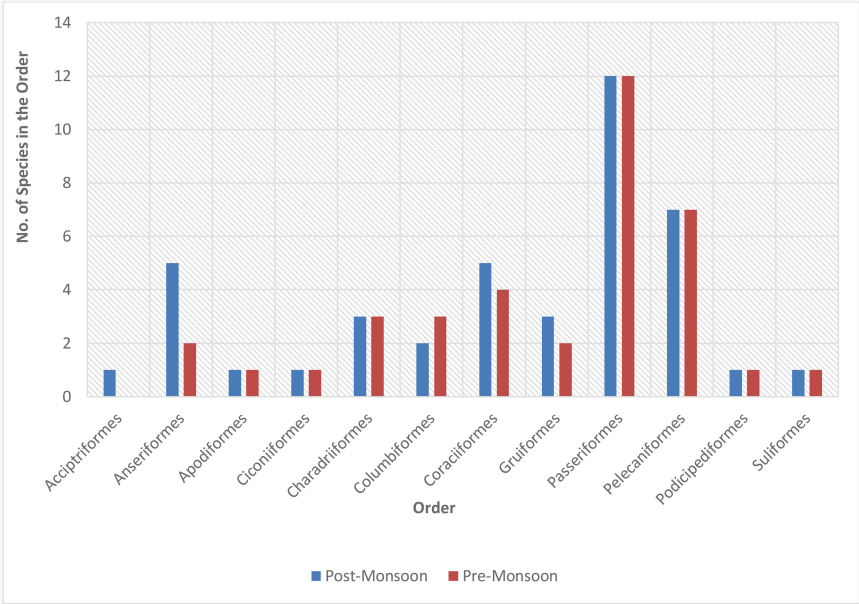

Fig. 3. .Comparison of pre-monsoon and post-monsoon birds (upto Order).

insects as well as on flower nectar, fruits. This may be the causation of having more number of migratory species under the Order Passeriformesin comparison to that of other orders (Fig. 6).

Analyzing the resources it can also be hypothesized that, the increasing resource availability also increases the chance of migratory birds to survive with the local ones concluding a lesser portion of resource compression between local and migratory birds.

After analyzing a particular year wise data, it is hard to state that whether the resource choice of local birds is a cause of migratory birds to overpopulate the area successfully or the migratory species survivability occurs due to resource segregation of migratory birds. However, any one of the possibilities may happen over here.

Table 5. Resource choice of local and migratory birds.

Name of Order	Resource	
	Local	Migratory
Anseriformes	Grain, small insects	Grain, aquatic mollusks, aquatic insects
Charadiformes	Seeds, roots of aquatic plant, aquatic insects, mollusks	Mainly aquatic insects
Gruiformes	Shoots and vegetable matters, insects, mollusks	Grass, paddy shoots aqutic insects mollusks
Passeriformes	Insects, flower nectar, fruits	Mainly aquatic insects

Probable cause of reduced number of migratory birds in Chupir Char

It has been observed that the numbers of migratory quatic birds were less in comparison to that of previous years. In this short communication seasonal diversity in a single year has been incorporated to avoid large number of data. One of the reasons of reduced number of migratory birds may be that the aquatic migrants build nests nest by the lake side among vegetation and lay eggs but due to human intervention lakeside vegetation is getting reduced and thereby less number of migrants are coming (Datta 2011). Aquatic plants growing in lakes are beneficial for aquatic birds. Thay provide food, dissolved oxygen, nesting habitat for aquatic birds. Water pollution is one of the important factors which is hurting aquatic

