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Editorial

Compositional Alteration of Fin Fish due to Climate Change Induced Oscillation of Hydrological Parameters

Climate change in the lower Gangetic delta has caused an increase in water temperature and altered the salinity and pH of the aquatic phase. Such changes have caused a significant alteration in the diversity spectrum of fin fishes prevailing in the system. The Shannon Weiner species diversity indices computed from the catch of commercially important fin fishes and trash fin fishes (sample size = mean of 20 catches of 100 kg each from each landing station; duration 1984 – 2014) indicate a pronounced temporal variation both in the western and central sector of Indian Sundarbans that have contrasting geo-physico-chemical features. The aquatic phase of the western Indian Sundarbans exhibited a gradual rise of commercially important fin fish diversity, while in the central sector the diversity of the trash fish variety increased over a period of more than two decades. The trash fin fish variety here indicates low priced fishes that are mostly used for poultry and fish feed preparation after sun drying.

Till date there are no literatures available on the impact of climate change induced temperature, salinity and pH alteration on fin fish diversity in the lower Gangetic delta although it is the breeding and spawning ground of a large variety of fish. Very little is known on the sensitivities of fin fishes to environmental factors although sexual maturation and spawning are significantly regulated by environmental cue(s). The alterations of hydrological parameters between the western and central Indian Sundarbans have been pointed by several researchers, but very few documents are available on the impact of these hydrological parameters on the fish spectrum of lower Gangetic delta. It is interesting to note that in the hypersaline environment of central Indian Sundarbans, the trash fish quantum and diversity increased significantly over a period of 31 years (1984 – 2014), but commercially important fish species could not show their strength and a significant decrease in diversity was observed (Figures 1 and 2). This has every possibility to affect the pisci-centric economy

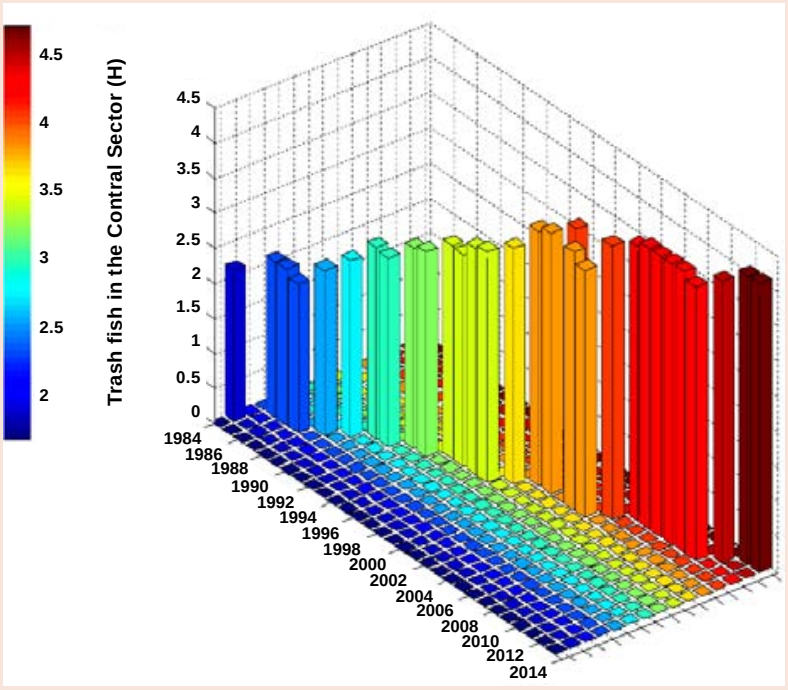

Figure 1: Increasing trend of trash fin fish variety.

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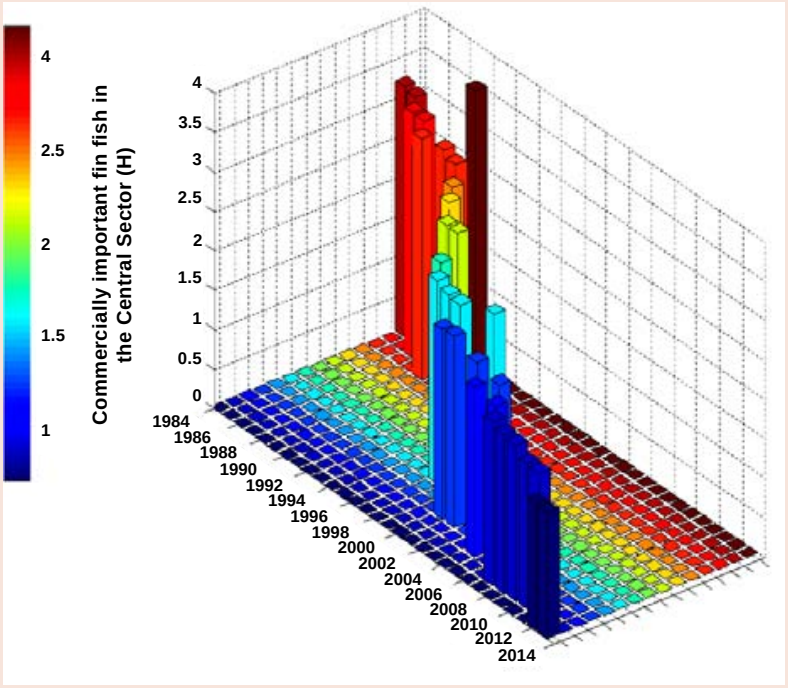

