



STUDIES ON SOME ASPECTS OF ECOLOGY OF CERTAIN FISH OF DARBHANGA IN RELATION TO SEASONAL VARIATION IN PHYSICO-CHEMICAL AND BIOLOGICAL PROPERTIES OF BAGMATI RIVER

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ABSTRACT :

A simple line analysis has been carried out to determine the physicochemical biological factors of the Bagmati river from the effects of anthropogenic activities. There was a well-defined variance in the season. The river tends to be poisoned on the basis of physical and biological criteria. The river water tended to be rough on the basis of Moyle 's classification. The examined water body can also be graded as a moderate trophic stage on the basis of phosphorous and nitrogen. A body of water receives domestic discharge that produces a large amount of nutrient inputs and a high amount of phosphate and nitrate in the water body suggests that Plankton biodiversity is an important research field in water-based ecological studies. Phytoplankton thus requires multiple environmental processes with an impact on the diversity of organisms.

KEYWORDS : Physico-Chemical, Water Quality, Freshwater, Seasonal Variation, Freshwater, fishes,

INTRODUCTION

Freshwater is the world's most valuable and scarce resource. The primary water supply is rivers, streams, s and lakes. But today most of the rivers have become a topic of major concern in recent decades due to their industrialization, urbanisation and anthropogenic activity, because of their critical significance in many human uses around the world. The rivers have now become one of the world's most complex ecosystems as the key function of the rivers is the country's unplanned industrialization and population explosion. They also bring the dissolved and particulate weather and erosion production from the earth to the sea. For several years, rivers have been studied using contributions from different science and humanity disciplines. A large number of literatures on the regional, hydrographical, chemical, and historical aspects (Livingstone, 1963; Barnes & Mann, 1980) have been developed by engineering hydrologists, geographic lists, economists, biologists, chemists, geologists, and social scientists. The inter-annual variation of discharge is between 6% and 33% from data collected with UNESCO 1979 and United Nations 1981 from 29 of the biggest rivers in the world. The disposal of sewage and industrial waste in most developed countries also takes place without critical assessment of the effects on their receiving waters. Domestic and industrial effluent sources are numerous which lead to enrichment of water and sediment with heavy metals. The



rapid urbanisation and industrialization of modern civilizations, advanced instruments and tips, have cultivated water, air and land pollution issues. The water quality is generally characterised by its physical, chemical and biological characteristics. Water use for any area depends on physical, chemical and biological characteristics for various purposes including residential, agricultural, farming and fish cultivation. This work deals with the seasonal change in the physical-chemical and biological characteristics of the Bagmati river .

Water is one of the most significant natural resources and an integral component of life. In water has evolved the current domain of earthly life. Water gives a beautiful picture of thousands of living organisms (from bacteria to higher forms). Roughly 70% of the Earth's surface is surrounded by water which makes up about 2.3% of the total freshwater, whereas salt water remains (Wetzel, 1983). Both water supplies have been contaminated as a result of rapid industrialisation and growth. The small water bodies such as pools are more susceptible, under these conditions, to changes in water quality through input of waste and nutrients. Enrichment of nutrients contributes to eutrophication, both beneficial and detrimental for these marine ecosystems. With this in mind, the fundamental properties of freshwaters have evolved to be understood in some detail. In the discovery of principles and general links to water management, the efficient use of water resources, and pollution control measures, limnological studies are significant. The current science policy of India is to use many waste water bodies, such as s, swamps and wetlands which, due to lack of adequate limnological data, are unutilized or underserved. This research is therefore undertaken to determine the limnological status of these water bodies and their use and availability for fish cultivation.

The main objective of this study is to generate baseline limnological data on these waterbodies that would be useful for aquaculture planning or conservation strategies.

MATERIALS AND METHODS:

This research was performed at five sampling stations on the Bagmati river, which were chosen within 15 kilometers. (Fig-1) Samples of water were obtained from each one of the sampling stations, at monthly intervals of the time between Jan'2017 to Dec'2018. Capability. Capacity. A standard mercury thermometer graduated 00 to 500 C was registered with the temperature of the water. The study was carried out in the APHA (1975) and Trivesy and Goel (1984) methods for pH, dissolved oxygen, free carbon dioxide, BOD, COD, bicarbonate, chloride, nitrate, phosphate and sulphate. The boiling silk plankton net (No.30) with 77mesh / sq. cm had 50 ltrs of water taken from the river and been filtered through it. The samples were taken periodically from various areas of the stations. With 5 percent formalin, the plankton concentrate on the plankton net was maintained. The isolation of the plankton and the counting were performed by 1 ml sub-sample into a 1 ml capacity chamber for Sedgwick Rafter Plankton. According to the Welch (1952) protocol all species were counted.

