DIVERSITY OF DHEER BEEL WITH REFERENCE TO ITS FISH AND MACROPHYTIC DIVERSITY IN DHUBRI DISTRICT OF ASSAM

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ABSTRACT

The biodiversity of north eastern region is well known to all and especially the flood plain wetlands constitute important fishery resources of Northeast India. Assam is having the largest flood plain wetland which serves the huge fishery resource of Assam. The Dheer beel is a water body situated in the Dhubri District of Assam is covering an area of 689 hectare and has a connection with the river Brahmaputra through an 11-km long channel. The present status of the beel has brought changes in the sustainability of fisheries and livelihood of fisherman. The changes in the management regime can be attributed to immigration of a large number of people from nearby areas since 1980 and the increase in the Brick manufacturing industry in this area. The study on this Beel has shown large scale fishing and new methods and techniques adopted for fishing. Till date there is a continuous encroachment of Beel area which has changed its Anthropogenicity resulting in the decline of fish productivity in the Dheer Beel up to 22.32%. The present studies shows the lack of awareness among the locally inhabited people that the Dheer Beel has been affected too much in the present situation of the beel in terms of fish production. Thus, the study has been made to watch the impact of changes in management of fisheries that affects the important Bioresources of Assam. This study underlines the potential of Fish diversity and the need for documentation of knowledge pertaining the sustainable utilization and conservation of fish for the greater benefit of mankind.

Keywords: - Management regime, Encroachment, Anthropogenicity, Dheer Beel, Bioresource.

INTRODUCTION

The fish resources utilization by human being can be distributed as mainly for food followed by ornamental and game purposes. Fish contributes almost half of the total number of vertebrates in the world. They live in almost all conceivable aquatic habitats. India is one of the mega-biodiversity countries in the world and occupies the ninth position in terms of freshwater mega-biodiversity. The Dheer beel is a water body situated in the Chapar town of Dhubri District. It is characterized as a floodplain wetland, covering an area of 689 ha and has a connection with the river Brahmaputra. Three villages, viz. Satyapur, Mowatari and Arrearjhar with inhabitations of about Eight thousand people surround this water body. These villages were inhabited by local fishermen in which were exclusively dependent on the Dheer beel (Barik *et al.*, 2007).

The Dheer beel has a lot of potential to sustain the people of that area by economically as well as by ecologically maintaining the ecosystem of the area. In the due course of time the beel is showing low productivity and losing its quality. The present study has attempted to understand the dynamics of the fisheries management regimes and its impact on fisheries and livelihoods in the Dheer beel. Such a study is particularly important as no such study has been made in India so far due to lack of comparative data. The present study has been undertaken in the Dheer beel as the case study with the following specific objectives:

(i) Anthropogenic activity around the Beel
(ii) Potentiality of fisheries and the livelihood of the fishers, and
(iii) Highlighting the sustainability implications of the change.

Study Area
Map Coordinates:- 26°16'21.68" N & 90°22'46.40" E

Photo: Map on Dheer Beel, Chapar, Dhubri (Assam)

The district of Dhubri is situated in the extreme south western part of the lower Brahmaputra valley of Assam with an area of 2, 67,572 hectares. The district is characterized by almost flat topography but the eastern part has an undulating topography .The drainage system is dominated by the Brahmaputra river that flows through the district with a sharp south turn in the extreme west end of the district. The northern part is having a number of tributaries of the Brahmaputra namely Champabati, Gourang, Tipkai, Godadhar and Sonkosh which are perennial in nature, originate from Bhutan and flow into the Brahmaputra towards south. Among the southern tributaries, the Jinjiram originates' from Urpad *bee*l of Goalpara district and flows parallel to the Brahmaputra for some distance before joining further downstream. The soil in the northern part of the district is composed of Recent Riverine Alluvial soils (Entiso1s), and that of the lowermost part of the district is formed by Old Riverine Alluvial soils (Inceptisols). The soil pH of the district varies from 4.5 to 7.5 i.e. acidic to neutral. The annual average rainfall of the district is 2647 mm. The maximum and minimum temperature of the district is 38°C and 7°C respectively (Barbhuiyan *et al*., 2015).

MATERIALS AND METHODS
The primary data were collected by survey method in the year 2011-13 from the fishermen and Managers to get the raw data. For collection of data, schedules, personal interviews and field visits were used as tools. Identification of fishes done by using guide book (Vishwanth *et al.,* 2014). The changes in the management regimes on temporal basis were documented by collecting information through discussions with the lease holders and senior fishermen of the area. The implications of the changes were observed on fisheries of the Dheer beel and livelihoods of the people. The fishery was evaluated in terms of production, productivity, and quality of fish and economics of fisheries. Through these two years w.e.f. Jan-2011 to February-2013 our study has found many facts about the potentialities of Fish species and Macrophytic diversity in Dheer Beel.

