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DIVERSITY OF WETLAND FISH AND ITS IMPACT ON THE INCOME OF FISHERMEN COMMUNITY OF ASSAM

TAPAN KUMAR DEKA*, M. KAKATI** AND M.M. GOSWAMI*

ABSTRACT

A survey was conductd in 3,000 fishermen households surrounding 54 wetlands (Beels) of Assam. The fish diversity of the wetlands has been decreasing during the last few years due to some extrinsic and intrinsic factors. The total number of fish species recorded so far during the present study is 67 belonging to 21 families. Cyprinidae is the most dominant family represented by major group species (8), intermediate group species (3) and minor group species (12) of high commercial value. Among these three groups, the diversity of fish species is higher in the minor group fish. The present paper deals with the economic condition of the fishermen who mainly fish in the wetlands. The economic condition of the fishermen community is found very poor. The income of fishermen varies from Rs.4,478.00 to Rs.7,484.00 per annum. A regression analysis shows that the income of fishermen is not dependent alone on the fish production but it is exclusively dependent on the value of the fish catch. All the three groups (in terms of value) have significant influence at 10.00% confidence level. But analysis of β shows that the intermediate fish group exhibits the highest influence on the variation of the fishermen income followed by minor and major group respectively.

Keywords : Fish diversity, Fishermen, Fishing income, Wetlands

INTRODUCTION

Assam is gifted with myriads of wetlands. There are about 3,513 wetlands (Assam Remote Sensing Application Centre, 1993) with a total surface area of more than 1.0 lakh hectare. These wetlands of Assam exhibits high diversity of fish species supported by the subtropical climate, favourable ecological and geohydrological condition and autostocking capacity of the wetlands.

But due to the influence of some extrinsic and intrinsic factors the ichthyofaunal diversity in the wetlands has been decreasing during the last few years. This has affected not only the ecosystem diversity but also the fish production in the wetlands. However, these wetlands provide tremendous economic benefit to the rural masses. The income of fishermen community and their livelihood mainly depend on these wetlands. Therefore, an attempt has been made to examine some relevant parameters like fish diversity, composition, production, price of fish in the

* Department of Zoology, Gauhati University.
** Department of MBA, Gauhati University.

local market and fishermen income of the wetlands and their relationship with the poor economic condition of the fishermen community.

METHODOLOGY

In the present study, the fish diversity in the floodplain wetlands was examined by using two methods - (i) through spot verification of fish catch during the harvesting seasons and (ii) fish species reported by the fishermen and *mahaldar* in the the questionnaire. Fish catch composition and fish species diversity had been collected by spot verification during physical survey at the fish landing stations. Only for those fish species which could not be recorded during physical survey were recorded from questionnaire. In the first method the fish species were indentified on the spot during fish landing in the fish landing stations. The species which could not be identified on the spot were brought to the laboratory and these were identified by using different keys of various standard literatures namely Talwar and Jhingran, (1991), Jayaram, (1981), and Dutta Munshi and Srivastava (1988).

To determine the composition of fish, the fish species were clasified into three categories based on size ranges - (i) major group, (ii) intermediate group and (iii) minor group. Major group fish is composed of fish species with the size above the size of juveniles and are generally the large growing fishes. On the other hand, the intermediate group includes the sizes equivalent to or less than the size of juveniles of Indian Major Carp (IMC), and minor group fish includes all fish species with a size equivalent to or less than the fingerlings of IMC. The fishermen while selling their catch in the auction center commonly follow this categorization. This principle/definition was, however, not being applied while analysing the fish diversity in the watlands. For the analysis of fish diversity, the classification into three groups was based on the size consideration at the maturity stage. For instance, the juveniles of IMC are considered under intermediate group for determination of fish biomass composition, whereas the same was considered under major group for analysis of fish diversity. Similarly, the fingerlings of IMC were considered under minor group in terms of biomass composition, and under major group for analysis of fish diversity. The fish biomass composition of each category was observed on the spot at the time of fish selling in the auction center (fish landing center). The biomass composition was than expressed in terms of percentage. Since, the spot observations were made for three to four days in each wetland, the data collected through spot observation may not be adequate for analysis of biomass composition. Hence, the second method was also adopted simultaneously to know more about fish biomass composition of the individual wetlands. In the second method, individual fishermen including mahalder were asked to indicate the total fish biomass production of individual group and also the fish species available in the wetland.

