

LIMNOLOGICAL PARAMETERS OF BAGAD RIVER ,U.P.,INDIA (A TRIBUTARY OF GANGA)

SEEMA SHARMA¹

Department of Zoology, Meerut College, Meerut,U.P.,India

ABSTRACT

Every day, rivers streams and their tributaries passing through cities are receiving large amount of contaminants released from different point and nonpoint sources and have become important sink for unused waste load. Water is indispensable to life on earth. It is a precious gift of nature which is essential for the survival of plants, animals and human beings. Present investigations were carried out on the limnological aspects of Bagad river of U.P. Many of the parameters were found below the permissible limits for drinking water as suggested by WHO. A total of 13 parameters were analysed and their seasonal variations in the year 2011 were discussed.

Keywords: Limnological, Parameters, Bagad river, Seasonal variations

Water scarcity and the fast decline of aquatic biodiversity are indicators of ineffective implementation of water protection policies (Rapport *et al.*; 1995). Freshwater is the most essential requirement for life and yet < < 1% of the Earth's surface water (Johnson *et al.*, 2001). Sustainable and optimal use of natural resources is imperative in any country due to its concomitant economic implication such as industrial and population growth infrastructure and development demands (Howarth and Farber, 2002). The total available water of use in India is estimated as 1900 billion cubic meters per years. About 80 percent of this form the surface runs off the rivers, streams, lakes and ponds. Man is dependent for his food supply entirely on the products of land, water, plants and animals of the earth. Ever since the turn of this century progress in limnology has been rapid and for reaching, as a result of which it has become as integrated and coherent branch of science (WHO 2004). A study of freshwater habitat with special reference to its physico-chemical, geological and biological characteristics is termed as limnology. The study of limnology is of great importance to human race as the biological and physico-chemical data of this branch can be useful for quick development and growth of fishes. The importance of primary productivity is also well realised practically in fish culture programmes. Besides that, elucidation of the physico-chemical conditions in lakes, reservoirs, ponds and rivers are utilized for tiding over difficulties in filtration of drinking water. Thus it is very much essential for a healthy growth. But it may become harmful for life, if one

uses water polluted with harmful or with toxic substances and poor sanitation. Mishra, *et al.* 2009, Sirajudeen, *et al.* 2014. We depend on water for domestic needs, irrigation, sanitation and disposal of wastes. The quality and quantity of surface water bodies like lakes and tanks depend upon the climate, catchments, geography of the area and the inputs and outputs both natural and manmade (Gray, 1994). The water quality of lakes can be degraded due to microbiological and chemicals contaminants. In water natural impurities are in very low amounts. Lakes, dams, rivers are important source of fresh water.

MATERIALS AND METHODS

The present investigation will be visualized to report the diversity, density, role of plankton and fish productivity in Bagadriver. Samples of the water for physicochemical characteristics were analysed according to standard methods of APHA (1998) and Paka and Rao (1997). Water samples were collected from Gajraula town of Amroha district during morning hours in between 10.00AM to 01.30 PM with one litre containers from the Bagadriver in three seasons. To study the water quality and its seasonal variations, the water samples are collected during summer, monsoon and winter seasons. Some of the results were recorded at the sampling sites whereas the others were recorded in the laboratory. The parameters observed were pH, total dissolved solids, carbonates, bicarbonates, hardness, calcium, magnesium, sodium, DO, BOD, COD, nitrate and phosphate. The colour of temple tank water was observed visually. Hydrogen ion

¹Corresponding Author

concentration was determined with the help of BDH narrow range pH strips. Later on, to confirm the results the pH was also measured in the laboratory by the phillip's digital pH meter. Total dissolved solids was measured by 100 ml of water sample (filtered) dried on a hot plate in a pre-weighed China dish.

RESULTS AND DISCUSSION

During the present investigation the values of hydrogen ion concentration of the Bagadriver during the summer, monsoon and winter seasons were 5.30, 7.40 and 4.32 respectively. The variations of pH values during the study showed no remarkable significance. The highest value was noticed in monsoon season and lowest in winter season. Total dissolved solids of the river was 118 mg/l in summer, which is the highest value and the lowest values was noticed in winter.

Absence of carbonates was noticed and the bicarbonate alkalinity varied from 26 to 64 mg/l in three seasons, during which minimum value was observed in winter season and the maximum in summer season. Larger quantities of bicarbonates during summer may be due to the liberate ion of CO₂ in the process of decomposition of bottom sediments with resultant conversion of carbonates to bicarbonates.

Total hardness value of the tank was 18 to 32 mg/l of which higher value was in summer while the lowest in winter season. The maximum permissible limit for this parameter for drinking water standards is 500 mg/l. Same result are also founded by Pandey and Tiwari (2016).

Calcium is found in greater abundance in all natural water as its main source is weathering of rocks from which it leaches out.

Table 1: Seasonal variation of physicochemical factors in Bagadriver 2011

Winter season	Monsoon season	Summer season	Parameters	S. No.
7.56	7.4	5.40	pH	1.
41	98	118	TDS (mg/l)	2.
79	64	56	Carbonates (mg/l)	3.
26	43	64	Bicarbonates (mg/l)	4.
18	18	32	Total Hardness (mg/l)	5.
7.6	4.3	7.2	Calcium (mg/l)	6.
4.0	1.12	2.10	Magnesium (mg/l)	7.
12	34	34	Sodium (mg/l)	8.
9.2	6.5	7.5	DO (mg/l)	9.
6.4	4.8	0.9	BOD (mg/l)	10.
6.8	4.3	2.7	COD (mg/l)	11.
4.3	3.45	2.46	Nitrate (mg/l)	12.
5.34	7.5	6.4	Phosphate (mg/l)	13.

