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STUDY OF PHYSICO-CHEMICAL PARAMETERS OF FISH FAUNA REFERENCE TO VEERANGANA DURGAVATI WILDLIFE SANCTUARY WATER BODIES

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INTRODUCTION

The pollutants and drastic environmental variation have also adversely effected and changed water qualities i.e. colour, hardness, turbidity, alkalinity, pH. COD, BOD and TDS etc. Aquatic life, thus, also is affected. Changes in morphology of fish like- colour, pigmentation, length, weight mass, structure of scales, finrays etc. may occur. This can not be ignored that the afore-mention variation may be responsible to develop new varieties or sub species.

Unfortunately, negligible work is done in relation to fish fauna of the area in recent-past. Though, appreciable limnological work is done, yet the fish fauna remained unexplored. The fauna study is of tremendous significance in determining population density and calculating sub specific diversity and conservation of ecosystem in Damoh Distric Veerangana Durgavati Wildlife Sanctuary (VDWS) is situated in Damoh District of Madhya Pradesh and lies between 23 30'and 23 35'N latitudes and 79 40' and 79 50' E longitudes. The sanctuary stretches over a total area of 24km with undulating terrain. The area of the sanctuary consists of well reserved forest classified as tropical mixed dry deciduous forest of medium and dense quality. The sanctuary is attributed with all kinds of habitat, number of water resources and rich floral and faunal diversity with fairly well stocked wildlife.

In present observation 24 species among them 20 species were most popular as food as well as game fishes and posses high economical value. Identified fishes including 2 exotic, 4 species belonging to family **Cyprinidae**, 2 species belonging to family **Bagridae,** 1 species belonging to family **Channidae,** 1 species belonging to family **Siluridae,** 1 species belonging to each family **Notopteridae, Cobitidae, Ambassidae, Anabentidae,** and **Mastacembelidae,** 1 species belonging to each family **Sisoridae Schilbeidae, Saccobranchidae, Claridae, Beloridae, Nandidae, Gobioidae, Cichilidae,** and **Osphronemidae,** etc.

The maximum population of *Labeo rohita* (Ham.) has been recorded in winter while the maximum population of *Catla catla* (Ham.) was noted in the rainy season. However, the maximum population of *Cirrhinus mrigla (Ham.)* and *Cyprinus Carpio (L.)* has been found during the summer months.

The population study of major carps fishes also revealed that *Labeo rohita (Ham.)* and *Catla catla (Ham.)* were observed higher in limnetic zones than in littoral zones of the water bodies, throughout the period of study except in the rainy season, while the population of *Cirrhinus mrigla (Ham.)* was higher at limnetic zones except in summer months and the population of *Cyprinus Corpio (L.)* has been observed to be higher only at littoral zones during summer and the rainy season. (Table-3)

MATERIALS AND METHODS

Study Area: The present study was carried out on Veerangana Durgavati Wildlife Sanctuary water bodies situated in Damoh District, Madhya Pradesh, India.

Sample Collection: Water samples were collected every month during July 2018 to June 2019. Surface water Samples were collected in clean sterile plastic containers. Preservation and transportation of the water samples to the laboratory were as per standard methods (APHA, 1998).

Fish collected seasonally, from all polluted and non polluted selected sites by hand picking or fishing nets and would be preserved in 5-10% formaldehyde in glass or plastic bottle. Authentic keys for identification and classification of fish, would be used. Days fauna. (1958), fish identification by H.R. Singh, Jhingaran (1985).

RESULTS AND DISCUSSION

The physico-chemical factors of natural water body may vary substantially at different seasons of the study period (Table 1-2). The factors contributing to such changes include topography of the area, atmospheric precipitation by rain and other meteorological forces in and around water body.

Temperature is an important physical parameter of the water body which regulates natural process within the environment and governs physiological function in organism. In the present study temperature fluctuate between 19.8 0C to 22.7 0C. Maximum temperature was recorded in the month of April and May. Minimum temperature was observed in June August and September.

pH is a variable parameter which serves as an important index for the degree of pollution. In the present investigation the pH was alkaline throughout the study period and values ranged between 7.1 and 8.2. Maximum pH recorded in November and lowest value recorded in February. Seasonally maximum pH is recorded in monsoon and minimum was in summer.

