

# **Study of Ecological Level of Rural Area Mirnagar Birra Pond of District Vaishali, Bihar**

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## **ABSTRACT**

*Ponds are used to check the water quality and presence of microbiological organisms. The impact of anthropogenic factors on water quality and biological productivity of the waters are generalized. In the present study Physico-chemical and biological parameters of rural area Mirnagar Birra pond of Hajipur Sadar Block of Mirnagar Birra Boarder area village of district Vaishali, Bihar was selected. The parameters of water quality and plankton status were investigated during the year 2019-2020.*

**Keywords:** *Ecological status, Anthropogenic factors, Mirnagar Birra pond, Planktons, Physico-chemical profiles.*

## **INTRODUCTION**

Ponds are common landscape elements which play important role in global processes of biosphere and preservation of biodiversity. The roles of ponds in supporting aquatic biodiversity are just as important as rivers and large lakes. They provide unique habitat islands for a diverse range of aquatic species *i.e.* noted for their copious and rich varieties of plant and animal life, which all are maintained in an insubstantial ecological balance. Life ranges from microscopic bacteria to insects, fish, small animals and water birds. The pond's age, the number of species living in it progressively increases until the growth of larger plants; algae and the accumulation of wastes convert it into a marsh or causes it to dry up. The ponds represent a stable environment where living things interact and materials are used over and over again. This is considered an ecosystem<sup>1</sup>.

## **MATERIALS AND METHODS**

Samples of selected Mirnagar Birra pond from different sites were collected for a period of twelve months, starting from February 2019 to January 2020 for investigation of physico-chemical profiles and March 2019 to February 2020 for seasonal variations in planktonic community. Samples were collected in triplicate from each site during the different seasons (summer, winter and monsoon) using PET bottles as per standard procedures and analyzed as per work plan employing prescribed standard methods<sup>2</sup>.

## **RESULTS AND DISCUSSION**

Physico-chemical and seasonal variations in planktonic community of Mirnagar Birra pond in different seasons and at different sites was investigated. As temperature is the important factor which influences the chemical, biochemical and biological characteristics of any aquatic system<sup>3,4</sup>, drastic changes were observed in winter ( $21.960 \pm 0.90$ ), summer ( $26.820 \pm 0.75$ ) and monsoon ( $20.128 \pm 1.90$ ) (Table 1). The pH also exceeded in winter and in summer. Remaining all the physico-chemical profiles like transparency, conductivity, FCO<sub>2</sub>,

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DO<sub>2</sub>, HCO<sub>3</sub>, CO<sub>3</sub>, total alkalinity, total hardness, calcium hardness, magnesium hardness, and calcium hardness showed indirect effect of toxicity intensifying deoxygenating and finally increasing the biomagnifications. Different plankton communities are also reported to prefer water with different physico-chemical characteristics and observed that abundant growth of blue green algae in pond water as inorganic nitrogen and phosphorus concentration were less than detectable limit. In Mirnagar Birra pond members of Chlorophyceae, Cyanophyceae, and Bacillariophyceae class and member of Phylum Rotifera, Rhizopoda, Cladocera and Copepoda were observed in all seasons, all months. The fluctuation seems to be mainly due to water temperature (Table 2).

Total phytoplankton density showed direct and significant correlation with water temperature in relation to the total zooplankton showed its maximum density during winter in all the sites and minimum density during rainy season. Present investigations also confirmed the earlier works done by many researchers<sup>5-10</sup>.

**Table 1**  
**Physico-chemical profiles of rural area Mirnagar Birra pond of Vaishali**  
(From February 2019 to January 2020)

Parameters & Months	Winter	Summer	Monsoon
Temperature	21.960±0.90	26.820±0.75	20.128±1.90
Transparency	13.89±0.53	16.714±0.770	13.419±0.338
Conductivity	22.880±0.92	16.806±0.770	13.450±0.350
pH	8.56±0.075	8.5±0.065	7.51±0.073
DO <sub>2</sub>	9.18±0.169	7.78±50.30	10.97±1.40
FCO <sub>2</sub>	5.44±0.80	5.66±0.60	2.50±0.10
CO <sub>3</sub>	28.0±1.50	34.9±2.380	43.475±2.264
HCO <sub>3</sub>	132.15±3.350	136.395±2.316	155.90±2.85
Total Alkalinity	160.00±3.80	170.180±4.58	200.580±4.89
Calcium Hardness	172.595±2.60	88.00±1.480	123.10±1.60
Magnesium Hardness	55.675±0.246	25.35±0.58	34.2±0.772
Total Hardness	226.025±2.150	112.9±1.462	155.86±1.891

**Table 2**  
**Seasonal variation in planktonic community of Mirnagar Birra pond of Vaishali**  
(From March 2019 to February 2020, PPN=Phytoplankton, ZPN=Zooplanktons)

Seasons	PPN	Total Planktons	Cyanophyceae (U/L)	Chlorophyceae (U/L)	Bacillariophyceae (U/L)	
Summer		22397	12410±135.66 (55.410)	8117±107.7 (35.97)	1870±13.16	
Winter		17362	7613±81.45 (43.85)	2019±12.18 (11.63)	7840±147.50	
Monsoon		15935	10200±63.9 (64.45)	2450±21.20 (15.34)	3320±70.85	
	ZPN		Rhizoda (U/L)	Rotifera (U/L)	Copepoda (U/L)	Cladocera (U/L)
Summer		7820	(00)	810±4.70 (10.35)	2302±26.6 (29.45)	4715±16.50 (60.30)
Winter		9910	406±8.39 (4.08)	846±4.29 (8.55)	4796±30.55 (48.44)	3860±16.48 (39.00)
Monsoon		7661	20±0.60 (0.28)	32±0.65 (0.45)	3355±18.80 (43.80)	4250±29.25 (55.58)

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