



ASSESSMENT OF SEASONAL VARIATIONS IN PHYSICO-CHEMICAL PARAMETERS TO INVESTIGATE POLLUTION STATUS OF NARMADA RIVER, JABALPUR REGION (M.P)

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Abstract

A systematic study has been carried out in year 2011-12 assess the water quality of river Narmada in Jabalpur region (M.P.). Water samples were collected from two different sampling stations and analyzed for physical chemical parameters (Temp., pH, TSS, TDS, alkalinity, hardness, calcium, magnesium, Nitrate. The study area experience a seasonal climate and broadly divided into three seasons as winter (Oct-Jan), Summer (Feb-May) and Rainy (Jun-Sept.). Each parameter was compared with the standard desirable limit of that parameter in river water as prescribed by different agencies. The analytical data of various physico-chemical parameters indicates that some parameters like pH, temperature, TSS, TDS, total alkalinity, hardness, calcium, magnesium and nitrate are beyond permissible limits. The WQI indicates that the water samples of some stations have very poor water quality which is unfit for drinking. Suitable and necessary suggestions have been made to improve the quality of river water.

Keywords- Physico-chemical parameters, Narmada River, Jabalpur (M.P), quality of water.

Introduction

Water plays an important role in human life. In many countries including India too, the river are not only being exploited but are also used as dumping place for sewage and solid wastes. Direct or indirect addition of solid waste and other pollutants is badly affecting and deteriorating the water quality. Jabalpur or Sanskardhani is the main city of Central India and is also known as "Mahakaushal". It is situated almost in the centre of India between the co-ordinate of 20°10' latitude and 79°57' E longitude and with a general elevation of about 393 meters above (MSL). Narmada is the fifth largest river in India. It originates from Maikal ranges at Amarkantak in Madhya Pradesh at an elevation of 900M. Considerable investigations of Physico-chemical properties of river water are carried out in India. Singh and Gupta, 2004 Barai and Kumar, 2012 Deshmukh, 2012, Chaurasia and Karan, 2013, Majumder and Dutta, 2014, Sharma 2015.

Materials and Method

Study area: The present study has been carried out in Jabalpur (M.P.) to examine water quality of Narmada River. During the study physico-chemical parameters were studied. Water samples were taken from 2 stations i.e. Lamhetaghat and Bhedaghat. Site 1 (S-1) Lamhetaghat is situated around 16kms from city head quarters. On this bank of river a fast developing village is situated. The village is of importance because of the existence of several mines and kilns for bricks building. The Narmada river at this point is 150-200 mts wide, dept 5-10 feet inner the bank and 40-50 feet in the center.

This stations is also a place of worship where devotees perform religious rituals, take holy bath, cattle bathing and washing of clothes can be seen here frequently. Site 2 (S-2) is Bhedaghat, one of the most visited tourist spot in Jabalpur. It is famous for its scenic beauty and marble rocks. It is situated 21kms from the city headquarters. River Narmada is about 600-800 ft deep here. Population is 1,840 out of which 53% males and 47% females. Due to overcrowding by visitors garbage can be seen commonly. Water is not clear enough, People wash clothes here.

Gelatin Factory

Narmada Gelatin Ltd. (Erstwhile Shaw Wallace Gelatin) is located near Bhedaghat (S-2). It is situated in Meeraganj, Bhedaghat. Thus, contributing a little bit to the pollution level.

Samples Collection and Analysis

All liquid samples were collected with a volume of not less than 100ml. A space of at least 2.5 cm was left in the bottle to facilitate mixing by shaking. Samples were collected in non-reactive glass bottles that had been cleaned and rinsed carefully. Containers were lowered to a depth a not greater than 20ft below the surface to fill. The present study was conducted at two different sampling stations from October 2011 to September 2012. For seasonal