The final composition of fish in terms of weight were determined by taking the aggregate of data procured from spot observation, report from fishermen and report from mahalder. While taking the

aggregate more weightage (50.0%) was given to the figures reported by *mahalders* followed by the figure obtained from spot observation (30.0%) and from fishermen (20.0%).

One of the parameter that has been used in the analysis is the income of fishermen were collected through questionnaire administered to each of the dependent fishermen. In the present study, the income of the fishermen means fishing income only. It does not include non-fishing income of fishermen households. While calculating the income of the fishermen from fishing the expenditure on account of fishing like hiring boat, nets and construction of fishing devices like katals etc. were deducted from fishing income. Therefore the income of the fishermen is considered as net income.

To explore the linkage between the fish biomass composition and the income of fishermen, a multiple regression analysis was carried out (using SPSS regression procedure) considering income of the fishermen as a dependent variable, and biomass production of major, intermediate and minor group as independent variables.

RESULTS

Fish Diversity

The fish diversity in the wetlands is explained under three broad categories - major fish group, intermediate fish and minor fish group.

Major fish group

Major fish group is constituted by 14 fish species belonging to 6 families of which the most dominant one is Cyprinidae. It includes *Catla, catla, Labeo rohita, Labeo ganius, Labeo calbasu, Cirrhinus mrigala, Cyprinus carpio v. communis, Cyprinus carpio var specularis, Ctenpharyngodon idella* and *Hypophthelmicthys molitrix.* Of these, *Labeo rohita, Labeo gonius, Labeo calbasu, Cirrhinus, mrigala* are found to occur most frequently in all the wetlands (Table 4.1.1) In addition, a solitary species, *Wallago attu* belonging to the family Siluridae is also commonly found in most of the wetlands and its dominance is significantly noticed in twenty eight wetlands.

Internediate fish group

Altogether seventeen species belonging to the intemediate group are observed with species number ranging from eight to seventeen in each wetland. These seventeen species represent 11 families. Considering the distribution of species across the wetlands and their frequency of occurrence in a particular wetland, the most dominant family is found to be Ophiocephalidae. Within that family, the fish species, *Channa punctatus* is the most predominant species distributed uniformly all across the wetlands (Table 4.11).

A few species belonging to the different family namely *N. notopterous* (Notopteridae), *C. batrachus* (Claridae), *A. testudienus* (Anabigidae), *H. fossilis* (Sacchobranchidae) and *M armatus* (Mastacembelidae) shows their dominant

Table 4.1.1. Fish Diversity of the Wetlands

Name of the fish species	family
Major group fish species	
1. *Catla catla*	*Cyprinidae*
2. *Labeo rohita*	- do -
3. *Labeo gonius*	- do -
4. *Labeo calbasu*	- do -
5. *Cirrhinus mrigala*	- do -
6. *Cyprinus carpio*	- do -
7. *Ctenopharyngodon idellla*	- do -
8. *Hypophthalmichthys molitrix*	- do -
9. *Wallago attu*	*Siluridae*
10. *Aorichthys*	*Bagridae*
11. *Notopterus chitala*	*Notopteridae*
12. *Tenualosa (Hilsa) illisa*	*Clupeidae*
13. *Channa striatus*	*Ophiocephalidae*
14. *Channa marulius*	*Ophiocephalidae*
Intermediate group fish species	
15. *Labeo bata*	- do -
16. *Cirrhinus reba*	- do -
17. *Puntius sarana*	- do -
18. *Notopterus notopterus*	*Notopteridae*
19. *Anguilla bengalensis*	*Anguillidae*
20. *Ompok pabo*	*Siluridae*
21. *Ompok bimaculatus*	- do -
22. *Channa orientelis*	*Ophiocephalidae*
23. *Mustacembelus armatus*	*Mastacembelidae*
24. *Mustacembelus puncalus*	- do -
25. *Clarius batrachus*	*Claridae*
26. *Anabas testudineus*	*Anabigidae*
27. *Heteropneustus fossilis*	Sacchobranchidae
28. *Monopterus cuchia*	*Mastancembelidae*
29. *Channa punctatus*	*Ophiocephalidae*
30. *Eutropiichthys vacha*	*Schibeidae*
31. *Clupisoma garua*	*Schilbeidae*

