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EVALUATION OF WATER QUALITY OF NARMADA RIVER WITH REFERENCE TO PHYSICO-CHEMICAL PARAMETERS

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ABSTRACT

The objective of this work is the study of various water pollutants available in Narmada River. This study requires the rigorous literature review along with lab testing. Sampling stations were selected at Upstream of Omkareshwar dam, downstream of Omkareshwar dam and Maheshwar. The water samples collected were analyzed, as per standard methods parameters such as pH, EC were measured. Raised values of physico-chemical parameters indicate the pollution of riverine water due to domestic wastes, municipal sewage, industrial effluent and agricultural run-off that influence the water quality directly or indirectly. Statistical analysis carried out for pre-mansoonans and mansoon water quality.

KEYWORDS: BOD(Biological oxygen demand), pH, CHLORIDE, TDS (Total dissolved solids).

INTRODUCTION

Natural water bodies like rivers are subjected to pollution comprising of organic and inorganic constituent. Omkareshwar is the largest cities situated at the bank of river Narmada, which is also a holy place. Narmada is the largest west flowing river in India and originates from Amarkantak at an elevation of 900m in the Mekhala range of Shadol district, Madhya Pradesh. It is the seventh largest among the fourteen major river basins in the country. The river Narmada drains the catchment between the Vindhyan Mountains to the north of the river stretching east-west in general, and the Satpura mountain ranges to the south.

It flows through the undulating plains of omkareshwar about 300m high, dotted with occasional low hills. It has a total course of 1312 km before joining the Gulf of Cambar in the Arabian Sea and total basin of 98,796,80 sq km. Its First 1,077 km length is in Madhya Pradesh and the last 161 km. is in Gujarat. Of the remaining length, 35 km forms a common boundary between Madhya Pradesh and Maharashtra. The strength of waste water is expressed in terms of BOD level. Microbial examination of water is a direct measurement of deleterious effects of pollution. The aim of this study was to ascertain the impact of several physico-chemical parameters on water quality of Narmada River and to assess further its nature in terms of microbial growth. Assessment of water quality is done to analyse the physical, chemical and biological characteristics of water.

OBJECTIVES OF THE STUDY

To address water-related environmental problems, it is must to have accurate information and to know precisely what the problem is, where it is occurring, how serious it is, and what is causing it. The goal is to provide appropriate picture of current water-quality conditions and trends in water quality and water uses, and to facilitate the identification of emerging issues and future priorities.

MATERIALS AND METHODS

The present study was conducted at two selected sampling stations. taking the samples with a view to assess the nature and degree of pollution. and samples were collected from just below the water surface. At each of the station, for all physico-chemical analysis. In the analysis of the physico-chemical properties of water, standard method prescribed in limnological literature were used. Temperature and pH were determined at the site while total hardness, chlorides,

BOD and T.D.S. were determined in the laboratory. The physico-chemical parameters were determined adopting methods given by APHA (2002) *(American Public Health Association*) and Golterman (1991).

RESULTS AND DISCUSSION

Temperature

Temperature is one of the most important parameters that influence almost all the physical, chemical and biological properties of water and thus the water chemistry. It never remains constant in rivers due to changing environmental conditions. In present study the temperature of river water ranged between 20.0 & 30.3 degree.Maximum values of water temperature were observed in pre-mansoon season and minimum in mansoon season.

Narmada River Map

pH

The pH of water determines the solubility (amount that can be dissolved in the water) and biological availability (amount that can be utilized by aquatic life) of chemical Constituents Water shows alkalinity due to presence of salts of weak acids and strong bases. Alkalinity in water is caused due to presence of carbonates, bicarbonates and hydroxides. It measures the ability of water bodies to neutralize acids and bases thereby maintaining pH. pH is one of the most important factors in measuring water quality, It indicates the concentration of hydrogen ions. Natural waters generally have been found to range from pH 5.5 to 8.6 because of the presence of bicarbonates and carbonates of alkaline earth metals. The water in river Narmada was always alkaline during the period of present study like most of the other Indian rivers. the variation in pH values of river water was not very significant and it varied between 7.20 to 7.90. The lowest pH i.e., 7.4 was observed at Maheshwer dam.

Total dissolved solids (TDS)

The TDS content of fresh water generally ranges from 10 to 500 mg/lit. The total dissolved solid (TDS) is the sum of the cations and anions concentration. A high content of solids elevates the density of water, reduces solubility of gases like oxygen and mitigates the utility of water for drinking, irrigation and other purposes. The maximum permissible limit of TDS for drinking water is 500 mg/lit. In present study TDS, 230 mg/lit was the lowest value recorded at downstream of Omkareshwar dam in Pre-Mansoon and 320 highest value recorded at Maheshwar dam during Mansoon season.

