P: ISSN NO.: 2394-0344 RNI No.UPBIL/2016/67980 VOL-2* ISSUE-4* July- 2017
E: ISSN NO.: 2455-0817 *Remarking An Analisation*

Study of Water Quality of Narmada River, Jabalpur Region (M.P.)

Abstract

Narmada river is the life line of Madhya-pradesh. River water is used for various purpose such as agriculture, domestic and irrigation etc. Jabalpur is the main city of Central India and traditionally known as Mahakoushal. The WCR headquarter GCF, OFK and VFJ and also a very important army base are situated at Jabalpur. Narmada Water is used by nearby villages of studied ghats in large amount . Due to nearly situated Gelatin Factory i.e. Narmada Gelatins,these ghats are also getting polluted day-by-day. It is necessary to regularly monitor the water quality by analysis of various Physico-chemical parameters. The objective of present research work is to study various water pollutants of river Narmada.

Keywords: Narmada River pH, Conductivity 'Turbidity, BOD.

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Introduction

Rivers are natural water course usually fresh water, flowing towards an ocean a lake or a sea or another river.River are the part of hydrological cycle. Rivers are the symbols of self- replenishing, self purifying life sustaining cycle of matters. The Narmada river is the fifth largest river in India and largest west flowing river of Indian peninsula It originates from Maikal ranges at Amarkantak in Madhya Pradesh at an elavation of 900M. Jabalpur also called as Mahakoushal, is situated almost in the centre of India between the co-ordinates of 20^0 10' Latitude and $79^0$57' E Longitude and with a general elevation of about 393 meters above (MSL).

The water quality of river Narmada has been studied during the period of one year i.e. from Oct. 2010 to Sep. 2011, from sampling station Lamhetaghat (S-1) to Sampling station (S-5) Bhedaghat. Narmada, a Holy river is getting polluted due to nearby gelatin factory situated between sampling station 4 & 5 i.e. Narmada Gelatins and other wastes such as cow-dung and other organic water from the nearby villages. The physico-chemical parameters such as pH, conductivity, turbidity and BOD are studied and on basis of these parameters, water quality is evaluated. A survey of literature reveals that good number of valuable contributions has been made during the last two- three decades from the central region of India. Literature survey showed that there were certain studies by workers like Soni and Salahuddin (2013). Ashraf,M.P And Mukundan,M.M.(2007)

Aim of the Study

To observe the seasonal variations in Narmada river water by evaluating its physico-chemical parameters at five different stations on the basis of which the nature and quality of water can be analysed. On the basis of which water quality index can be calculated and necessary actions can be taken. It is important to know about the accurate condition of water quality as it is highly used by nearby villages for drinking.

Review of Literature

Rivers are the most important source of water to global population, Narmada is a holy river and is the only river in India that flows in a right valley.

Similar studies are done by many researches. The water of lower Lake of Bhopal is used for drinking, irrigation and power supply but varies from one station to another. The situation is not too worst but its alarming (Ghosh et.al.,2014). Deep research is being done by Kushram, Parvati (2013), Majumdar and Dutta, 2014 one Physico-Chemical study of Narmada river at Dindori (M.P.)

Varhasiya, A.R., Pamnai A.N., Patel N.R. (2016), studied the physico-chemical water quality of Narmada river (Gujrat).

Similar work is done by Kumari M, Mudgal L.K. and Singh A.K. (2013), on comparative study of physico-chemical parameters of two reserviors of Narmada river at M.P.

Material and Methods

During the present study of Narmada river water in Jabalpur region from Oct 2010 to Sept 2011, survey is done in 5 sampling spots (ghats) namely Lamhetaghat (S—1), (2) Laxminarayan Ghat (S-2), (3) Gograghat (S-3), (4) Saraswati Ghat (S-4), (5) Bhedaghat (S-5) for physico-chemical analysis covering all the seasons, water sample have been collected. All liquid samples were collected with a volume of not less than 100ml. A space of atleast 2.5m was left in the bottle to facilitate mixing by shaking. Samples were collected in a non- reactive bottles that had been cleaned and rinsed carefully. Taking the samples with a view to assess the nature and degree of pollution. The samples were collected from just below the water surface by using modified hales samplers of liter capacity. For seasonal variations the sampling is done every month between 8.00 am to 10.00 am and to show diurnal variations the day in a month was chosen and around five readings were taken by keeping the gap of 4 hours (approximately) for each sampling stations different dates were selected. P^H was determined by using digital P^H meter, conductivity by conductivity meter, turbidity by using turbidity meter. While BOD and other physico-chemical parameters were determined by adopting methods given by APHA(1992).

