

# Qualitative and Quantitative Analysis of Planktonic Fauna of Nageshwar pond, Chapra (SARAN) BIHAR.

<sup>1</sup>Arjun Pratap Singh, <sup>2</sup>Raj Kumar

<sup>1</sup>Research Scholar, <sup>2</sup>Associate Professor and HOD  
Department of Zoology,  
Rajendra College Chapra-8413014, India.

**Abstract:** Nageshwar pond is a small pond located in Chapra (saran) district Bihar. Study on limnology of Nageshwar pond carried out during January 2008 to December 2008. The present study deal with physico-chemical parameters such as temperature, PH, alkalinity, chloride, conductivity, TDS, Dissolve oxygen, calcium, magnesium, sodium, carbonate, bicarbonate, transparency and silicate. The total eighty one type of phytoplankton is recorded by four classes. A total seventeen type of benthic fauna is recorded in different season.

**Keywords:** Quantitative Analysis of Phytoplankton, Zooplankton in Nageshwar Pond.

## INTRODUCTION

Nageshwar pond is situated of Chapra district (saran) State- Bihar. The fresh water pond is more than 20 year old. This pond is about 4 acre in area and with an average depth of about more than 4 to 5 meters (13-15 feet). The water of this pond is used by fish production. The pond is also use for washing dirty cloth bathing of domestic animal and used by animal for drinking purpose. Sample of the water to physiochemical characteristics is analyses according to standard method of APHA (2008).

Phytoplankton growth depends on the availability of carbon dioxide, sunlight, and nutrients. Phytoplankton, like land plants require nutrients such as nitrate, phosphate, silicate, and calcium at various levels depending on the species. Some phytoplankton can fix nitrogen and can grow in areas where nitrate concentrations are low. They also require trace amounts of iron which limits phytoplankton growth in large areas of the ocean because iron concentrations are very low. Other factors influence phytoplankton growth rates, including water temperature and salinity, water depth, wind, and what kinds of predators are grazing on them.

In an aquatic ecosystem, the planktonic organisms are essential links in the food chain. Zooplankton, the significant member of an aquatic ecosystem forms an indispensable link in a trophic level. They are the most important food for the commercially and economically imperative fish and prawn larvae. Indices of dominance, similarity, species diversity (species richness, evenness index, Shannon index of general diversity) are some of the useful ecological indices of species structure in communities. The present study was an attempt to qualitative and quantitative analysis of Plankton Fauna.

## MATERIAL AND METHODS

The sampling was carried out at one location in Nageshwar pond chapra district, India during January 2008 to December 2008. Physico-chemical parameters such as temperature, P<sup>H</sup> alkalinity, chloride, conductivity, TDS, Dissolve oxygen, calcium, magnesium, sodium, carbonate, bicarbonate, transparency and silicate per the protocol provided by APHA (2008). The plankton samples were collected using plankton net made up of bolten silk with a pore diameter of 20 µm at the early hours of the day. For qualitative analysis plankton were narcotized with 50% ethanol and preserved in 5% formaldehyde solution, and identified (Michael, 1973, Battish, 1992, Verlecar and Desai, 2004). For quantitative analysis, 100 litres of water was filtered using a plankton net, the zooplankton were preserved and different species were enumerated using a Sedgewick – rafter counting cell under microscope.

The ecological indices viz., Dominance, Simpson, Shannon, Evenness, Brillouin, Menhinick, Margalef, Equitability, Fisher-alpha, Berger-Parker and Chao were determined using PAST software package (version 3.11).

Kamran Tassaduqe, Muhammad Ali et al. (2003) Study of the seasonal variation in the physio chemical and Biological aspects of Indus River Pakistan and they observed 43 different genera of phytoplankton and 17 different genera of zooplankton were observed at Darya Khan.

J.R. Bhuiyan and S. Gupta 2007 study of a few ponds of Barak Valley, Assam and they observed a clear indirect relationship between iron concentration and euglenoids has been observed. Major phytoplankton taxa present in the ponds are Chlorophyceae, Cyanophyceae, Bacillariophyceae.

