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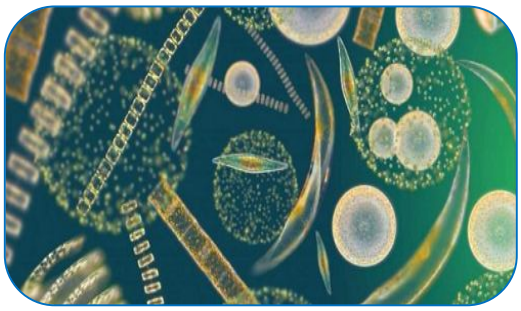
LIMNOLOGICAL STUDIES OF TWO PONDS OF LNMU CAMPUS DARBHANGA (BIHAR) IN RELATION TO PLANKTONS

Ashwini Kumar
Research Scholar, L.N.M.U, Darbhanga, Bihar.

ABSTRACT :



Diversity of plankton is an important criterion for water quality assessment. We were trying to determine the diversity of plankton species in two LNMU pools, the Darbhanga viz campus. The pond of Anandbag and the temple pond of Manokamna. From January 2018 to June 2018, Plankton diversity was recorded in both ponds. A total of three phytoplankton and Zooplankton groups containing 18 species of phytoplankton and 14 Zooplankton of both ponds were reported. Of these, 9 phytoplankton species and 11 Zooplankton species were prevalent in the two pools. Alone the Anandbag pond had 12 phytoplankton species and twelve zooplankton species. The Temple pond in Manokamna had 15 phytoplankton species and 13 zooplankton species. Both phytoplankton and Zooplankton were abundant in the temple pond of Manokamna. A main relationship between phytoplankton and zooplankton diversity has been observed.

KEYWORDS : *Plankton diversity, Pond****, Limnological studies, Fish Ponds.***

INTRODUCTION :

Pond is the smallest unit of the biodiversity-rich freshwater ecosystem. Anthropogenic violence affects the biodiversity of the pond ecosystem. Domestic waste, sewage, industrial and agricultural effluents, etc. pollute pool water. Plankton is part of aquatic life composed of small organisms which live and move toward the current of water. Phytoplankton is the community's main source and is the main consumer and secondary source as zooplankton[1].NASA study (2009) reports that phytoplankton accounts for half of all earth photosynthesis activities. Phytoplanktons are therefore responsible for most of atmospheric oxygen, which is half of the total amount of all plants produced[2]. Phytoplankton is of great significance for the water body and helps to save the pool. Phytoplankton is the vital source of nutrition for certain marine animals as primary producers and serves as a direct food source[3].Phytoplankton is an important source of fish food for the biosynthesis of organic matter in aquatic zooplankton. In the food chain and food web of pond ecology, zooplankton plays an significant part. There is, though, a lack of literature about Darbhanga Plancton, particularly the LNMU, Campus and Darbhanga District Pond. This study is planned to evaluate the limnological awareness of the plantonic diversity of two LNMU representative ponds, Campus, Darbhanga.

MATERIALS AND METHODS

The analysis was carried out on two ponds between January 2018 and June 2018. LNMU, Darbhanga Campus, India, Anandbag Pond and Manokama Tample Pond. Darbhanga is 25.53 ° to 38 ° C, with an average temperature difference of 1638 mm, with latitude of 25.53 ° to 26.27 ° (North) and 85.45 ° (East). It is convenient to label Darbhanga as "the city of ponds." Both ponds are used as an irrigation and fish farming industry. Samples of planktons were collected one monthly at a depth of 25 cm below the surface, from all 5 selected random places of the pond.Planktone samples from the Bolting Silk Tissue No.25 with mesh size 0.03-0.04 mm have been obtained for this analysis. Samples of phytoplankton in 0.3Lugol's iodine have been conserved while 4% formaline buffer Zooplankton has been preserved. Ln laboratory, the 1938 Lackey Process was used to study the plankton. Belligner 1992 conducted the identity of plancton species with the aid of a plankton key and monograph [5].