RESULT AND DISCUSSION:

Water transparency can be used as a valid measure of efficiency as the depth to which light penetrates in a body of water. After all the suspended matter had settled down, the highest clarity was observed during post-monsoon and winter. The presence of TSS and plankton in the water column influenced the availability of light at different depths. The relationship between the openness, the TSS and TS was statistically significant and negative.

The calculation of the degree of absorption or dispersal of light in water is turbidity. After all the suspended materials have been settled, maximum turbidity has been recorded during monsoon months, and minimum during postmoon and winter.

Surface water temperature varied depending on air temperature. Both of these water bodies have highest importance of summer and lowest in winter. Statistically, the association between air and water temperatures was very important and positive.

Physical / Chemical parameter analysis(Panchobh Village Darbhanga District)

Period	pH	Temp.	Tur.	Do.	Co ₂	Alk.	Cl.	TH.	BOD.	COD.	PO ₄	NO ₃
July 2017	7.2	25.8	28.0	7.8	3.0	82.0	22.0	100.0	3.0	10.0	0.3	1.2
Aug. 2017	7.0	26.2	20.0	7.9	4.3	85.0	15.0	106.0	2.0	12.0	0.3	1.0
Sept. 2017	7.7	26.4	22.0	7.3	3.0	94.0	25.0	108.0	3.0	18.0	0.2	1.8
Oct. 2017	7.8	26.3	30.0	7.5	2.0	92.0	30.0	105.0	5.0	20.0	0.2	1.3
Nov. 2017	7.9	26.1	38.0	7.9	-	90.0	32.0	108.0	4.0	16.0	0.3	0.9
Dec. 2017	8.1	25.9	44.0	7.7	3.0	93.0	33.0	104.0	3.0	12.0	0.3	0.8
Jan. 2018	7.9	25.7	60.0	7.8	2.0	80.0	28.0	100.0	4.0	8.0	0.2	0.4
Feb. 2018	7.7	25.5	70.0	7.9	3.0	95.0	30.0	106.0	5.0	6.0	0.3	0.3
March 2018	7.2	25.3	64.0	7.6	1.0	84.0	32.0	110.0	4.0	8.0	0.3	0.6
April 2018	7.8	25.2	72.0	7.4	2.0	88.0	35.0	96.0	3.0	10.0	0.2	0.7
May 2018	8.0	25.4	56.0	7.5	1.0	89.0	40.0	106.0	2.0	8.0	0.3	1.0
June 2018	7.6	25.8	42.0	7.7	2.0	70.0	32.0	80.0	3.0	6.0	0.2	1.2

The acid-base equilibrium of various dissolved compounds is indicated by **pH** in any aquatic environment. This index, therefore, is widely regarded as an index of environmental suitability to any function and is also considered to be one of the key factors influencing a water body's efficiency (Welch, 1952).

Electrical conductivity (EC) is a valuable instrument for the determination of water purity. It depends on the ion and the temperature of the water. Complete salts are directly related to the conductivity of a water body. Conductance is often an indicator of freshness of the water body or otherwise. High conductivity values have been reported to be a pollution indicator.

In no of these **carbon dioxide** was reported possibly because of active photosynthesis and full conversion of CO₂ into stable charcoal.

Dissolved oxygen from any body of water forms an important parameter in the evaluation of water quality as it affects aquatic organisms' living conditions. Oxygen reaches the water by circulation or agitation of water by diffusion from around the air. It also is created in the water body itself as a by-product of photosynthesis. It has shown significant variations, showing the highest and lowest values based on various factors such as temperature, number and decay.

The toxic effects of poisonous elements also rely on **hardness**, as does alkalinity. Urmi (1983) indicated that overall hardness could be used to identify household pollution in water. Due to excessive evaporation and minimum mountain dilution caused by rainwater, it reached its maxima during the summer. For diatoms that make their frustules of this glassy content, **silica** is an essential nutrient. The key sources for fresh waters are the weathering of extremely plentiful feldspar rocks, the addition and recovery of silicate particles from the surrounding catchment areas.

Phytoplankton are the main producer of any aquatic environment which by means of the photosynthesis process fixes solar power to produce carbohydrates and assimilates carbon dioxide. Chlorophyceae, Myxophyceae, Bacillariophyceae, Euglenophyceae and Desmidiaceae were all members of the group and contributed to total phytoplankton. In these water bodies, all these species, including genera, have their own distribution pattern.