Results and Discussion

The results analyzed form the water samples collected from different sampling stations of river Narmada, Jabalpur region during the study period (Oct. 2010 to Sep. 2011) is present in Tables & Graph 1,2,3 & 4.

Hydrogen Ion Concentration

It is the measure of the relative acidity or alkalinity and represents the negative logarithm of the concentration of free hydrogen ions in a solution. The 'P' of pH denotes the power of the hydrogen ion activity in mole per liter. In the year 2010-2011 of the study, the annual pH mean values were recorded on S1 : Lamhetaghat – 8.23, S-2 : Laxminarayan Ghat – 7.81. S-3: Grograghat – 8.27, S-4: Saraswati Ghat – 7.77, S-5: Bhedaghat – 7.1 Similar work has been reported by Pahwa and Mehrotra (1966) with pH range of 7.4 to 8.3 in river Ganga.

Conductivity

It defines materials ability to conduct electricity. Electric current can flow easily through a material with high conductivity. Conductivity is measured in Siemens per meter and is often represented by a Greek letter. In the year 2010-2011 of the study the annual conductibility mean values were recorded are S1 : Lamhetaghat – 230, S-2 : Laxminarayan Ghat – 253.91. S-3: Grograghat – 229.91, S-4: Saraswati Ghat – 248.75, S-5 : Bhedaghat – 247.66.

Turbidity

Turbidity in water is caused by the substances not present in the form of true solutions. Turbidity makes the water unfit for domestic purpose. The measurement of turbidity is the key test of water quality. Fluids can contain suspended solid matter consisting of particles of many different sizes. While some suspended material will be large enough and heavy enough to settle rapidly to the bottom of the container if the liquid sample is left to stand. Very small particles will settle only very slowly. There small solid particles cause the liquid to appear turbid. In the year 2010-2011, the annual turbidity mean values were recorded as S1: Lamhetaghat – 14.81, S-2: Laxminarayan Ghat – 15.09. S-3: Grograghat – 13.54, S-4: Saraswati Ghat – 15.02, S-5 : Bhedaghat – 13.52.

Biological Oxygen Demand

Biological oxygen demand is the amount of oxygen required by aerobic bacteria to decompose the organic matter of base water and polluted water. In the study year 2010-2011, BOD is found to be high in sampling stations S2, S4 & S5. The annual BOD means values were recorded as –

S1: Lamhetaghat – 8.6, S-2: Laxminarayan Ghat – 8.75. S-3: Grograghat – 7.75, S-4: Saraswati Ghat – 8.41, S-5: Bhedaghat – 11.5. The high BOD values are due to less dilution and waste water. The rainy season shows the BOD is less due to dilution by rain water as compare to winter and summer seasons that has high BOD.

Sources of Pollutants

The main source contributing to the pollution of Holy river Narmada at these five staions are "Narmada Gelatin Factory", Garbage through nearby villages, ritual reasons, Cow-dung etc. These altogether contribute to the change in physico - chemical parameters such as pH, turbidity, BOD etc. Some parameters showed significant changes resulting in deterioration of water quality. Thus, making the water unfit for drinking and other uses too. Similar studies 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. As Narmada river is a holy river. So, government alogwith some Non-governmental organisations should take an appropriate action to minimize the bad impact on Narmada water.

Conclusion

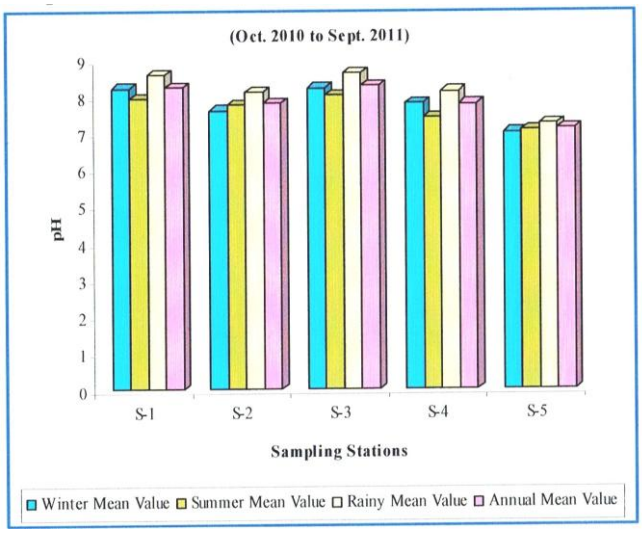
The result of sampling programme clearly determines the water quality of Narmada is a bit unfit for drinking purpose as well as irrigation and other uses too. All the undertaken parameters are exceeding the permissible limits. The pollution of river is increasing sharply and can cause serious problems in future. It is suggested that state Government along with the help of non-governmental organization should take appropriate actions and should start some abhiyan's to help Narmada, to be a holy river once again with a good quality water.

