

PHYSICO-CHEMICAL STUDY OF NARMADA RIVER WATER AT GUJARAT, INDIA

Vaghasiya A.R.¹, Pamnani A. N.², Patel N.R.³

¹ M.E. Student, Environmental engineering, BVM Engineering College, Vallabh Vidyanagar, Gujarat

² Lecturer, Civil Engineering Department, B & B Inst. of tech, v.v.nagar, Gujarat

³ Associate Professor, Civil Engineering Department, BVM Engineering College, Vallabh Vidyanagar, Gujarat

ABSTRACT

Rivers are the most important source of fresh water for living being in earth. Since stone age it is found that social, economic and political development takes place near river banks. Rivers are a major source for drinking water supply. Narmada being longest river of Gujarat is considered as drinking water source for many habitat. To have portability water source for habitate around Narmada a study is carried out for flowing water of the river. For this study water sample of Narmada River from three different sites Bharuch (Below Golden Bridge), Poicha (Rajpipla) and kevadia colony has been physico chemically evaluated for its suitability for domestic and irrigation purposes. Study of physico-chemical Parameters pH, Turbidity, Temperature, Total Dissolved Solid, Total Suspended Solid, Dissolved Oxygen, Nitrate, Fluoride and Chloride were done. The results showed that the characteristic range of 8.18-8.41, 10-4.6 NTU, 28- 28.5 °C, 840-150 mg/l, 5.3-1.1mg/l, 9.5-6.6 mg/l, 0.08-0.002mg/l, 0.18-0.06mg/l and 236-15 mg/l are respectively. The Physico-Chemical parameters of water were determined as per standard methods of IS APHA (2012). The results indicate that the Narmada River water quality is suitable and safe for domestic, irrigation but not for drinking purposes because of Turbidity and TDS are not ranges of permissible limits on drinking water.

Keyword : - Narmada River, Bharuch, Poicha and kevadia colony, Physico-Chemical parameters, quality of water.

1. INTRODUCTION

Water is one of the most valuable resources on planet earth. Water is the lifeline of almost all living thing on earth. Water is one of the natural and precious resources which is important for human survival and development of industry. Most of it is in icecaps and glaciers is 69 % and Ground water (30 %), While all lakes and river etc. uses of water include agricultural, industrial, house hold and environmental activities. 97% of the water on the earth is salt water and only 3% is fresh water.¹ The majority of humans uses require fresh Water.

The rivers plays an important role in providing irrigation water, drinking water, electricity, easy & cheap transportation, other miscellaneous works has been done with the help of rivers. The important rivers of India are Ganga, Yamuna, Brahmaputra, Sindhu, Mahanadi, Godavari, Krishna, Kaveri, Narmada and Tapi.¹ The main rivers of Gujarat are Narmada river.

Narmada River flows through the three states of Gujarat, Maharashtra and Madhya Pradesh (MP). The Narmada river also called the Rewa. It is the biggest flowing river to the west. It is the 5th Longest in the Indian sub-continent. It is also called the Life line of Madhya Pradesh and Gujarat. Therefore Narmada River is known as "Life Line of Madhya Pradesh". It provides the clean water for domestic and irrigation purposes to Madhya Pradesh.²

There is quantum jump in pollution level for water, air, land etc. due to population growth, life style changes, economical and industrial revolution.

First sample had taken from the golden bridge which is suited at Bharuch and has Latitudes 21°70' and Longitudes 73°00'. Second Sample taken from Poicha is situated at Rajpipla and has Latitudes 21°96' and Longitudes 73 °46'. And Third Sample taken from Kevadia colony is situated Latitudes and Longitudes are 22°25' and 71°19' respectively.

Narmada river water is the main resource for domestic and irrigation purposes in the study area. So it is very important to estimate the superiority of water in the study area.³ In the present study water sample of Narmada River from three different site at Bharuch, Poicha and Kevadia colony has been assessed physico-chemically to evaluate its suitability for domestic and irrigation purposes.

Many researchers have done work on physico-chemical and biological evaluation of water⁴⁻⁶. Also many good research papers have published on Narmada River⁷⁻¹⁰.

2. NEED OF THE STUDY

The Gujarat Region and its surrounding region are subjected to high river pollution due to large bathing and other activities. Also the wastes of all the activities such as puja is generated. Peoples throw large amount of materials such as flowers and etc. which are also responsible for pollution of river water.¹¹

In Narmada river huge quantity of domestic waste, municipal sewage dumped daily in addition to industrial effluents and agricultural run-off. Rivers are the most important fresh water resource for human, social, economic and political development has, in the past, been largely related to the availability and distribution of fresh water in the river system. Rivers are a major source for drinking water supply.¹²

3. AREA OF STUDY AND OBJECTIVES

The area of study is around Gujarat region of Narmada river and its surrounding area. Sample collecting points are established. The samples are collected from following points.