Rutgers Rosenberg et al. (1991) reported that in stratified coastal marine water hypoxia is a growing problem affecting bottom-dwelling animals. Earlier studies suggest oxygen concentrations of about 2 ml l<sup>-1</sup> (Rosenberg 1980) as the lower tolerance limit for many benthic species in coastal areas. We exposed several conspicuous in faunal species on the NE Atlantic continental shelf, contained within their sediment habitat, to gradually reduced oxygen concentrations. Tolerance to hypoxia for the 8 species examined was in the range of 0.5 to 1.0 ml l<sup>-1</sup> (8 to 15 % saturation), which they could tolerate for several days to weeks. The

ophluroid *Amphura filiformis* left its protected position in the sediment at an oxygen concentration of  $0.85 \text{ ml l}^{-1}$  (13 % sat.) Whereas *A. chiajei* emerged from the sediment at  $0.54 \text{ ml l}^{-1}$  (8 % sat.).

#### QUALITATIVE AND QUANTITATIVE ANALYSIS OF PHYTOPLANKTON:

In the present study were Nageshwar pond of qualitative and quantitative analysis of phytoplankton was done by Lackey's drop method. In Lackey's drop method, the cover slip was placed over a drop of water in the slide and whole of the cover slip was examined by parallel overlapping strips to count all the organisms in the drop. About 20 strips were examined in each drop. Number of sub samples without any addition of unencumbered species when compared to the already examined sub samples in the same sample (APHA, 1985).

Water was collected from the structure with minimal disturbance and filtered in a No. 25 bolting silk cloth net or plankton net of mesh size 63  $\mu\text{m}$  and 30 cm. diameter. The final volume of the filtered sample was 200ml plastic bottle and labeled mentioning the time, date and place of sampling. The samples collected in 200ml plastic bottles were preserved by adding 8 ml of 6 % formalin. The preserved samples were kept for 24 hours undisturbed to allow the sedimentation of plankton suspended in the water. After 24 hours, the supernatant was discarded carefully without disturbing the sediments and the final volume of concentrated sample was 50ml.

#### *Qualitative and quantitative analysis of zooplankton*

The Qualitative and quantitative analysis of zooplankton was done by using Sedgwick-Rafter cell (for standardization) and by Lackey's drop method. Six strips were counted in Sedgwick –Rafter cell with dimensions of  $50\text{mm} \times 20\text{mm} \times 1\text{mm}$ . in Lackey' drop method, the cover slip was placed over a drop of water in the slide and whole of the cover slip was examined by parallel overlapping strips to count all the organisms in the drop. About 20 strip were examined in each drop. Number of sub sample to be taken was dependent on the examining 2 to 3 successive sub samples without any addition of unencumbered species when compared to the already examined sub samples in the same sample. The zooplankton were identified up to a taxonomic precision of species level in Rotifera, genus level in both cladocera and copepoda using self made keys given in Appendix 2 and standard identification keys Murugan et al. (1998), Altaff (2003), Edmondson (1959), Battish (1992), Dhanapathi (2000).

Water was collected from the surface with minimal disturbance and filtered in a No. 35 bolting silk cloth net or plankton net of mesh size 63  $\mu\text{m}$  and 30 cm diameter. The final volume of the filtered sample was 125ml, which was transferred to another 125ml plastic bottle and labeled mentioning the time, date and place of sampling. The sample collected in 125 ml plastic bottles was preserved by adding 2ml of 4% formalin. The preserved sample was kept for 24 hours undisturbed to allow the sedimentation of plankton suspended in the water. After 24 hours the super ant was discarded carefully without disturbing the sediments and the final volume of concentrated sample was 50ml.

#### RESULTS AND DISCUSSION

*Table No. 1-Monthly variations in the Physico-chemical characteristic of water of the of Nageshwar Pond 2008.*

Month	Air Temp in $^{\circ}\text{C}$	Water Temp in $^{\circ}\text{C}$	Rain Fall in(mm)	Transparency
Jan	20	18	21	189
Feb	23	20	13	185
Mar	24	22	nil	140
Apr	35	29	10	90
May	38	31	30	70
Jun	42	32	85	62
Jul	37	30	120	45
Aug	29	27	140	40
Sept	30.5	29	20	34
Oct	32	28.5	30	37
Nov	28	24	nil	125
Dec	19	18.5	40	127

The plankton populations are influenced by various environmental factors. It is essential to monitor the physico-chemical

parameters to reveal the information regarding the pollution load (Reddi *et al.*, 1993).