Dissolved oxygen is required for living organisms to maintain their biological process. Dissolved oxygen has been attributed a great significance as an indicator of water quality. In the present study, DO values were recorded 6.8 mg/l to 16.4 mg/l. Maximum Do was recorded in October where temperature was less and minimum DO was 6.8 mg/l recorded in May where the temperature was highest. Seasonally it is less values recorded in summer, solubility of oxygen decreases with increase in temperature.

Biochemical oxygen demand is an indicator parameter to know the presence of biodegradable matter and express the degree of contamination. BOD values ranged from 4.8 to 28.00 mg/l. Higher values of BOD were noted during summer months due to favorable environmental conditions for microbial activities at higher temperature. This is in concurrence with the findings of Danital.

Total dissolved solid is a measure of the solid materials dissolved in the river water. This includes salts, some organic materials. Waters with higher solids content have laxative and sometimes the reverse effect upon people whose bodies are not adjusted to them. TDS consist of oxygen demanding wastes, disease causing agents, which can cause immense harm to public health. TDS values are ranged between 110.6 mg/l to 188.8 mg/l. Higher values are recorded from January to May.

Domestic sewage contains very high amount of nitrogenous compounds, runoff from agricultural fields is also contain nitrate. Unpolluted natural water contains usually only minute amount of nitrate. The main source of the nitrate is the decomposition and biodegradation of organic matter. Such lower quantities also observed in Kataw lake of Singrampur Region. Presence of iron in considerable amounts in water imparts colour and develops turbidity when exposed to air, consequently water becomes unacceptable for drinking.

It was found that fish *Catla catla, Labeo rohita, Cirrhinus mrigala, Cyprinus carpio and Oreochromus mossambiaca* were dominant fauna in almost all the water bodies. *Cyprinus carpio and Oreochromus mossambiaca* were abundance fish fauna in the different water bodies.

Table-1 Physical Features.

S. No	Name of the Water Body	Water temperature (^{o}C)	Colour (Pt. Co. Unit)	Turbidity (FAU)	TDS (mg/l)
1	Singrampur	20.8	12	7	128
2	Singorgarh	19.8	38	12	139
3	Giridarshan	20.6	52	22	156
4	Kodi Kalan	21.1	58	21	188.6
5	Bhaisaghat	21.7	54	18	178.6
6	Tilgua	20.8	28	12	128.6
7	Kala Nala	21.7	26	10	124.6
8	Danital	22.7	28	12	112.8
9	Dan Sah	21.3	24	12	144.6
10	Kataw River	21.5	12	6	124.6
11	Kataw lake	22.3	8	4	110.6

Table-2 Chemical Features.

S. No	Name of the Water Body	DO (mg/l)	BOD (mg/l)	COD (mg/l)	Total Alkalinity (mg/l)	pH	Nitrate (mg/l)	Orthophosphoate (mg/l)
1	Singrampur	8.8	12	42	122	8.2	1.234	0.78
2	Singorgarh	16.4	12	102	132	7.8	2.778	6.45
3	Giridarshan	12.4	28	112	148	7.1	5.664	16.56
4	Kodi Kalan	10.6	12.8	44	178	8.1	3.1.12	8.89
5	Bhaisaghat	10.2	22.8	78	164	8.4	4.114	7.89
6	Tilgua	12.8	12.5	56	168	8.2	2.217	5.45
7	Kala Nala	7.6	24	88	122	8.1	0.778	7.12

8	Danital	7.2	12	46	112	8.2	0.332	0.78
9	Dan Sah	8.2	10	38	122	7.6	3.212	7.64
10	Kataw River	7.4	6	24	102	7.9	0.217	0.32
11	Kataw lake	6.8	4.8	20.4	88	7.6	0.127	0.11

Table -3 Biological Features.

