CHANGE IN WATER QUALITY DURING CONSTRUCTION OF NEW BRIDGE ON NARMADA RIVER AT JABALPUR, INDIA

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SUMMARY

Present study is focused on the monitoring of pollution level in Jamtara station at Khirhani ghat, of Narmada River in Jabalpur. Jamtara station is situated at a distance of 12 kms away from the Jabalpur city .It is situated $23^0$5'12" latitude and 79^0 57' 06" longitudes. The Gaur River is a major tributary of the Narmada River which meets at Khirhani Ghat. This river is mostly polluted by the wastage of dairy farms, which are at the bank of the river; it is also being polluted by so many sources such as ashes, remains of bodies after cremation, cattle bathing, washing of clothes and discharge of domestic sewage. The bridge construction started on17th January 2006 and still work is going on. During the bridge construction lot of cement, soil, concrete, brick and dust is falling in river water every day. Due to the construction, it has become a serious threat to water quality. The Narmada River water is used for bathing, drinking, and irrigation purposes. Water samples were collected from surface area of water 1meter away from the river and at a depth of 1 meter. Physico-chemical parameter of the river water were analyzed. These are temperature, pH, Turbidity, Conductivity, CO_2, Alkalinity, Dissolved Oxygen, BOD, Hardness, Calcium, Magnesium and Chloride. The study reflected that the sampling sides were polluted. Pollution level has increased beyond the prescribed standard limit

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Key words : Water Quality, Physico-Chemical Parameter, Bridge Construction.

Nowadays**,** due to construction of bridge at Jamtara station lot of cement, sand, concrete, brick and dust mix up in river Narmada at Jabalpur. It is becoming a matter of serious concern for aquatic flora and fauna and human health point of view. This urges a need for proper care of river health also Rivers play a significant role and are the lifelines of the majority of the population in cities, towns and villages. Rivers are symbols of self replenishing, self purifying.Cement does not get dissolved or disintegrate fast and on settling on the beds, kill the flora and fauna. Even non-biodegradable materials contaminate the water quality. All this is adding a greater load to our already overburdened water bodies. Our water is poisoned killing the innocent aquatic life and affecting our health too. Cement dust has been shown to adversely affect the aquatic communities. Studies of cement dust and dust pollution show elevated levels of soil pH (Adamson *et al*. 1994, Mandre *et al* .1997, Mandre *et al*. 1998).

The water quality is becoming more and more unfit to mankind due to interference. The physical and chemical factors play an important role. They are responsible for distribution of animal life in a fresh water habitat because water is the basic component of life and therefore, it is of vital importance The Assessment of water quality in a region is an important aspect for any developmental activity of the region. The physical and chemical quality of Jamtara ghat water is badly affected by the bridge construction, the cement, duct, concrete and brick mixed into water it has become pale yellow with soil smell. Hence, the study was taken up with the following objectives

- To study the deterioration in water quality due to construction activities find where the cement dust contamination by surveying water quality,
- To highlight areas of concern for future studies.

MATERIALS AND METHODS

Study Area :

Jamtara is the sampling station, situated at a distance of 12 kms away from the Jabalpur (Fig-1). It is situated $23^0$5'12" latitude and 79^0 57' 06" longitudes. The Gaur river is a major tributary of the Narmada river which meets at Khirhani Ghat.

Sampling Techniques:

Jamtara station was chosen for water quality analysis during bridge construction in river Narmada at Jabalpur.15 January 2007 to 15 August 2007. The water samples were collected in porcelain and sterilized high- grade plastic bottles of 1L capacity in the morning between 8 to10 a.m. The samples were preserved as per APHA (1985) and Trivedi and Goel (1986) and brought to the laboratory within 12 hr and stored at 4 to 15^0C. Analysis was completed within 48hr to avoid any variation in the result. All the glassware and other containers were thoroughly cleaned by soaking in detergent followed by 10 % of HNO_3 for 48 hr and finally rinsed with double distilled water.