Figure 2: Decreasing trend of commercially important fin fish variety.

of the region as 70% people in the lower Gangetic delta region in and around Indian Sundarbans depend on culture and capture fisheries for their livelihood. The salinity could be a pertinent cause behind this picture as surface water temperature and pH has exhibited uniform rise and fall respectively in both the sectors.

The western Indian Sundarbans, on contrary, is not so seriously affected on account of having a congenial salinity due to discharge from the Farakka barrage (Table 1).

A survey conducted on more than two decades in the fish landing stations located in the western and central Indian Sundarbans reveal more commercially important fin fish species compared to trash fin

Table 1: Water flow and water level height of Farakka.

Year	Max. water flow (in 1000 cu.metres)	Max. water level (in metres)	Rise in water level* (in metres)
1979	42.8	22.9	0.95
1981	57.0	23.7	1.75
1983	60.5	24.9	2.95
1985	57.3	24.3	2.35
1988	68.0	25.1	3.15
1991	69.7	25.3	3.35
1993	58.2	24.1	2.15
1996	71.0	25.1	3.15
1998	75.9	25.4	3.45
2001	45.68	24.0	2.05
2003	57.52	24.78	2.83

*Relative rise in water level with respect to normal level of 21.95 metres

Table 2: Check list of commercially important and trash fin fish varieties in the fish landing stations of Diamond Harbour (located in the western sector of the study area) and Canning (located in the central sector of lower Gangetic delta).

S. No.	Commercially important fin fish	Western sector	Central sector
1	*Tenualosa ilisha* (Family: Clupeidae)	+ +	-
2	*Pama pama* (Family: Sciaenidae)	+ +	+
3	*Pampus* spp. (Family: Stromateidae)	+ +	-
4	*Ilisha elongata* (Family: Pristigasteridae)	+ + +	-
5	*Lates calcarifer* (Family: Centropomidae)	+ + +	+
6	*Pangasius pangasius* (Family: Pangasiidae)	+ +	+
7	*Liza parsia* (Family: Mugilidae)	+ + +	+
8	*Liza tade* (Family: Mugilidae)	+ + +	+
9	*Tenualosa toli* (Family: Clupeidae)	+ + +	-
10	*Polynemus paradiseus* (Family: Polynemidae)	+ + +	+ +
11	*Otolithoides biauritus* (Family: Sciaenidae)	+ + +	
12	*Tachysurus jella* (Family: Ariidae)		
13	*Sciaena biauritus* (Family: Sciaenidae)		
14	*Eleutheronema tetradactylum* (Family: Polynemidae)		
Trash variety fin fish			
1	*Coilia* spp. (Family: Engraulidae)	+	+ + +
2	*Harpodon nehereus* (Family: Harpodontidae)	+	+ + + +
3	*Trichiurus* sp. (Family: Trichiuridae)	+	+ + +
4	*Setipinna* spp. (Family: Engraulidae)	+	+ + +
5	*Cynoglossus* sp. (Family: Cynoglossidae)	+	+ + +
6	*Stolephorus* sp. (Family: Engraulidae)	+ +	+ + +
7	*Thryssa sp.* (Family: Engraulidae)	+ +	+ + +

- means less than 30% of the catch volume; + means less than 30 - 39% of the catch volume; + + means less than 40 - 59% of the catch volume; + + + means less than 60 - 70% of the catch volume; + + + + means greater than 70% of the catch volume

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fish variety (Table 2). The picture is just opposite in central sector, due to which the livelihood options and economic profile have retarded in the area.

The main causes behind the change of fin fish community structure due to effect of salinity in the lower Gangetic delta region are:

1. Reproductive failure in the hypersaline environment
2. Change in migratory route for breeding purpose
3. Loss of primary food supply (mainly plankton) due to adverse impact of salinity tolerance for that organism (plankton), and,
4. Direct mortality due to extreme saline condition

A long-term study of some fifty years is, however, needed to pinpoint the impact of salinity fluctuation on fish catch composition in the lower Gangetic delta at the apex of Bay of Bengal.

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