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Seasonal Fluctuation of Physico-chemical Characteristics of Mansarovar Talab of Jeerapura Dhar Madhya Pradesh India

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ABSTRACT

The present paper deals with physico-chemical characteristics of Mansarovar talab Indore at four stations during the period 2014-2015. The water samples were analyzed for temperature, pH, total hardness, dissolved oxygen, biochemical oxygen demand, chloride, and prosperous. Dissolved oxygen was observed to be higher (11.9 mg/l) in the month of November (post monsoon) and minimum (7.4 mg/l) in month of June (summer season), while the Biochemical oxygen demand was recorded to be higher (6.9 mg/l) in the month of May and minimum (2.0 mg/l) in the month of August (monsoon season).

Introduction

Water is one of the abundantly available substances in nature. It is an essential element of our body and also a factor indispensable to our economic and social development. It is the basic and primary need for all vital life processes and it is now well established that the origin of life first took place in aquatic environment (Sharma, S. 2002). The physico-chemical characteristics of the water body are essentially considered to assess and to monitor the water quality for various purposes. Banerjea (1967).

The physico- chemical parameters are important for assessing the water quality. Physico- chemical properties of a natural water body (like river), their spatial distribution and variation in time provide a lot of information about the ecosystem. The physico-chemical characteristics of the water body have direct influence over its flora and fauna. It is difficult to understand biological phenomena fully without the knowledge of water chemistry as the metabolism of the ecosystem and hydro biological interactions may be understood in relation to water chemistry (Kulahresth 2005). Study of physico- chemical characteristics of the Mansatovar talab depict that the various physical and chemical characteristics show monthly and spatial changes.

The present study devoted for evaluation of inter and intra relationship of physical and chemical parameters of the Mansatovar talab and compare them with other talab, reservoirs and lakes.

Material and methods

The water samples for the physico-chemical analysis were collected in the first week of each month. The samples were taken each time between 9 .00-11.00 am from the four selected stations.

Collection of water samples

The samples were collected in plastic canes of five liters capacity without any air bubbles. The instruments were used of accuracy. The temperatures of the samples were measured in the field itself at the time of sample collection.

Physico-chemical analysis

Analysis was carried out for various water quality parameters such as Water Temperature, Transparency and pH were recorded at the time of Sample Collection, by using Thermometer and Pocket Digital pH Meter. Dissolved Oxygen (DO) and alkanity

was recorded by using portable water analysis kit. The estimation of total hardness, calcium factors are interrelated and interdependent. The calcium hardness, magnesium hardness, sulphates and chlorides were analyzed in the laboratory after immediately collecting samples. These parameters were measured in using Standard APHA (2005), Welch (1998), Trivedi et al (1986) and Golterman et al (1978).

Results and discussion

The concise presentation of seasonal variation for all the above mentioned physico-chemical characters were shown separately in figure 1-10.

Temperature

The Temperature is one of the most important factors in an aquatic environment and profoundly influences the nature of water body. In the present study water temperature ranges from 24.8 – 37.9°C. The minimum water temperature was recorded at station IV in December in the year 2014-2015 and maximum value was recorded at station IV in June in the year 2015-2016. The same observations were also reported by Sharma et al (2011) and Shraddha et al (2008) while studying the hydrological parameters of Narmada river at Hoshangabad recorded water temperature between 27.6o C to 38.4o C. Sharma et al (2001), Yogesh et al (2001) also reported the same type of fluctuation in various freshwater bodies.

Transparency

Transparency of the water body is mainly affected by the suspended particles and other factors like plankton growth, rain fall, nature of water and weather conditions. In general transparency varied from 19.8 – 50.0 cm. The minimum transparency was recorded at station II in July in the year of 2015-16. This was due to the increased amount of particles which were added by surface runoff. The maximum transparency was at station IV in November in the year 2015-2016. This was due to settling of particles. These observations were also supported by Prasanna and Panda (2010), Shraddha et al (2008) and Trivedi et al (2009).

pH

pH is greatly affected by photosynthetic activity of aquatic plants, by exposure of air temperature, disposal of sewage and disposal of industrial water etc. pH fluctuated between 7.4 to 9.1. The minimum pH was recorded at station I in January in the year 2014-15. The maximum pH was recorded at station IV in June in 2015-16. Similar observations were confirmed by many other workers such as Pathak and Mudgal (2005), Khanna (2003).

