e-ISSN: 2455-667X

Annals of Natural Sciences
Vol. 2(4), December 2016: 40-43
Journal's URL: http://www.crsdindia.com/ans.html
Email: crsdindia@gmail.com

Annals of Natural Sciences

ORIGINAL ARTICLE

Limnological Study of River Yamuna Distt. Etawah (U.P.), India

Anil Kumar
Deptt. of Zoology, J.V. College, Baraut, Distt.– Baghpat (U.P.)
Email: drkatheriya76@gmail.com

ABSTRACT

Present work deals with the limnological study of river Yamuna at Etawah. Monthly samples were collected from the sites of Jaswantnagar, Etawah & Chakar Nagar. The physicochemical parameters clearly indicate like, temperature, colour, transparency, TDS, DO, BOD. Ammonia, Nitrate, Cloride were studies for one successive year. From the present observation it can be concluded that the over all water quality of river Yamuna at the selected site is poor.

Key words: *Yamuna River, Limnology, Physicochemical*

Received: 28th September, 2016, Revised: 25th October 2016, Accepted: 29th October 2016

How to cite this article:
Kumar A. (2016): Limnological Study of River Yamuna Distt. Etawah (U.P.), India. Annals of Natural Sciences, Vol. 2[4]: December, 2016: 40-43.

INTRODUCTION

The Yamuna River also known as the Jamuna, is second largest tributary river of the Ganga and the longest tributary in India. Yamuna River originates fro the Yamunotri Glacier at a height of 6387 meter on the south western slopes of Bandarpooch peaks of the lower Himalaya in Uttarakahand.

In India limnochemistry & limnobiology of the lakes, ponds and tanks have been recorded Ganpati 1955, 1960, Tamot *et.al.*, 1991. Mishra and Saxena 1993, Chaurasia and Pandey 2007, Kensa 2011, Saxena and Saxena 2012. In India 80% of the surface water is exposed to pollution. More then 95% of the sewage in the country is not treated. The amount of raw sewage entering the rivers is still increasing. The increase of pollution is caused by urbanization and population growth. Related to this industrialization also causes huge environmental problems (Zwart & Trivedy, 1995).

Moreover, the pollution problems have been adventitous to her development progress and her campaign to eradicate poverty. The efforts to boost progress has simultaneously put dire pressure on natural resources of the country. Irrigation facilities produced salinity and result was land pollution. Industrial development was a pollutant of air and water. Eradication of poverty warranted over exploitation of natural resources of the country. Pollution has come to stay in its diverse string and the whole humanity is out on a crusade for environmental balance.

MATERIAL AND METHODS

Water samples were collected monthly at every station from October to September. The samples were collected from 30 cm. depth of the water body and kept in polythene containers (5 litre). Some parameters were estimated on the spot while rests were done immediately after arrival in the laboratory. Pollution monitoring of the rivers as carried out by analysing different physico-chemical parameters for one years. Methods adopted were those of APHA, 2005. pH was measured with the help of Elico pH meter. Dissolved Oxygen was determined by the Wrinkler titrametric method. Alkalinity, carbonate,

hardness & chloride were measured titrametrically. Sulphate, phosphate, Ammonia-nitrogen and nitrate were analysed spectrophotometrically.

RESULTS AND DISCUSSION

Fresh water habitats play a very important role in sustaining human activities. Natural function of wetlands, and other freshwater habitats, generate a wide array of resources that directly or indirectly support the economic and social welfare of diverse groups of people. This role is being seriously weakened as a result of people. This role is being seriously weakened as a result of inappropriate planning and management approaches (Burbridge, 1994). The area experiences tropical monsoon climate with three distinct seasons viz. summer, rainy and winter. An average of physico-chemical values for one year of all three stations are summarised below.

TEMPERATURE:

The atmospheric temperature and water temperature were closely related to each other. Temperature recorded were high in the summer season (April & May) and low in water season (Nov. to Feb.). So far as the ecological factors are concerned temperature is of unique importance influencing the growth of the fauna and flora. The range of temperature varies from 15^0C to 38^0C. Dadhich (1989) recorded surface water temperature of river Chambal between 14.0^0C to 37.4^0C. Thus the area was found to be favourable for the growth of fauna and flora based on the temperature variation.

