



Physico-chemical Evaluation of Water Quality of Narmada River at Barwani and Khalghat, MP, India

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Abstract

Narmada River is the key source for domestic and irrigation purposes in the Barwani and Khalghat Region. In the present study water sample of narmada river from two different sites Barwani and Khalghat has been assessed physico-chemically to evaluate its suitability for domestic and irrigation purposes. The important parameters taken into consideration are Temperature, turbidity, pH, Conductivity, T.D.S, Suspended Solid, Alkalinity, Total hardness, Calcium hardness, Magnesium hardness, Chloride, Fluoride, Dissolve Oxygen, B.O.D., C.O.D. and Nitrate were determined in the laboratory. The Physico- Chemical parameters were determined as per standard methods of APHA (2002). Obtained results regarding the Narmad River water quality status shows that the overall water quality is suitable and safe for domestic and irrigation purposes.

Keywords: Narmada River, Barwani, Khalghat, physico-chemical parameters, quality of water.

Introduction

Narmada River is one of the most important rivers in Madhya Pradesh. It is known as "Life Line of Madhya Pradesh" for its enormous gift to the state of Madhya Pradesh in numerous ways. Passes through Hoshangabad, Jabalpur, Mandhata, Barwani, Omkareshwar, Dewas, Maheshwar, Mandla cities of Madhya Pradesh and flows 1,077 km in madhya pradesh. It provides the clean water for domestic and irrigation purposes to Madhya Pradesh¹⁻³. Narmada River is one of the five sacred rivers of India so it becomes even more important. It is called Kalyug's Ganga River. Barwani is a city and a municipality in Barwani District in the state of Madhya Pradesh, India. Before Independence Barwani was known as 'The Paris of Nimar'. Barwani is located at 22.03°N 74.9°E. It has an average elevation of 178 metres (583 feet). The great Narmada River flows through Barwani (just 5 km from city). Barwani is situated near the left bank of the Narmada River.

Khalghat is a town and a municipality in Dhar district in the state of Madhya Pradesh. It has an average elevation of 150 metres (495 feet). It is located on the banks of Narmada River and National Highway 3 Agra-Indore-Dhule-Mumbai. Its latitude 21 °06'N and longitude 75 °27'E.

Narmada river water is the key source for domestic and irrigation purposes in the study area. So it is very necessary to evaluate the quality of water in the study area. In the present study water sample of narmada river from two different site Barwani and Khalghat has been assessed physico-chemically to evaluate its suitability for domestic and irrigation purposes.

In India many environmental scientist have done work on physico-chemical and biological evaluation of water⁴⁻⁶. Also many study have done on Narmada River^{1,7-10}.

Material and Methods

Samples were collected in February 2012 from the sampling sites viz Rajghat, Barwani (S-I) and Khalghat (S-II). In the physico-chemical properties of water, standard methods prescribed in literature were used. Temperature, turbidity, pH, Conductivity, T.D.S., Suspended Solid, Alkalinity, Total hardness, Calcium hardness, Magnesium hardness, Chloride, Fluoride, Nitrate, Dissolve Oxygen, B.O.D. and C.O.D. were determined in the laboratory. The Physico- Chemical parameters were determined as per standard methods of APHA.

pH of water Sample measured by pH meter using standard solutions; temperature of water sample measured by thermometer; conductivity measured by conductivity meter; turbidity of water sample measured by turbidity meter; tds (total dissolved solid) measured by tds meter; suspended solid measured by filtration; total alkalinity and value bicarbonate determined by acid-base titration method; value of total hardness, calcium hardness and magnesium hardness of water sample determined by edta method; 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 metod; dissolved oxygen determine by Winkler method; BOD also analyzed using BOD incubator; COD measured using Open Reflux Method.

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 was 7.7 and S-II was 7.84. Value of temperature at S-I was 28.8°C and S-II was 28.9°C. Conductivity observed at S-I was 274 µs/cm and S-II was 288 µs/cm. Turbidity observed at S-I was 0.12 NTU and S-II was 0.18 NTU. Total dissolved solids (TDS) observed at S-I was 160 mg/l and S-II was 170 mg/l. Total suspended solids (TSS) observed at S-I was 12 mg/l and S-II was 14 mg/l. Alkalinity observed at S-I was 110 mg/l and S-II was 130 mg/l.