RESULTS AND DISCUSSION

(A) Management Regime and Temporal Change

The water body owned by Assam Fisheries Development Corporation (AFDC) has been leased out to a private person for 5 years. The fisheries management involves facilitation of inward flow of the fish seed through connecting channel, observation of fishing closure during the rainy season, non-use of destructive gears like very small-meshed net, catching the fish of economic size, monitoring and collection of information (e.g. flow fish seed, who is fishing, number of people fishing, types of gear used, amount of catch, type of fish, size of fish, price of fish). These management measures require the cooperation, participation and compliance of the people living around the beel. Therefore, social and institutional environment is important for beel fisheries management. Due to influx of a large number of people from the neighbouring areas, the emigrants replaced the traditional fishers around the beel (Yadava and Choudhury, 1984). Consequently, the whole set of social and institutional environment has undergone a dramatic shift. The immigrants had different sets of values and norms, and have disregard for the traditional institutions of self-regulations and rule compliance. Consequently, the regulation regimes weakened over a period of time. Now, the rules and management schemes made by the manager are frequently breached, leading to poor management of the beel.

Population Pressure for Fishing

300 fishers were completely dependent on the Dheer beel. These people belonged to the scheduled castes community. But now due to influx of large number of people near the beel has resulted in the fishing pressure and threat to the beel area.

Fishing Methods

The fishery was completely dependent on the natural stocking from the river Brahmaputra through a connecting channel. A wide variety of fishing practices were followed in the beel, depending upon the species, size and season. These fishing practices were the important capture technology, which had undergone changes in the recent time. Some of the fishing methods as follows:-

Sl. No.	Fishing practices	Season
1.	*Brush Park*	October-March
2.	*Barrier*	October-March
3.	*Drag net*	October-March
4.	*Drag net (fine-mesh)*	October-November
5.	*Gill net*	October-March
6.	*Cast net*	April-June
7.	*Scoop net*	August to October
8.	*Traps*	September-October
9.	*Dip net*	September-October
10.	*Hook and line*	August to October
11.	*Pen fisheries (ha)*	August to October

Brush park (katal) fishing was the major fishing practice in the *Beel* during October-March. During pre-monsoon and monsoon seasons, hook and lines, dip nets and traps were important. The barrier fishing (banas fishing) is predominant from August to October. The katal fishing is found to continue as the dominant fishing practice; but, the fishermen were setting the katal by themselves in addition to that by the Manager. The Manager had 6 numbers of katal, 18 katals were being operated four times. Hence, the operation of the katal is used 60- 72 in a year. A new fishing gear, observed during the study, was the fine-meshed drag net called Masuri Jal and was considered as the destructive fishing gear if operated during the breeding season. Ten-to-twelve such nets were being operated during October-November and 25 during July-September. Intense use of this gear was observed during the

breeding (rainy) season, which was responsible for the killing of juveniles. A total of 10 cast nets (Khora jal) were being operated during September-October, which were 5 before 20 years. There were 150 – 200 gill nets (Fasi jal) of 2-inch mesh size, which were around 50 in the 'before' period. The number of scoop nets (Thela jal) operated during Sep.-Oct. is 50. The number of dip nets operating in the channel had increased from 10 to 20. The fishing in the margins of beels by erection of enclosures called pen fisheries was a new development. The highest increase of fishing nets was observed in the case of gill nets, drag nets, scoop net and hook and line.

(B) Implications on Fisheries Output

Production, Productivity and Value

The total value of fish catch is approximately Rs 53.22 lakh based on the current price the fish harvest was estimated to be 85 t with the value of Rs 56.30 lakh (*assamagribusiness.nic.in*).

Quality and Composition of Fish Catch

The impact of over and irrational fishing can be assessed through the decline in the share of commercially important fishes. The fish-catch composition and the average size of dominant fish species are the important indicators of the quality of fish catch.

