

Original Research Article

Study of Limnological Work and Statistical Analysis with Special Reference to Narmada River in Village Bhilkheda, Barwani District (M. P.) India

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ABSTRACT

Rivers are most important source of drinking water for living being in earth. Narmada being longest river of Madhya Pradesh. In present study was carried out for a one year from January 2011 to December 2011. Water sample was collected from Narmada River at Bilkheda station and various physico-chemical parameters evaluated for its suitability for domestic and irrigation purposes. In physical and chemical parameter such as Air and Water Temperature, Turbidity, pH, Conductivity, Alkalinity, Free CO₂, Chloride, Dissolve O₂, Nitrate, Phosphate, BOD were analyzed in the laboratory. The physicochemical parameters of water were determined as per standard methods. The result indicate that Narmada River water quality is suitable and safe for domestic and irrigation purposes.

Keywords

Narmada River, water quality and physicochemical parameters

Introduction

Water is very necessary for the survival of living organisms. India has a vast aquatic area like oceans, rivers, streams, lakes and pond. Narmada River is the fifth major and the largest west graceful river of Indian peninsula. It is situated of 1057m above the sea level (situated at 20⁰ 40' N, 80⁰ 45'E) in Anuppur district zone of the Shahdol of Eastern Madhya Pradesh. The river travels a huge distance of 1312 km, before Joins the Arabian sea (situated at 21⁰ 43'N, 72⁰ 57'E) at gulf of Cambay in Gujarat, out of which 1077 km is in the state of Madhya Pradesh.

Water quality means the physical chemical and biological characteristics of water. A healthy aquatic environment is one in which the water quality supports a rich and varied

community of organisms and protects public health. The maintenance of a healthy aquatic ecosystem is dependent on the physico-chemical properties of water and the biological diversity. Many researchers have done work on physico-chemical and biological evaluation of Narmada river water Shatri (2000), Verma (2006), Kumari *et al.*, (2013), Salahuddin *et al.*, (2014). The main purpose of analyzing physic-chemical characteristics of water is to determine its nutrient status.

Materials and Methods

Water samples were collected in January 2011 for the sampling site Bhilkheda. It is located 5 km from Barwani and 3 km from

Narmada River towards North part of District head quarters.

Water sample were collected every month during January 2011 to December 2011. Sample were collected from just below the water surface and collected in clean sterile plastic containers and preserve sample to the laboratory were as per standard methods.

Air and Water Temperature was measured by mercury thermometer. pH of water sample measured by pH meter. BOD estimation, water sample were collected separately in dark bottle. Conductivity observed by conductivity meter and Alkalinity was determined by acid base titration method.

Dissolve oxygen determine by Winkler method. All the parameters were analyzed the standard methods (Golterman, 1969, Michael, 1984, Trivedy and Goel, 1986, and APHA, 2005).

Results and Discussion

In present study various physico-chemical parameters were carried out in the samples collected from the study area the drinking water quality and detailed of the same was given in separate table to show the seasonal fluctuations of selected parameters.

The present study is given in separate table the data showed the seasonal variations of all the parameters during the study period.

Temperature

The water temperature is one of the important parameter of the water body which regulates natural process within the environment and governs physiological function in organism. In the present study temperature fluctuate between 19.7⁰C to

33.7⁰C. The month wise studies showed the increased temperature of the river during May and June due to common effect of intensity of solar radiations, ambient temperature and minimum decreased values of temperature was recorded during month of December to January due to low ambient. The range air temperature was 18⁰C to 43⁰C. The lowest air temperature was recorded in winter in the month of January and the highest in summer in the month of May.

pH value

pH indicates the concentration of hydrogen ions. It is one of the most important factors in measuring water quality and evaluating the acid base balance. Natural waters generally have been found to carbonate and bicarbonate of alkaline earth metals. Drinking water with a pH range from 6.5 to 8.3 has been necessary. In the study lowest pH value 7.2 in March and highest value 8.9 recorded in month of August.

Conductivity

The ionic status of water determines the conductivity. Most of the salts in the water are present in the carbonates and bicarbonates form, are responsible to conduct the electric current. Electric conductivity values are ranged from 196 μ /cm to 388 μ s/cm. maximum value was recorded during October and minimum value August was recorded. Shrivastawa (1999) recorded conductivity of river Narmada in the range between 105 and 481.5 mhos/cm.

Alkalinity

Total alkalinity in river water range from 70.9 mg/l to 139 mg/l during August. Lowest values of hardness were observed and highest values were recorded during July.