- a. Bharuch (below at Golden bridge)
- b. Poicha (Rajpipla)
- c. Kevadia colony

The main objectives are,

1. To evaluate the temporal and spatial variations of water quality at all collecting points.
2. Checking quality of water and its pollution extent on basis of following parameters
 - a. pH
 - b. Temperature
 - c. Turbidity
 - d. Total Dissolved Solid
 - e. Total Suspended Solid
 - f. Dissolved Oxygen
 - g. Nitrate
 - h. Fluoride
 - i. Chloride

4. Material and Methods

Water samples were collected in January 2015 from the sampling sites at Bharuch (S-I), Poicha (S-II) and Kevadia colony (S-III), Gujarat, India and used for laboratory of BVM engineering college scale tests. In the evaluation of physico-chemical parameter of water, standard methods approved in available literature were used. The Physico-Chemical parameters of water were determined as per standard methods of APHA (2002). The sample had been stored in the refrigerator in order to minimize the changes in the characteristics of river water sample since it may vary from day to day.

pH of water sample measured by pH meter using standard solutions; temperature of water sample measured by thermometer; turbidity of water sample measured by turbidity meter; TDS (total dissolved solid) measured by TDS meter; suspended solid measured by filtration; chloride measured by titration method; fluoride measured by sodium 2- (parasulphophenylazo)-1,8-dihydroxy-3,6-naphthalene 128 disulphonate (SPADNS) method; nitrate measured by spectrophotometric method; dissolved oxygen determine by Winkler method.

4.1 Method Of Water Sample Collection

This standard operating procedure (SOP) applies to the collection of water grab samples for water chemistry analysis. The purpose of this SOP is to provide standardized methods for collecting water Grab samples from rivers. **Grab sample** : “It is a sample of river, stream or freshwater wetland water collected for the purpose of analysing its constituent water chemistry.”

At the center of river stretch, travelling through boat, the river water sample is collected using a grab sampling method. The sampling bottle was cleaned and rinsed carefully with sample water.

5. Results and Discussion

The results of study have been reported in the given table. The values of all the parameter were found to be within the limits. The pH value observed at S-I, S-II and S-III are 8.18, 8.59 and 8.41 respectively. Value of temperature at S-I, S-II and S-III are 28 °C, 28 °C and 28.5 °C respectively. Turbidity observed at S-I, S-II and S-III are 10 NTU, 5 NTU and 5.6 NTU respectively. Total dissolved solids (TDS) observed at S-I, S-II and S-III are 840 mg/l, 180mg/l and 150mg/l respectively. Total suspended solids (TSS) observed at S-I, S-II and S-III are 5.3 mg/l, 1.5 mg/l and 1.1 mg/l respectively. Dissolved oxygen (DO) observed at S-I, S-II and S-III are 9.5 mg/l, 5.5 mg/l and 6.6 mg/l respectively. Nitrate was recorded at S-I, S-II and S-III are 0.08 mg/l, 0.002 mg/l and 0.002 mg/l respectively. Fluoride observed at S-I, S-II and S-III are 0.18 mg/l, 0.07mg/l and 0.06mg/l respectively. Chloride observed at S-I, S-II and S-III are 402.4 mg/l, 75 mg/l and 15 mg/l respectively. The results denoted that all values were increased at S-I as compared to S-II and S-III.

Table 1 Water quality parameter of Narmada River Sample from study area

S.N	PARAMETERS	UNITS	Acceptable Limit	RESULTS		
				BHARUCH S-I	POICHA S-II	KEVADIA COLONY S-III
1.	pH	---	6.5-8.5	8.18	8.59	8.41
2.	Turbidity	NTU	1	10	5	4.6
3.	Temperature	°C	---	28	28	28.5
4.	T.D.S.	mg/l	500	840	180	150
5.	T.S.S.	mg/l		5.3	1.5	1.1
6.	D.O.	mg/l	4	9.5	5.5	6.6
7.	Nitrate	mg/l	1	0.08	0.002	0.002
8.	Fluoride	mg/l	1	0.18	0.07	0.06
9.	Chloride	mg/l	250	236.0	75.0	15.0

CONCLUSION

The quality parameters determined for sources of the area show that the water of Narmada river at Bharuch (S-I), Poicha (S-II) and Kevadia colony (S-III) quite within the acceptable range and shows that the overall quality of water is suitable and safe for domestic and irrigation purposes.