Total hardness observed at S-I was 90 mg/l and S-II was 112 mg/l. Calcium hardness observed at S-I was 68 mg/l and S-II was 88 mg/l. Magnesium hardness observed at S-I was 22 mg/l and S-II was 24 mg/l. No nitrate was recorded at S-I. Its value observed at S-II was 0.004 mg/l. Chloride observed at S-I was 20 mg/l and S-II was 30 mg/l. Dissolved oxygen (DO) observed at S-I was 8 mg/l and S-II was 7.7 mg/l. Biological oxygen demand (BOD) observed at S-I was 0.8 mg/l and S-II was 1.2 mg/l. Chemical oxygen demand (COD) observed at S-I was 10 mg/l and S-II was 14 mg/l. The results denoted that all values were increased at S-II as compared to S-I.

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

S. N.	Parameters	Rajghat, Barwani, MP S-I	Khalghat, Dhar, MP S-II
1.	pH	7.7	7.84
2.	Temperature (°C)	28.8	28.9
3.	Conductivity (µs/cm)	274	288
4.	Turbidity (NTU)	0.12	0.18
5.	T.D.S. (mg/l)	160	170
6.	Total Suspended Solid (mg/l)	12	14
7.	Alkalinity (mg/l)	110	130
8.	Total hardness (mg/l)	90	112
9.	Calcium hardness (mg/l)	68	88
10.	Magnesium hardness (mg/l)	22	24
11.	Chloride (mg/l)	20	30
12.	Fluoride (mg/l)	0.11	0.14
13.	Nitrite (mg/l)	Nil	0.004
14.	Dissolve Oxygen (mg/l)	8.0	7.7
15.	B.O.D. (mg/l)	0.8	1.2
16.	C.O.D. (mg/l)	10	14