COLOUR & ODOUR:

In the down stream, the river water has its natural colour and it is odourless while in upstream of Yamuna it is yellowish black in color and have smell. Based on the colour, water is impure at station II and little polluted at rest of the stations Trivedy *et.al.,* (1995) have also studied of the colour variation in different rivers of the area.

TRANSPARENCY:

Transparency of the water is directly related with the penetration of light. Usually lower transparency or higher turbidity values show high pollution load. The higher sediments during rainy season months may increase the turbidity and decrease the transparency. The values of transparency ranged from minimum .2m - .7m in river Yamuna. According to Khalique (1995) turbidity and temperature correlate with each other. From our observation it was calculated that flood, rainfall and consequent increase of turbidity brings fall in phytoplankton population.

TDS & CONDUCTIVITY:

Conductivity and total dissolved solids are within the tolerance limit except at station I and III. The TDS & conductivity values are higher only in monsoon months. Therefore, they are favourable for biotic life. According to Ellis (1937) and Sharma *et.al.*, (1998) specific conductivity supporting a good fish lies between 150-500 micro mhos/cm.

pH:

There was slight fluctuation in the pH value of water ranging between 7.8-9.6. Thus the pH of the river water is always alkaline at all the stations. It has a higher range in summer, lower in rains and medium in winter. The pH variation range was also reported by other investigators Dadhich (1989), Khalique (1995) & Islam (1996). The hydrogen ion concentration of the water is influenced by the biological activities besides the addition of chemical substances. During rainy season the pH values are more lower due to dilution of alkaline substances or dissolution of atmospheric CO_2 as per WHO (1971) standard.

DISSOLVED OXYGEN:

Dissolved oxygen is an important parameter to determine the water quality for various purposes. Do concentration in water body indicates its ability to support aquatic life. In natural waters Do levels depend on physicochemical and biological activities of the water

body. It was observed by us all the time that DO at station I varied from 8.1 to 13.2 mg/l, at station II 6.7 – 11.80 mg/l and at station III 6.01 to 12.10 mg/l.

COD & BOD:

Chemical Oxygen Demand (COD) & Bio-Chemical Oxygen Demand (BOD) are the most important parameters used to determine the degree of pollution in river water at any time and their self purification capacity. High COD & BOD may cause oxygen depletion to level detrimental to the aquatic life. COD value at station I is 12.73 mg/l, at station II 3-23 mg/l, at station III 5-32 mg/l. Thus the COD and BOD values at site I & III were not very high but it was under stress in some months of the year. Most of the time the values do not undergo the tolerance limit.

AMMONIA– N:

The nitrogenous organic matter present in water is degraded biologically with the production of ammonia. Hence water polluted by sewage or industrial waste containing nitrogenous organic matter may contain a high concentration of ammonia. Nitrogen compounds as nutrients for aquatic micro organisms, may be partially responsible for eutrophication process. It has higher range in station I and lower range at other stations. As per standard NH_3 – N valves are at the safer level.

NITRATE & PHOSPHATE:

Nitrate and phosphate concentration of the water bodies are influenced with the geochemical conditions, organic load and rate of their mineralization. The rainfall is said to be responsible for increasing he amount of nitrate in water (Prasad & Saxena, 1980). Use of detergent may increase the phosphate concentration to great extent. Higher amounts of nitrate and phosphate represent high pollution load and are causes of eutrophication of the aquatic body. In our observations only river Yamna shows high values before the confluence with other rivers as showsn in the Graph (Plate II). Nitrate and phosphate are the most important nutrient for the growth of algal flora. The values vary during the different seasons but do not exceed the tolerance limit.

CHLORIDE:

Chloride values are highest in May (281) and June (190), suddenly become lower in July and remain low till October: increase thereafter till February and then reduce again. Dilution by rains and increase in river water apparently explains reduction in chloride values from July.

Bicarbonate values are relatively high from Jan to July (245-430 mg/l) at station I and lower at all the other stations, low from August to October and medium in winter (Nov.-Dec.). The physico-chemical parameters clearly indicate that less polluted and pollution load is also not very high. Therefore the area is very favourable for the growth of the fauna and flora. Intensive cultivation causes proliferation of agricultural pests and the wide spread use of pesticides. Increased pesticides run off can be a particularly injurious form of non-point pollution. On the basis of pollution load and pollution levels station, II was found to be eutrophic and other stations including were found to oligotrophic.