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Total hardness

The total hardness was found to be high in all water bodies. This is highest (175 mg/l) in Maheshwar site during monsoon season and lowest (133 mg/l) at Omkareshwar downstream study in premansoon season. The hardness is due to dominance of salts of calcium and magnesium which indicated surge in eutrophication of river resulting to greater pollution level. The presence of lower pH and higher hardness may affect their continued use.

Biological oxygen demand (BOD)

The biochemical oxygen demand, abbreviated as BOD, is a test for measuring the amount of biodegradable organic material present in a sample of water. This results in release of organic nutrients in water bodies resulting in death of organisms thriving on water. The highest degree of biochemical oxygen demand (6.5 mg/l) was reported from Maheshwar dam study site during monsoon season, while lowest level (4.5 mg/l) was observed from upstream of Omkareshwar dam during premansoon.

chloride

The amount of chloride in all water bodies was found to be higher in all sites. At Maheshwar dam site, the maximum content of chloride (26 mg/l) was noticed during monsoon season, while the minimum (21 mg/l) was reported from upstream of Omkareshwar dam in premansoon. The high amount of chloride is an indication of burgeoning anthropogenic pressure on water bodies. The increased chlorine is generally due to the salts of sodium, potassium and calcium.

Alkalinity

Alkalinity is total measure of the substances in water that have acid neutralizing ability. Its level showed greater variation at all sites. The highest alkalinity (137 mg/l) was reported from upstream of Omkareshwar dam during premonsoon season, whereas the lowest (131 mg/l) was found to be at Maheshwar dam site during the same season. The amount of alkalinity is dependent on the nature of materials discharged in water bodies.

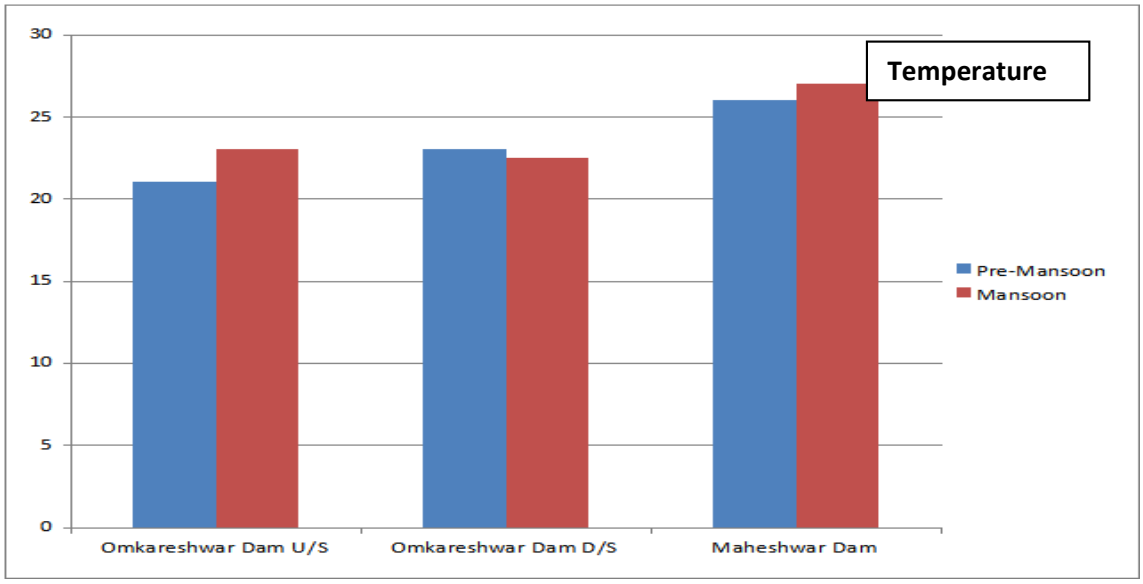

Figure 1. Fluctuation in the value of Temperature at different sites of Narmada River in different seasons.