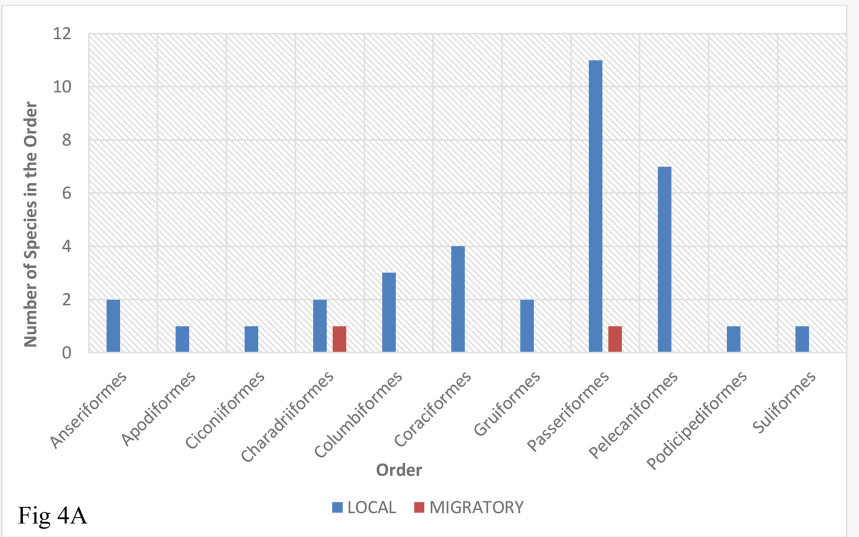

Fig 4A

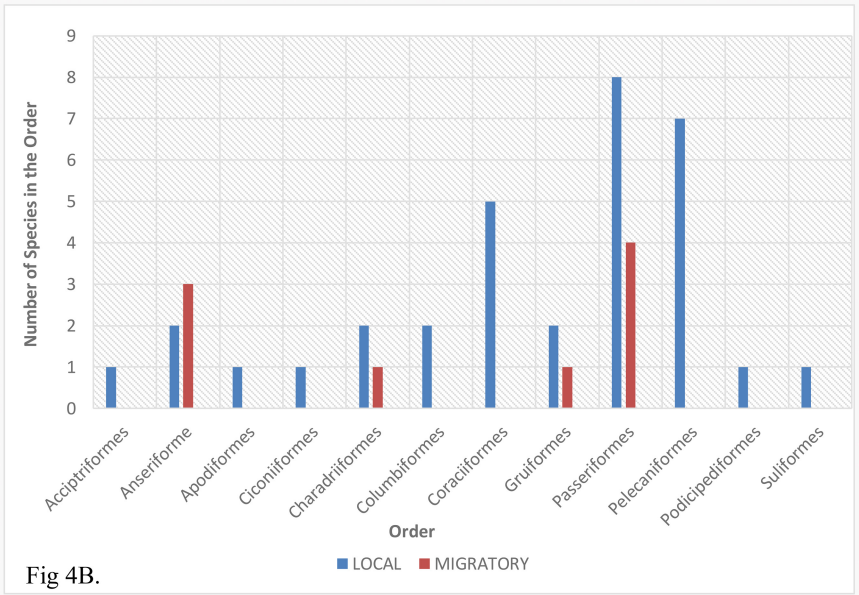

Fig 4B.

Fig. 4A. Comparison of local and migratory birds (Order) of pre-monsoon. **Fig. 4B.** Comparison of local and migratory birds (Order) of post-monsoon.

flora and thereby avifauna. On the other hand dense growth (over 25% of surface are) algae and other water plants in shallow water can seriously interfere with aquatic life (Helfrich *et al.*2009). Dense growth of plants can cause night time oxygen depletion and fish kills and thereby depletion of food for some aquatic birds. Optimum quantity of aquatic flora is needed to attract aquatic birds (Helfrich *et al.* 2009). Main agricultural crops of Purbasthali lake adjacent area are paddy, maize and jute. The aquatic migratory birds they feed on mostly aquatic insects, small fish and the local resident birds they feed on insect, nectar and fruits. Migratory birds they generally use aquatic plant bed for their

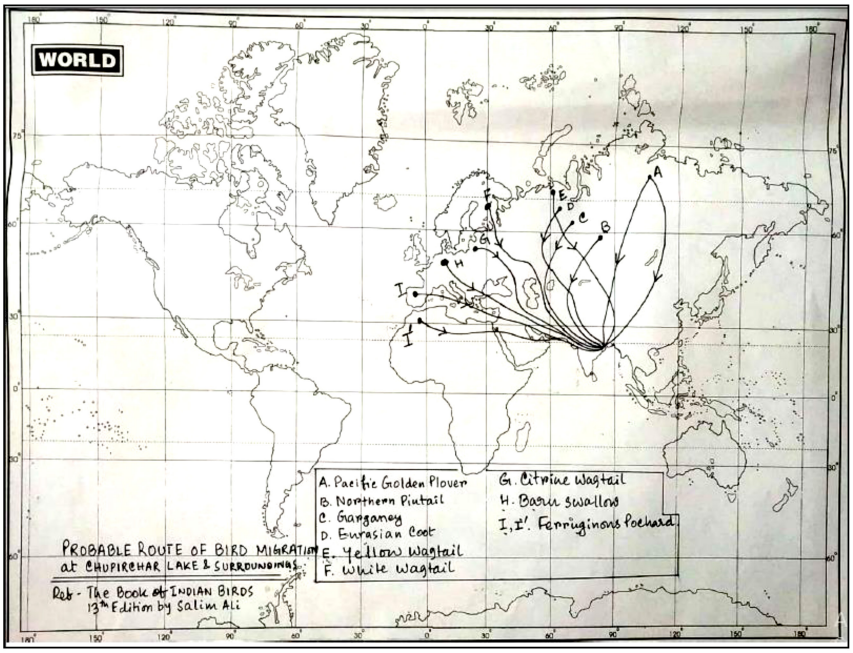

Fig. 5. Probable route of bird migration at Chupir Char Lake and surroundings.

shelter and sometimes they rest n paddy field as well. The reason of gradual reduction of aquatic migrants may be loss of aquatic plants due to human intervention. Further investigation is needed to find out exact cause of reduction of winter migrants. Our investigation throws light about presence of enormous resource as food source for migratory birds but less number of migrants may be due to loss of habitat.