Name of the fish species	family
Minor group fish species	
32. *Puntius ticto*	*Cyprinidae*
33. *P.sophore*	- do -
34. *P.conchonius*	- do -
35. *P.gelius*	- do -
36. *P. phutonio*	- do -
37. *Amblypharyngodon mola*	- do -
38. *Parluciosoma daniconius*	- do -
39. *Oxygaster bacaila*	- do -
40. *Osteobrama cotio cotio*	- do -
41. *Nandus nandus*	*Nandidae*
42. *Macrognathus puncalus*	*Mastacembelidae*
43. *M. aculeatus*	- do
44. *Xenontodon cancilla*	*Belonidae*
45. *Lepidocephalus guntia*	*Cobetidae*
46. *Chanda ranga*	*Ambasidae*
47. *Chanda nama*	- do -
48. *Rhinomugil corsula*	*Mugilidae*
49. *Gadusia chapra*	*Clupeidae*
50. *Colisa fasciata*	*Belontiidae*
51. *Mystus tengra*	*Bagridae*
52. *M. vittatus*	- do -
53. *M. cavasius*	- do -
54. *Sicamugil cascasia*	- do -
55. *Tetradon cutcutia*	*Teradontidae*
56. *Bedies bedis*	*Badidae*
57. *Botia derio*	*Cobitidae*
58. *Botia rostrata*	- do -
59. *Brachydanio rerio*	*Cyprinidae*
60. *Danio devario*	Cyprinidae
61. *Glossogobius giuris*	*Gobidae*
62. *Colisa sota*	*Belontiidae*
63. *Colisa lalia*	- do -
64. *M. aral*	*Mastacembalidae*
65. *Chela laubuca*	*Cyprinidae*
66. *Aplocheilius panchax*	*Aplochieilidae*
67. *Macrobrachium spp.*	(Non piscine)

distribution pattern in all the wetlands.

However, some species are significantly restricted to particular type of wetland. For instance, *Channa orientalis, H. fossilis, C. batrachus, M. cuchia, A. testudineus* are found in large number in Sialekhaiti, Lakhanabandha, Borthol, Dighali - Putali, Merkolaberia and Moridikhow wetlands which are generally close type wetlands infested with swamps. In contrast, *L. bata, C. reba, P. sarana, N. notopterous, M. cuchia* and *M. armatus* are found abundantly in almost all the open type and flood prone wetlands with clear inlet/outlet channels.

Minor fish group

Analysis on the distribution of fish species across the wetlands reveals that, as expected the diversity of fish species of minor group is higher than of the fish species of major and intermediate groups.

Thirty-six fish species constitutes the minor group and they represent 15 families. Cyprinidae is the most diversified family among the minor group families with 12 fish species. Species-wise analysis indicates that *Puntius ticto,* and *P. sophore* are predominantly found in all the wetlands.

Further, some species show their dominance in a particular region. For instance, *Gadusia chapra* has been observed as the most dominant species in Silchar, Karimagani, Hailakandi and Dhubri districts only, whereas its population is significantly less in other floodplain wetlands.