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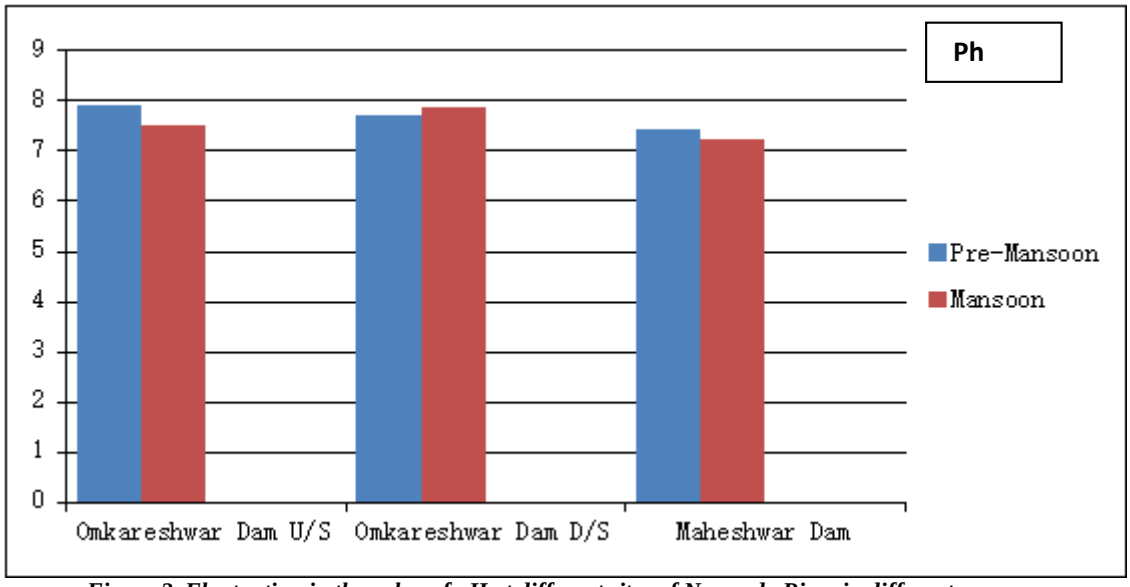

Figure 2. Fluctuation in the value of pH at different sites of Narmada River in different seasons.

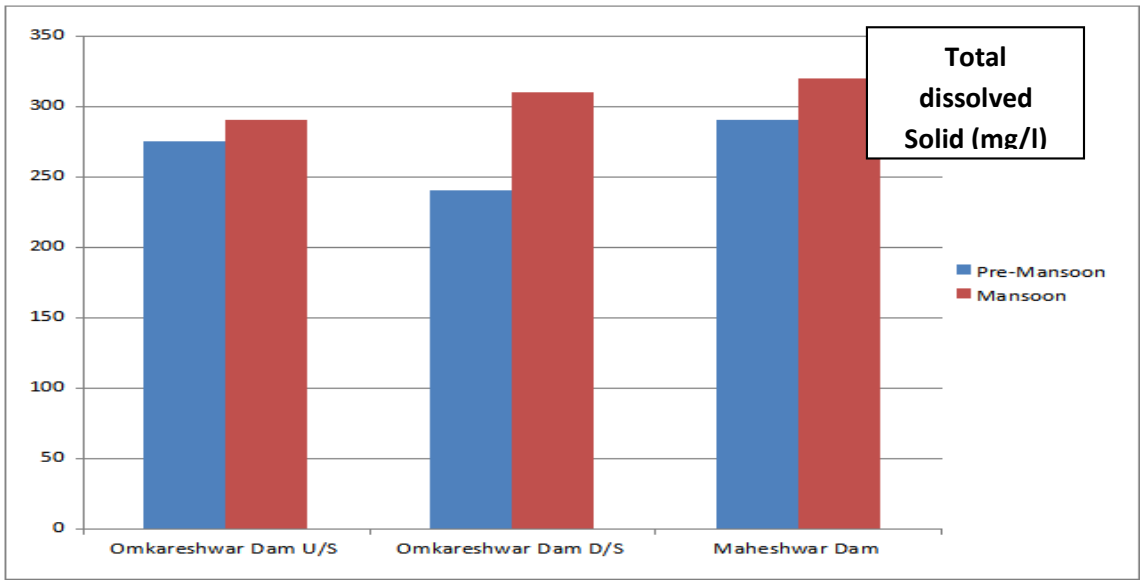

Figure 3. Fluctuation in the value of Total dissolved solid at different sites of Narmada River in different seasons.