Dissolved Oxygen

Dissolved Oxygen is important for aquatic system and also essential for the metabolism in the organisms. There are two main sources of dissolved oxygen in water i.e. by diffusion from air and photosynthetic activity. In general dissolved oxygen varied between 5.2 – 11.9 mg/l. The minimum value was recorded at station III in September in the year of 2014-15. The maximum dissolved oxygen value was recorded at station I in June in the year of 2014-15.

Total Alkalinity

The value of total alkalinity is fluctuated from 225.4-499.0 mg/l. The minimum value was recorded at station II in March in the year of 2014-15. The maximum value was recorded at station II in November in the year of 2015-16. Same results were also reported by Choubey (1991) and Sharma et al (2004).

Biochemical Oxygen Demand

Biochemical oxygen demand is an index of organic pollution and help in deciding the suitability for water consumption. The biochemical oxygen demand value fluctuated between 2.0 – 6.9 mg/l. The minimum biochemical oxygen demand value was recorded at station I in August in the year 2014-15. The maximum value was recorded at station II in January in the year of 2015-16. Same observations were also recorded by Nnaji et al (2010) and Mary et al (2000).

Hardness

It shows quality of water supplies. The hardness is governed by contents of calcium and magnesium salt, largely combine with bicarbonates and carbonates, and with sulphate, chloride and other anions. The total hardness varied between 105.0– 330.0 mg/l. The minimum total hardness was recorded at station II in February in the year of 2014-15 and maximum total hardness at station IV in June in the year of 2014-15. This maximum value is due to continuous leaching an accumulation of salts in the absence of flow in summer months. Similar results have been observed by Varunprasath K., Nicholas A. & Daniel (2010), Sandwar & Prasad (2000), Choube (1991).

Chloride

Chloride is present in fresh water in the form of calcium, magnesium and sodium salts. The concentration of chloride content is also used as an indicator of pollution in fresh water. In the present study, chloride varied from 23.4–69.3 mg/l. The minimum value was recorded at station I in December in the year 2014-15 and maximum value was at station IV in June in the year of 2014-15. Similar results have been observed by Chowdhary (2011) and Siraj et al (2010).

Nitrate

In an aquatic ecosystem, nitrogen is present in the form of organic nitrogen compounds, ammonia, nitrate, and as nitrite. In present study, nitrate value fluctuated between 26.0–68.0 mg/l. The minimum value was recorded at station II in month of October in the year of 2014-15 and maximum value was recorded at station III in June in the year of 2015-16. Similar results have been observed by Tripathi (1982) and Shukla et al (1989) and Ahmad (2004), Pant et al(1985).

Phosphate

The major sources of phosphorus are domestic sewage detergents, agricultural effluents with fertilizers and industrial waste water. In the present study, phosphate values varied between 1.15 – 3.80 mg/l. The minimum value was recorded at station II in June in the year of 2014-15. The maximum value was at station III in June in the year of 2014-15. Similar results have been observed by Chouhan, R. (1995) Sharma et al (2011), Trivedi et al (2009).

Sulphate

Sulphate is ecologically important for growth of plants and its short supply may inhibit the development of plankton. It is utilized by all living organisms, in the form of both mineral and organic sulphate. In the present study, the value of sulphate varied from 4.9–118 mg/l. The minimum value was recorded at station I in month of May (summer) in the year of 2014-15 and maximum value recorded at station IV in May in the year of 2015-16. Similar fluctuation in sulphate values were reported by Sharma et al (2004) in Yashvant Sagar reservoir India. Dixit et al (2015), Sandwar. & Prasad (2000) also reported similar values.

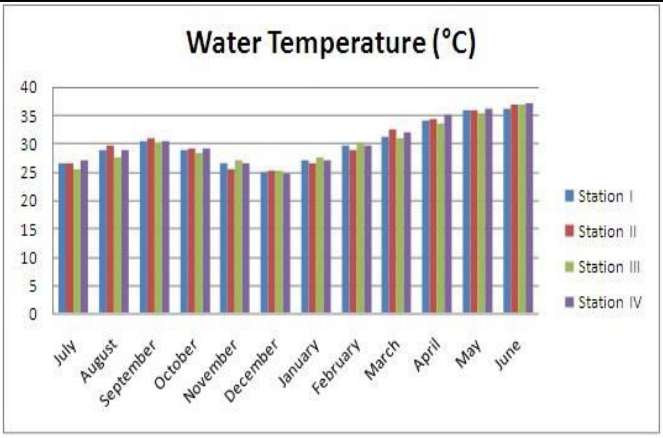

Fig.-1. Monthly Fluctuations in Water Temperature (°C) in Mansarovar Talab of Jeerapura (Dhar) Year July 2014- June 2015.