Pooling the diversity of fish species, the following catalog can be prepared as the typical ichthyofauna of the floodplain wetlands of the state (Table 4.1.1).

Fish Composition

Based on the biomass production figures collected from three sources, the fish composition in each wetlands were determined in terms of weight and rupee value. Table 4.1.2 presents the wetland-wise fish composition under three heads - major, intermediate and minor. It reveals from Table 4.1.2 that the minor group on an average contributes much more to the total production compared to the other two groups, though the level of contribution may varies widely across the wetlands. The minor group is predominantly high in 42 numbers of wetlands. Next to the minor group, it is the major group that makes significant contribution to the total fish production. The major group dominance is observed in 20 numbers of wetlands. The contribution of the intermediate group is the minimum in most of the wetlands except in 8 wetlands where its contribution is significantly high.

As per the opinion of the fishermen and mahalder there have been gradual changes in the fish composition over the few decades. In the past, the major group used to make the highest contribution to the fish production in terms of both weight and value in most of the wetlands. It appears that the major group is losing its dominance to the minor group in most of the wetlands of Assam.

Table 4.1.2 : Fish composition, fish price and fish production of the wetlands

Name of Wetlands	Fish composition (%)			Fish price (Rs).	Fish production (kg/yr)
	Major	Inter.	Minor		
Bhoispuri	40	25.0	35.0	12.30	5300
Hakama	35.0	25.0	40.0	18.40	2000
Horinchora	28.5	32.1	39.3	17.30	3500
Chandakhal	25.0	40.0	35.0	11.28	3000
Kalidanga	20.0	37.0	43.0	16.30	2500
Nandini	10.0	17.0	73.0	19.35	2500
Jogra	45.0	20.0	35.0	27.50	1500
Barundanga	20.0	30.0	50.0	12.30	2500
Dhaka	15.0	30.0	55.0	13.42	1000
Salchapra	22.0	25.0	43.0	23.50	7500
Baskandi	25.0	25.0	50.0	21.48	5000
Bhitopuni	20.0	25.0	55.0	21.55	1500
Autibauti	27.0	33.0	40.0	25.37	1700
Tapang	23.0	37.0	40.0	27.42	8500
Meda	22.0	23.0	55.0	17.33	1000
Digrabakri	35.0	15.0	50.0	18.37	1700
Ranimegna	35.0	22.0	43.0	19.32	4500
Gapharsung	20.0	30.0	50.0	25.55	1300
Sagar	22.0	25.0	53.0	27.45	4000
Angang	30.0	20.0	50.0	22.47	2600
Rata	20.0	25.5	54.0	17.42	7000
Saitali	17.0	20.0	63.0	24.45	1600
Sone	25.0	27.0	48.0	22.40	14500
Sibnarayan	28.0	32.0	40.0	21.41	9200
Sakarikandianua	28.0	32.0	40.0	21.41	9200
Mori	20.0	25.0	55.0	18.35	8200
Bormonoha	35.0	20.0	45.0	15.35	25500
Jaluguti	25.0	30.0	45.0	14.30	5200
Kasodhara	25.0	30.0	45.0	12.32	3700
Kujibalipatty	22.0	30.0	48.0	12.35	8060
Deora	27.0	30.0	43.0	14.32	9900
Udori	16.0	28.0	56.0	17.35	14500
Nandinikarmori	40.0	40.0	20.0	17.35	8700
Thekera	25.0	27.0	48.0	18.60	3500
Sialekhaiti	25.0	30.0	45.0	25.55	100
Dighali	25.0	45.0	30.0	20.43	1000
Satiyan	23.0	25.0	52.0	17.47	1100
Borthal	12.0	45.0	43.0	21.50	1500
Lakhanabandha	25.0	30.0	45.0	23.50	1700
Brahmamyjan	15.0	35.0	50.0	18.50	700
Sagmara	50.0	20.0	30.0	20.35	5800
Borbilla	10.0	30.0	60.0	25.30	6000
Batuakamakhya	30.0	25.0	45.0	20.33	6000
Siligurijan	20.0	35.0	45.0	18.40	400
Gorjanbullatjan	30.0	35.0	35.0	20.45	8400
Deepar	22.0	35.0	43.0	25.50	3500
Pungani	40.0	30.0	30.0	17.48	3500
Bihdia	40.0	25.0	35.0	23.50	2300
Moridisoi	10.0	30.0	60.0	22.45	12000
Ganakdubaiduba	35.0	25.0	40.0	22.40	4000
Tinsukiborbeel	45.0	25.0	30.0	24.50	8000
Merkolaberia	20.0	20.0	60.0	35.52	1300
Goroimari	40.0	25.0	35.0	20.48	9000
Botalikhosa	45.0	25.0	30.0	20.45	3300
Moridikhow	45.0	35.0	20.0	28.48	1000
Teliadanga	40.0	30.0	30.0	15.52	8000