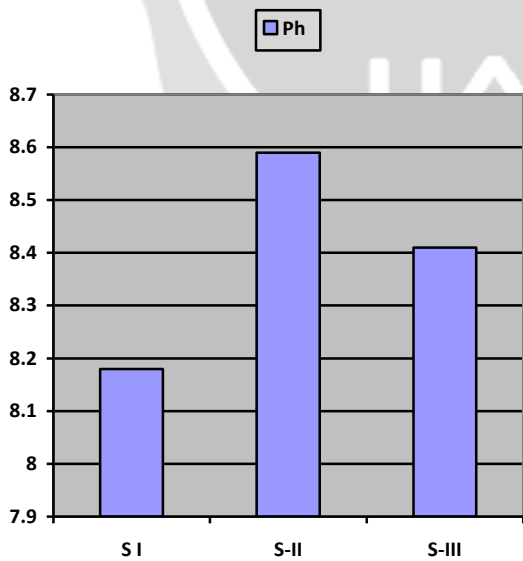


Figure 1 : Characterisation of pH

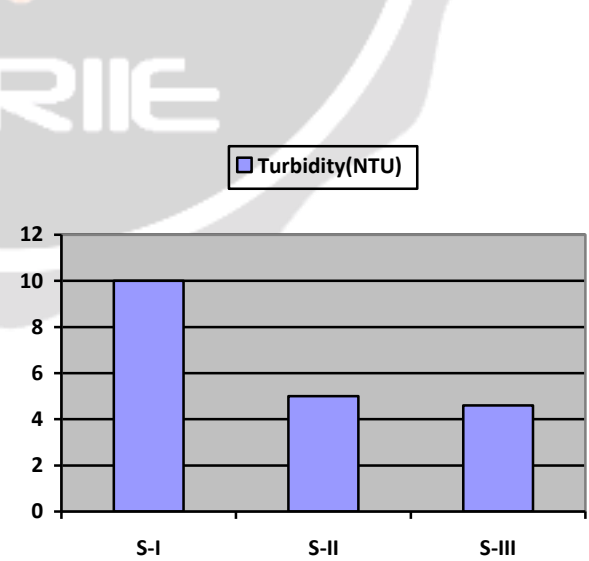


Figure 2 : Characterisation of Turbidity

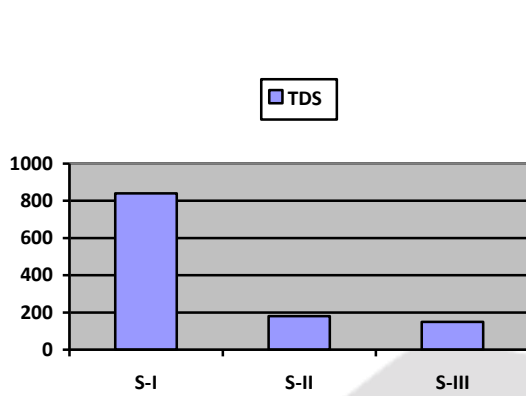


Figure 3 : Characterisation of TDS

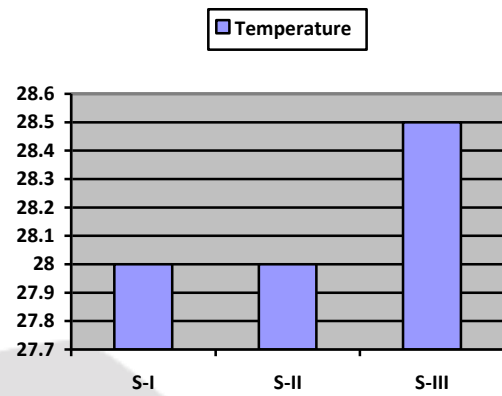


Figure 4 : Characterisation of Temperature

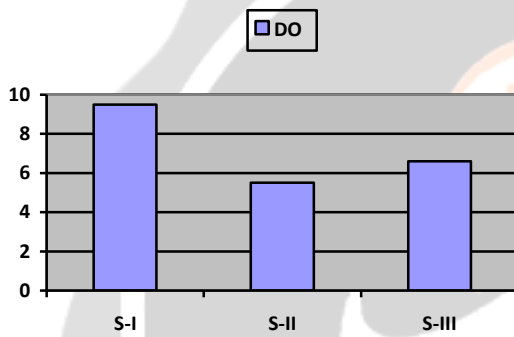


Figure 5 : Characterisation of DO

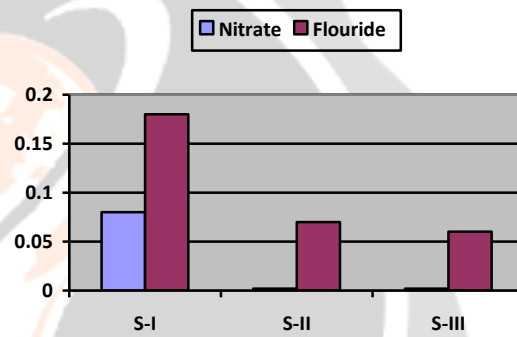


Figure 6 : Characterisation of Nitrate and Fluoride

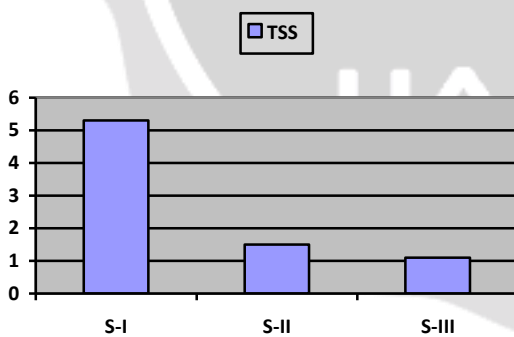


Figure 7 : Characterisation of TSS

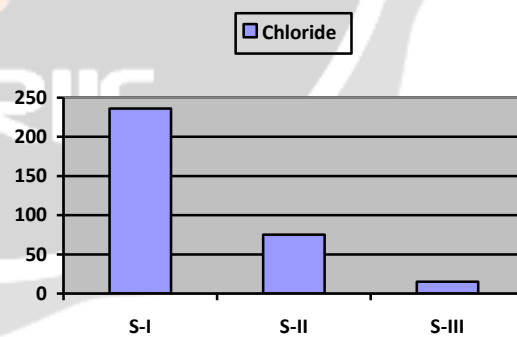


Figure 8 : Characterisation of Chloride

8. ACKNOWLEDGEMENT

I express sincere and heartfelt thanks to **Dr. F. S. UMRIGAR**, Principal, Birla Vishvakarma Mahavidyalaya Engineering College, Vallabh Vidyanagar, **Arti N. Pannani**, Lecturer, Civil Engineering Department, B & B Inst. of tech, v.v.nagar and **Neha R. Patel**, Associate Professor, Civil Engineering Department, BVM Engineering College, Vallabh Vidyanagar for giving me an opportunity to undertake this research subject for study.

Finally, I am extremely thankful to my family for their continuous moral and financial support. Their support and love always encouraged me significantly. All my gratitude to my friends, thank you for your love, support and encouraging me in my dissertation work.

9. REFERENCES

- [1] https://en.wikipedia.org/wiki/Narmada_River#/media/File:1_Narmada_River_and_a_Bridge_Gujarat_India.jpg
- [2] Veer Singh Barde et al. Comparative Physico-Chemical Analysis of Narmada River Water at Barwani and Khalghat, MP, India, *Research Journal of Chemical Sciences*, Vol. 5(3), 6-8, March (2015)
- [3]. Sharma Shraddha et al. Evaluation of Water Quality of Narmada River with reference to Physicochemical Parameters at Hoshangabad city, MP, India, *Research Journal of Chemical Sciences*, Vol. 1(3) June (2011), 40 -48