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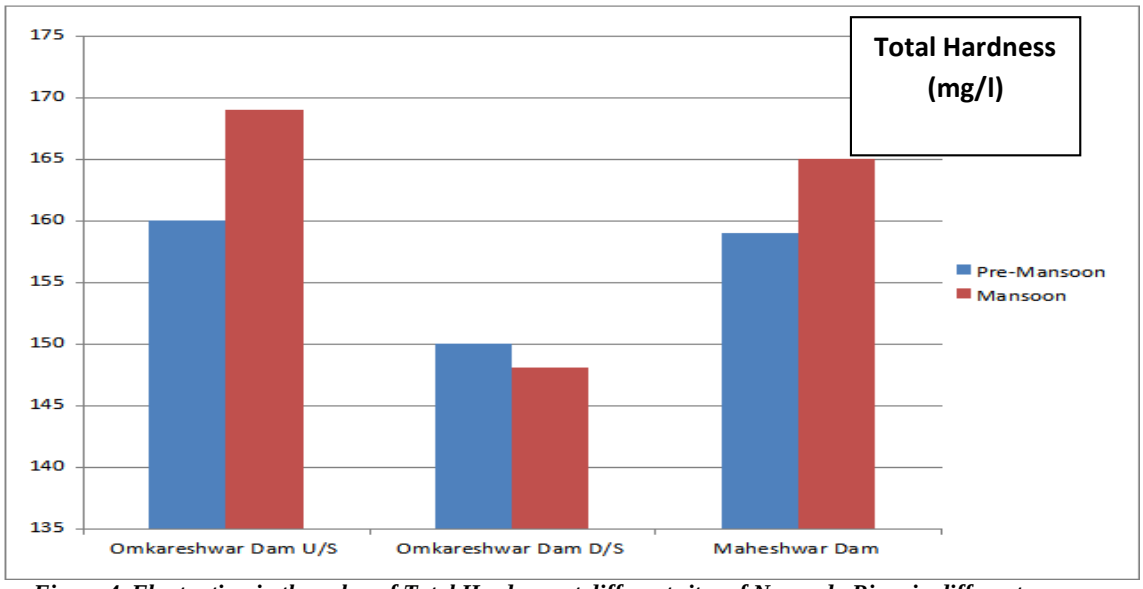

Figure 4. Fluctuation in the value of Total Hardness at different sites of Narmada River in different seasons.

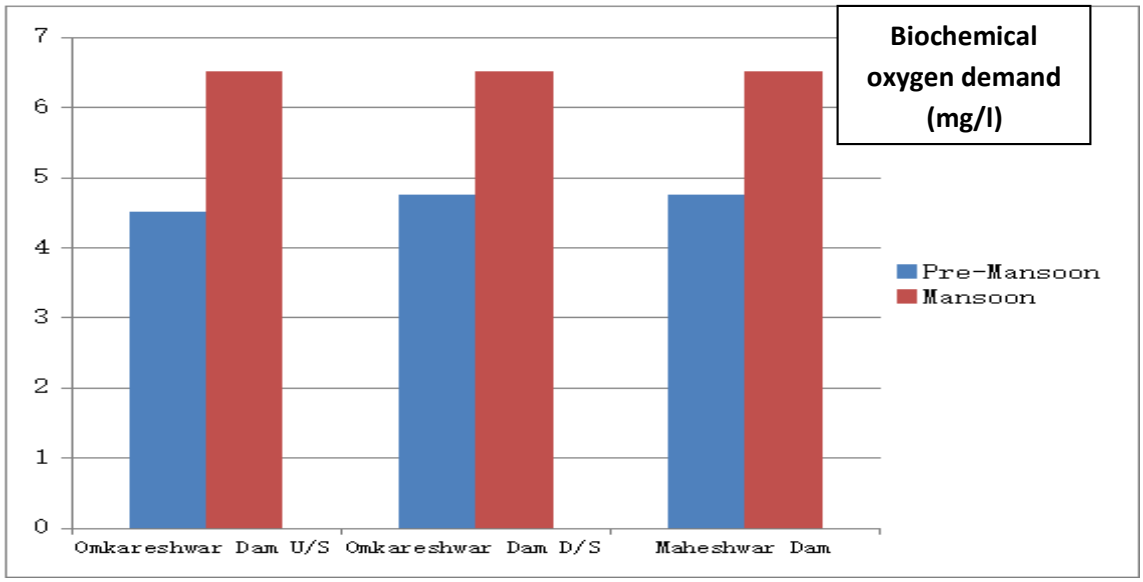

Figure 5. Fluctuation in the value of Biological oxygen demand at different sites of Narmada River in different seasons.