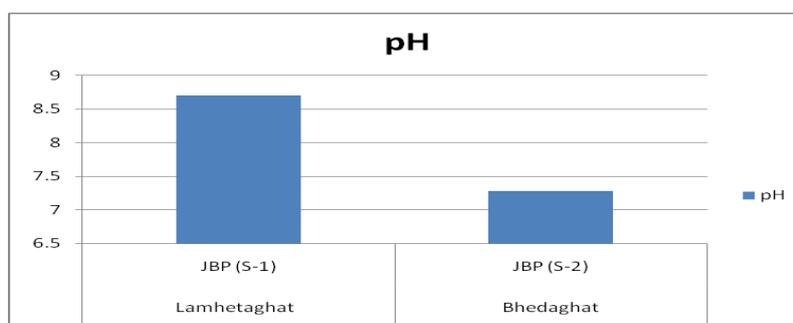
variations, the sampling is done every month between 8.00 am to 10.00 a.m. Physical parameters are examined on the spot whereas, for chemical analysis samples were taken to the laboratory. pH of water samples was measured by pH meter using standard solution, temperature using thermometer. TDS (Total dissolved solids) is measured using TDS meter; TSS by filtration; total alkalinity by acid- base titration, total hardness, calcium and magnesium using EDTA method and nitrate by spectro -photometric method.

Results and Discussion

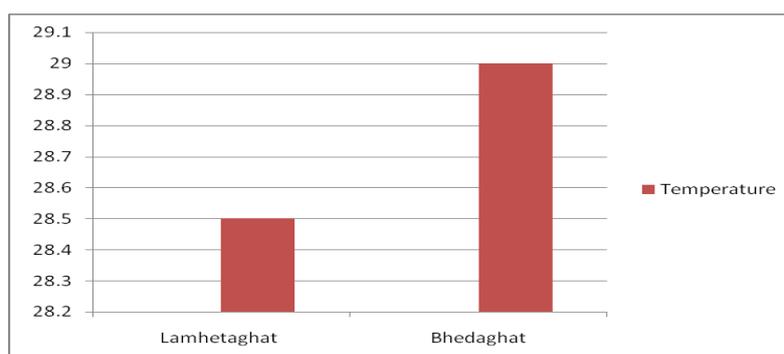
The results of study have been reported in the table given below. The values except for few of all parameters were found above the permissible limits. Temperature influences the life of all biological organisms. During the research work pH value observed at S-1 was 8.7 and S-2 was 7.28. Value of temperature at S-1 was 28.5°C and S-2 was 29°C. Similar range of temp. i.e. 23.6°C to 46.6°C was reported by Trivedi (1989) in polluted water zone of Chambal river at Nagda. Total dissolved solids (TDS) observed at S-1 was 256.91 mg/l and S-2 was 167.9 mg/l. Total suspended solids (TSS) observed at S-1 was 142 mg/l and S-2 was 146.75 mg/l. Similar studies were reported by Kataria et.al (1995). Total Alkalinity observed at S-1 was 211.3mg/l and S-2 was 218.25 mg/l. Similar range of 72mg/l to 207 mg/l in Ganga river was reported by Pahwa and Mehrotra (1996). Total hardness observed at S-1 was 459.5 mg/l and S-2 was 428.16 mg/l. Similar studies are reported by Walega (1982) Calcium hardness observed at S-1 was 297.75 mg/l and S-2 was 277.91 mg/l. Magnesium hardness observed at S-1 was 160 mg/l and S-2 was 151.41 mg/l. Nitrate observed at S-1 was 21.54 mg/l and S-2 was 15.55 mg/l, which is much more higher than the drinking standards as standard by IS; 10500 (1983)-45 mg/l (Max.) this excess of nitrate content beyond 45 mg/l causes methemoglobinemia (Maiti, 2001). These values indicate that the water is highly unfit for drinking. All the above values are shown in table-1 & Graphs 1,2,3,4 and 5 respectively.

Table-1 Water quality parameters of Narmada River sample from study area.