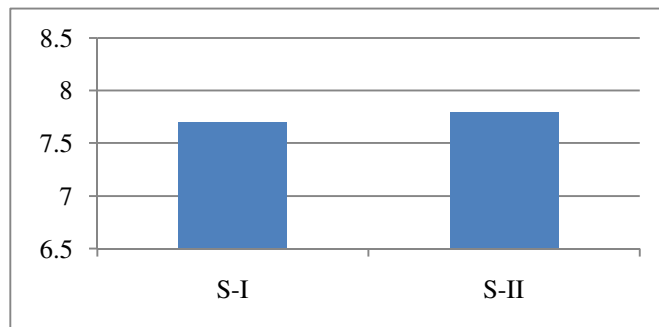


Figure-1
 Showing the pH values of sites

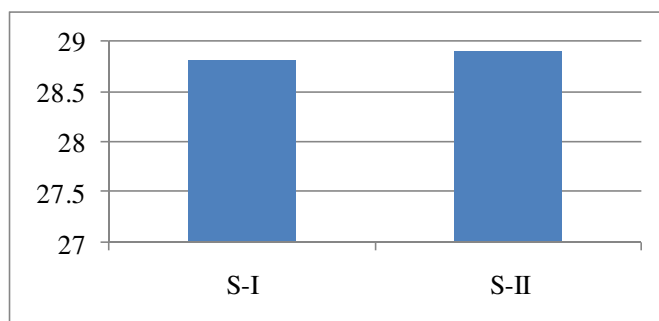


Figure-2
 Showing the Temperature (°C) values of sites

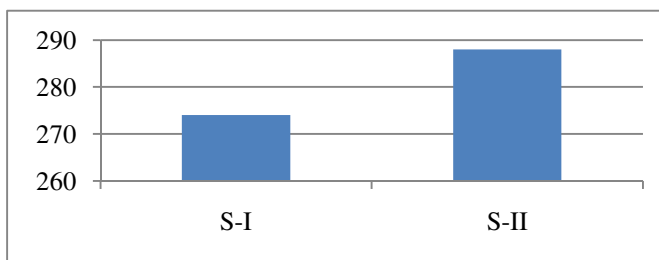


Figure-3
 Showing the Conductivity (µs/cm) values of sites

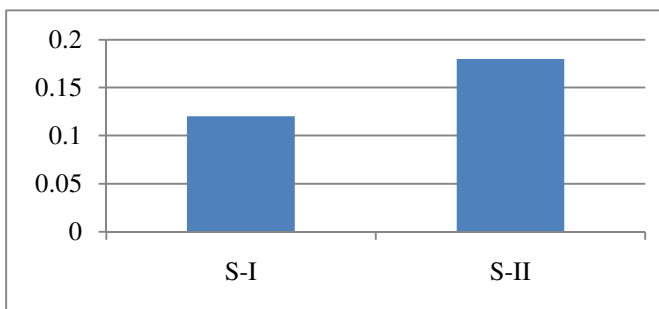


Figure-4
 Showing the Turbidity (NTU) values of sites

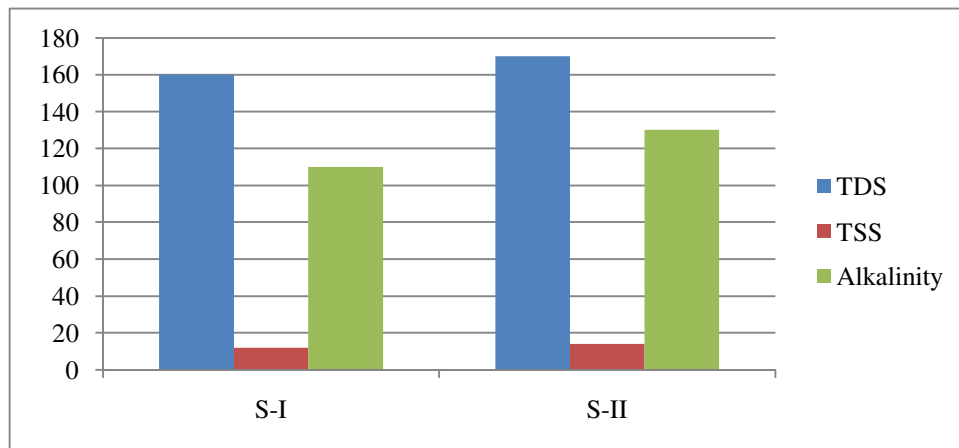


Figure-5

Showing the Total dissolved solids (TDS) and Total suspended solids (TSS) in mg/l values of sites

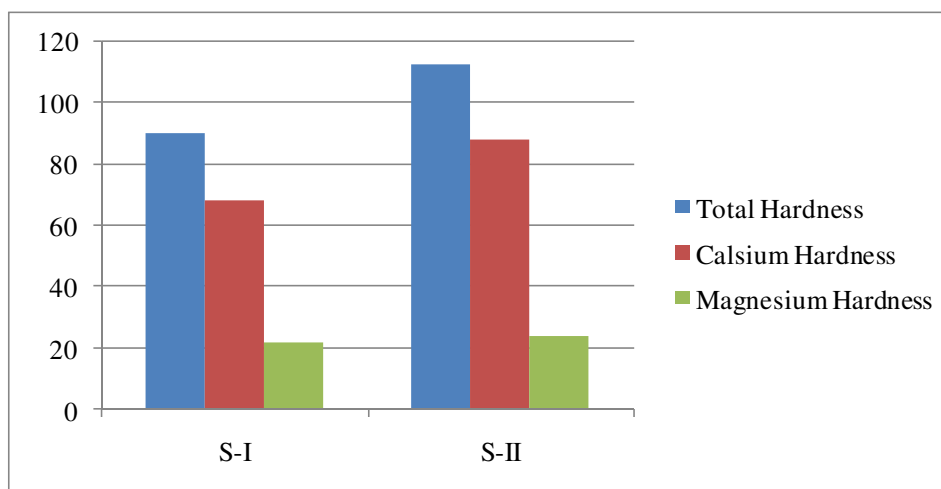


Figure-6

Showing the Total hardness, Calcium Hardness and Magnesium Hardness in mg/l values of sites