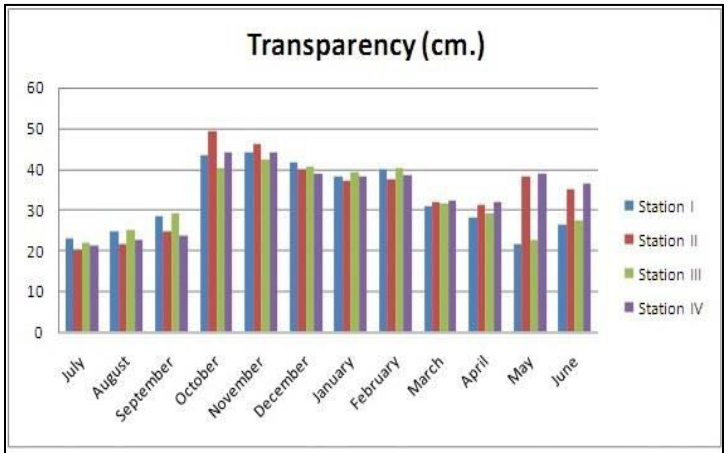

Fig.- 2 Monthly Fluctuations in Light Transparency (cm.) in Mansarovar Talab of Jeerapura (Dhar) Year July 2014 - June 2015.

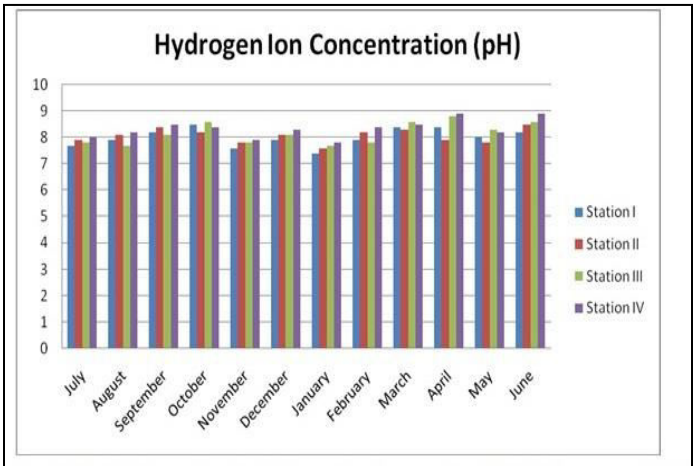

Fig.3 . Monthly Fluctuations in Hydrogen Ion Concentration (pH) in Mansarovar Talab of Jeerapura (Dhar) Year July 2014- June 2015.

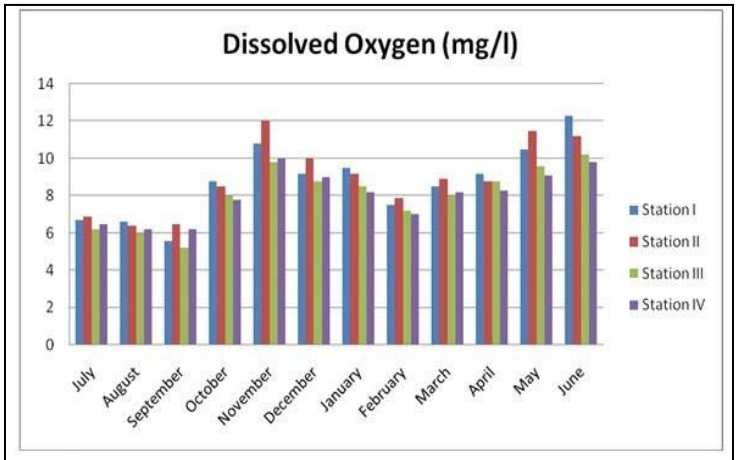

Fig. - 4 . Monthly Fluctuations in Dissolved Oxygen (mg/l) in Mansarovar Talab of Jeerapura (Dhar) Year July 2014- June 2015.

