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Chemical assessment of narmada river water at Hoshangabad city and Nemawar as navel of river in Central India

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ABSTRACT

Narmada river water is the main source of drinking, Irrigation, fish culture and other important activities for central India. Hence the present investigations and plan of work is consisting to observe the chemical and physical constituents of Narmada River water flow. The quality of water pollution status of river.

The sample collection, preservation and pre treatment according to standard method of collecting samples at international level i.e. APHA and BIS procedure. Prior to this a through survey conducted to know about probable pollution source and other relevant features.

Keywords: Dissolve oxygen, BOD, COD, Turbidity, Total hardness.

INTRODUCTION

Narmada is one of the sacred rivers of India, attracting pilgrims from all parts of the country. It Originates from Amarkantak in Shadol district, at an elevation of 1057 meter above MSL, covers distance of nearly 1312 km and total basin of 98, 796, 80 sq. km. The Narmada basin is about 1288 km. long and 80 km. broad running from east to west in Madhya Pradesh, occupies a central position in the country and empyties into the Gulf of Cambay below Broach.

The Narmada river is located in Hoshangabad district of Madhya Pradesh, at latitude 22°23' 40" North and longitude 77° 58' 30" East. It flows along the Northern boundary of the district. The area of Hoshangabad district is 10,016 sq. km. topography of the district is marked by the plateau and hills of the Satpura in South all its length. The range of Satpura hills runs east to west between the Narmada river.

"Nemawar is a village in Dewas district M.P., It is 130 k.m. from Indore. Nemawar is considered as "Navel" of Narmada river" Below Nemawar to Hiran fall (also called the deer's leap) the river is surrounded by hills from both sides. In this stretch the character of the river is varied.

In Madhya Pradesh out of the total catchments area of the river Narmada basin lying in the state is 85,938 sq. km.

Due to urbanization and industrialization, environmental pollution is increasing day by day. The disposal of city waste, sewage and industrial effluents is becoming a major problem. The present study has been carried out to evaluate the impact of man induced environmental changes on the water quality through variation in the chemical and microbiological properties at different locations of Hoshangabad city and Nemawar village.

MATERIAL AND METHODS

The river Narmada has been surveyed through out the year. Four sampling sites were selected in Hoshangabad, one sampling site in Handia village (Harda) and one sampling site in Nemawar village (Dewas).

Site Ist is situated at "Vivekanand Ghat" on the upstream of river. Here many people take bath and wash their daily. Site IInd is situated at "Sethani Ghat" where continuous discharge of domestic sewage of the city in the river. Site IIIrd is situated at "Mangalwara Ghat" on the downstream of the river Narmada and site IVth at "Dongarwara" village where effluent of the security paper mill poured in the river. Site Vth is situated at "Handia" and site VIth is situated at "Nemawar", both V and VI site people take bath and wash their cloths daily.

The various physico-chemical and biological parameters were determined as per methods suggested by APHA (1976). Temperature, pH and Dissolved oxygen were recorded immediately after collection of sample at the sites, while other parameters were analysed in the laboratory within 24 hours.

RESULTS

The survey of the river water resources includes the identification and characterization of all sites. At the point IVth more pollution is observed. The observation has been given in Table 1.

Table - 1: Mean values of physico-chemical parameters at sampling sites in river Narmada at Hoshangabad & Nemawar