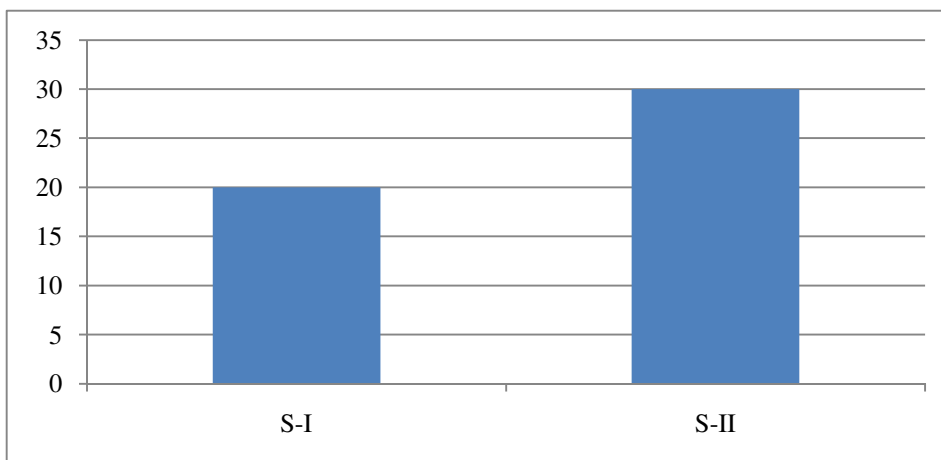


Figure-7

Showing the Chloride (mg/l) values of sites

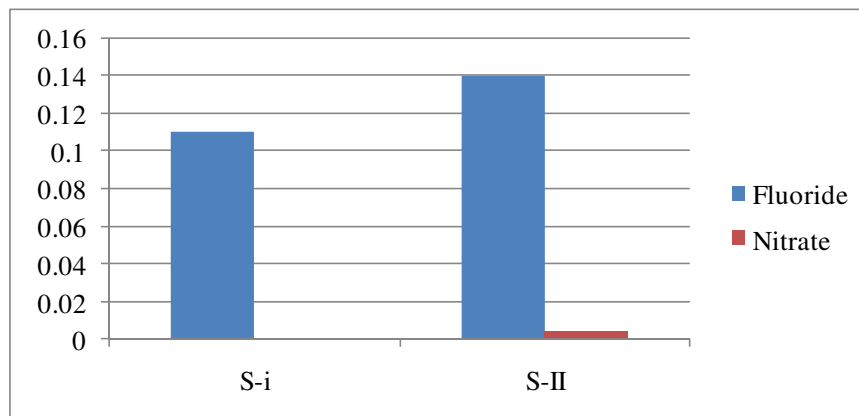


Figure-8
 Showing the Fluoride and Nitrate (mg/l) values of sites

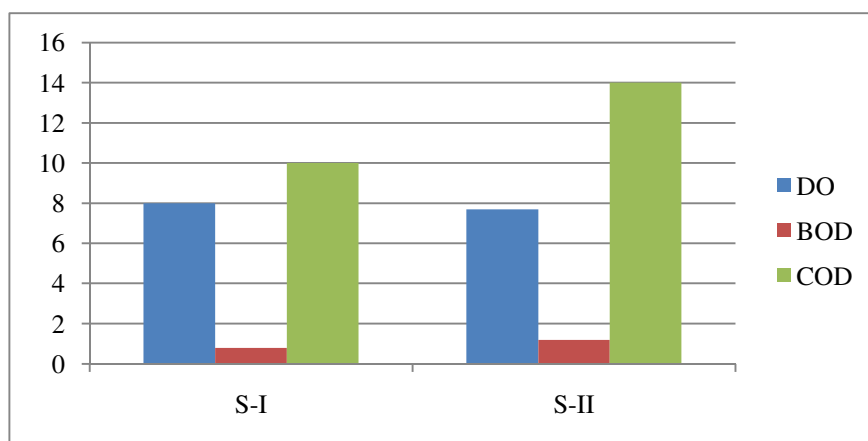


Figure-9

Showing the Dissolved oxygen (DO), Biological oxygen demand (BOD) and Chemical Oxygen Demand (COD) in mg/l values of sites

Conclusion

The quality parameters determined for sources are conclude that the Narmada river water at Rajghat, Barwani (S-I) and Khalghat (S-II) quite within the acceptable range and shows that the overall quality of water is suitable and safe for domestic and irrigation purposes.

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References

1. Soni V., Khwaja S. and Visavadia M., Preimpoundmental studies on Water Quality of Narmada River of India, *Int. Res. J. Environment Sci.*, **2(6)**, 31-38 (2013)
2. Narmada Valley Development Authority, NVDA, Government of Madhya Pradesh, Narmada Basin, Narmada Water Dispute, Nvda.nic.in. 1985-07-16, Retrieved 2014-03-03, (2014)
3. Narmada Control Authority, NCA. Retrieved 21 March 2013, (2013)
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; **(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)