The Water Samples from Gangasagar Pond were obtained from four separate Stations in the morning of 9 a.m. to 11 a.m. In the process of processing, the Water samples were then brought into the Laboratory with the use of Thermometer and Automated pH metres to estimate various physico-chemical parameters including water temperature transparency and pH. With the support of Secchi Disk, transparency was assessed. Other parameters such as DO, TDS, free CO2, hardness, Chlorides, Alkaline, Phosphate and Nitrate have been calculated in a Estimated in the Laboratory By using Standard Methods as Prescribed By APHA, AWWA, [10], Trivedy and Goel [8], Kodarkar [9] standard methods.

The Monthly Variation in Physico-chemical Parameters is presented in Table.

Table 1: Physical parameters of Gangasagar Pond district, Darbhanga

Month	Temperature ^{0}C	Transparency cm	Turbidity NTU	TDS gm/lit	pH
Jan	23	12	9.95	0.37	8.4
Feb	25	10.5	12.41	0.39	8.4
Mar	26	9.75	12.2	0.4	8.8
Apr	23.5	7.5	8.4	0.1	8.3
May	25	6.0	7.1	0.6	8.0
Jun	23.5	9.5	11.6	2.2	8.1
Jul	23.5	60.75	1.0	1.13	8.1
Aug	24.5	61.75	2.2	0.2	8.3
Sept	25.5	58.5	2.2	0.3	7.3
Oct	25	92.0	0.4	0.4	7.5
Nov	24	82.5	1.35	1.8	7.9
Dec	22.5	67.25	1.8	0.4	8.2

Biostatistical Analysis of Physical Parameters of Gangasagar Pond district, Darbhanga

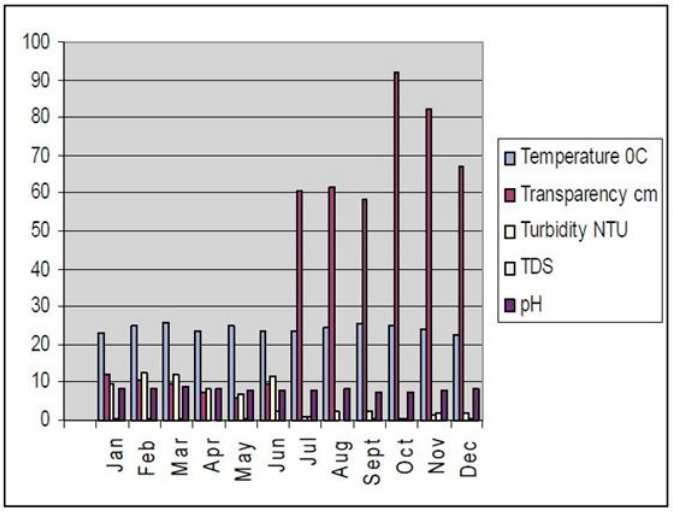
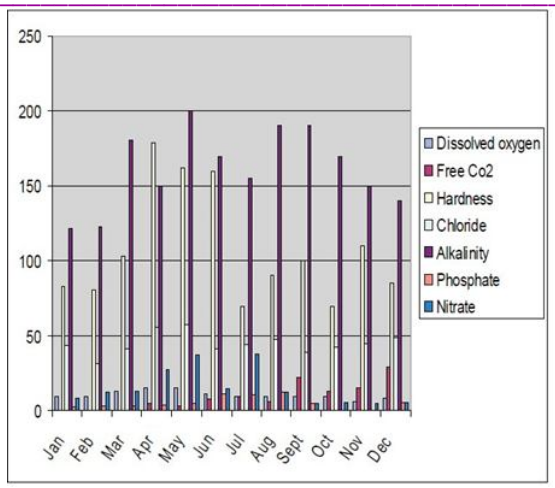


