

## A Study of Seasonal Variation in Physico-chemical Parameters and pollution status of River Kshipra at Ujjain (M.P.)

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**Abstract-** The present study was carried out for a period of one year from January 2015 to December 2015 to enumerate the various Physico-chemical parameters and pollution in river Kshipra at Ujjain. During the study observe much fluctuation in river in one year period. Drinking water quality of river is imperishable due to very high range record of BOD and least strength seen of DO other physico-chemical parameter like TDS, TS, turbidity nitrate and sulphat are very unbalance, because polluted water are mix in river major resource of pollution is sewage or municipal west of Ujjain city.

**Keywords-** *Physico-Chemical, Parameter, Pollution, Fluctuation, Sewage, Municipal*

### INTRODUCTION

Rapid industrialization and urbanization has lead to poor water quality and pollution problem because water quality is disturb. Due to increase in population people start migrating from rural to urban areas and hence have also increase in causes a pollution in water body [1]. Water is a good occurrence for living, aquatic autotrophic living like algae and macrophytes are preparing the food for herbivorous of river and conducts many ecosystems. Physico-chemical parameters play a trigger roll for hydrophytes growth. The water quality management and monitoring are most important for drinking purpose of water. Catchment area and tributary decide the water quality of river. The abiotic components give information about the type of a substance and its concentration, while biotic components indicate the general effect of the substance. The changes in the physicochemical conditions of water can be reflected directly in the biotic community of ecosystem [2].

Kshipra River is a holly river of India, which is situated middle of the city in Ujjain. The river rise in Kskri Bardi hill of Vindhya rang on Dhar district. River flowing in Malwa plateau and joins the river Chambal. The geological position of the river is 23.17°N, 75.79°E on Ujjain. The drainage water of city is connecting to it. Domestic industrial and other purposes discharge water are mix in their water. Sewage water is a major component of water pollution, contributing to oxygen demand and nutrient loading of the water bodies [3]. The wastewater is a mixture of sewage water, agricultural drainage, industrial waste effluents and hospitals facilities it is well known that the wastewater from domestic origin contains pathogens, suspended solids, and other organic and inorganic

pollutants. Industrial estates are established to fulfill the demand of the growing population in the country [4].

### MATERIAL METHOD

The present study was conducted at selected sampling stations Ujjain in the Kshipra River for the period of one year from January 2015 to December 2015 by taking the samples monthly with a view to assess the nature. The samples were collected from just below the water surface and analyzed all physicochemical parameter standard method of A.P.H.A. 1992, and Adoni et.al 1985 method [5], [6]. Water quality parameter like B.O.D., D.O., TDS, TS, pH, Ca, Mg etc was analyzed in laboratory. Mercury thermometer was used for measuring air and water temperature. Standardized digital laboratory grip pH meter was used for recording the pH of water. Do was estimated by the azide modification of Winkler's method. Total dissolved solids were measured by TDS meter by immersing the electrodes of it in a well-mixed sample. Electrical conductivity was measured by Grip conductivity meter. Free CO<sub>2</sub>, alkalinity, total hardness, and calcium, magnesium hardness were measured by titration method. Chloride was determined by Argometric method using potassium chromate as an indicator. Nitrate nitrogen was measured spectrophotometrically. Phosphate phosphorus content of water sample was determined by stannouschloride method.

### RESULT AND DISCURSION

In the present study, seasonal variation of physical and chemical parameter of Kshipra River like pH, Temperature, turbidity, and total dissolved solids in conjunction with chemical Characteristics such as DO, BOD, COD, hardness, nitrates, sulphates, chlorides etc., and the water quality has been assessed.

**Temperature:** Temperature is a important parameter of water body. Variation of temperature was recorded in the years of during investigation. The higher seasonal value of temperature that is 32.8°C in summer was recorded in the sample and lower value was observing 18°C in winter. Temperature is influence on the biotic communities.

**pH:** The drainage wastewater was alkaline in nature in Premonsoon, Monsoon and Post monsoon seasons, that is increase value of pH between 7.2 in summer and higher 8.4 and within the permissible limits of pH for irrigation which vary between 6 to 9 as laid down in IS7.

**Turbidity:** The turbidity was observes in summer 54.23 NTU are minimum and higher value seen during rainy season 65.38 NTU. These values are too high it indicates the more insoluble water mixing in river water.