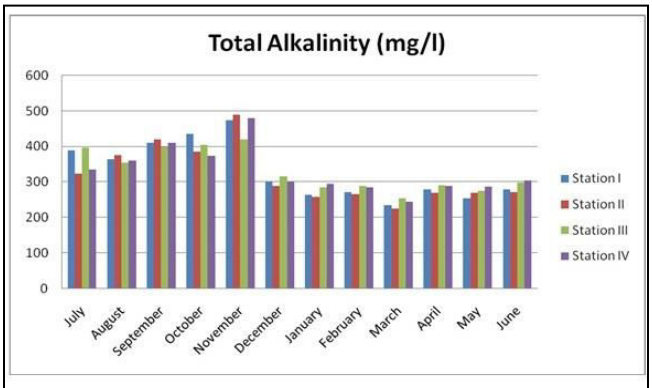

Fig. - 5 . Monthly Fluctuations in Total Alkalinity (mg/l) in Mansarovar Talab of

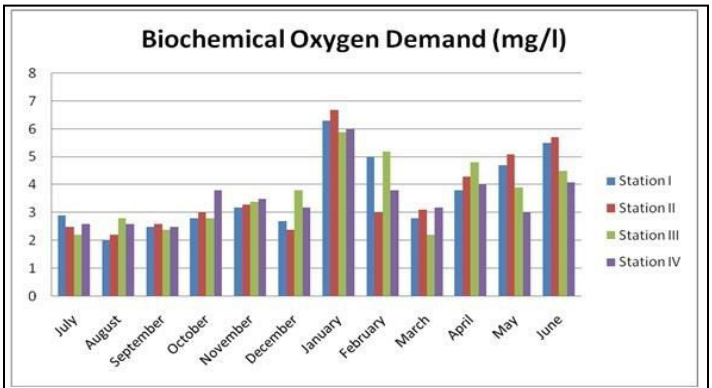

Fig. - 6 . Monthly Fluctuations in Biochemical Oxygen Demand (mg/l) in Mansarovar Talab of Jeerapura (Dhar) Year July 2014- June 2015.

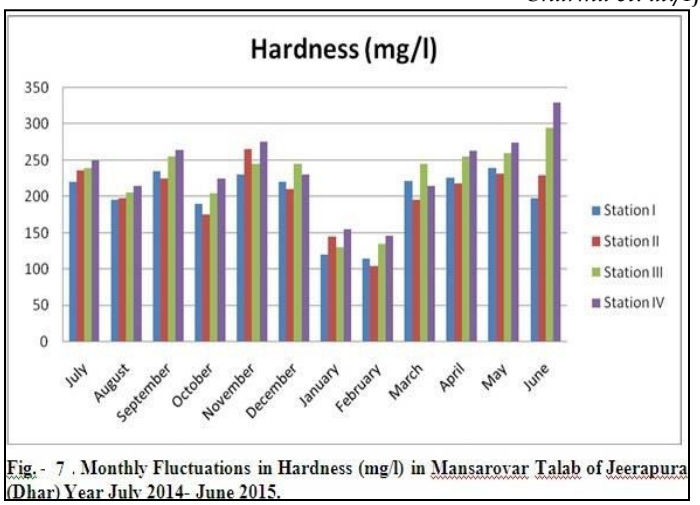

Fig. - 7 . Monthly Fluctuations in Hardness (mg/l) in Mansarovar Talab of Jeerapura (Dhar) Year July 2014- June 2015.

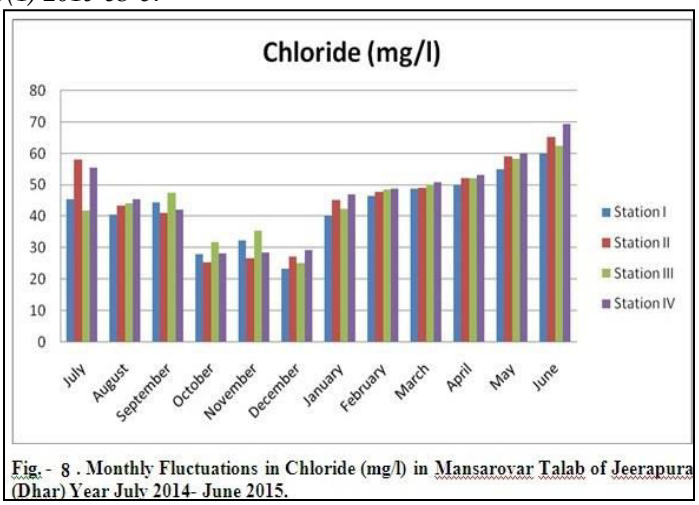

Fig. - 8 . Monthly Fluctuations in Chloride (mg/l) in Mansarovar Talab of Jeerapura (Dhar) Year July 2014- June 2015.