- [4] Trivedy R.K. and Goel P.K., Chemical and biological methods for water pollution studies, Environmental Publication, Karad, Maharashtra, (1986)
- [5]. Kodarkar M.S., Methodology for water analysis, physico-chemical, Biological and Microbiological Indian Association of Aquatic Biologists Hyderabad, Pub., (2), 50 (1992)
- [6]. Anjum Praveen, Rajesh Kumar, Pratima and Rajat Kumar, Physio- Chemical Properties of the Water of River Ganga at Kanpur, *International Journal of Computational Engineering Research*, 03, 134-137, (2013)
- [7]. Sharma S., Vishwakarma R., Dixit S. and Jain P., Evaluation of Water Quality of Narmada River with reference to Physicochemical Parameters at Hoshangabad city, MP, India, *Res. J. Chem. Sci.*, 1(3), 40-48 (2011)
- [8]. Tali I., Pir Z., Sharma S., Mudgal L.K. and Siddique A., Physico Chemical properties of water of river Narmada at Madhya Pradesh, India, *Researcher*, 4(6), 5-9 (2012)
- [9]. Pir Z., Tali I., Mudgal L.K., Sharma S. and Siddique A., Evaluation of water quality: Physico chemical characteristics of River Narmada at Madhya Pradesh, India, *Researcher*, 4(5), 63-67 (2012)
- [10]. Kumari M., Mudgal L.K. and Singh A.K., Comparative Studies of Physico-Chemical Parameters of Two Reservoirs of Narmada River, MP, India, *Current World Environment*, 8(3), 473-478 (2013)
- [11]. SHIRULE.P.A, SONWANE.A.E, PATHAK P.L "GODAVARI RIVER POLLUTION & USE OF COCONUT SHELL AS FILTER MEDIA FOR DESIGN OF DUAL MEDIA FILTERS", *International Journal of Advanced Technology in Civil Engineering*, ISSN: 2231 -5721, Volume-2, Issue-1, 2013, pg. no:55-57
- [12]. Tanvir A. "process analysis and optimising of direct horizontal flow roughing filtration ", *International institute for infrastructural, Hydraulic and Environmental Engineering/1995/pp-8.*