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Limnology and Biodiversity of Fish Fauna in Virla Reservoir M.P. India

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Abstract

The limnological factors in Virla reservoir of west Nimar district (Khargone) that were monitored for two years (July 2001 to June 2003) show high positive correlations among different factors such as alkalinity and phosphates (0.893),transparency and dissolved oxygen (0.885), pH and alkalinity (0.873), alkalinity and BOD (0.859), pH and phosphate (0.826), BOD and phosphate (0.764) [Table- 2]. The total number of 29 species of fishes were recorded in Virla reservoir with order Cypriniformes contributing maximum of 19 members (65.51%) of species followed by four members (13.79%) of order Ophiocephaliformes.

Introduction

All organisms have unique characteristics and maintain ecological balances (equilibrium).For enhancement of fish production and suitable management , it is necessary to interact fish species with abiotic and biotic factors. Probable threats and measures to fish conservation were also studied. Some of the important contributions in this regard are those of Menon (1949), Singh and Shromany (1964), Pandey (1999) and Rema *et al*. (1999). The present study deals with the ecology and fish diversity in this reservoir which receives water from the local nullah and the adjacent agricultural field during rainy season.

Material and Methods

The Virla reservoir is an irrigation water body having a total length of about 270 m, a catchment area of about 50 sq. Kms.. The gross storage capacity is about 525 hectare. It is located near Virla village of Khargone district headquarters that falls under 21^0- 50'-30'' latitude and 75 ^{0}-23'-30'' longitude and is 309 meters above the mean sea level.

The physico-chemical parameters such as water temperature, transparency, pH and dissolved oxygen were measured at site with mercury thermometer, Secchi disc, digital pH meter and Winkler's method. Besides this total alkalinity , BOD, total hardness , free carbondioxide,phosphates were analysed in laboratory by following the standard methods of APHA (1989). Fishes were caught with the help of local fishermans during course of study by operating cast net and drag nets collected and identified according to Jayaram (1994), Srivastava (1980) and Day (1958).

Results and Discussion

Water temperature ranged from 19.20^{o}C to 34.20 ^{o}C. The minimum value was recorded during the month of January and the maximum during June. The trend of variation is mainly affected by seasons and contribute to biodiversity of fish in aquatic system. Transparency values ranged from 57 to 170 cms. The maximum value was observed in the month of January when the water of reservoir was most clear with high transparency. The water was dirty with the mini

mum transparency ,during the rainy season when sand and silt came with runoff water to the reservoir. Transparency is an important factor which affects survival and growth of fish and biodiversity of fish in aquatic habitat.

pH of the reservoir fluctuated from 7.38 to 9.26 with the minimum value during December and the maximum during June. It shows direct significant correlation (r= 0.873) with total alkalinity. Same trend was also reported by Bhutiani (2004). Total alkalinity varied from 133 mg/l to 256 mg/l. The highest value was observed in the month of June while the lowest in the month of January.Dissolved oxygen fluctuated from 5.80mg/l to 9.84 mg/l. The highest concentration that was recorded in winter month shows inverse correlation with BOD, total alkalinity , water temperature and pH. It depicts positive correlation with transparency which enhances the photosynthesis activity. The same type of results were also recorded by Khanna (1993).

The value of BOD ranged between 3.26 mg/l to 5.53 mg/l. The lowest value was recorded in month of January, while the maximum in the month of August. It shows negative correlation with transparency and dissolved oxygen.Free carbon dioxide value ranged between 3.86mg/l to 4.55 mg/l. It was observed in the month of December and January, which shows more respiratory activities and incomplete utilization in photosynthesis. Similar trend was obtained by Khanna and Chugh (2004).

The value of total hardness varied from 150 mg/l to 233 mg/l. It was low during winter season.Phosphate varied from 0.20 mg/l to 0.50 mg/l. The maximum value was found during the rainy season which may be due to the influx of the rain water .The same observation was recorded by Sharma and Hussain (1999), Das *et al.(*2000) and Das and Chand (2003). The phosphate is one of the important nutrients which influences the productivity . This nutrient play an important role in food chain and ichthyobiodiversity in aquatic ecosystem.

Various species of fishes contributes the biodiversity of the reservoir. under investigation included the fishes that came to the reservoir through local nullah, adjacent agriculture fields and those of reservoir itself. Subsistence dominant fishery of reservoir are categorised as major carp , cat fishes, murrel and miscellaneous. The observed fishes in reservoir have been tabulated in table 1.

It was found that the fish biodiversity of Virla reservoir contributed Cypriniformes maximum of 19 numbers of species (65.51%) followed by four numbers (13.79%) of Ophiocephaliformes, two numbers (6.90%) of Perciformes and Mastacembeleformes and one number (3.45%) of Clupeiformes and Beloniformes. Due to more fecundity of major carp and suitable environmental condition there exists a relatively higher number of Cypriniformes. Such type of observation was also recorded by Talwar and Jhingran (1991) and Das and Chand (2003) in inland fishes.

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Table 1: List of Fishes recorded in Virla Reservoir during July 2001 to June 2003

ORDER	FAMILY	GENERA
Cypriniformes	**Cyprinidae**	1. *Catla catla*
		2. *Cirrhinus mrigala* (Ham)
		3. *Cirrihinus reba* (Ham.)
		4. *Labeo rohita* (Ham)
		5. *Labeo calbasu* (Ham)
		6. *Labeo bata* (Ham)
		7. *Puntius ticto* (Ham)
		8. *Puntius sophore* (Ham)
		9. *Rasbora daniconius* (Ham)
		10. *Namachelius botia* (Ham)
		11. *Nemachelius beavani* (Ham)
		12. N*emachelius aurius* (Ham)
	Siluridae	1. *Ompok bimaculatus* (Bloch)
		2. *Wallago attu* (Sclin)
	Bagridae	1. *Mystus seenghala* (Skyes)
		2. *Mystus tengara* (Ham)
		3. *Mystus aor* (Ham)
	Schielbeidae	1. *Eutropiichthys vacha* (Ham)
	Saccobranchidae	1.*Heteropneustus fossilis* (Bloch)
Clupeiformes	**Notopteroidae**	1. *Notopterus notopterus* (Pallas)
Beloniformes	**Belonidae**	1. *Xenentodon cancila* (Ham)
Ophiocephaliformes	**Ophiocephalidae**	1. *Channa marulius* (Ham)
		2. *Channa gachua* (Ham)
		3. *Channa striatus* (Bloch)
		4. *Channa punctatus* (Bloch)
Perciformes	**Centropomidae**	1. *Ambasis nama* (Ham)
		2. *Ambasis ranga* (Ham)
Mastacembeleformes	**Mastacembelidae**	1. *Mastacembelus armatus* (Lac)
		2. *Mastacembelus pancalus* (Ham)

Table 2: Correlation Matrix of Physico-Chemical factors at Virla reservoir durng July 2001 to June 2003

Parameters	Water Temp.	Transpare-ncy	pH	CO_2	Alkalin-ity	D.O.	BOD	Hardn-ess	Phosph-ates
Water Temp.	1	-0.651	0.879	-0.605	0.885	-0.706	0.652	0.762	0.821
Transparency		1	-0.718	0.651	-0.827	0.885	-0.839	-0.259	-0.784
pH			1	-0.562	0.873	-0.786	0.747	0.726	0.826
Carbondioxide				1	-0.592	0.518	-0.450	-0.332	-0.511
Alkalinity					1	-0.895	0.859	0.497	0.893
DO						1	-0.988	-0.238	-0.794
BOD							1	0.190	0.764
Hardness								1	0.579
Phosphates									1