Table 2: Chemical parameters of Gangasagar Pond district, Darbhanga

Months	Dissolved oxygen	Free Co_2	Hardness	Chloride	Alkalinity	Phosphate	Nitrate
Jan	8.85	-	82.5	43.48	121.25	1.91	8.43
Feb	9.06	-	80.25	31.06	122.50	3.38	11.84
Mar	12.52	-	103	41.0	180	3.39	12.9
Apr	15.1	4.4	179	55.38	150	4.14	26.90
May	15.5	3.4	162	57.61	200	4.8	36.84
Jun	11.19	7.6	160	41.17	170	11.12	14.25
Jul	9.04	8.8	70	44.02	155	10.68	37.8
Aug	8.79	6.0	90	47.57	190	12.38	12.02
Sept	9.05	22	100	38.34	190	4.58	4.58
Oct	8.82	13.2	70	42.6	170	0.12	5.43
Nov	6.40	15.4	110	44.55	150	0.19	4.40
Dec	8.21	28.6	85	48.61	140	5.16	5.25

Biostatistical Analysis of Chemical Parameters of Gangasagar Pond district, Darbhanga



Water – Water Temperature ranges of 22.5 ° c to 26 ° C in the latest Water Temperature Report.

The maximum (26 ° C) Temperature in the month of March (summer) was recorded and in December (winter) the minimum (22.5 ° C) was recorded. It revealed that the summer was higher and the winter was comparatively lower. Similar research, Jayabhaye et al . [11], Salve and Hiware [12], Water Temperature was high during the summer, due to Low Water Level and High Temperatureand clear atmosphere. A Important Factor affecting the chemical , Biochemical and Biological characteristics of the body of a water . Water Temperature

Watertransparency-Water transparency Fluctuates between 6.0 and 92.0 cm. Water transparency In the month of October (winter), the maximum (92.0 cm) was recorded and in the month of May (6.0 cm) in the summer, the minimum. Khan and Chowdhury[13] recorded greater clarity due to the lack of precipitation, runoff and water and the gradual settlement of suspended particles in winter and summer. The related remarks mentioned also by Kadam, et al [14].

Turbidity- The water turbidity varies between 0.4 NTU and 12.41 NTU. The maximum values (12.14 NTU) were reported in February (summer time) and may be due to human activities in the month of October, decrease of water and presence of particulate matter suspended and minimum (0.4NTU) value.

Total dissolved solids- The total solids dissolved range between 0.1g / l and 2.2g / l. In the month of June, the highest value (2.2 g / l) was reported. Due to high rainfall in the month of April and a minimum value of 0,1 g / l.

pH-The pH ranged from 7.3 to 8.8 for alkaline values. In May (summer) and in September (7.3), the maximum pH value (8.8) was reported. Factors such as air temperature shift the water's pH. The decreased rate of photosynthetic activities reducing the assimilation of carbon dioxide and bicarbonates that ultimately cause pH development, the low oxygen values correlate with the high temperature in the summer months [15]. Most biochemical and chemical reactions are affected by the pH.

DissolvedOxygen-DO values are between 6.40 mg / l and 15.5 mg / l. In May (summer) the maximum values (15.5 mg / l) were reported, in the November (winter) the minimum values were (6.40 mg / l). The high DO in the summer has an effect on the percentage of soluble gases (O^2 & Co^2), as the temperature and length of sunlight increases. Long days and strong sunshine during the summer tend to speed up photosynthesis through the use of phytoplankton, Co2 and oxygen. The higher quality levels of O2 reported during the summer are possible. The quality reported by [16] is slightly lower in the winter.

FreeCarbondioxide-The free Co2 value varies between 0.0mg / l and 28.6 mg / l. In the month of December (winter), the maximum value (28.6 mg / l) and the minimum value (0.0 mg / l) were recorded between January and March. The alkalinity and hardness of the water body may be a determination. In December, the CO2 value was high. This may be correlated with the high decline rate in the warmer months.

Hardness–The durability is between 70 mg / l and 179 mg / l. In April (summer), the maximum (179 mg / l) and the minimum (70 mg / l) were registered in October. The total hardness of Hujare [17] was high in summer as well as in winter. A reduced water volume and an increase in the evaporation of water can be attributed to the high summer hardness value. The present research produced similar results. Similar results.

Chlorides-The chloride levels differ between 31.06 mg / l and 57.61 mg / l. The maximum value was recorded in May (summer) (57.61 mg / l) and the minimum value was recorded in February (31.06 mg / l). Maximum chloride value hits in the summer in the current analysis. Swarnalatha and Narsing rao have recorded similar results[18].