Chlorophyceae, which comprise a wide variety of different ecological species. It has 10 genera, (Crucigenia, Ankistrodesmus, Scenedesmus, Protococcus, Tetraspora, Ulothrix, Spirogyra, Chlorella, Pediastrum and Actinasrum).

Only two separate genera are described, namely Euglena spp. (E', acus, E. deses) and Phacus sp. **Euglenophyceae** group. All in the report. Euglenoides were identified as biological indicators of organic pollution by Kumar and Gupto (2002) in their study of some of the Santal Pargana (Jharkhand) s in India.

The most significant group of freshwater phytoplanktons is **baciUariophyceae**, the diatoms. They have always been reported in large numbers. The diatoms in these waterbodies described Cydotella, Amphora, Navicula, Nitzschia, Synedra and Diatoma. In the present analysis, polymodal maximums of diatoms have been found to be connected to the amount of dissolved silica available in ambient waters.

The Biochemical Oxygen Demand(BOD) for waste water, contaminated water and effluent is a parameter to determine relative oxygen demands. Higher value was observed and presented seasonal monsoon fluctuation and a low post-monsoon value. BOD showed very significant situations. Water BODs ranged from 19.6 to 29.8 mg / l.

In the river waters of 59.5 to 92.8 mg / l, **COD** values were also very high. Due to algal biomass and other organic matter, high COD values were observed (Patel and Sinha, 1998). The COD peak in Monsoon has been observed. BOD and COD are strongest in rainy seasons due to increased dissolved solid concentrations (Jameel, 1998).

In soft water systems, **sulphate** is a popular anion, where certain organic chelates are preventing the complex metal ions from interacting with other substances (Hutchinson 1957 and Wetzel 1975) This ions are very significant. The increased sulphate value may be attributable to the flux of the soil, which creates more suspended solids and organic and soluble salts (Sinha 1986).

A strong acid is the **alkalinity** of water and is characterised by the presence of hydroxyl ions which can be mixed with hydrogen ion. Philipson (1959), according to which inland waters are classified into three groups, also according to the same author, with low alkalinity waters, have defined the role of alkalinity in the determination of productive potential of the aquatic environment.

Zooplankton forms an important link in an aquatic environment between autotrophs and heterotrophs. Zooplankton is placed on the food web in the middle position. Zooplankton is adversely affected, the primary consumers that play a major role in fish processing. Sampathet al., 1978; Sharma, 1986 and Saksena, 1987 are highly variable in nature between water bodies and function as contaminant bioindicators (Arora, 1966). The Zooplankton connects phytoplankton with the macroinvertebrates, which in turn provide fish and aquatic birds with food.

CONCLUSION:

The turbidity benefit of the present research is little more so that turbidity can also minimise turbidity by dispersing gypsum on the entire water at the rate of 200kg/1000m³ of the s or the use of lime. Other criteria that are appropriate for fish culture are beyond the normal range. The fish water must be periodically examined. It is desirable. Standard time limits should be carried out according to the pH of water. Drag-Netting should be conducted at least once a month in order to damage the floor and ensure good quality conditions. The use of lime is to correct pH to a degree that is more suitable to fertilisers. The water should also be studied on a regular basis

REFERENCES:

1. Adoni, A.D.,1975. Studies on micro-biology of Sagar lake. Ph. D. thesis, Sagar University, Sagar, M.P.Anderson, G.C., 1961. Recent change in the trophic nature of lake, Washington. A review in algae and metro politancinnati, Ohio, TRW, 61(3):27-33
2. Tonapi, G.T. (1980) - Freshwater Animals of India: An Ecological Approach. Oxford and IBH Publishing Co., New Delhi, India. 341pp.
3. Unni, K.S. (1972) - An ecological study of the microphytic vegetation of the Doodhadhari Lake, Raipur, India. II. Chemical factors. Hydrobiologia, 40: 25-36.
4. Strom. K.M. (1927-28) - Recent Advances in Limnology. Proc. Linn. Soc. Land, 140:96-110.
5. Sinha, A.K., Srivastava, S. and Srivastava, K.N. (1989) - Physico-chemical studies of river Ganga water at Kalakankiar (Pratagarh). Indian J. Environ. Prot., 9(3): 194-197
6. Das. A.K., 2002. Phytoplankton primary Production in some selected Reservoirs of A.P. Geobios, 29:52-57.David, A. and Roy. P., 1966. Studies on the pollution the river Daha (N. Bihar) by sugar and distillerywastes. Environ. Hlth., 8(1):6-35.
7. Kaur, H., Dhillon, S.S., Bath, K.S. and Mander, G., 1996. Analysis of the elements polluting River Ghaggarain the region of Punjab. J.Env.& poll ., 3 (2): 65-68.