Fishing income

The present investigation shows that fishing income of fishermen community depends on fish production of the wetlands and availability of fish in the surrounding areas of the wetlands. The floodplains are furnished with new fish stock and enriched by water renewal with high nutrient load during flood season. It appears that good autostocking results in higher fish production and higher fishing income.

The analysis (Table 4.1.3) of fishermen household income indicate that the average household income for each district ranges from Rs.4,478 to Rs.7,484 and the average for all the district together Rs.5,864.

The standard deviation of income of fishermen household is found to be very high, indicating that some of the fishermen income is very high and some of them earn very low. The dispersion of income from fishing is really very high. In Cachar, Karimganj, Hailakandi, Morigaon, and Kamrup districts, fishermen income is found to be below the sample mean and in Dhubri, Nowgaon, Darrang and Jorhat districts, they are above the sample mean.

Household Expenditure

The analysis of actual expenditure (Table 4.1.3) of fishermen household shows that the average hosehold expenditure for each district ranges from Rs. 9,640 to Rs. 12,665 per annum and the average for all the district together Rs. 10,993 per annum. This works out the per day actual expenditure of fishermen household to be Rs.30.12. The average annual fishing income constitutes only 53.34 per cent of the average annual actual expenditure of fishermen households and the fishermen household meet their rest of the household expenditure (i.e 46.66%) from subsidiary income. This implies that the fishermen household spends entier amount of their fishing income for their daily basic necessities. This results no saving of

Table 4.1.3. Average annual fishing income and family expenditure (Rs.)

Districts	Minimum	Maximum	Average	Family Expenditure
Dhubri	2000	16600	7429.00	12666
Cachar	3000	13300	4858.00	10500
Karimganj	4000	12600	6262.00	10475
Hailakandi	2000	18300	4478.00	11990
Morigaon	2000	13400	4749.00	10400
Nowgaon	1400	22000	7484.00	11110
Barpeta	1800	18000	6624.00	11970
Nalbari	2500	14200	5419.00	11070
Kamrup	2000	14000	4537.00	10209
Golaghat	2500	13500	5463.00	11295
Sibsagar	2000	18000	6800.00	11295
Jorhat	3700	13400	6116.00	11415
Darrang	4000	14000	6012.00	9640

individual household from their fishing income.

Analysis of fishermen income and fish composition

To examine the influence of fish composition on the income of fishermen, multiple regression was carried out taking fishermen income as dependent variable and fish value composition as independent variable. The results are shown in Table 4.1.4 and 4.1.5.

The correlation between the fishermen income (dependent variable) and fish composition in terms of fish value (independent variable) in each group has been found to be very high i.e. r=0.96. Fish composition together explains 93.00 per cent of the variance of the fishermen income. Only 7.00% of the total fishermen income is explained by other income. This indicates that fishermen income is exclusively dependent on the value of the fish catch. The overall regression equation is also found to be highly significant (F=228.00, significant F=0.000). As far as the influence of major, intermediate and minor fish group on the fishermen income is concerned, all the three groups have been found to contribute significantly to the fishermen income. As can be inferred from the Table 4.1.4, individually, all the three groups show significant influence at 10.00% confidence level.