Alkalinity – Alkalinity cumulative varies between 121.25 mg / l and 200 mg / l. In the month of May (summer) and in January (winter) the maximum value (200 mg / l) was recorded and the minimum value (121.25 mg / l). Due to increased bicarbonates in water, the alkalinity was maximum in April (summer). In addition, Hujare [16] published similar results that were highly photosynthetic in summer and lowest in winter.

Phosphate – The phosphate value is between 0.12 mg / l and 12.38 mg / l. In August (monsoon), the maximum value (12.38mg / l), and the minimum value in October (winter, respectively), were reported. The high values of phosphate during the months of August (monsoon) are primarily attributed to drought, surface water runoff and the agricultural run off. Similar Arvindkumar results [19]. Similar results.

Nitrates – Nitrate concentrations differ between 4.40mg / l and 37.5mg / l. In July (monsoon) and November (winter) (4.40mg / L) a maximum value was observed, (37.5mg / L).

RESULTS AND DISCUSSION:

Three Classes of phytoplankton (Chlorophyceae, Cynophyceaeand Bacillariophyceae) were recorded from Aanand bag pond and Manokama Trample pond.12 species of phytoplankton(Euglena, Spirogyra Volvox, Pediastrum, Cosmerium, Rhizoclonium, Nostoc, Anabaena, Microcystis, Pinnularia, Fragilaria, Nitzhiapalea) were recorded in Anandbag Pond. 15 species of phytoplankton (EuglenaSpirogyra, Volvox, Cosmerium, Cladophora, Rhizoclonium, Nostoc, Spirulina, Ocillatoria, Anabena, Cymbella, Synendra, Fragilaria, Naviculla, Nitzhiapalea) recorded in Manokama Trample pond. Three classes of Zooplankton(Cladocera,Rotifers and Copepoda) were recorded from Anandbag pond and Manokamna Temple pond. 12 species of Zooplankton (Bosmina, Daphnia, Ceripdephnia, Alona, Monia, Chydorus, Brachionus, Euchlanis, Nothola, Rotara, Filinia, Diaptomous) were recorded in Anandbag pond. 13 species of Zooplankton (Bosmina, Daphnia, Ceripdephnia, Alonella, Monia, Chydorus, Brachionus, Trichosera, Nothola, Rotaria, Filinia, Diaptomous, Cyclopus) were recorded in Manokamna Temple Pond.

Fish predation as feeders has also impacted the variety and density of plankton in the fish pool. Green algae, especially Labeo rohita among phytoplanktons, are ideally fed by cultured carps[6]. The poor phytoplankton diversity in the pools can be due to the cumulatives and pasture effects of blue-green algal crops. In both ponds there were a total of twenty seven phytoplankton species. Nine species in both ponds have been found popular among them. 12 species were recorded from Anandbag pond and15 species were recorded from Manokamna Tample pond (Euglena, Spirogyra Volvox, Pediastrum, Cosmerium, Rhizoclonium, Nostoc, Anabaena, Microcystis, Pinnularia, Fragilaria, Nitzhiapalea) were recorded in Anandbag water pond. Euglena, S pirogyra, Volvox, Cosmerium, Cladophora, Rhizoclonium, Nostoc, Spirulina, Ocillatoria, Anabena,

Cymbella, Synendra, Fragilaria, Naviculla, Nitzhiapalea were recorded in Manokama Trample pond. Zooplankton is one of the most biotic components that influence the food chain and food web of any limnological water bodies [7], total twenty five Zooplankton were found in both ponds. Among them 11 species were common in both ponds. 12 species were recorded from Anand bag pond and 13 species were recorded from Manokamna Temple pond. Bosmina, Daphnia, Ceripdephnia, Alona, Monia, Chydorus, Brachionus, Euchlanis, Nothola, Rotaria, Filinia, Diaptomous were recorded in Anandbag pond. Bosmina, Daphnia, Ceripdephnia, Alonella, Monia, Chydorus,Brachionus Trichosera, Nothola, Rotaria, Filinia, Diaptomous, Cyclopus were recorded in Manokamna Temple Pond.