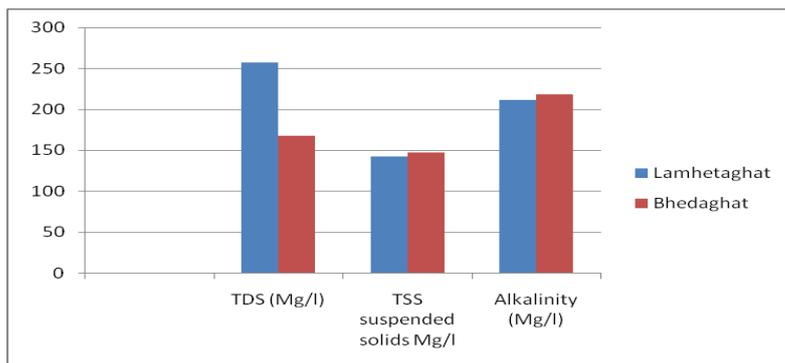
S.No.	Parameters	Lamhetaghat JBP (S-1)	Bhedaghat JBP (S-2)
1.	pH	8.7	7.28
2.	Temperature	28.5°C	29°C
3.	TDS (mg/l)	256.91	167.91
4.	TSS suspended solids (mg/l)	142	146.75
5.	Alkalinity (mg/l)	211.3	218.25
6.	Total Hardness (mg/l)	459.5	428.16
7.	Calcium hardness (mg/l)	297.75	277.91
8.	Magnesium hardness (mg/l)	160	151.41
9.	Nitrate (mg/l)	21.54	15.55



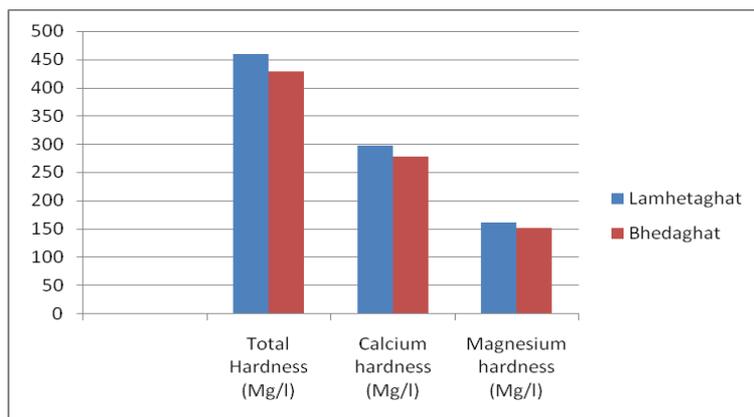
Graph -1 showing annual mean value of pH



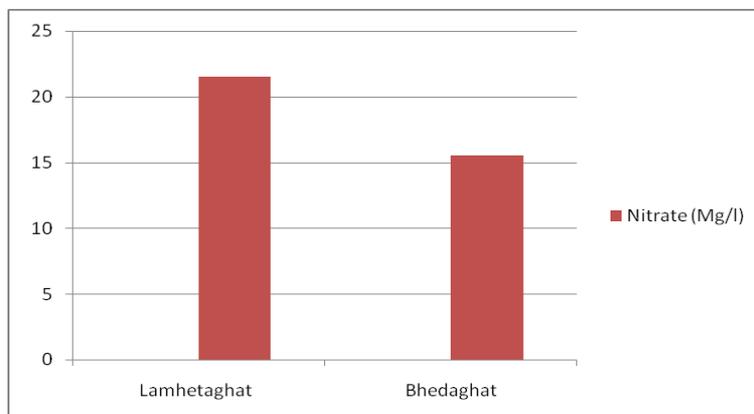
Graph -2 showing annual mean value of Temperature



Graph -3 showing annual mean value of TDS, TSS, Alkalinity



Graph -4 showing annual mean value of Total Hardness, Calcium Hardness, Magnesium hardness



Graph -5 Showing annual mean value of Nitrate

Sources of pollutants

The main source contributing to the pollution of Holy river Narmada at these two stations are “Narmada Gelatin Factory”, Garbage through nearby villages, ritual reasons, Cow-dung etc. These altogether contribute to the change in physico-chemical parameters such calcium, alkalinity, magnesium etc. Some parameters showed significant changes resulting in deterioration of water quality. Thus, making the water unfit for drinking and other uses too. A similar study on water quality of river has been described Malviya et.al (2010). It was proven by this experiment that the human activities along with animal wastes and all are adding a great degree of negativity to the water quality, which finally leads to the destruction of flora and fauna.

Conclusion

While assessing the various parameters, it was concluded that the water quality level of Narmada is not satisfactory. It is also observed that nearby Gelatin factory (Ernst Shaw wallace Ltd) is also adding a little contribution to the poor quality of Bhedaghat water. So, it is highly suggested that state government along with

source non-government organization should take an appropriate actions and should start some “Swachh Narmada Abhiyan” to help Narmada to be a holy river forever.

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