The Analysis of (Beta) shows that the intermediate group makes the highest influence on the variation of fishermen income followed by minor and major fish group respectively.

When multiple regression is carried out between the fishermen income and fish production of each fish group (i.e. major, intermediate and minor), the regression equation was not found to be significant (Table 4.1.5). The value of F is 1.20 and significant at 31.85% significant level. Further, none of the independent variable has significant influence on the variation of the fishermen income at 10.00%

Table 4.1.4. Multiple regression of fishermen income with fish value

Parameters	r	r^2	Adj.r^2	F	(Beta)	T	Sig.t
Major group fish value	0.96	0.93	0.92	226.04	0.14	1.76	0.08
Intermediate group fish value					0.62	6.41	0.00
Minor group fish value					0.24	3.35	0.00

Table 4.1.5. Multiple regression of fishermen income with fish production

Parameters	r	r^2	Adj.r^2	F	(Beta)	T	Sig.t
Major group fish production	0.46	0.21	0.16	4.14	-0.18	-0.45	0.65
Intermediate group fish production					-1.58	-2.35	0.23
Minor group fish production					1.44	2.40	0.02

significant level (t-value is less in each case and significant at 24.00%).

The analysis indicates that the fish production alone is not that important. It is the value of the fish (Price x quantity) that is most important for the overall income of the fishermen. The higher fish production may not increase the fishermen income if higher production and thereby higher fish supply to the market depressess the selling price. Fish is the commodity type of product and its selling price depends on demand-supply situation. High fish supply depresses selling price and low fish supply increase the selling price, provided demand remains more or less at the same level. This is perhaps the main reason why fishermen income does not depend on the fish production alone.

DISCUSSION

Sixty seven species (Table 4.1.1) found in the studied wetlands show rich fish diversity. The rich fish diversity in the wetlands (nee beels) of Assam has been reported by a number of previous workers (Dey, 1981; Goswami, 1985; Lahon, 1979) from their studies in a limited number of wetlands. Their studies indicate the presence of 57 fish species in Chandubi, 62 in Dora, 41 in Deepor, 44 in Salsala and 63 fish species in Tamranga wetland (Agarwal, 1996).

The breeding habitat is also one of the important parameter from the point of view of fish diversity. The breeding environment of the wetlands has been observed to be conducive in most of the wetlands. The surrounding physiographic conditions of the wetlands creates an environment for the fish species to breed in the wetlands. During breeding season, the brooders come to the nearby catchment area which are provided with the breeding facilities. The brooders generally prefer the shallow catchment areas provided with grasses, submerged emergent macrophytes and shallow paddy fields. A similar finding was also put forward by Weller (1978) in the floodplain wetlands of USA. He reported that fishes find their shelter and food in the littoral plants of lake or in emergent marshes. He also opined that several fish species move into marshes from adjacent lakes to breed and some fish species also use marshes as their nursery ground / habitat.

Five number of Indian Major Carp (IMC) species namely *L.rohita, L. calbasu, L. gonius, Catla catla* and *Cirrhinus mrigala* are found significantly in most of the wetlands. The existence of these coveted fish resources in the wetlands of Assam also reported in the previous studies. The wetlands of Assam provide the fishes with favorable breeding environment because of which fish germpasm of IMC species are still continuing their life in the wetlands in spite of several constraint (Dey, 1981). One more IMC species *(L. nandina)* though reported earlier from a wetland of Assam (Goswami, 1985) is not found in the present study, and this may be due to the fact that the species is slowly disappearing from the wetlands of Assam.