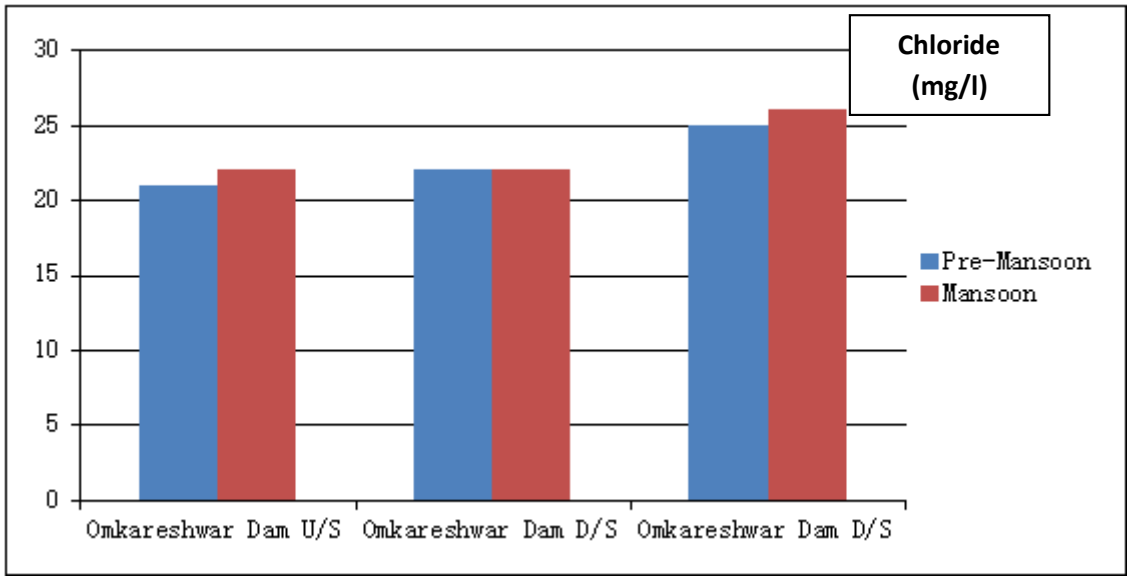

Figure 6. Fluctuation in the value of chloride at different sites of Narmada River in different seasons.

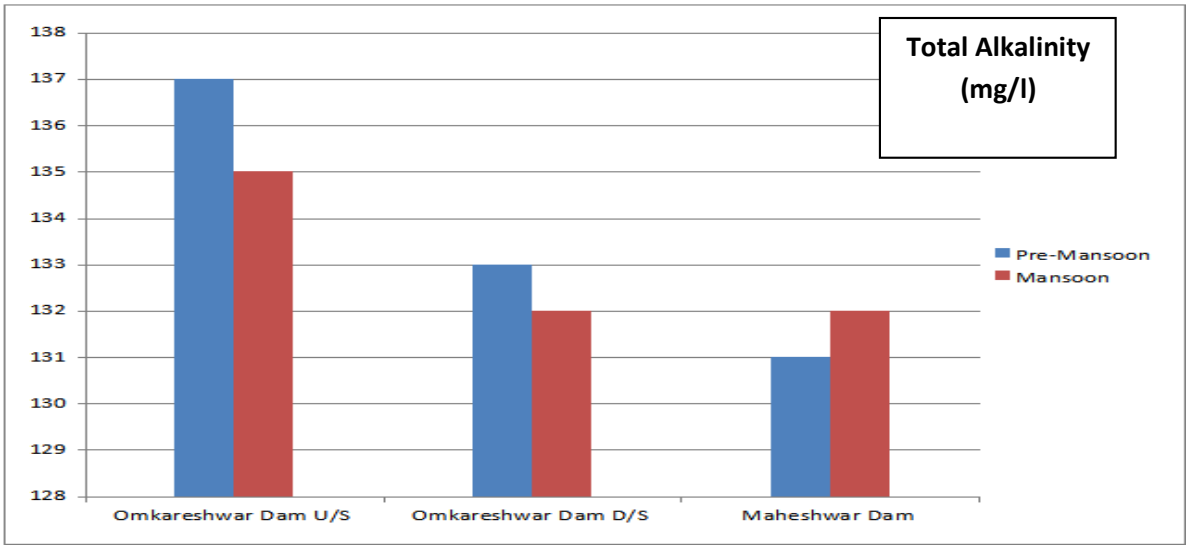

Figure 7. Fluctuation in the value of Total alkalinity at different sites of Narmada River in different seasons.

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