Table – 1 Seasonal and Annual Means Variation in pH at Different Sampling Stations of RIver Narmada (Oct. 2010 to Sep. 2011.)

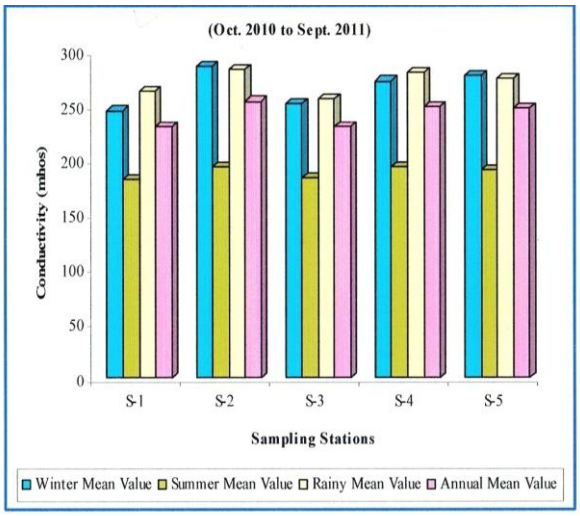
Sampling stations	Oct 2010	Nov 2010	Dec 2010	Jan 2011	Winter Mean Value	Feb 2011	Mar 2011	Apr 2011	May 2011	Summer mean value	June 2011	July 2011	Aug 2011	Sep 2011	Rainy mean value	Annual Mean Value
Lamheta Ghat	8.1	8.4	8.2	8.1	8.2	8.1	8.2	7.6	7.8	7.92	8.6	8.2	8.6	8.9	8.57	8.23
Laxmina rayan Ghat	7.3	7.6	7.6	7.9	7.6	7.4	7.9	7.8	7.9	7.75	7.9	8.0	8.2	8.3	8.1	7.81
Gograghat	8.1	8.2	8.2	8.3	8.2	8.0	8.3	7.6	8.1	8.0	8.5	8.2	8.7	9.1	8.62	8.27
Saraswati Ghat	7.4	7.8	7.7	8.3	7.8	7.4	7.5	7.3	7.4	7.4	8.1	8.3	8.0	8.1	8.12	7.77
Bhedaghat	6.8	7.2	7.1	6.9	7.0	6.6	7.2	6.9	7.5	7.05	7.1	7.3	7.2	7.4	7.25	7.1

Table – 2 Seasonal and Annual Means Variation in Conductivity at Five Different Sampling Stations of River Narmada (Oct. 2010 to Sep. 2011.)

Sampling stations	Oct 2010	Nov 2010	Dec 2010	Jan 2011	Winter Mean Value	Feb 2011	Mar 2011	Apr 2011	May 2011	Summer mean value	June 2011	July 2011	Aug 2011	Sep 2011	Rainy mean value	Annual Mean Value
Lamheta Ghat	349	241	221	170	245.5	180	182	163	202	181.75	258	252	260	282	263	230
Laxmina rayan Ghat	374	278	264	226	285.5	183	183	179	227	193	270	283	285	295	283.25	253.91
Gograghat	360	244	228	173	251.25	180	169	177	206	183	246	245	261	270	255.5	229.91
Saraswati Ghat	371	258	249	212	272.5	182	192	181	220	193.75	278	275	276	291	280	248.75
Bhedaghat	375	254	270	211	277.5	180	176	182	266	191	268	271	270	289	274.5	247.66



Graph – 1 Seasonal and Annual Means Variation in Ph at Different Sampling Stations of River Narmada (Oct. 2010 to Sep. 2011.)



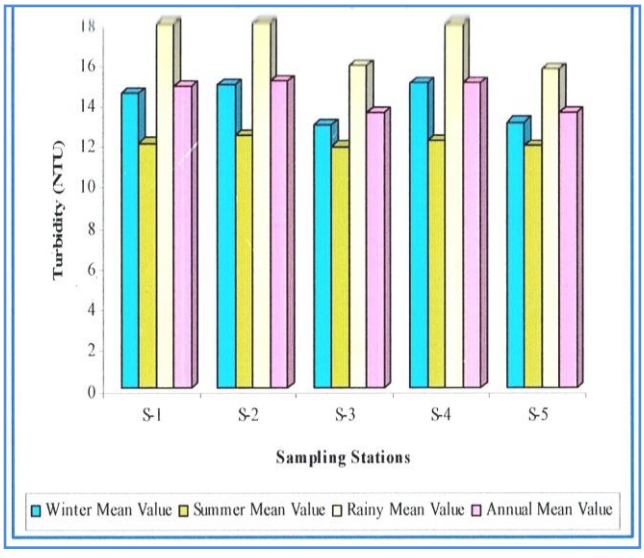
Graph– 2 Seasonal and Annual Means Variation in Conductivity at Five Different Sampling Stations of River Narmada (Oct. 2010 to Sep. 2011.