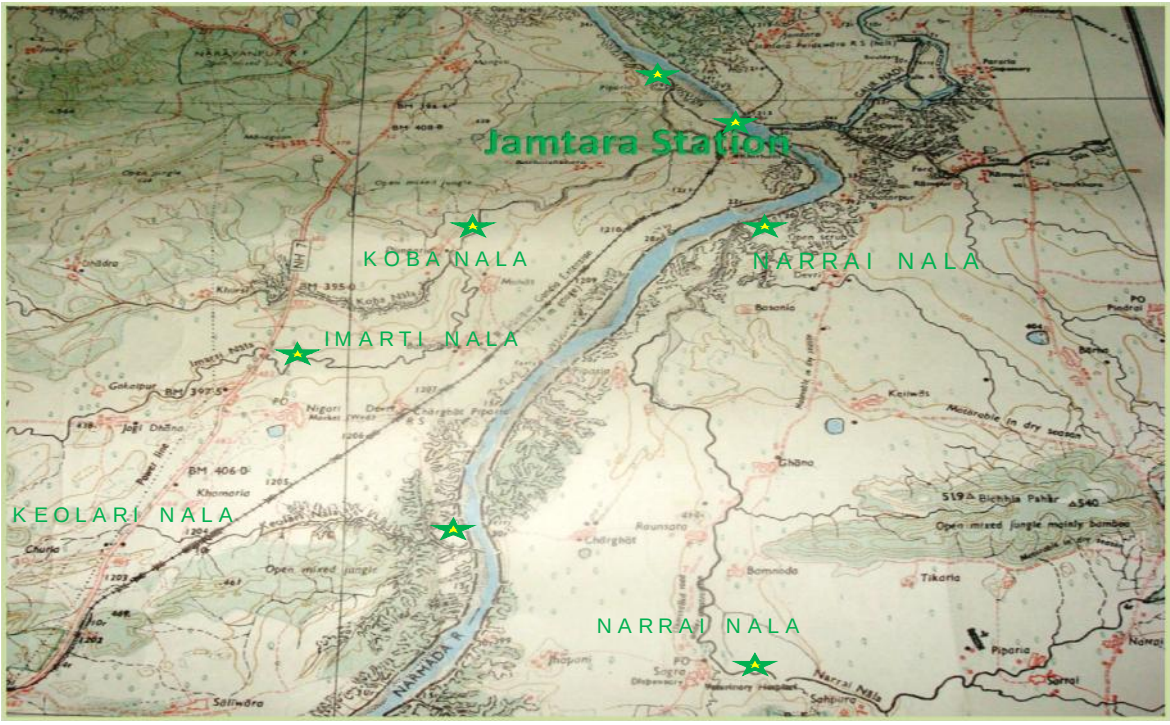

Fig.1 : Map showing sampling station Jamtara ghat at Jabalpur

Analysis Techniques :

The entire chemical used was (AR) grad. The water samples were analyzed as per standard methods prescribed by APHA (1985) and Trivedi and Goel (1986). Some parameters as temp, colour, pH, odor, D.O. were analyzed at the field itself. Turbidity of the samples were analyzed by digital Nephelometric meter, T.D.S. of sample was analyzed by filtration method .Total hardness, calcium, magnesium; chloride and alkalinity were estimated by the titration method.

RESULTS AND DISCUSSION

Physico-chemical parameter analyse is of Narmada river water has been conducted during the bridge construction time at Jamtara station. The data from the water analysis is shown in Table 1 and 2. Results show that the water temperatures range between 18^{0}C to 38^{0}C the minimum tem.18^{0}Cis in the month of Feb. and maximum tem. 38^{0}C month of June.The colour of the water was whites colour which light brown and odour with soil smell.

Table 1 : Hydrological characteristics of the Narmada river at various locations of Jamtara

Location	Latitude	Longitude	Basin area (sq. km)	Length of river (km)	Water discharge ($km^3\ yr^{-1}$)	Sediment load (10^6ton-syr^{-1})
Jamtara	23^{0}05'12"	79^{0}57'06"	17,157	389	9.27	3.32

Water pH levels increased significantly during January to March but decreasing April to August in (Fig. 2).The increase in pH is not detrimental at this stage. The TDS values range from 1800 mg/l to 2500mg/l in (Fig. 3) during January to August increasing turbidity significantly. Total

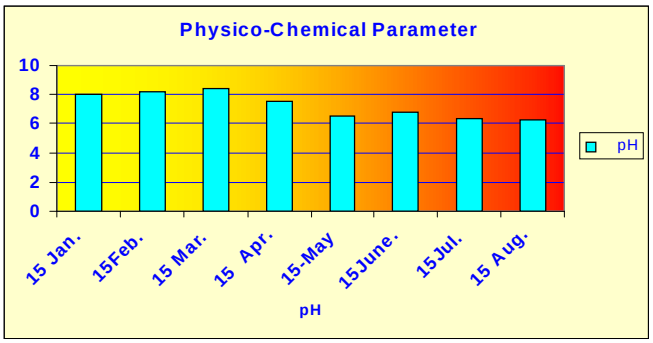

Fig.2 : Monthly Comparison Mean pH Values Varying

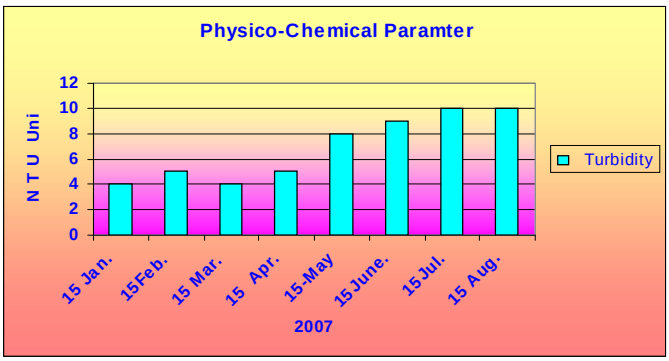

Fig.3 : Monthly Comparison Mean Turbidity Values Varying

Table 2 : Physico-Chemical Analysis data of surface water sample of Jamtara Station at Jabalpur, (M.P.)

