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Eco-Hydrobiology Study with special amphasis on Ichthyofaunal Diversity of Kuruka–Rangajan Beel of Golaghat District, Assam

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Abstract:

Kuruka–Rangajan beel, situated located between latitudes 26º30′27″ N to 26º31′08″N and longitude 93º54′47″E to 93º54′59″E to the south of the Dhansiri river of Golaghat District, Assam. The present findings reported a total of 58 fish species belonging to 21 family from the wetland. Many riverine species have amalgamated in this wetland due to connection with the Dhansiri river. Encroachment, agricultural activities, forest cover change and human settlement within the wetland and its buffer zone resulting in an imbalance in the wetland ecosystem. The wetland supports considerable numbers of migratory bird populations which are declining owing to extensive human disturbances.

Keywords: Hydrobiology, Ichthyofauna, Diversity, Wetland

INTRODUCTION:

North Eastern region of India has already been recognized as global hotspots of freshwater fish diversity (Kottelat &q Whitten ,1996) and among the eight states of the northeast, Assam has the largest number of fishes with 200species (Mahanta et al, 2001). Recently a good number of new species have been reported from the states of North Eastern region [Sen & Biswas, 1994; Biswas, 1997; Menon et al, 2000; Vishwanath & Shanta, 2004] indicating the scope for exploring more on the rich ichthyological diversity of the region. North Eastern region in general and Assam in particular, is blessed with a number of wetlands locally called ‘Beel’, which alone constitute 81 % of the total lentic area in Assam (Dey,1981). The wetlands of Assam were highly productive in terms of fish diversity and production. These Beels provide their natural resources directly or indirectly, for livelihood of the villagers located nearby. Unfortunately, wetlands are presently among the world’s most threatened habitats (Tiner, 1984; William, 1990). The livelihood and economic condition of the fisher community depends mainly on the fish catch from these wetlands.

The Asian Wetland Symposium of 1992 concluded that wetlands are being lost and degraded rapidly in Asia, as well as in other regions, and many people are paying the cost, some with increased cost of living, and some with their lives. In Pabna District of Bangladesh huge water bodies had lost biodiversity, due to establishment of the Pabna Irrigation and Rural Development Project (PIRDP), and also establishment of the embankment of flood control by Bangladesh Water Development Board (BWDB). Flood-controlled dykes, sluice gates and pump houses have been established with a view to protect flood water, as well as supplying the river water into the cropping area in a controlled and systematic way. After the green revolution, farmers are still using chemical fertilizers, pesticides, herbicides and other toxic substances to improve crop

production to meet the growing needs. As a result, biodiversity in the study area has been misplaced and beneficial insects, birds and aquatic animals, useful for biodiversity conservation do not exist in that region. Fishermen groups are becoming more vulnerable by losing their profession and have been forced to change their profession. Conflict between fishermen, private leases and government over water access was common throughout the period and was the subject of a number of court cases (Pokrant et al. 1997). Every professional group from all sectors, except agricultural day labourers, have migrated to the other places or shifted their profession.

The present state of wetland biodiversity is exacerbated due to a series of problems, including poverty, population growth, urbanization, force from pressure groups and construction of flood- control embankment, through inappropriate regulations of water flow (sluice-gate). Many species, including fish, plants and aquatic species, are shown to be threatened and endangered due to siltation of beel, changing physical nature of wetlands, indiscriminate uses of chemicals, construction of embankment and fishing of broods. Physical changes in watersheds and floodplains have drastically reduced the area and quality of wetlands. Flood-control embankments and water control structures have blocked fish migration routes. On the other hand, expanded irrigation of cultivated areas and expanding areas of winter-rice cultivation has reduced the water available for aquatic life to survive in the six-month dry season. Losses of tree cover and poor cultivation practices in watersheds have caused high rates of siltation in rivers and loss of floodplain wetlands. Human threats come from over exploitation, encroachment, reclamation of vast wetland areas for agriculture. Therefore fish production from these wetlands is declining day by day. The present investigation deals with study of Kuruka –Rangajan (26º30′27″ - 26º31′08″N and 93º54′47″ - 93º54′59″E) wetland of Golaghat District, Assam .