CONCLUSION:

A pivotal relationship was observed between phytoplankton and Zooplankton diversity. Both ponds are highly productive for fish farming but Manokamna Tample pond is eutrophic condition,grater diversified and phytoplankton is being the dominance group than Anandbag pond. On the basis of study and findings that the people of this region will care for the proper and better upkeeps of both ponds for the purpose of the economy.

REFERENCES:

1. Hossain Y, Jasmine S, Ibrahim AH. A preliminary observation on water quality and plankton of an earthern fish pond in Bangladesh: Recommendations for future studies. Pak J Biol Sci. 2007; 10: 868-873
2. Henson SA, Sarmiento JL, Lima I, Doney SC, John J, Beaulier C. Detection of antropogenic climate change in satellite records of ocean chlorophyll and productivity. Biogeo sciences. 2010; 7: 621-640.
3. Saha SB, Bhattacharya SB, Choudhary A. Diversity of Phytoplankton of a sewage pollution brackish water tidal ecosystem. J Environ Biol. 2000; 21: 9-14.
4. APHA. Standard methods for the examination of water and waste water. (18th edn). American Public Health Association, Washington, DC., USA, 1995.
5. Bellinger EG. A key to common Algae. The institute of water and environmental management, London, UK. 1992.
6. Khan RA, Siddiqui AQ. Food selection by Labeo rohita (Ham.) and its feeding relationship with other major carps. Hydrobiologia. 1973; 43: 429-442.
7. Battish SK. Freshwater zooplankton of India. Published by oxford & IBH publishing Co. Pvt. Ltd. New Delhi, India. 1992.
8. Trivedy, R. K. and Goel P. K. (1986): Chemical and biological methods for water pollution studies, Environmental Publication, Karad, Maharashtra.
9. Kodarkar M. S. (1992): Methodology for water analysis, physico-chemical, Biological and Microbiological Indian Association of Aquatic Biologists Hyderbad; Pub.2: pp. 50.
10. APHA (1985): Standard Methods For Examination of Water and Wastewater, 20th Edition, American Public Health Association, Washington D. C.
11. Jayabhaye, U. M.; Pentewar M. S. And Hiware C. J. (2006): A Study on Physico- Chemical Parameters of a Minor Reservoir, Sawana, Hingoli District, Maharashtra.
12. Salve, V. B. and Hiware C. J. (2008): Study on water quality of Wanparakalpa reservoir Nagpur, Near Parli Vaijnath, District Beed. Marathwada region, J. Aqua. Biol., 21(2): 113-117.
13. Khan, M. A. G and Choudhary S. H. (1994): Physical and chemical limnology of lake Kaptai, Bangladesh. Trop. Eco. 35(1): 35-51.
14. Kadam, M. S. Pampatwar D. V. and Mali R. P. (2007): Seasonal variations in different physico-chemical characteristics in Masoli reservoir of Parbhani district, Maharashtra, J. Aqua. Biol. 22(1): 110- 112.
15. Kamble, S. M.; Kamble A. H. and Narke S. Y.(2009): Study of physico-chemical parameters of Ruti dam, Tq. Ashti, dist. Beed, Maharashtra. J. Aqua. Biol. 24(2): 86-89.
16. Masood Ahmed and Krishnamurthy R.(1990): Hydrobiological studies of Wohar reservoir Aurangabad(Maharashtra state) India. J. Environ. Biol. 11(3), 335- 343.

17. Hujare, M. S. (2008): Seasonal variation of physico-chemical parameters in the perennial tank of Talsande, Maharashtra. Ecotoxicol. Environ. Monit. 18(3): 233- 242.
18. Swaranlatha, S. and A. Narsingrao. (1998): Ecological studies of Banjara lake with reference to water pollution. J. Envi. Biol. 19(2): 179-186.
19. Arvindkumar, (1995): Some Immunological Aspects of the Fresh water Tropical Wetland of Santhal. Pargana (Bihar) India, J. Envi. Poll.2 (3): 137-141.