S. No	Name of the Water Body	Dominant Flora	Dominant fish fauna	AB	Status IUCN-1990	Causes of threatened
1	Singrampur	*Melosira varians sp* *Navicula sp* *Cymbella sp* *Scenedesmus ulna sp*	*N. notopterus* *C. catla* *C. mrigala* *L. rohita* *C. carpio* *M. Seenghala* *H. fossilis* *C. batrachus* *X. cancila* *C. punctatus* *M. seenghala* *O. mossambiaca* *(Total No. of reported fish species -13)*	C Vc Vc Vc C C C C O C C Vc	LRnt Vu LRnt Vu Vu LRnt LRnt Vu EN EN LRnt Vu	F, Cult, Ur, Pl, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, Cult, Ur, Pl, Ind, Hd. F, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, Cult, Ur, Pl, Ind, Hd.
2	Singorgarh	*Microcystis aeruginosa* *Oscillatoria sp* *Spirulina sp* *Merismopedia sp* *Anabaena sp* *Synedra ulna sp*	*N. notopterus* *C. catla* *C. mrigala* *L. rohita* *C. carpio* *M. Seenghala* *H. fossilis* *C. batrachus* *X. cancila* *C. punctatus* *M. seenghala* *O. mossambiaca* *(Total No. of reported fish species -09)*	C Vc Vc Vc C C C C O C C Vc	LRnt Vu LRnt Vu Vu LRnt LRnt Vu EN EN LRnt Vu	F, Cult, Ur, Pl, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, Cult, Ur, Pl, Ind, Hd. F, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, Cult, Ur, Pl, Ind, Hd.
3	Giridarshan	*Cymbella sp* *Tabellaria sp* *Pinnularia sp*	*C. catla* *C. mrigala* *L. rohita* *C. carpio* *H. fossilis* *C. batrachus* *C. punctatus* *M. seenghala* *O. mossambiac*	Vc Vc Vc C C C C C Vc	Vu LRnt Vu Vu LRnt Vu EN LRnt Vu	F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, Cult, Ur, Pl, Ind, Hd.
4	Kodi Kalan	*Cymbella sp Navicula sp* *Pinnularia sp*	*C. catla* *C. mrigala* *L. rohita* *C. carpio* *O. mossambiaca* *(Total No. of reported fish species -08)*	Vc Vc Vc C Vc	Vu LRnt Vu Vu Vu	F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, Cult, Ur, Pl, Ind, Hd.
5	Bhaisaghat	*Microcystis aeruginosa* *Oscillatoria sp* *Spirulina sp*	*C. catla* *C. mrigala* *L. rohita*	Vc Vc Vc	Vu LRnt Vu	F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd.

		Cymbella sp *Frgillaria sp* *Chlococcum sp*	*C. carpio* *O. mossambiaca* *(Total No. of reported fish species -13)*	C Vc	Vu Vu	F, S, Cult, Ur, Pl, Ind, Hd. F, Cult, Ur, Pl, Ind, Hd.
6	Tilgua	*Microcystis aeruginosa* *Fragillaria sp* *Cyctotella sp*	*C. catla* *C. mrigala* *L. rohita* *C. carpio* *O. mossambiaca* *(Total No. of reported fish species -09)*	Vc Vc Vc C Vc	Vu LRnt Vu Vu Vu	F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, Cult, Ur, Pl, Ind, Hd.
7	Kala Nala	*Melosira granulate* *Scendeesmus sp* *Synedra ulna sp* *Chlorococcum Volvox sp* *Cyclotella sp*	*C. catla* *C. mrigala* *L. rohita* *C. carpio* *O. mossambiaca* *(Total No. of reported fish species -13)*	Vc Vc Vc C Vc	Vu LRnt Vu Vu Vu	F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, Cult, Ur, Pl, Ind, Hd.
8	Danital	*Melosira sp* *Ciatomela sp* *Pinnularia sp* *Cholrella sp*	*C. catla* *C. mrigala* *L. rohita* *C. carpio* *O. mossambiaca* *(Total No. of reported fish species -07)*	Vc Vc Vc C Vc	Vu LRnt Vu Vu Vu	F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, Cult, Ur, Pl, Ind, Hd.
9	Dan Sah	*Melosira sp* *Cymbella sp*	*C. catla* *C. mrigala* *L. rohita* *C. carpio* *O. mossambiaca* *(Total No. of reported fish species -09)*	Vc Vc Vc C Vc	Vu LRnt Vu Vu Vu	F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, Cult, Ur, Pl, Ind, Hd.
10	Kataw River	*Navicula sp* *Cyclotella sp*	*C. catla* *C. mrigala* *L. rohita* *C. carpio* *O. mossambiaca* *(Total No. of reported fish species -16)*	Vc Vc Vc C Vc	Vu LRnt Vu Vu Vu	F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, Cult, Ur, Pl, Ind, Hd.
11	Kataw lake	*Melosira varians sp* *Scendeesmus sp*	*C. catla* *C. mrigala* *L. rohita* *C. carpio* *O. mossambiaca* *(Total No. of reported fish 06.*	Vc Vc Vc C Vc	Vu LRnt Vu Vu Vu	F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, S, Cult, Ur, Pl, Ind, Hd. F, Cult, Ur, Pl, Ind, Hd.

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