Materials and Methods:

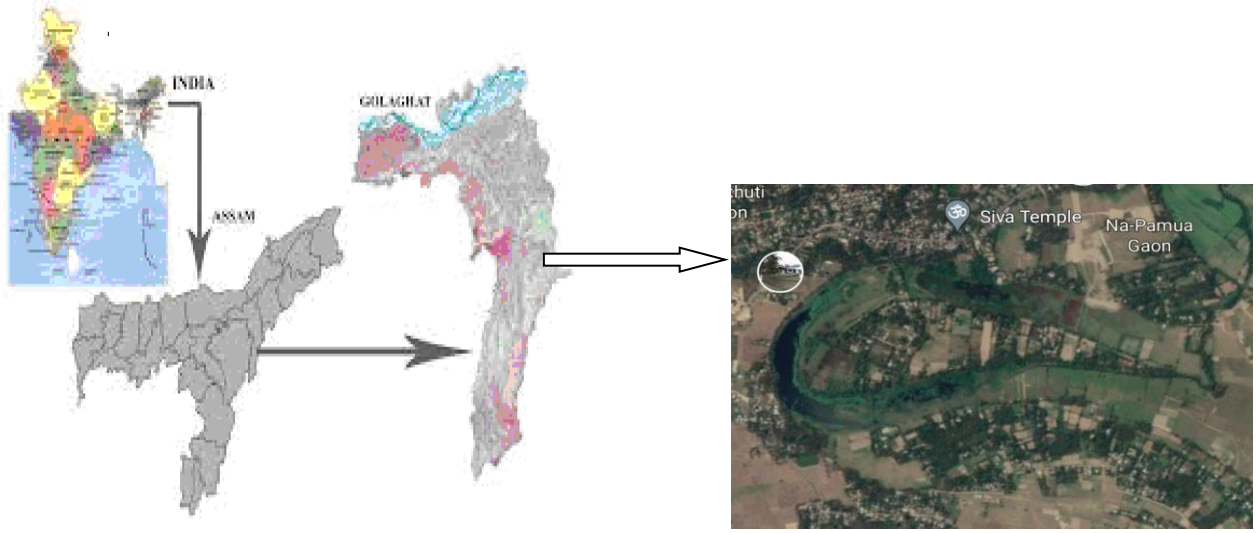
The study was conducted from March,2020 to February,2021. For diversity study fishes were sampled in four pre-selected sampling sites. Cast net was mostly used to collect the fishes, however others were also used. Fish species available at the local market and caught by local fishermen were also purchased. The collected fish species were preserved in 8% formaldehyde solution for further study using standard method of Jhingran(1991) and Jayaram(1999). Plankton, Benthos and Macrophytes were also collected for diversity study. Water samples for physico-chemical parameters were collected from four pre-selected sampling sites in each seasons(i.e. in premonsoon, monsoon, retreating monsoon and winter). Physico-chemical parameters were analysed adopting the method of APHA(1998).

Results and Discussions:

Description of the Wetland:

Location:

Kuruka –Rangajan beel is located between latitudes 26º30′27″ N to 26º31′08″N and longitude 93º54′47″E to 93º54′59″E to the south of the Dhansiri river of Golaghat District, Assam.(Figure-1). The eastern side of the wetland is surrounded by village Kuruka. Perennially, the wetland is fed by river Dhansiri. Dhansiri river originates from Laisang peak of Nagaland passes by the side of the wetland and ultimately meeting the Brahmaputra river.



(Source www.google map)

Figure-1: Satellite imaginary of Kuruka-Rangajan beel.

Hydrology:

The wetland receives water from the river Dhansiri. The wetland also collects part of the water from the plains. The local monsoon run off is also a major source of water to the wetland. The area experiences heavy rainfall occurs during June, July and post-monsoon season extend upto the end of October.

Climatic Condition:

The climate of in and around the wetland more or less moderate with temperature variation between the average minimum of 10º C in winter and average maximum in summer limited to around 33º C. The monsoon is long extending from May to September. Though most of the rainfall occurs during the Monsoon, occasional heavy downpour is often experienced during winter.

