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Seasonal variations and pollution level of Mirza Khan pond of district Darbhanga, Bihar (India)

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ABSTRACT

The physico-chemical characteristics of any fish culture pond influences on the types and distribution of aquatic biota. Normally, water is never pure in chemical sense and there are natural impurities derived from at wasp hare catchments areas and the soil. Thus, the importance of water quality is quite obvious.

In the present study, an attempt has been made to investigate the quantity the ecological status i.e. pollution level of fish culture Mirza Khan pond located in the west of Benta chowk of Laheriasarai of disrict Darbhanga.

Keywords: ***Pollution, Seasonal variations, Mirza Khan pond, Ecological status.***

INTRODUCTION

Darbhanga district of Bihar is known as the richest production district of Mithilanchal which also well identified as culture of fishes, makhana, Singhara due to a number fish culture pond, wetlands and reservoirs in urban and rural areas.

Ecological statuses of water bodies are generally analyzed to determine the pollutional load of these water bodies. In order to the availability and quality of water always have played an important role in determining quality of life. Water quality habitats occupy a relatively small portion of earth's surface when compared from marine to terrestrial habitats. Their importance to man is far greater than their area of occupancy. They are the most convenient and cheapest available water source for domestic and industrial demands. Physical and chemical characteristics of water bodies affect the abundance, species composition, stability, productivity and physiological condition of aquatic organisms. The physico-chemical parameters of an aquatic body not only reflect the type and diversity of aquatic biota but also the water quality and pollution[1-5]. Therefore a regular monitoring is the need of the hour. In the present study, the various physico-chemical analysis of the studied fish culture pond of district Darbhanga have been undertaken.

MATERIALS AND METHODS

Samples of selected fish culture pond from different sites were collected for a period of twelve months, starting from February 2016 to January 2017. 125ml glass bottles were used to collect and fix samples for estimation of dissolved oxygen (DO) content. Samples were collected in triplicate from each site during the four quarters of the year using PET bottles as per standard procedures. The samples thus collected were analysed for parameters of work plan of physico-chemical parameters employing standard methods[6].

RESULTS AND DISCUSSION

Four seasons were studied as post monsoon, summer, pre-monsoon and monsoon. The data presented here are discussed on the basis of these seasons. The results of physico-chemical analysis and planktons population of the studied Mirza Khan fish culture pond are shown in Table 1 and 2. During the study it was found higher temperature in summer, lower in winter and medium in rainy season.

Table 1

Physico-chemical profiles of studied Mirza Khan Pond (From February 2016 to January 2017.)

Parameters & months	Summer Season				Rainy Season				Winter season			
	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
At (øc)	21.7	25.2	29.4	34.5	34.5	29.3	28.2	26.4	26.2	21.2	17.0	17.6
Wt (øc)	18.4	24.0	26.0	28.0	28.9	26.4	24.0	24.5	21.2	21.0	19.5	16.1
TR	25.0	27.4	30.4	35.5	32.2	28.1	22.5	15.0	17.3	20.7	19.7	21.5
pH	8.4	8.3	8.3	8.7	8.8	8.0	7.3	7.1	7.4	7.7	7.7	7.7
TDS (ppm)	46	462	590	650	800	9.2	710	630	410	440	565	545
DO_2 (ppm)	11.4	8.8	5.9	3.8	6.3	7.0	7.6	7.9	9.1	9.8	12.5	14.1
FOC_2 (ppm)	7.2	5.45	4.22	4.05	4.70	6.7	6.10	4.8	3.7	4.2	2.80	6.02
Ca (ppm)	34.3	36.0	40.2	45.4	45.0	42.4	30.2	26.3	26.5	25.0	28.0	32.0
Mg (ppm)	12.4	14.3	20.3	20.5	24.0	17.3	6.5	3.7	7.2	8.8	10.9	10.4
Cl (ppm)	42.0	50.2	61.3	65.1	70.2	78.2	76.2	60.0	55.0	50.5	45.6	42.8

At= Atmosphere temperature, **Wt** = water temperature, **T_R** = Transparency, **TDS** = Total dissolved Oxygen, **DO_2** = Dissolved Oxygen, **FCO_2=** Free Carbon dioxide, **Ca=** Calcium, **Mg** = Magnesium, **Cl** = Chlorine.

Table 2

Population density of planktons in studied Mirza Khan pond (2016 – 2017)

Sl.No.	Phytoplanktons	Class	Zooplanktons	Phylum
1.	*Pinnularia sp.*	Bacillariophyceac	*Cyclops sp.*	Arthropoda
2.	*Gamphonema sp*	Bacillariophyceac	*Moina sp.*	Arthropoda
3.	*Diatoma sp.*	Bacillariophyecae	*Nauplius larvac*	Arthropoda
4.	*Nostoc*	Cyanophyceac	*Monostyla sp.*	Arthropoda
5.	*Oscillatoria sp.*	Cyanophyceac	*Bosmania sp.*	Arthropoda
6.	*Rivularia aquatica*	Cyanophyceac	*Verticella companula*	Arthropoda
7.	*Spirogyra sp.*	Cholorophyceac	*Brachionus sp.*	Rotifora
8.	*Chloella*	Chlorophyceac	*Euglina sp.*	Protozoa
9.	*Closterium sp*	Chlorophyceac	*Amoeba*	Protozoa
10.	*Eudorinia sp.*	Chlorophyceac	*Parameciun auretia*	Protozoa

The range was between 17.6 – 34.5 (January – May). It has been observed that an indirect effect to toxicity intensifying deoxygenating and finally increasing the biomagnifications, that is why the dissolved oxygen depletion and plankton are characterized by cyanobacterial algal bloons[7,8]. In the present studied pond of Darbhanga, *Nostoc, Rivularia aquatica* and *Oscillotaria* sps. including some more common phytoplanktons were found, where zooplanktos of phylum Protozoa, Rotifera and Arthropoda (6species) were observed. The nature and health of aquatic communities is an expression of water[6]. Water pollution manifests through changes such as physical, Chemical and biological water of the studied pond was observed alkaline throughout the study period (pH 7.1 - 8.8 *i.e.* September – June). The alkalinity was lower in the month of September, higher in summer and winter seasons. The whole observation thawed that the studied pond did not showed trend of normal pond. However, the eutrophication trends with normal and developing as polluted pond has been studied by some works[9,10].

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