Sl. No.	*Fish Species*	Common Name	English name
1	*Chitala chitala* (Ham -Buch)	Chital	Humped feather back
2	*Wallago attu* (Scheidner)	Barali	Fresh water shark
3	*Anguilla bengalensis bengalensis* (Gray)	Kuchia	Indian long fin eel
4	*Moringua hodgarti* (Chaudhuri)	--------	
5	*Pisodonophis boro* (Ham -Buch)	-------	Rice paddy eel
6	*Gudusia chapra* (Ham -Buch)	Karoti	Indian river shed
7	*G. variegata* (Day)	Karoti	Burmese river shed
8	*Hilsa (Tenualosa) ilisha* (Ham -Buch)	Ilish	Indian shad
9	*Gonialosa manmina* (Ham -Buch)	Karoti	Ganges river gizzard shad
10	*Ilisha melastoma* (Schneider)	---------	--------
11	*Ilisha megaloptera* (Swainson)	---------	--------
12	*Setipinna phasa* (Ham -Buch)	Salo/ Chalo	Gangetic hair fin anchovy
13	*Chela cachius* (Ham -Buch)	Laupati	Silver hatchet chela
14	*C. labuca* (Ham -Buch)	Laupatia/ Laupati/ Herbeggi	Indian hatchet fish/ Indian glass barb
15	*Salmostoma bacaila* (Ham -Buch)	Selkona	Large razorbelley minnow
16	*S. clupeoides* (Bloch)	-------	Bloch razorbelly minnow
17	*S. phulo* (Ham -Buch)	Selkona	Fine scale razorbelley minnow
18	*Securicola gora* (Ham -Buch)	Selkona	Gora chela
19	*Amblypharyngodon mola* (Ham -Buch)	Moa	Mola/ Indian carplet/ Pale carplet
20	*Aspidoparia jaya* (Ham -Buch)	Mouah/ Bariala	Jaya
21	*A. morar* (Ham -Buch)	Bariala/Baliara/ Boreala/ Mouah	Aspodiparia
22	*Barilius barila (*Ham -Buch)	Korang	Barred baril
23	*B. barna* (Ham -Buch)	Balisonda/ Ozola	Barna baril
24	*B. bendelisis* (Ham -Buch)	Korang	Hamilton's barila
25	*B. dogarsinghi* (Hora)	-------	Manipur baril
26	*B. shacra* (Ham -Buch)	Korang	Shacra baril
27	*B. tileo* (Ham -Buch)	Tilei/ Selleng/ Boolla	Tileo baril
28	*B. vagra* (Ham -Buch)	Korang	Vagra baril
29	*Bengala elanga* (Ham -Buch)	Elang	Bengala barb

30	*Brachydanio rerio* (Ham -Buch)	Laupati	Zebra danio
31	*Danio aequipinnatus* (McClelland)	Saldarikana	Giant Danio
32	*D. dangila* (Ham -Buch)	Laupati	Dangila danio
33	*D. devario* (Ham -Buch)	Laupati/ Dahrie	Devario danio
34	*B. dario* (Ham -Buch)	Rani botia	Tiger loach
35	*Esomus danricus* (Ham -Buch)	Darikana	Flying barb
36	*Parluciosoma daniconius (*Ham -Buch)	Darikana	Blackline rasbora
37	*Raiamas bola (*Ham -Buch)	Korang/ Rajahmas	Indian trout
38	*Rasbora rasbora* (Ham -Buch)	Darikana	Gangetic scissortail rasbora
39	*Catla catla* (Ham -Buch)	Bhakua/ Bahu/ Dhekera	Catla
40	*Chagunius chagunio* (Ham -Buch)	Keintah puthi/ Pootee- Keintah	Chenguni
41	*Cirrhinus mrigala* (Ham -Buch)	Mirika	Mrigal
42	*C. reba* (Ham -Buch)	Rashim/ Lachim/ Laseem	Reba
43	*Cyprinion semiplotum* (McClelland)	-------	Assamese kingfish
44	*Labeo angra* (Ham -Buch)	-------	Angra labeo
45	*L. bata* (Ham -Buch)	Bhangone/ Nara/ Bango	Bata labeo
46	*L.boga* (Ham -Buch)	Bhangone	Boga labeo
47	*L. calbasu* (Ham -Buch)	Mali/ Kaliajora	Calbasu/ Black rohu
48	*L. dero* (Ham -Buch)	Silgharia/ Gorea/ Nepura	Kalabans
49	*L. dyocheilus* (McClelland)	Silgharia/ Lasu	Brahmaputra labeo
50	*L. gonius* (Ham -Buch)	Kurhi/ Kuria	Kuria labeo
51	*L. nandina* (Ham -Buch)	Nandani/ Nadani	Nandee labeo
52	*L. pangusia* (Ham -Buch)	Lasu/ Loannee	Pangasia labeo
53	*L. rohita* (Ham -Buch)	Rau/ Row	Rohu
54	*Neolissochilus hexagonolepis* (McClelland)	Pakhironga/ Bokar/ Boolooah	Chocolate mahseer/ Katli
55	*N. hexastichus* (McClelland)	-------	
56	*Oreichthys cosuatis* (Ham -Buch)	-------	Cosuatis barb
57	*Osteobrama cotio cotio* (Ham -Buch)	Hato/ Hamto	Hafua
58	*O. cotio cunma* (Day)	-------	
59	*Puntius chola* (Ham -Buch)	Puthi	Swam barb/ Chola barb
60	*P. clavatus* (McClelland)	-------	Stedman barb
61	*P. conchonius* (Ham -Buch)	Puthi	Rozy barb/ Red barb
62	*P. filamentosus* (Valenciennes)	-------	Black spot barb, Indian tiger barb
63	*P. fraseri* (Hora & Misra)	-------	
64	*P. gelius* (Ham -Buch)	Puthi/ Gilipungti	Golden barb/ Golden dwarf barb
65	*P. guganio* (Ham -Buch)	Puthi	Glass barb
66	*P. phutunio (Ham -Buch)*	Puthi/ Ngakha	Dwarf barb/ Pigmy barb
67	*P. sarana sarana (Ham -Buch)*	Cheniputhi/ Maraputhi/ Ngabon	Olive barb
68	*L. guntea*	Botia	Guntia loach
69	*P. sophore (Ham -Buch)*	Puthi/ Phabounga	Spot fin swam barb
70	*P. terio (Ham -Buch)*	-------	One spot barb
71	*P. ticto (Ham -Buch)*	Puthi/ Kenipotiah/ Aahaneee-potiah/	Fire-fin Barb/ Two