Limnochemistry:

The wetland is less contaminated and henceforth provides sheltering place for large numbers of aquatic resources. But due to heavy silt coming into the wetland every year the depth of water has reduced which also affect the physico-chemical characteristics of the wetland (Table-1). The wetland water is alkaline in nature through out the year which ranged from 7.1 to 8.2. High dissolve oxygen value was recorded during winter (10.4 mg/l). While less value was observed during monsoon (6.5 mg/l) because of influx of nutrients from the catchments.

Total alkalinity was maximum in winter (156.8 mg/l) which may be due to high photosynthetic activity. Dilution of water may be responsible for minimum value (91.6mg/l) in monsoon. Total hardness usually ranged from 22.3 mg/l to 38.2 mg/l. usually higher values are observed in winter season (Table-1).

Table 1. Physico-chemical parameters of Kuruka-Rangajan wetland.

Water Quality parameters	Pre-monsoon	Monsoon	Post Monsoon	Winter
pH	7.1-8.2	7.2-8.2	7.6-8.2	7.9-8.1
Temperature	7.4-15.9	7.1-19.8	6.4-15.2	6.2-7.2
Dissolve oxygen	8.7-8.9	6.5-8.4	8.3-10.2	8.7-10.4
Free carbondioxide	6.1-6.5	6.2- 6.6	7.4- 7.7	7.6- 7.8
Alkalinity	123.4-145.7	91.6-125.2	126.8-131.8	151.9-156.8
Hardness	22.3-37.3	27.7-35.2	23.1-37.6	29.2-38.2

Biological Resources:

Kuruka-Rangajan wetland is endowed with rich floral and faunal diversity. The Kuruka-Rangajan ecosystem harbours large numbers of migratory waterfowl each year. It regularly supports substantial numbers of fish fauna indicative of wetland values, productivity and diversity.

Planktons:

Rich plankton diversity is noticeable in this wetland of which 15 were phytoplankton and 30 zooplanktons. Pre-monsoon records of the plankton was 475 nos/litre. The phytoplankton percentage was 54.2% and zooplankton 35.8%. Cyanophyceae was the most dominant group among phytoplankton and copepods among zooplanktons. Other dominant groups were chlorophyceae and rotifers. The dominance of cyanophyceae and Chlorophyceae indicated the eutrophic nature of the water body. The dominant species encountered were Anacystic sp. Oscillatoria sp. Spirogyra sp. Selanastrum sp. Microcystis sp. Anabena sp. Zygnema sp. Closterium sp. Hydrodictyon sp. Trichonema sp. Chlorella sp. Navicula sp. Melosira sp. and Synedra sp.

Benthos:

The important benthic fauna found in Kuruka-Rangajan wetland ecosystem includes, Tubifex sp., Naisi sp, Dero sp., Limnodrillus sp., Chaoborus sp., Chironomus sp., Bellamya sp. Bortia sp., Chaoborous sp., Culicoids sp., Dragonfly larvae, stone fly larvae, Cybister larvae, Pila globosa and Unio sp.

Macrophytes:

Macrophytes form an important component of the wetland and constitute diverse form of free floating submerged and imerged macrophytes. Important floating macrophytes found in the wetland are Eichhornia crassipes, Pistia stratiotes, Lemna minor, Azolla pinnata, salvinia natans, Nelmbo lotus, Nymphaea alba, Nelumbo rubra, Euryale ferox, Marsiela quandrifolia, Spirodela polyrrhiza and Trapa bispinosa. The submerged macrophytes include Potamogeton crispus, Vallisneria spiralis, hydrilla verticellata, Nais sps., Najas sp., Nitella sp. Nechamendra sp., Chara sp., Ceratophyllum demarsum I and utricularia sp. the emergent species are represented by Paspalum serobiculatum, Ipomoea reptans, Cyperus sp., Eupatorium sp. Phragmitis sp. Saccharum sp., Accium sp., imperata sp. Vitex sp., Eleocharish pentagine, Sagittaria sagitifolia and Hygrorhiza sp.