Table – 3 Seasonal and Annual Means Variation in Turbidity (NTU) at Different Sampling Stations of River Narmada (Oct. 2010 to Sep. 2011.)

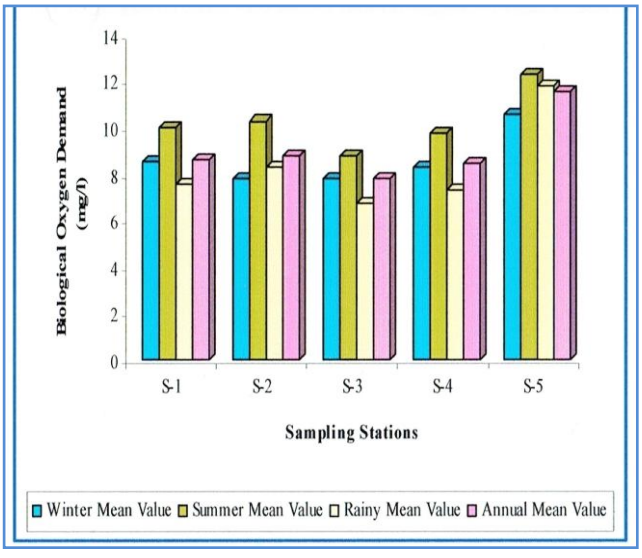
Sampling stations	Oct 2010	Nov 2010	Dec 2010	Jan 2011	Winter Mean Value	Feb 2011	Mar 2011	Apr 2011	May 2011	Summer mean value	June 2011	July 2011	Aug 2011	Sep 2011	Rainy mean value	Annual Mean Value
Lamheta Ghat	15.2	14.5	14.0	14.2	14.47	12.2	12.1	12.3	11.5	12.02	15.5	19.0	19.1	18.2	17.95	14.81
Laxminarayan Ghat	15.4	15.6	14.3	14.3	14.9	12.2	12.1	12.3	13.0	12.4	15.4	19.2	19.4	17.9	17.97	15.09
Gogragh at	12.9	13.5	12.8	12.4	12.9	12.1	11.6	11.8	11.9	11.85	14.4	16.2	16.3	16.6	18.87	13.54
Saraswati Ghat	15.8	14.2	14.4	15.5	14.97	12.6	12.2	12.1	11.7	12.15	14.6	19.9	19.0	18.3	17.95	15.02
Bhedagh at	13.2	13.8	13.3	11.9	13.05	12.3	11.6	11.1	12.5	11.87	14.2	16.3	16.0	16.1	15.65	13.52

Table – 4 Seasonal and Annual Means Variation in Biological Oxygen Demand (BOD) at Five Different Sampling Stations of River Narmada (Oct. 2010 to Sep. 2011.)

Sampling stations	Oct 2010	Nov 2010	Dec 2010	Jan 2011	Winter Mean Value	Feb 2011	Mar 2011	Apr 2011	May 2011	Summer mean value	June 2011	July 2011	Aug 2011	Sep 2011	Rainy mean value	Annual Mean Value
Lamheta Ghat	9	8	8	9	8.5	9	11	11	9	10	11	6	7	6	7.5	8.6
Laxminarayan Ghat	7	8	7	9	7.75	8	10	11	12	10.25	10	6	8	9	8.25	8.75
Gogragh at	8	9	7	7	7.75	9	7	11	8	8.75	10	6	5	6	6.75	7.75
Saraswati Ghat	9	9	8	7	8.25	10	11	8	10	9.75	10	7	10	6	7.25	8.41
Bhedagh at	10	12	11	9	10.5	12	13	12	12	12.25	6	12	10	11	11.25	11.5



Graph – 3 Seasonal and Annual Means Variation in Turbidity (NTU) at Different Sampling Stations of River Narmada (Oct. 2010 to Sep. 2011.)



Graph– 4 Seasonal and Annual Means Variation in Biological Oxygen Demand (BOD) at Five Different Sampling Stations of River Narmada (Oct. 2010 to Sep. 2011.)

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