Sr. No.	Parameter	Unit	Method	Year 2007			
				15Jan.	15Feb.	15March	15April
			Physical Parameter				
1.	Temperature	^{0}C	Thermometer	20^{0}C	18 ^{0}C	25 ^{0}C	28^{0}C
2.	Odour	-	Simple Observation	Tempered	Tempered	Tempered	Tempered
3.	Colour	-	Simple Observation	whitish	whitish	Wheatish	Wheatish
4.	pH	_	Digital pH meter	8.0	8.2	8.4	7.5
5.	Turbidity	N T U	Nephelomet ic meter	4	5	4	5
6.	T.D.S	Mg/l	Filtration method	1800	2000	2100	1900
			Chemical Parameter				
7.	Hardness	Mg/l	EDTA method	350	366	370	386
8.	Calcium	Mg/l	EDTA method	232	240	232	250
9.	Magnesium	Mg/l	EDTA method	118	126	138	136
10.	Alkalinity	Mg/l	Titration method	222	228	320	329
11.	D.O	Mg/l	Winkler's method	7.5	7.2	7.4	5.3
12.	Chloride	Mg/l	Argentometric method	346	385	357	450

hardness levels varied from 350mg/l to 600mg/l, Calcium level ranged from 232 mg/l to 350mg/l. The BIS (1998) acceptable limit for calcium is 200mg/l .However, in the present study, all the sample show higher calcium within the permissible limit magnesium values ranged from 118 mg/l to 250mg/lwhich is below the acceptable limit of BIS. Alkalinity values ranged from 222 mg/l to 485 mg/l. D.O. values ranged from 4.0 mg/l to 7.5 mg/l. Chloride values ranged from 346 mg/l to 525 mg/l .The values of chloride for permissible range in (Fig. 4).

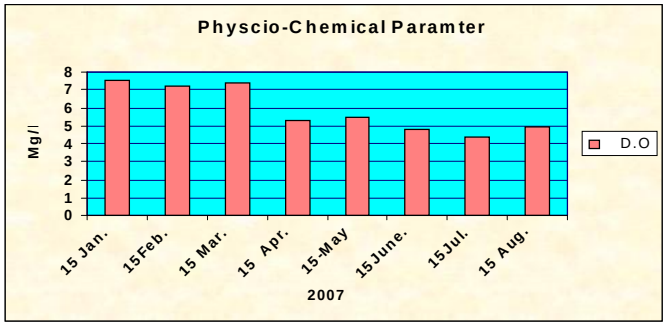

Fig. 4 : Monthly Comparison Mean D.O. Values Varying

This river is mostly polluted by the waste water of dairy farms, which are at the bank of the river; it is also being polluted by the ashes and remains of bodies after cremation cattle bathing, washing of clothes and discharge of domestic sewage. Construction waste come in the waterways, it is also possible that airborne dust may settle in the water. Continuous cement, sand, concrete, brick and dust all these things mix, and so the reason of increasing water pollution and directly effect on water quality. The alkalinity and mineral content of the dust may cause increasing levels of pH, hardness, calcium and silica in the water. The increase in pH is not detrimental at this stage. However, the pH levels of the water in this area should continue to be monitored as highly alkaline water may have adverse health effects on human, including skin problems, gastrointestinal problems and rashes (Brender *et al*.1998).