(C) Macrophytic diversity in Dheer Beel

Macrophytes are the important parts of the aquatic ecosystem and contribute to primary productivity of the aquatic ecosystem. The aquatic plants are considered as source of multipurpose raw materials for food, fodder, medicinal, house hold materials, and natural fertilizer water purifier and for other economic purposes directly or indirectly by surrounding people. Several workers of carried out their studies on the aquatic and wetland flora viz. Mirichi (1954), Maheswari (1960) and in Assam by Kanjilal *et al.* (1934-40), Barua and Barua (2000).

Some species such as *Ipomoea aquatica*, *Eichhornia crassipes, Nymphae rubra, Hydroryza asiatica, Ceratophylum* of the fringing area and *demorsum, Trapa bispinosa* are found to be dominant indirectly dependable upon the wetland for their livelihood species, while *utricularia aurea*, *Limnophylla sessilis*, in terms of fishing and collection of plant species for *Ottelia alismoides, Hydrilla verticillata, Monocharia* different purposes. The study of the area of Dheer beel for different growth of *Eichhornia crassipes, Ludwidia octavalvis* form aquatic flora and their economic utilization is of utmost a carpet over the water surface which reduce the growth importance. Hence, the *Beel* and its biodiversity depend upon its Macrophytes.

(D) Anthropogenic activities

i) Encroachment by various immigrants from other parts of the District

ii) Setting up of 08 large Brick Industry touching the Dheer *Beel* increases the Temperature of the area.

iii) Killing of various Birds in the *Beel* area. The number of Greater Adjutant stork has been decreased.

iv) During the study period, Eight major Brick Industry were recorded in the surrounding regions. However, not all brick industries are reported to be in active operation. Brick burning in the study area was observed from late September to February. Almost all the Brick Industry recorded was human-caused (anthropogenic). The clear vegetation on land for cultivation, Bathing and washing clothes causes effects on the *Beel* surrounding.

CONCLUSION

Above work has resulted in Seventy one Ichthyospecies have been recorded in the Dheer beel of Dhubri District of Assam. The beel has undergone a lot of change in terms of fish production and decrease in the quality of fishing practices. The management has a limited control over the access and use of the beel. The anthropogenic activities like setting up of brick industry and the use of beel water by the nearby people for bathing and washing has resulted in the change of water quality of the beel. The decline has been predominant in the composition and quality of the fish stock, as evident from the reduction in average size of the fish catch in the beel. It has also indicated an increased fishing pressure on juveniles and lack of systematic fishing practices. The weakening of the regulatory regime has led to the degradation of the Beel area thus a matter of concern which needed special attention. The encroachment of the beel area is one of the serious concerns for the management of the beel. Also the attention of all the regulating bodies for the better scientific management and maintenance along with the introduction of culture based fishery than the fish production of the beel can be increased (Barik *et* al 2007). The Fishery sectors are particularly important in developing countries, for providing both food and livelihoods. The Beel offer immense potential for increasing fish production, employment generation and several other additional source of income for the rural population. Thus, a proper documentation and process is needed to re-establish the lost biodiversity of the Beel as well as save the better benefit of the mankind.

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