Majority of the parameters including conductivity, dissolved solids, chloride, magnesium, fluoride, sulphate, phosphate and iron were at a higher concentration before the rainfall than after. It could be due to the dilution of water. However, the  $p^H$  of the water did not show much difference.

**Table No.2- Chemical Analysis of Nageshwar Pond 2008.**

Month	pH	Conductivity			HCO <sub>3</sub>		Ca(ppm)	Mg(ppm)
		c.m./mhos	Do <sub>2</sub> (ppm)	Co <sub>2</sub> (ppm)	Co <sub>3</sub> (ppm)	(ppm)		
Jan	7.7	654	12.30	1.30	2.7	112	12.7	8.9
Feb	8.0	664	12.00	1.10	2.5	114	11.7	9.3
Mar	8.0	730	11.80	1.70	2.7	119	12.1	10
Apr	7.6	710	11.10	2.00	2.9	120	11.7	11.4
May	7.3	705	10.80	2.40	3.1	107	11.9	6
Jun	7.1	655	10.40	2.80	2.1	103	6.8	5.8
Jul	6.6	585	10.70	2.60	1.9	100	7.3	3.4
Aug	6.2	590	11.40	2.00	2	102	10.4	3.6
Sept	6.3	587	11.30	1.20	1.9	113	12.6	3.5
Oct	6.6	610	11.00	1.40	1.7	118	14.2	5.3
Nov	7.2	644	11.50	1.50	2.3	125	17.5	6.7
Dec	7.0	648	12.40	1.60	2.5	125	17.7	12.7
Avg	7.1	648.5	11.39	1.80	2.37	112.5	12.21	7.21

Several studies showed a decrease in the population of zooplankton after rainfall (Naveed *et al.*, 2005;). It is assumed that rotifers exploit the supplements and phytoplankton more quickly to develop their populace.

**Table No.3- Chemical Analysis of Nageshwar Pond 2008.**

Month	Silicate		Po <sub>4</sub> (ppm)	T.D.S (ppm)	Chlo (ppm)	Alkalinity
	Na(ppm)	(ppm)				
Jan	3.8	12.8	0.04	361	11.3	122
Feb	3.6	13.2	0.06	351	11.5	129
Mar	4.2	14	0.07	346	11.8	140
Apr	4.4	11.4	0.08	345	12.1	152
May	4.6	10.5	0.09	340	12.5	165
Jun	3.2	11.7	0.11	473	12.6	138
Jul	4	18.7	0.1	468	10.8	122
Aug	2.9	22.1	0.09	496	10.5	108
Sept	3.1	26.7	0.08	464	10.9	111
Oct	3.2	26.9	0.06	440	10.2	114
Nov	3.3	24.8	0.04	420	10.5	116
Dec	3.5	16.6	0.03	380	10.9	120
Avg	3.65	17.45	0.07	407	11.23	128.08

**Table No.4- Quantitative evaluation of plankton during 2008 in Nageshwar pond**

Month	Phytoplankton	Zooplankton	Total	%	
				phytoplankton	Zooplankton
Jan	850	110	960	88.54	11.45
Feb	400	190	590	67.79	33.2
Mar	1210	210	1420	85.21	14.78
Apr	630	190	820	76.82	23.17
May	610	240	850	71.76	28.23
Jun	675	270	945	71.42	28.57
Jul	175	65	240	72.91	27.08
Aug	290	135	425	68.23	31.76
Sept	775	235	1010	76.73	23.26
Oct	460	285	745	61.74	38.25
Nov	505	75	580	87.06	12.93
Dec	670	120	790	84.81	15.18

The present studies were Quantitative evaluation of plankton during 2008 in Nageshwar pond observation are recorded in table 4. As per table the erratic distribution of plankton was recorded. The maximum phytoplankton is 1210 in March and the minimum is 175 were recorded in July. During January and September it was in higher number while in February, August and November it remained lower in number. Phytoplankton was always in higher % ranging between 61.74% to 88.54%.

The maximum Zooplankton is 285 in October and the minimum is 65 were recorded in July. During June and May it was in higher number while in September, March and February it remained lower in number. Zooplankton Varied between 11.45% to 38.25% during 2008.

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