On account of varied pollution sources and human interference the water quality and aquatic biodiversity are being deteriorated considerably and some immediate measures are needed to save this water body from further damage. Unfortunately real integration of water management, pollution control and land management have not proved possible in this area. Therefore, integrated management of land and water will have to become the norm, not the exception. Planned development is the only solution available with the developing countries like India, for improving their living standard and the quality of life. Development implies utilisation of natural resources which result in the alteration of the natural environment. To avoid depletion or degradation of the natural environment, careful planning and designing ecologically sound management plan is the only answer.

REFERENCES

1. Akolkar Pratima and Trivedi R.C. (1995): Bio monitoring of water. Parivesh News letter, CPCB. 2(2): 1-16.
2. APHA, AWWA and WPCF (2005): Standard methods for the examination of water and waste water, Washington D.D., 19th Edn.
3. Burbridge P.R. (1994): Integrated planning and management of fresh water habitats, including wetlands. *Hydrobilogia,* 285(1-3): 311-322.
4. Chaurasia M. and Pandey G.C. (2007): Study of physico-chemical characteristics of some water ponds of Ayodhya-Faizabad. Indian *J. Environ. Prot.* 27: 1019-1023.
5. Dadhich L.K. (1989): Limnological studies on Chambal river. J. Phytol. Res., 2(2): 215-216.
6. Ellis M.M. (1937): Detection and measurement of stream pollution U.S. Fish Bull. No. 48.
7. Ganapati S.V. (1955): Diurnal variation in dissolved gases, hydrogen ion concentration and some of the important dissolve substances of biological significance in three temporary pools in stream bed at Mettur Dam. *Hydrabiologia,* 7: 285-303.
8. Ganapati S.V. (1960): The ecology of tropical waters. In: *Proceedings of the Symposium on Algology* (ed. Kachroo F). Indian Council of Agricultural Research, New Delhi, 204-218.
9. Islam M.F. and Islam S.R. (1996): Surface water quality of water bodies of Chalan beel area in Nator District, Bangladesh. J.Bull.env. Sci., 14: 1-3.
10. Jain Praveen, Sanjay Telang and Jawed Ahamed Khan (1998): Pollution status of Parbati river, Sehore. J. Eco., Env. & Cons., 41(2): 71-72.
11. Kensa M.V. (2011): Interrelationship between physico-chemical parameters and phytoplankton diversity of two perennial ponds of Kulasekharam area, Kanyakumari district, Tamil Nadu. *Plant Sci. Feed,* 1(8): 147-154.
12. Khalique A. and Afser M.R. (1995): Physico-chemical analysis of river Ganges at Farakka. Biojournal, 7(1-2): 101-105.
13. Lean Geoffrery and Don Hinrichsen (1994): Fresh water pollution Atlas of Environment, New Edn., 61-64.
14. Mishra S.R. and Saksena D.N. (1999): Phytoplanktonic composition of sewage polluted Morar (Kalpi) river in Gwalior (M.P). *Environ. & Ecol.,* 11: 625-629.
15. Nirmal K.J.E. (1997): Impact of pollution on aquatic biodiversity. J.Eco. Env. & Cons., 3(3-4): 20-217.
16. Prasad B.N. and Saxena M.M. (1980): Ecological study of blue green algae in the river Gomti. Indian J. Environ. HLTH, 22: 151-168.
17. Saxena M. and Saksena D.N. (2012): Water quality and trophic status of Raipur reservoir in Gwalior, Madhya Pradesh. *J. Natu. Sci. res*., 2(8): 82-96.
18. Singh D.K. and Singh C.P. (1990): Pollution studies on river Subernarekha around Industrial belt of Ranchi (Bihar), Indian J. of Environ. HLTH., 31(1): 26-33.
19. Tamot P., Khare S. and Shrivastava P. (1991): Limnological studies of Upper Lake, Bhopal during certain religious activities. *J. Natcon*., 3: 141-146.