**Total Solids (Dissolved and Suspended solids):** Total dissolved solids affect the qualities of drinking water and is most important parameter in irrigation water because, it has the capable to diffuse in to the plants. It is able to inhibit the growth of flora and biota. Minimum TDS value 732.38 ppm. observe in summer season and higher value 770.14 ppm. observe in winter during research work .

**Hardness:** Hardness one of the most important parameter of river, calcium and magnesium ions are responsible for increasing the hardness of water maximum value of hardness record 378.51 ppm.in winter and lowest value recorded 243.58 ppm in rainy season. Generally the water can be said to be hard and therefore unsuitable for both domestic and industrial use as there exists possibility of scale formation in boilers and pipes.

**Chloride:** Chloride one of most important parameter, value of chloride mostly affected by monsoon and wastewater contamination and the domestic and industrial west also increase it. Maximum chloride observes in summer 169.82 ppm. and 119.56 ppm. observe in winter season.

**Nitrate:** The nitrate is major nutrient for aquatic plant, it is found in different concentration a high content of NO<sub>3</sub>-N and NO<sub>2</sub>-N in water may be toxic to babies when used for making up feeds from milk powders NO<sub>2</sub>-N causes the blue baby syndrome .higher value of nitrate 63.81 ppm. seen in rainy season 59.25 ppm. in winter season.

**Sulphate:** The observed levels of sulphate during work 241.56 ppm. rainy season high value observe 263.16 ppm. in winter. WHO recommended values of 400 ppm. higher SO<sub>4</sub> content can cause diarrhea. Presences of sulphate in municipal wastewater are due to the addition of detergent wastes from textile industries and washing of clothes in rivers.

Table 1-Observation of physico-chemical parameters were analyses in 2015.

Parameters	Summer	Rainy	Winter
1. pH (pH unit)	8.42	7.29	8.14
2. TDS (ppm)	732.38	758.29	770.14
3. Temperature (°c)	32.8	25.6	18
4. Turbidity (NTU)	54.23	65.38	58.3
5. Ca (ppm)	225.7	253.40	198.96
6. Cl (ppm)	169.82	158.22	119.56
7. Total Solids	1038	1032	1056
8. Mg (ppm)	143.42	107.19	119.14
9. NO <sub>3</sub> (ppm)	62.6	63.81	59.25
10. SO <sub>4</sub> (ppm)	254.33	263.16	241.56
11. BOD (ppm)	141.11	129.98	144.25
12. COD (ppm)	335.74	321.88	145.89
13. DO (ppm)	0.0	0.1	0.12
14. Hardness (ppm)	356.31	243.98	278.51

**Dissolved Oxygen (DO):** The free oxygen of water is indicates the ability of water. Water is an indication of the ability of that water to support biological life.

However DO concentration values can be affected by the water temperature as the solubility of O<sub>2</sub> is a function of temperature and photosynthesis. It may also be related to the concurrent changes in the formation and decomposition of organic compounds and to the uptake of inorganic carbon and release of nutrient elements such as nitrogen, phosphorus. During research work we got 0.0 to 0.12 value of dissolved oxygen in the years, because polluted industrial and domestic uses water mix in Kshipra water.

**Biological Oxygen Demand (BOD):** The BOD is an important parameter which indicate the decomposition and organic status of river water, during the study maximum value 144.25 ppm. record in summer and minimum value 129.98 ppm. record in rainy. This value indicates the hyper 111 loading of decomposition and anaerobic oxidation in river water [7].

**Chemical Oxygen Demand (COD):** COD is another measure of organic material contamination in water specified in ppm. COD is the amount of dissolved oxygen required to cause chemical oxidation of the organic material in water. Both BOD and COD are key indicators of the environmental health of a surface water supply. They are commonly used in waste water treatment but rarely in general water treatment. The COD is another parameter used to characterize the organic strength of wastewater [7], [8]. COD higher value observes in summer 335.74 and lower value 145.98 ppm. observe in winter season.

### CONCLUSION

The present study revealed that the river Kshipra is of a poor quality, although there is a need to continuous monitoring in order to maintain the quality of river water. Assessment of water quality is a critical factor for assessment of pollution levels. The results from the present study clearly pointed out that waters are highly polluted as they contain high levels of nitrates, phosphates, chlorides and sulphates. Further, the study of DO, BOD, COD, and total dissolved solids values are not within the permissible limits given by EPA [9], [10]. People want to be aware for river Kshipra because the higher range of sewage and municipal waste are converting to river a nalla [3],[11].

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