Calcium was found in the same quantity and comparatively higher both in summer and monsoon seasons while lower in winter seasons. Magnesium values are poor in all season. Sodium quantities varied between 12 to 34 mg/l with its summer maxima and winter minima. Throughout the investigation period, high dissolved oxygen contents was noticed during winter season. Carbon dioxide is one of the essential constituents of an aquatic ecosystem. The abundance of carbon dioxide exerts certain specific effects on aquatic bioata. The river exhibited maximum carbon dioxide as 36.0 mg/l during summer whereas the

lowest concentration of carbon dioxide (6.8 mg/l) was recorded during winter season. Cole (1975) noted that free CO₂ supply rarely limits the growth of phytoplankton. Alternately, the bicarbonates are utilized as a source of carbon by the photosynthetic activity of phytoplankton. BOD is found to be more sensitive test for organic pollution. BOD value of river water ranged between 0.8-4.3 mg/ l. Highest BOD value was observed in winter season. Increased temperature and sedimentation load reduce BOD (Pyatkin and Krivoshein, 1980). The estimation of COD is of great importance for waters having

unfavourable conditions for the growth of microorganism, such as presence of toxic chemicals (Saxena, 1994). COD value of river water ranged between 1.8-8.5 mg/l. Highest COD value was observed in winter season. The most important source of nitrates is biological oxidation of nitrogenous substances present in sewage, industrial wastes, chemical fertilizers, decayed vegetables, animal feed lots, leachates from refuse dumps, septic tank effluent, etc. High amounts of nitrates in river water are indicative of pollution. The nitrates concentration of water lies in the range of 2.46-4.30 mg/l. Although all the samples have nitrate concentration within the permissible limits prescribed by Bureau of Indian Standards, the presence of nitrates in the water samples is suggestive of some bacterial action and bacterial growth. These findings support to the observations of several workers (Hussainy, 1967, Singh, 1991, Majumder *et al.*, 2006). It is evident from the present study that the phosphate concentration was higher during monsoon and lower in winter season. It was quite opposite in relation to dissolved oxygen and phytoplankton population.

CONCLUSION

In the present investigation results of physicochemical parameters of Bagad river water were within desirable limits. The results obtained from the present investigation shall be useful in future management of the river. The physicochemical characteristics of river water suggested that there is harmful to, irrigation and drinking water and all biodiversity of river. So there is a need of proper treatment and restoration for humans and environment.

REFERENCES

- APHA, AWWA, WPCF, 1998. Standard methods for the estimation of water and waste water. American public health association. American waste water association and water pollution control federation. 20th Edition Washington. D.C.
- Cole G.A.; 1975. Text book of limnology. C.V. Mosby. Co., St. Lois, Sanfransisco.
- Gray N.F., 1994. Drinking water quality problems and solutions Chichester UK. John Wiley and Sons.
- Hussainy, S.V., 1967. Studies on limnology and primary production of a tropical lake. *Hydrobiologia*, **30**:335-352.
- Howarth, R. B. and Farber, S.; 2002. Accounting for the value of ecosystem service. *Ecological Economics*, **41**: 421-429
- Johnson N., Revenga C. and Echeverria J., 2001. Managing Water for People and Nature. *Science*, **292**: 1071-1072
- Majumder S, Gupta S, Saha R. N, Datta, J.K, Mondal, N., 2006. Eutrophication potential of municipal sewage of Burdwan Town, West Bengal, India. *Pollut. Res.*, **25**(2):299-302.
- Mishra, Deepti, Mudgal, Manish, Khan, Mohd Akram, Prabha Padmakaran and Chakradhar, B., 2009. Assessment of ground water quality of Bhavnagar region (Gujarat). *Journal of Scientific & Industrial Research*, **68**:964- 966.
- Paka, S and Rao A.N. , 1997. Interrelationship of physicochemical factors of a pond. *J. Environ. Biol.*, **18**:67-72.
- Pandey, Sulekha Rani and Tiwari A.K., 2016. Limnological studies of Gangapur tank (Raipur Karchuliyan) Rewa (M.P.) with special reference to zooplankton population, *International Journal of Advanced Science and Research*, **1**(7):01-05.
- Pyatkin KD, Krivoshein Yu S. ,1980. Microbiology (Eds: Trans. Aksenova and V. Lisovskaya). Mir Publishers, Moscow, 133-135.
- Rapport D. J., Gaudet, C., and Calow, P., 1995. Evaluating and monitoring the health of large ecosystems. Springer-Verlag, Berlin, Heideberg. New York, USA.
- Sirajudeen, J and Yahith R. A., 2014. Water quality assessment of groundwater resources between Tamilnadu and Pondicherry states,

- India. World Journal of Pharmacy and Pharmaceutical Sciences, **3**(7):881-893.
- Saxena MM.,1994. Environmental analysis, water, soil and air. Agro-botanical Publishers, Bikaner, India..
- Singh P.,1991. Seasonal variation in the macrophytic biomass production and its effects on the water chemistry of Kawarlake, Begusarai, Bihar. Environ. Ecol., **9**:72-76.
- World Health Organization (WHO),2004. Guideline for drinking water quality,thirdedn. World Health Organization. Geneva:104.