Fish And Fisheries:

A total of 58 species belonging to 21 family have been recorded (Table-2) from the wetland. Earlier also a wide array of fishes is recorded in this wetland. Majority of them are resident fauna of this wetland. Some of the fishes migrate between the wetland and the river Dhansiri and so many riverine species have amalgamated in this wetland. Numbers of exotic fish species is also recorded from the wetland. Commonly encountered exotic carps in this wetland are. Cyprinus carpio, Ctenopharyngodon idella, and Hypothalmichthys molitrix.. The wetland is a good breeding ground for almost all fishes except the carps which breed in running water. The commercially important fish species found in the wetland are, , Labeo rohita, Labeo calbasu, Labeo gonius, Catla catla, Cirrihinus mrigala, Labeo gonius, Notopterus chitala, Aorichthys aor, Wallago attu, Channa marulius, Channa striatus, Cirrihinus reba, Heteropneustes fossilis, Clarias batrachus, Ompok pabo, Anabas testudineus, Gadusia chapra, Rasbora elanga, Mystus cavasius, , Monopterus cuchia etc. Three species of freshwater Prawn belonging to Palinomidae family such as Macrobrauchium dayanum, M. assmensis and M. lamerrie were found in the wetland.

Fishing in this wetland continuous through out the year with a peak during winter (Dec- Feb). Since the wetland encompases a huge area it is difficult to estimate the total catch. Gill nets locally called Phasi or Lungi jal is widely used and chaki or chak jal, a conical shaped net 1.5-3.0 m wide is widely used. The drag nets are used in those parts of the wetland where macrophytes are not present or moderately infested. Some groups of fishermen are completely dependent on fishing activity. They fish round the year in groups and are completely dependent on fishing for their livelihood. They have no landholdings of their own or marginal land holdings. The other groups of fishermen are those who take up fishing as subsidiary source of income and fish only for their domestic consumption. They fish with small nets like cast net and dip net.

Table 2. Fish species occurring in Kuruka-Rangajan wetland with potential food, ornamental and sport value.

Fish taxa/ species	Potential value			Conservation status*
	FF	OF	SF	
ORDER: I. OSTEOGLOSSIFORMES Family: (1) Notopteridae				
1. Chitala chitala (Ham-Buch)	√√	√	√	EN
2. Notopterus notopterus (Pallas)	√√	√	√	LR-nt
ORDER: II. CLUPEIFORMES Family: (2) Clupeidae				
3. Gudusia chapra (Ham- Buch)	√√			LR-lc
ORDER: III. CYPRINIFORMES Family: (3) Cyprinidae				
4. Salmostoma bacaila (Ham- Buch)	√	√		LR-lc
5. Amblypharyngodon mola (Ham-Buch)	√			
6. Brachydanio rerio (Ham-Buch)	√	√		LR-nt
7. Danio devario (Ham- Buch)	√	√		LR-nt
8. Esomus danricus (Ham-Buch)	√	√		LR-lc
9. Parlicosoma daniconius (Ham- Buch)	√	√		LR-nt
10. Catla catla (Ham- Buch)	√			
11. Cirrhinus mrigala (Ham-Buch)	√			LR-nt
12. C. reba (Ham-Buch)	√			Vu
13. Ctenopharyngodon idella (Valenciennes)	√			
14. Cyprinus carpio var. communis (Linnaeus)	√			
15. Labeo calbasu (Ham- Buch)	√			Vu
16. L. gonius (Ham- Buch)	√			LR-nt
17. L. rohita (Ham- Buch)	√			LR-nt
18. Osteobrama cotio cotio (Ham- Buch)	√	√		LR-nt
19. Puntius chola (Ham-Buch)	√	√		Vu
20. P. conchonius (Ham- Buch)	√	√		Vu
21. P. gonionotus (Bleeker)	√			LR-Ic
22. P. phutonio (Ham- Buch)	√			
23. P. sophore (Ham- Buch)	√			LR-nt
24. P. ticto (Ham- Buch)	√	√		LR-nt
25. Hypothalmichthys molitrix (Valenciennes)	√			
26. Aristchthys nobilis (Richardson)	√			
27. Chela laubuca				
Family: (4) Balitoridae				
28. Acanthocobitis botia (Ham- Buch)	√	√		LR-nt
Family: (5) Cobitidae				
29. Lepidocephalus guntea (Ham- Buch)	√			
ORDER: IV. SILURIFORMES Family: (6) Bagridae				
30. Sperrata seenghala (Sykes)	√	√		
31. Mystus bleekri (Day)	√			Vu
32. M. tengara (Ham-Buch)	√	√		
33. M. vittatus (Bloch)	√	√		
Family: (7) Siluridae				
34. O. pabda (Ham-Buch)	√			EN
35. Wallago attu (Scheidner)	√			LR-nt
Family: (8) Schilbeidae				
36. Ailia coila (Ham-Buch)	√	√		Vu
37. Eutropichthys vacha (Ham-Buch)	√			LR-nt