S. No.	Parameters	Site-I Vivekanand Ghat	Site-II Sethani Ghat	Site-III Mangalwara Ghat	Site-IV Dongarwara Ghat	Site-V Handia Ghat	Site-VI Nemawar Ghat
1.	Air temp.	25.2	25.2	25.0	25.6	25.0	25.3
2.	Water temp.	21.4	21.7	21.2	21.9	21.1	21.2
3.	pH	7.5	7.8	7.6	6.8	7.9	7.6
4.	Total Alkalinity (mg/lit)	243.95	217.70	217.70	461.45	325.20	238.75
5.	CO_3^{2-} Alkalinity (mg/lit)	25.83	20.83	27.08	54.58	19.16	22.08
6.	HCO_3^- Alkalinity (mg/lit)	218.13	196.88	190.63	406.88	306.04	216.67
7.	DO (PPM)	6.7	6.2	6.5	4.8	5.6	7.8
8.	BOD (PPM)	1.9	1.9	2.0	2.8	1.9	1.9
9.	COD (mg/lit)	120.38	125.04	117.46	2171.2	87	95.58
10	Total Hardness (mg/lit)	137.29	132.08	139.37	247.91	133.54	138.12
11	Calcium Hardness (mg/lit)	87.5	87.28	81.37	132.56	77.65	82.46
12	Magnesium Hardness (mg/lit)	49.79	44.80	58	115.35	55.88	55.65
13	Conductance	0.24	0.22	0.25	0.79	0.26	0.28
14	Chloride (mg/lit)	294.77	262.28	288.14	452.62	350.27	342.25
15	Fluoride (mg/lit)	0.81	0.77	0.70	0.83	0.77	0.79
16	Phosphate (mg/lit)	0.3	0.22	0.12	0.15	0.37	0.32
17	Ammonical Nitrogen	0.85	0.64	0.89	1.12	0.89	0.95
18	R. Chloride (mg/lit)	0.13	0.12	0.13	0.13	0.13	0.15
19	T. Solid (mg/lit)	1.85	1.75	1.89	3.27	2.22	2.12
20	T.D.S. (mg/lit)	1.35	1.16	1.30	2.79	1.72	1.61
21	T.S.S. (mg/lit)	1.35	1.16	1.30	2.79	1.72	1.61
22	Iron (PPM)	0.264	0.205	0.364	0.350	0.371	0.229
23	Zinc (PPM)	0.162	0.158	0.172	0.152	0.187	0.171
24	Cupper (PPM)	0.283	0.275	0.321	0.346	0.286	0.250
25	Manganese (PPM)	0.131	0.160	0.153	0.220	0.157	0.141