Emergence of exotic carps is a significant event in the context of fish diversity in the wetlands of Assam. Their presence in the wetlands was not reported in the study made before 1987. In contrast,

the present study identifies three number of exotic carps species namely *Hypophthalmichthys molitrix, Ctenopharyngodon idella*, and *Cyprinus carpio* in some wetlands (Sone, Rata, Sibnarayanpur, Salchapra, Pungani, Tinsukibor beel, Bormonoha, Udori and Jogra wetland) Presently, the populations of these species are not high and have not reached an alarming position. However, if population of these species increase in the future, they will compete with the indigenous species as a result they are likely to suffer and may lose their population. This fact is quite evident from the study of Agarwala, (1996), Goswami, (1996) and Chakraborty, (1997) which ascertained that decline of fish diversity has also been aggravated by the introduction of exotic species which are damaging the indigenous carp and other fish species through competition for food and space in the floodplain wetlands. In Africa endemic fishes have been eliminated by the introduction of exotic predators like *Salmonids*. Citing an example, a rare cyprinid *Oreo daimon* (*Quathlambae*) is earadicated from Natal by introduction of trout (Skelton, 1977, 1980). Similarly, red fin burbus species in South West Cape Province of South Africa are also threatened by introduction of predatory fishes. Though in Assam, the competition between exotic and indigenous carp species in the wetlands is not yet significant, the newly introduced cat fish species. *Clariaus garipenius* (Thai magur) may intensity the competition for food in Teliadanga wetland of Sibsagar district. Unless this exotic catfish species is prevented from its emergence into the wetlands, a large number of minor and intermediate group fish species may disappear from the wetlands.

The catch composition of major, intrermediate and minor group fish species varies from wetland to wetland depending on topography of the basin as well as zoogeographic situation of the ichthyospecies. The present status of the ichthyofaunal composition in the wetland indicates that the minor variety fish population dominates over the major and intermediate (minor>major>intermediate) variety fish popualation. But it is reported by the fishermen that major variety fish population in terms of weight was higher than the intermediate and minor variety fish population in the long past. The present reversal trend in catch composition convincingly establishes the low yielding habitat condition of the wetlands for the major group. The major group is also suffering due to indiscriminate fishing of brooders during breeding season, killing of fry and fingerling, destruction of eggs and spawn, and use of *Musarijal* (an encircling net) of 1.0 to 3.0 mm mesh size. This finding is in conformity with the findings of Jha (1997). Occurance of Tenualosa *(Hilsa) illisa* in the catch of some studied wetlands indicates a prospect of important lucrative fishery. This Indian shad was detected in the catch in Udori, Sone, Rata, Kalidanga, and Chandakhal wetlands. Dey and Kar (1982) Yadava et al. (1989) reported the status of Hilsa fishery in Assam, and its occurrence in three important wetlands (Dhir, Dora and Sone) and considerable annual catch. Occurrence of this species in the wetlands of Assam warrants serious efforts for the conservation of these species through judicious and pragmatic approaches.

The present study however, reveals that fishermen income is not soley dependent on fish biomass composition. When the income of fishermen was used as dependent variable and fish biomass composition as independent variable, the regression equation was not found fish biomass composition as independent variable, the regression equation was not found to be significant. This indicates that biomass composition alone (i.e. in terms of weight) does not influence the variation of fishermen income.

The regression analysis was also carried out by using the fishermen income as dependent variable and fish value composition (in terms of value) as independent variable. The fishermen incomes were significantly related to the fish value. This indicates that (not alone fish production) among the various groups of fishes, intermediate fish group value plays a key role in enhancing the fishermen income. Some species of intermediate group like *Clarius batrachus, Anabus testudineus, Heteropneustus fossilis, Ompok pabo* and *Onpok bimaculatus* have very high demand and these locally produced indigenous fish species, which are uniformly found in the most of the wetlands, command an exorbitant price in the fish markets.

It is to be noted that minor group fish is also gaining importance in the contribution to the fishermen income probably due to the fact that their price in the fish market of Assam is increasing substantially in the last few years and likely to be so in the future.

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