Table.1 Annual fluctuation in Physico-Chemical Parameter of Narmada River at Bhilkheda in Barwani District (M.P.) during January 2011 to December 2011

S. No	Parameter	Month												Min	Max	Mean
		Jan	Feb	March	April	May	June	July	Aug	Sept	Oct.	Nov	Dec.			
1	Air tem (0C)	18.0	20.5	32.0	38.0	43.0	42.0	35.0	28.0	31.0	26.0	27.0	20.0	18.0	43.0	30.5
2	Water tem	19.7	21.9	27.4	29.9	33.7	30.9	28.0	26.0	33.5	26.7	24.8	20.3	19.7	33.7	26.7
3	Turbidity (NTV)	4.9	5.2	5.8	6.2	6.7	9.2	9.2	45.9	48.8	15.0	5.9	6.1	4.9	48.8	26.9
4	P ^H	7.8	7.8	7.2	7.9	8.7	8.3	8.5	8.9	8.0	8.2	8.2	8.4	7.2	8.9	8.1
5	Conductivity (us/cm)	263.0	284.0	320.0	299.0	343.2	318.9	354.0	196.0	200.0	388.4	345.2	288.6	196.0	388.0	292.0
6	Alkalinity (mg/l)	103.0	113.0	135.0	127.0	116.7	119.5	138.8	70.9	78.4	93.1	110.5	108.5	70.9	139.0	105.0
7	Free Co2	2.0	2.8	2.0	6.0	5.0	6.0	7.0	7.0	6.0	3.0	2.0	4.0	2.0	7.0	4.5
8	Chloride (mg/l)	20.0	22.4	20.0	22.6	21.0	21.8	20.0	18.2	19.2	25.1	23.4	21.7	18.2	25.1	21.7
9	Dissolve O2 (mg/l)	12.6	12.0	8.1	8.7	8.0	7.9	8.6	9.6	9.3	11.8	12.2	13.5	7.9	13.5	10.7
10	Nitrate (mg/l)	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0
11	Phosphate	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	BOD (mg/l)	1.0	1.5	1.4	2.0	1.0	0.9	1.0	1.0	1.2	0.5	0.6	1.0	0.5	2.0	1.3

Free CO₂

Free carbon dioxide (CO₂) occurs in water as the dissolved gas, carbonic acid, carbonates and bicarbonates of calcium and magnesium. Permissible limit of free CO₂ in water for drinking purpose is 2 mg/lit. In the present study lowest value of free CO₂ was 2mg/lit while the highest value of free CO₂ was 7 mg/liter.

Chloride

It is an element of the halogen group that also includes fluorine, iodine and bromine. Chlorides in the form of Cl⁻ ions, is one of the major inorganic ions in water and wastewater. In potable water the salty taste produced by chloride concentrations is variable and dependent on the chemical composition of water. The present study reports the chloride values ranged between 18.2 mg/lit. to 2.1 mg/lit. The minimum values of Chlorides were recorded in August and the maximum in October.

Dissolve O₂ (DO)

Dissolved oxygen (DO) is a fundamental requirement for living plant and animal population in any given body of water. Dissolved oxygen of water is an important test to study the quality of water. Its optimum value for good quality water is 4 to 6 mg/liter which is able to maintain aquatic life in a water body. DO concentration in water is mainly depended upon temperature, dissolve salts, velocity of wind pollution load. In present study the D.O. values ranged from 7.9 mg/lit. to 13.5 mg/lit. The highest values of D.O. were recorded in months of December while lowest in June.

Nitrate

Nitrate represents the higher oxidized form of nitrogen and an important plant nutrient.

The most important inorganic nitrogen compounds in water are nitrate and ammonia. High concentration of nitrates are useful in irrigation but their entry into water resources increase the growth of annoyance algae, macrophytes and trigger eutrophication and pollution (Trivedy and Goal 1984). In the study the minimum nitrate was noted 0.02 mg/liter while maximum nitrate was noted 0.07mg/ lit.

Phosphate

Phosphate is very essential plant nutrient. The major source of phosphorus in a water body is domestic sewage, detergents, agricultural effluents with fertilizers and industrial waste water. In the present study phosphate values are recorded in a range of 0.14 mg/lit. to 0.2 mg/liter were recorded.

BOD

Biological Oxygen Demand is an important parameter to determine the magnitude of organic matter in a water body. BOD of 1 mg/liter has been characteristic of nearly pure water. In the present study the BOD values ranged from 0.54 mg/liter to 1.98 mg/liter. Minimum values were recorded in October and the maximum values were recorded in April. During the month of summer the microbial activities were higher due to favorable environmental conditions.

From the above study, it may conclude that all the physico-chemical parameters were in permissible limit at study side of the Narmada River and suitable for drinking, bathing, irrigation and another fishery purpose.

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