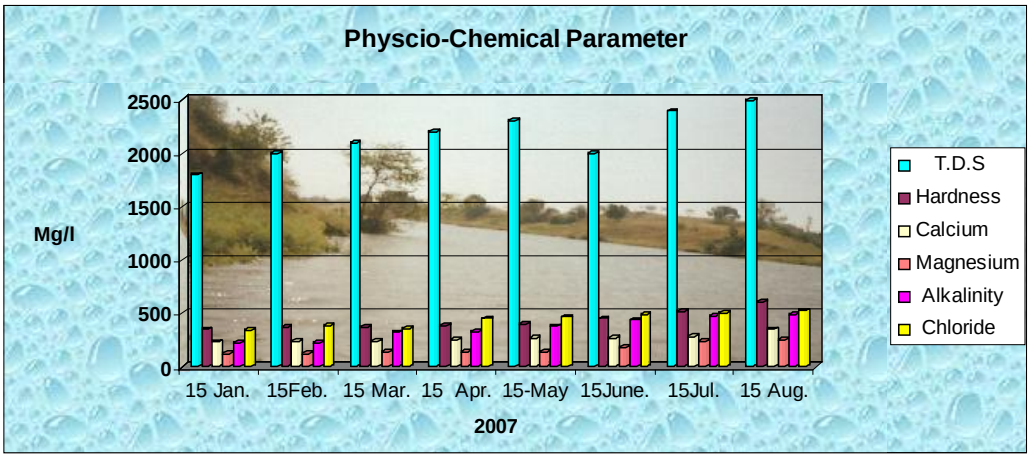

Fig. 5 : Results of water samples tested for T.D.S., Hardness, Calcium, Magnesium, Alkalinity and Chloride varying

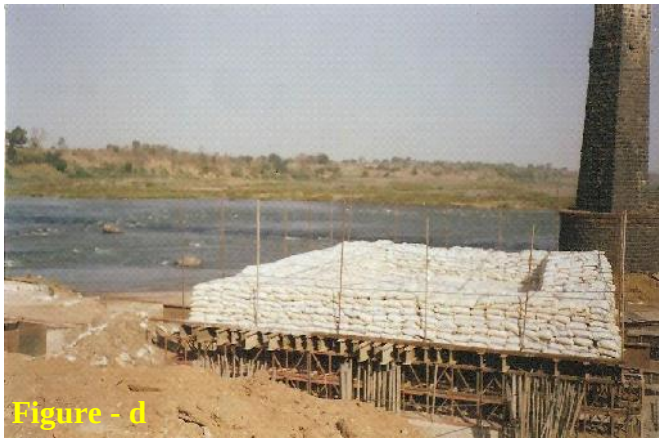

Fig. 6 : (a, b, c, d) Jamtara bridge construction of Narmada river at Jabalpur

Fig. 7 : Devotees performing various rituals activities and bathing all above these thing Change river water in light brown colure

Highly alkaline water may cause changes in gas transport and muscle range within aquatic animals (Randall and Brauner 1991). Increases in hardness may change the water community and cause decreases in species richness and diversity (Clements and Kiffney1995) .So many reasons increasing water pollution in Figure (5, 6 and 7).

Conclusion :

During the physcio-chemical analysis of the Narmada river at Jamtara on the basis of the data given in Table 2 and 3 it may be concluded that there is monthly variation in pollution level .That study reflected that almost all the parameter were found to be beyond permissible limits.

Table 3 : Physico-Chemical Analysis data of surface water sample of Jamtara Station at Jabalpur, (M.P.)

Sr. No.	Parameter	Unit	Method	Year 2007			
				15 May	15June.	15 July	15 August
Physical Parameter							
1.	Temperature	^{0}C	Thermometer	35^{0}C	38^{0}C	30^{0}C	28^{0}C
2.	Odour	-	Simple Observation	Soil smell	Soil smell	Soil smell	Soil smell
3.	Colour	-	Simple Observation	Light Brown	Light Brown	Light Brown	Light Brown
4.	pH	_	Digital pH meter	6.5	6.8	6.4	6.3
5.	Turbidity	NTU	Nephelometric meter	8	9	10	10
6.	T.D.S	Mg/l	Filtration method	2200	2300	2400	2200
Chemical Parameter							
7.	Hardness	Mg/l	EDTA method	400	450	520	600
8.	Calcium	Mg/l	EDTA method	265	270	285	350
9.	Magnesium	Mg/l	EDTA method	135	180	235	250
10.	Alkalinity	Mg/l	Titration method	380	435	472	485
11.	D.O	Mg/l	Winkler's method	5. 5	4.8	4.4	4.9
12.	Chloride	Mg/l	Argentometric method	465	487	500	525

Only few found within permissible limit like dissolved oxygen levels were generally acceptable; however, some extremes in temperature above guidelines have been recorded. These generally last for only short periods of time. Significant pollution was observed and in the present condition is not suitable for drinking purpose.

Recommendation :

Monitoring should be continued for the Narmada River in Jamtara station at Jabalpur. At the bridge concentration time, lot of cement, sand, and concrete; brick and dust mix up in river Narmada at Jabalpur. The Gaur river is a major tributary of the Narmada river which meets at Jamtara Ghat and is polluted by so many source.The sources of pollution should be checked

People living on the banks of this river should be made aware above the delimitating waste quality of the river & public / Govt. authorities should take proper action for the prevention.

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