Family: (9) Claridae.				
38. Clarius batrachus (Linnaeus)	√			Vu
Family: (10) Heteropneustidae				
39. Heteropneustes fossilis (Bloch)	√			Vu
ORDER: V. BELONIFORMES Family: (11) Belonidae				
40. Xenentodon cancila (Ham-Buch)	√	√		LR-nt
ORDER: VI. CYPRINIDONTIFORMES Family: (12) Aplocheilidae				
41. Aplocheilus panchax (Ham-Buch)				Vu
ORDER: VII. SYNBRANCHIFORMES Family: (13) Synbranchidae				
42. Monopterus cuchia (Ham-Buch)	√			Vu
ORDER: VIII. PERCIFORMES Family: (14) Ambassidae				
43. Chanda nama (Ham-Buch)	√			
44. Pseudambassis baculis (Ham-Buch)	√			LR-lc
Family: (15) Nandidae				
45. Badis badis (Ham-Buch)	x			
46. Nandus nandus (Ham-Buch)	√			LR-nt
Family: (16) Gobiidae				
47. Glossogobius giuris (Ham-Buch)	√			
Family: (17) Anabantidae				
48. Anabas testudineus (Bloch)	√			Vu
Family: (18) Belontidae				
49. Colisa fasciatus (Schneider)	√			LR-nt
50. C. lalia (Ham-Buch)	√			
51. C. sota (Ham-Buch)	√			
Family: (19) Channidae				
52. C. marulius (Ham-Buch)	√			LRnt
53. C. punctatus (Bloch)	√			LRnt
54. C. striatus (Bloch)	√			
ORDER: IX. MASTACEMBELLIFORMES Family: (20) Mastacembellidae				
55. Macrognathus aral (Bloch & Schneider)	√			LRnt
56. M. pancalus (Ham-Buch)	√			
57. Mastacembelus armatus (Lacpede)	√			
ORDER: X. TETRAODONTIFORMES Family: (21) Tetraodontidae				
58. Tetraodon cutcutia (Ham-Buch)	x	√		LR-nt

Note: FF = Food fish; OF = Ornamental fish; SF = Sport fish;
*Based on CAMP report (1998);
√√ = Commercially important; x = No food value
#Exotic species introduced in the state; CR = Critically endangered EN = Endangered; Vu= Vulnerable; LR-nt = Lower risk near threatened LR-lc = Lower risk least concern.

Current Conservation Threat :

During the past few decades the Kuruka-Rangajan wetland area has undergone rapid changes due to encroachment, agricultural activities and human settlement within the wetland and its buffer zone; resulting in an imbalance in the wetland eco-system. Moreover, the inflow of stormwater from the adjoining settlement area to the wetland is degrading its water quality causing a hazardous environment for the aquatic flora and fauna. The threats to Kuruka-Rangajan are typical of wetlands in this region and other developing countries. It is purposed that the following three major anthropogenic threats receive immediate attention:

- Illegal land use and settlement in and around the wetland.
- Siltation in the wetland causing decline of the water depth.
- Lack of a comprehensive management policy with adequate institutional arrangements

Conclusion :

The wetland offer immense potential for increasing fish production, employment generation and several other additional source of income. The abiotic and biotic condition of the wetland is suitable for fish growth. It is one of the potential wetland within northeastern regions of India, who continuously supports large numbers of wetland biota. The wetland supports considerable numbers of migratory bird populations which are declining owing to extensive human disturbances. This was happened, owing to heavy human disturbances in the shallow parts of the wetland and shoreline area of the wetland.

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