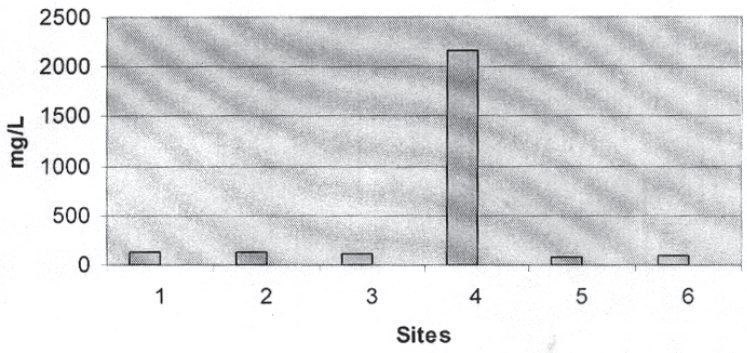

Fig. 1: Mean values of COD at sampling sites in Narmada river

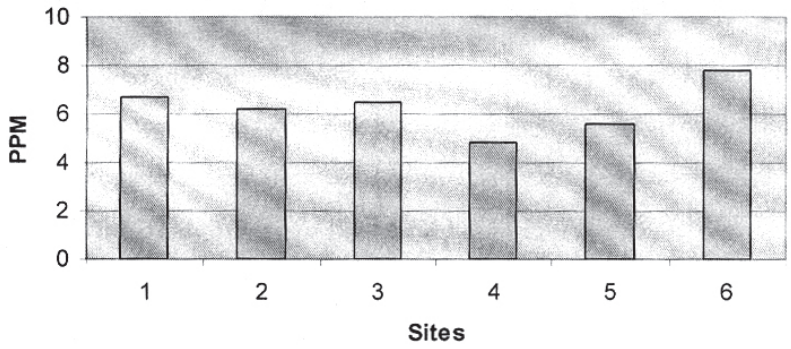

Fig. 2: Mean values of DO at sampling sites in Narmada river

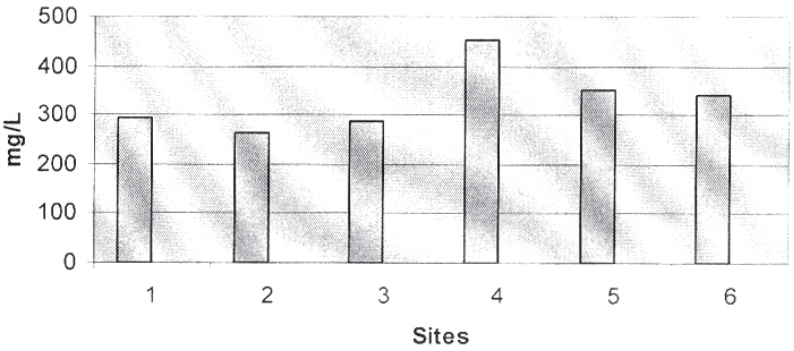

Fig. 3: Mean values of Chloride at sampling sites in Narmada river

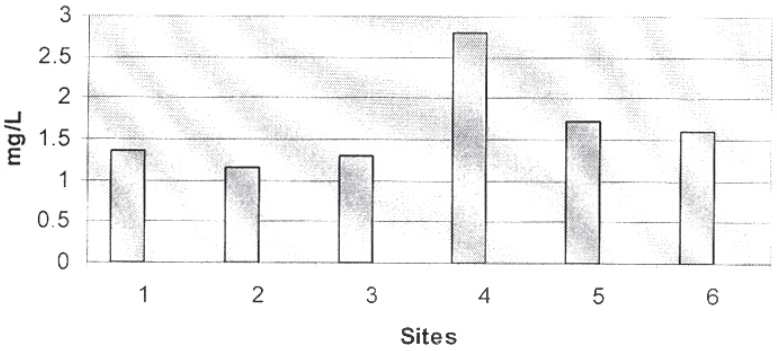

Fig. 4: Mean values of T.D.S. at sampling sites in Narmada river

Table 2: Correlation coefficient (R) among various Narmada river water quality parameters

S.No.	Parameters	pH	Turbidity	TDS	TSS	Hardness	Alkalinity	Chloride	Nitrate	Free CO_2	D.O.	BOD	COD
1	pH	1.00											
2	Turbidity	+.35	1.00										
3	TDS	+.1	+.1	1.00									
4	TSS	-.4	-.94	-.4	1.00								
5	Hardness	+.02	+0.69	-.73	-.005	1.00							
6	Alkalinity	-.9	-.1	-.12	+.06	+.24	1.00						
7	Chloride	+.23	+.21	-.56	-.04	-.05	+.24	1.00					
8	Nitrate	-.7	+.27	-.13	-.21	+.04	+.17	-.06	1.00				
9	Free CO_2	-.28	+.03	-.18	+.52	+.29	-.04	-.02	-.04	1.00			
10	DO	+.62	+.09	-.86	+.09	+.03	+.01	-.07	-.07	+.13	1.00		
11	BOD	+.6	-.5	+.03	+.19	+.82	+.32	-.02	-.16	-.04	+.17	1.00	
12	COD	+.33	+15	-.12	+.01	+.2	+.20	-.04	-.08	-.08	+.24	+.05	1.00

High values of COD (2171.2 mg/lit) have been observed at the polluted site IV[th] throughout the year, low BOD values 1.9 PPM is recorded at I, II, V and VI[th] polluted site throughout the year.

High values (325 mg/lit to 461.45 mg/lit) of Total alkalinity was observed at both polluted sites (IV and V) Munawar (1970) and Bhowmic (1985) have also recorded the same in sewage polluted water.

The high values (350.27 and 452.62 mg/lit) of chloride were recorded at both polluted sites. Klein (1957) has observed that direct correlation between chloride in water is an index of pollution of animal origin.

DISCUSSION

Several physico-chemical and biological parameters and their variability have been studied in relation to the pollution of river water. The chemical analysis showed that polluted site IV[th] and V[th] contained high values of chloride, total hardness, total alkalinity, COD, heavy metals like as iron, zinc, cupper, manganese and low value of dissolved oxygen, which indicates a high pollution load. The present study indicates greater impact of Urban activity on ground and river water quality in Hoshangabad. It may be attributed to the fact that most of the river water Hoshangabad site are polluted through discharge of wastes at various land sites.

These studies also have resulted in several policy changes and strict regulatory measures for water quality maintenance in the river system. The present observations made at Hoshangabad and Nemawar stretch on Narmada is a strong pointer towards the possibility of ecological up gradation and thereby enhancing the aquatic productivity in our river systems through regulate effluent flow.

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