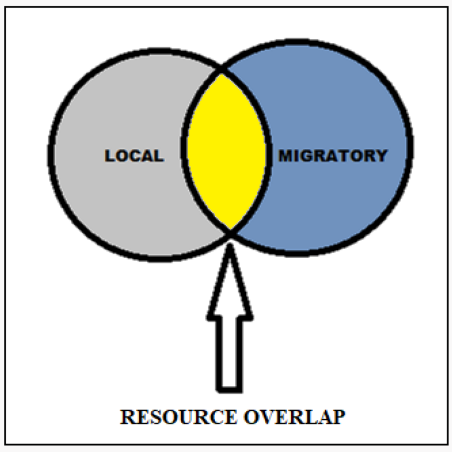

Fig. 6. Prominent resource prtioning in local and migratory birds under Order Passeriformes in post-monsoon season.

However systematic and extensive investigation is required to make any comment regarding loss of aquatic flora with avifauna. Some local people made several noises and also take their bath in the water of Chupir Char Lake. This also gives an alarming call on the natural habitat alteration which might put a severe effect fluctuating the number and behavior of migratory birds (Fig.7).

CONCLUSION

Chupir Char and its surrounding area plays an important role in maintaining ecological and environmental balance being an important habitat for various Avifaunal species including migratory birds make this area an attractive place for ecological study. Now-a-days ecological health of the lake and habitat quality decline as mentioned earlier.Therefore, strict check on land encroachment in this area, pollution control strategy and holistic management planning is necessary for the conservation of enriched habitat of Chupir Char and its surrounding area.

Fig. 7. Human interference in Chupir Char lake.

ACKNOWLEDGEMENT

The author is thankfully acknowledged the financial support received from Charuchandra College (under University of Calcutta), Kolkata. Author is also grateful to Department of Zoology, Charuchandra College, Kolkata, for providing required facilities.

REFERENCES

Ali S (2002) The Book of Indian Birds.13th edn. Published by Bombay Natural History Society, Oxford University Press.

Amat JA, Green AJ (2010) Waterbirds as Bioindicators of Environmental Conditions Conservation Monitoring in Freshwater Habitats. Springer Netherlands, pp. 45—52.

Anon (2000) Wetland values and functions. The Ramsar Bureau. Gland, Switzerland, pp. 20—25.

Bowden CGR (1990) Selection of foraging habitat by wood larks nesting in pin plantation. *Appl Ecol* 27 : 410—419.

Buckland ST, Marsden SJ, Green RE (2008) Estimating bird abundance : Making methods work. *Bird Conserv. Int* 18 (S1) : 91—108.

Czech HA, Parsons KC (2002) Agricultural wet lands and water birds: A review. *Water Birds* 25 : 56—65.

Gregory R (2006) Birds as biodiversity indicators for Europe. *Significance* 3 : 106—110.

Grimmett R, Inskipp C, Inskipp T (2011) Helm field guides birds of the Indian subcontinent. 2ndedn.Oxford University Press.

Gupta AK, Singh SK (2003) Changing wetlands due to discharge of effluents from small scale industries around Varuna river corridor. *Ecol. Env Cons* 9 (2) : 209—212.

Helfrich LA, Neves RJ, Libey G, Newcomb T (2009) Methods for aquatic plants in ponds and lakes. Virginia Cooper ative Extension, pp 420—451.

Jorvinen O, Vaisenen RA (1978) Recent changes in forest bird population in Northern *Finland Anim Zool* 15 : 279—289.

Kumar A, Sati JP, Tak PC, Alfred JRB (2005) Handbook of Indian wetland birds and their conservation. Director Zool. Survey Ind., pp. 167-—170.

Manakadan R, Pittie A (2001) Standardized common and common names of the birds of the Indian sub-continent. *Buceros* 6 (1) : 1—8.

Mckinney ML (2002) Urbanization, biodiversity, conservation. *Bioscience* 52 : 883—890.

Mcparland CE, Paszkowski CA (2007) Water bird assemblages in the Aspen Parkland of western Canada: The influence of fishes, invertebrates and the environment on species composition. *Ornithol Sci* 6 : 53—65.

Rottenborn SC (1999) Predicting the impacts of urbanization on riparian bird communities. *Biol Conserv* 88 : 289-299.

Rundle WD (1982) A case for esophageal analysis in shorebird food studies. J. *Field Ornithol* 55 : 249—257.

Schwartz CW, Schwartz ER (1951) An ecological reconnais sance of the pheasants of Hawaii. *Auk* 68 : 281—314.