

# Status of the Heavy Metals in Matatila Dam: An Important Source of Surface Water in Bundelkhand Region

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**Abstract:** The physico-chemical analysis was carried to assess the water quality of Matatila Dam and results are presented in the paper. Water quality was found impaired with more activities which cause organic pollution. Different physico-chemical parameters were measured by standard methods. From the obtained data it is found that parameters like temperature, pH and DO are more than the limit, while other parameters like BOD, COD and EC were found below the limit. The presence of heavy metals in Matatila Dam were found of the following order:  $\text{Fe} > \text{Mn} > \text{Cu} > \text{Cr} > \text{Ni}$  and are within the limit or below limit of international standard. Based on the study this paper provides the scientific information to the concerned implementation of Matatila Dam restoring and conservation of water bodies.

**Key words:** Matatila Dam, Betwa river, water quality parameters, heavy metal AASB.

## Introduction

Clean water is one of the most important elements to sustain good health. It is a known fact that all life would cease to exist without water. It makes about 80% of our body weight. About 99% of the world reservoir of water is found in oceans and is too salty for drinking, irrigation, most industrial and house hold use; 0.3% of the remaining water is in the form of glaciers and polar ice caps. Lakes and rivers which are the major source of drinking water of the world account for just over 0.1% of earth's total water availability (Atla and Bertha, 1997).

Among different water resources present in Bundelkhand region Matatila Dam is one of the important source of surface water used for generating electricity and drinking purpose. It was built in 1958 on the Betwa River, 7 km from the centre. Location of the Matatila Dam is  $25^{\circ} 5' 26'' \text{ N}$  to  $78^{\circ} 22' 32'' \text{ E}$ . It

is situated in Lalitpur district 93 km from Deogarh. It is reported that during past decades the quality of drinking water has undergone radical changes (Kumar et al., 2010). The surface water are not acceptable for drinking purpose as these are often loaded with various organic, inorganic and biological constituents (Singh, 2006). The consequence of urbanisation and industrialisation leads to spoil the water causing a number of water-borne diseases.

It is therefore imperative to determine the physico-chemical parameters of water system to ensure the safe pollution level in it.

## Material and Methods

Ten water samples were collected during a fortnight in air-tight bottles from different sites in the Matatila Dam. Water temperatures were measured by mercury bulb thermometer. The conductivity and pH were

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measured by pH and conductivity meters. The COD and BOD were measured by titration. Using COD digestive unit and BOD incubator the DO is measured by titration whereas heavy metals like Mn, Cr, Cu and Ni were assessed by electro thermal atomization (AAS 30 EAT).

## Result and Discussions

The physico-chemical parameters like temperature, pH, DO, BOD, COD etc. are given in Table 1.

From the physico-chemical analysis of water it was found that water temperature is the most important factor which affects the chemical and biological reactions in water.

Measured temperatures showed fluctuation in their values which are due to seasonal variation. The pH of water showed that  $pH > \pi$  which indicates the

alkaline (basic) nature due to presence of carbonates and bicarbonates. Dissolved oxygen and biological productivity are indirect indicators of waste water. As the temperature was slightly lower in pre-winter water and in post-winter the dissolved oxygen content was found to be higher in surface water sample. COD test is useful with respect to toxic condition and presence of biochemical resultant substances. From the above results we can conclude that the Dam water is second class surface water.

The elemental concentration determined in water for each sampling site are presented in Table 2.

From the two tables it was assessed that heavy metals are present in the surface water of Matatila Dam. It was found that the heavy metals are present in order of  $Fe > Mn > Cu > Cr > Ni$ . All these results that Matatila Dam water is not useful for drinking purposes.

**Table 1: Physico-chemical parameters of surface water of Matatila Dam**

<i>Samples</i>	<i>Temperature</i>	<i>pH</i>	<i>DO (mg/L)</i>	<i>BOD (mg/L)</i>	<i>COD (mg/L)</i>
1.	25	8.70	7.40	1.20	4.70
2.	24.4	8.62	7.80	1.40	4.52
3.	25.2	8.40	7.50	0.98	3.80
4.	24.0	8.91	7.45	1.12	4.48
5.	23.0	8.50	7.71	1.43	4.81
6.	25.2	8.00	8.10	0.99	3.92
7.	26.5	8.35	8.52	1.31	3.56
8.	28.4	8.52	8.60	1.22	4.06
9.	24.0	8.38	7.20	1.50	4.46
10.	27.7	8.75	6.90	1.42	3.12

**Table 2: Concentration of different elements in samples from each site**

<i>Samples</i>	<i>Cr</i>	<i>Cu</i>	<i>Fe</i>	<i>Ni</i>	<i>Mn</i>
1.	0.061	0.094	0.421	0.042	0.341
2.	0.102	0.091	0.324	0.046	0.254
3.	0.031	0.076	0.226	0.039	0.313
4.	0.014	0.087	0.383	0.060	0.182
5.	0.021	0.110	0.271	0.025	0.323
6.	0.042	0.068	0.345	0.036	0.184
7.	0.059	0.098	0.313	0.038	0.353
8.	0.071	0.120	0.194	0.049	0.120
9.	0.110	0.079	0.287	0.061	0.240
10.	0.011	0.086	0.380	0.027	0.190

<i>Element</i>	<i>Cr</i>	<i>Cu</i>	<i>Fe</i>	<i>Mn</i>	<i>Ni</i>
Av. Conc.	0.062	0.0913	0.473	0.316	0.42
Trend	Cr	Mn	Cu	Cr	Ni

### Conclusion

The base line data obtained from the comparative studies of water sample at different sites of Matatila Dam revealed that its water is facing a problem of organic and inorganic lead pollution. Other slight increase and decrease in determined physico-chemical characteristics is due to human activities that change the water quality of Matatila Dam and in the coming years the water body may lead to the extent of deterioration if not maintained.

The presence of heavy metals in Matatila Dam also reveals that it gets pollutants due to effluents of the industries into it without proper planning. The maintenance of Matatila Dam is required in order to ensure the pollution check and survival of the dam. It is clear that the Matatila Dam water is not useful for drinking purpose.

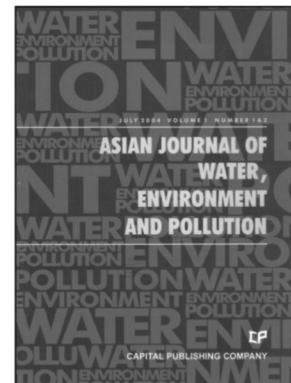
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## Aims and Scope

Asia, as a whole region, faces severe stress on water availability, primarily due to high population density. Many regions of the continent face severe problems of water pollution on local as well as regional scale and these have to be tackled with a pan-Asian approach. However, the available literature on the subject is generally based on research done in Europe and North America. Therefore, there is an urgent and strong need for an Asian journal with its focus on the region and wherein the region specific problems are addressed in an intelligent manner. In Asia, besides water, there are several other issues related to environment, such as; global warming and its impact; intense land/use and shifting pattern of agriculture; issues related to fertilizer applications and pesticide residues in soil and water; and solid and liquid waste management particularly in industrial and urban areas.

Asia is also a region with intense mining activities whereby serious environmental problems related to land/use, loss of top soil, water pollution and acid mine drainage are faced by various communities.

Essentially, Asians are confronted with environmental problems on many fronts. Many pressing issues in the region interlink various aspects of environmental problems faced by population in this densely habited region in the world. Pollution is one such serious issue for many countries since there are many transnational water bodies that spread the pollutants across the entire region. Water, environment and pollution together constitute a three axial problem that all concerned people in the region would like to focus on.

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