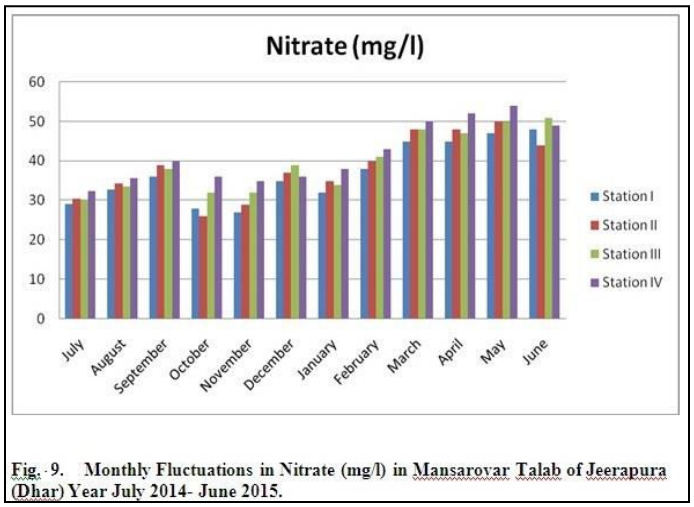

Fig. 9. Monthly Fluctuations in Nitrate (mg/l) in Mansarovar Talab of Jeerapura (Dhar) Year July 2014- June 2015.

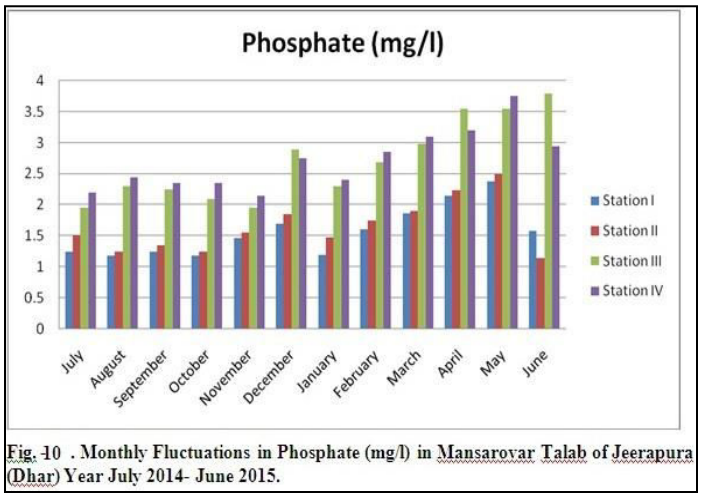

Fig. 10 . Monthly Fluctuations in Phosphate (mg/l) in Mansarovar Talab of Jeerapura (Dhar) Year July 2014- June 2015.

Conclusion

This study provides an informative data and helps to understand the contamination of waste water in Mansatovar talab and the influences the ecology of Mansarovar talab. The major source of pollutants are local anthropogenic activities, agricultural runoff and swage effluent. In the present study it was found that physico-chemical characteristics of a few of the talab water samples crossed the maximum permissible limit, due to effluent of waste and domestic sewage it was noticed that the physico-chemical parameters indicates balance of the Mansarovar talab was disturbed. The study concluded that due to discharge of untreated sewage into the Mansarovar talab, the water quality of Narmada has been severely deteriorated day by day and the potable nature of water is being lost. So that continuous monitoring of the physico-chemical parameters of the Mansarovar talab are required. Protection and management of water bodies have been recognized as a priority sector all over the world, since the quality of potable water plays an important role for the welfare of the public health.

References

APHA (2005) Standard method for examination of water and waste water Amer Publ. Health ASSOC, Washington. (22th Edition) New York.

Belsare, D.K, (1984) Limnology background of water treatment problems in tropics, Journal of Scientific and Industrial Research. 43: 172-176

Das, S.M, (1989) Hand book of limnology and water pollution , South Asian Publishers Pvt. Ltd. 174 pp.

