



Fish Diversity and Community of Mone Wetland in Siwan District

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ABSTRACT

The Mone wetland connected to Gandak River in monsoon period contribute to its water profile and aquatic biodiversity. There is restricted study only available in such mesotrophic and river related wetland. This study was an endeavor to the fish species composition, diversity and distribution in three sites of river. The captured fishes were identified according to taxonomic keys. The study approached that adequate fish diversity due to water depth, availability of nutrients and other environmental factors. The fish diversity and biomass is maximum in site II have potential under proper management. This river might be developed as fishery work for local communities of Siwan district.

Keywords: Mone wetland, Inland fisheries, diversity, Abundance, species richness

INTRODUCTION

The wetland contains diverse fauna and flora due to enriched nutrient medium with less pollution corresponding to water depth, flow regime and its origin, however small ones are more vulnerable due to water scarcity in summer seasons and unexpected fish catches by local fishermen. The Mone wetland contribute immensely to the water budget and aquatic biodiversity. Fish contains protein and also other minerals required by the body (Bhat, 2003). Such wetlands are recently categorized as threatened ecosystems ultimately being resulting in low fisheries potential due to increased pollution in last few decades through new settlements, drainage systems and anthropogenic disturbances (Qadir *et al.*, 2008).

The combined effect of high temperature and minimum flow is deleterious to aquatic organisms with reduction in the dissolved oxygen quantity. The predicted change in air temperature causes increase in water temperature is a complex process depends upon insulators and buffers such as solar radiation, groundwater input and shading. There are also some attributes are generated with peak rainfall and flooding in the monsoon period. There are also seasonal water variables with intense rainfall events as drainage of nutrients from bottom and sides to the

floodplains. The community homogenization in endemic or exotic species is also expected (Eady *et al.*, 2013). The spawning behavior of fishes might be triggered due to combined experiences imposed by increased heat and water volume in the seasonal wetlands. These variables are also important in regulating seasonal alterations in existing populations (Rectliffe, 2011). Certain species are winners or losers because global warming resulted in community shift and trophic disturbances in inland reservoirs. This study relies on the fish community, their distribution and diversity along three selected sites in the Mone wetland of Siwan district.

METHODS AND MATERIALS

The fishes from selected sites during March 2018 to April 2019 were collected with the help of local fishermen brought to laboratory where preserved in formalin to separate jars with matching to length and size. The fishes were identified with taxonomic keys to identification in Indian subcontinent (Jayram, 1999; Talwar and Jhingaran, 1991). The fishes identified with taxonomic key (Jayaram, 1999). Diversity index H' (Shannon and Reid, 2003) was estimated following the formula:

$$\text{Shannon-Wiener index: } H' = -\sum p_i \ln p_i$$

$P_i = n/N$, n = diversity of individual and N = total density

Table 1: Water characteristics of selected sites in Mone wetland

Sl. No.	Parameters	Site- I		Site- II		Site – III	
		Min	Max	Min	Max	Min	Max
1.	pH	7.4	8.2	7.6	8.4	8.2	8.9
2.	TDS (mg/L)	1230.60	1410.0	1310.0	1520.0	1460.0	1580.0
3.	Hardness (mg/L)	620.30	770.10	660.20	810.10	710.30	840.10
4.	Chloride (mg/L)	470.40	560.10	520.30	610.0	620.10	680.60
5.	Alkalinity (mg/L)	380.10	732.60	410.30	840.20	530.0	910.60
6.	DO (mg/L)	3.10	4.20	3.70	4.80	4.30	6.10
7.	COD (mg/L)	110	170	140	210	170	240
8.	Nitrate (mg/L)	1.30	1.70	1.60	2.30	1.80	2.50
9.	Phosphate (mg/L)	0.60	0.90	0.70	0.90	1.10	1.40

Table 2: Fish attributes at sites of Mone wetland during study period

Parameters	Mone wetland		
	Site 1	Site 2	Site 3
Species richness	10	12	7
Species abundance	66	94	40
Shannon-weiner index (D)	1.9	2.8	1.5

Table 3: Fish groups in Mone wetland during study period

Family	Genus	Site 1	Site 2	Site 3	Richness	Abundane	Relative abundance
Cyprinidae	Catla	12	22	13	3	47	21.4
	Labeo	7	14	7	4	28	12.7
	Salmostoma	2	6	-	1	6	2.7
	Mystus	7	4	-	2	11	5
	Puntius	3	-	3	2	6	2.7
Bagridae	Rita	2	5	2	3	12	5.4
	Mystus	-	4	-	1	4	1.8
Siluridae	Ompok	-	12	-	2	12	5.14
Mastacembelus	Mastacembelus	8	7	4	3	19	8.6
Notopteridae	Notopteros	10	5	10	3	25	11.4

RESULTS AND DISCUSSION

The mean value of total alkalinity gradually decreased from March to July and increased in August. The values are comparatively high in cold season due to expected calcium carbonates at lower temperature (Table 1). Hardness of wetlands decreased from August to November with excess water volume input, while higher values in dry months with discharge of water through outlets and evaporation (Table 1). TDS value showed rise at site I and III in June and fall on site II due to large inflow of rainwater (Table 1). Variation in salinity was notable with maximum and minimum value in May and August related to organic deposition in wetlands (Table 1). The dissolved oxygen fluctuates with any rise in heat and biomass of planktons and macrophytes (Table 1).

This research hold relation between hydrobiology and fish productivity was consistent with study of Downing *et al* (1990). The fish yield was variable for existing species and showed Gaussian curve for productivity. There is effect of unconventional diets on growth and mortality in fishes as reported in the case of *Clarias batrachus* by Tiwary and others (2013). The higher bed loads are beneficial to creation of spawning, rearing and over-wintering habitat.

This work revealed variable diversity at desired sites in wetland, where dominant group is Cyprinidae and thereafter also Bagridae, Siluridae, Mastacembelidae and Notopteridae existed, whereas site II is more diverse due to optimum water depth and baren place without nearby local settlements in Table 2 and the community attributes are presented in Table 1 and distribution in Table 3. Cyprinidae family is most abundant group

rather than other families consistent with earlier research (Bhat, 2003). The distribution differed in sites due to pollution status and flow regime with water depth which contributes to suitable environment and suitable habitat to the existing fishes (Table 3). The Shannon-Weiner value of different sites of Mone wetland shows high diversity index (2.9) in site 1 followed by 2.8 in site 2 and 2.5 in site 3. This information could be utilized by the biodiversity conservation managers for prioritization of sites of conservation and habitat restoration (Bergerot *et al*, 2008).

CONCLUSION

There is direct relationship between fish yield and water chemistry. However, government consideration is needful to overcome several hindrance factors encountered due to specific need in existed fishes. Thus, further researches may be needful during restoration for particular fish species for local population.

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