Gopal, B and Zutschi, D.P (1998) Fifty years of Hydrobiological Research in India. Hydrobiologia, 384: 267-290.

Choube U (1991) Studies on physico-chemical and biological parameters of Gandhi sagar reservoir, Mandsaur district MP. Ph. D thesis, Vikram University Ujjain.

Dixit A K., Pandey S K , Mehta R, NiyazAhmad, Gunjan, Pandey J. (2015):Study of physico-chemical parameters of different pond water of Bilaspur District, Chhattishgarh, India Environmental Skeptics and Critics,ISSN 2224-4263 4(3): 89-95

Goltherman, H.L. Clymo R.S. and Ohnstad, M.A.M. (1978) Method for physical and chemical analysis of fresh water. IBP Handbook No.8 Blackwell Scientific Publication, Oxford, 213 pp.

Lind, O. T (1979) Handbook of common methods in Limnology. C.V. Moshy Co. 2ndEdition, St Louis, Missouri, 199 pp.

Munawer. M, (1970) Limnological study on fresh water of Hyderabad, India; I. The Biotop; Hydrobiologyia 35 : 127-162.

Odum, E.P.(1971): Fundamentals of ecology 3rd Ed. Saunders. Philadalphia. 574 pp.

Pant M.C, Sharma P.C. and Sharma A.P. (1985): Physico-chemical limnology of Lake Nainital Kumaun Himaliya (UP) India. Acta. Hydrochim. Hydrobiol., 13: 331-349.

Chouhan, R. (1995) Relationships among physico-chemical characteristic in Rewalsar Lake, Himachal Pradesh. Flora and Funa 1: 77-78.

Reid G.K. and Wood. R.D. (1978) Ecology of inland water and Esturaies, D.Vah. Nostrand Company, New York.

Sunder, S.C. (1998) In Ecology and pollution of Indian rivers (Ed) R.K. Trivedi, Ashish Publ. House New Delhi, 131.

Wipple. G.C, (1954); Microbiology of drinking water, John Wiley and Sons London

Wetzel R.G., Likens G.E. (2006) Limnological analysis.3rd ed. Springer-Verlag, New York, 391. 22.

Sandwar B.B. & Prasad J. (2000): Physico-chemical characteristics of Ganga river at Makamah, Bihar. In (Trivedi, R.K. Edited) pollution & Biomonitoring of Indian Rivers. ABP. Pub: pp 130-132.

Sharma S., V. Rakesh, D. Savita and J. Praveen (2011). Evaluation of water quality of Narmada river with reference to physico-chemical parameters at Hoshangabad city, MP, India. Res. J. Chem. Sci. 1(3) pp 40-48.

Sharma, S., Tali, I., Pir, Z., Siddique, A. & Mudgal, L.K. (2012): Evaluation of physico-chemical parameters of Narmada river, MP, India Researcher 4(5): 13-19pp.

Sharma, S. (2002): Biodiversity of littoral benthic organism & their tropical relationship with shorebirds & fishes in Krishnpura lake. Ph.D Thesis, D.A.V.V. Indore (M.P.). Sharma, S. (2002): Biodiversity of littoral benthic organism & their tropical relationship with shorebirds & fishes in Krishnpura lake. Ph.D Thesis, D.A.V.V. Indore (M.P.).

S. Sohani, S. Iqbal A. Bafna(2014). Studies of Physico-Chemical Status of the Sirpur Talab at Indore, India. IJSRD Vol. 2, Issue 09, 2014 | ISSN (online): 2321-0613

Shraddha S., D. Savita, J. Praveen, K. W. Shah, R. Vishwakarma (2008) Statistical evaluation of hydrological parameters of Narmada river water at Hoshangabad city, India. Environ Monit Assess.143: 195-202.

Trivedi P., A. Bajpai and S. Thareja (2009) Evaluation of water quality: Physico-chemical characteristics of Ganga river at Kanpur by using correlation study. Nature and Science 1(6) pp91- 94.

Varunprasath K., Nicholas A. & Daniel (2010): Physico-Chemical Parameters of River Bhavani in Three Stations, Tamilnadu, India Iranica Journal of Energy and Environment 1(4): 321-325pp. ISSN 2079-2115.

Welch E. B, Jacoby J. M. and Christopher W. M. (1998); Stream quality in river ecology and management lesson from the pacific coastal eco region published by springer Varley New York. 69-94.