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Kolar River in the Focus of Natural-Anthropogenic Situations at Catchments (M.P INDIA)

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Abstract: River water quality is very essential as it is used for drinking and domestic purpose, irrigation and aquatic life including fish and fisheries. The study was conducted to assess the relationship between the catchment area and water quality of Kolar River (A right bank tributary of Narmada River). Physico chemical analysis was the focus to evaluate the water quality. The water samples were collected in plastic container of 500 ml capacity from five different geographic locations along the river. And samples were collected from water at different selective sampling stations. A number of physiochemical water quality parameters including Temperature, pH, EC, TDS, DO and Chloride, were measured on field, so that the accuracy of the result will be suitable. The mean value of such respective parameters compared with the water quality standards as set by the NWQS. For catchment assessment QBR index has been used in the present study.

Key Words: Water quality, Kolar River, Physiochemical, assessment etc

Introduction

An essential resource for human life, freshwater has no substitutes. Freshwater is also essential for many natural systems that support human well-being [1]. India is one of the developing country having prosperous fresh water resources in the form of rivers, kunds, ponds and lakes etc [2Water is absolutely essential not only for survival of human beings, but also for animals, plants and all other living things [3]. Water has become an essential commodity for the development of industrials and agriculture [4]. Water is also crucial for the quality of life. The oceans, the rivers, lakes and creeks together with the land constitute the canvas on which life grows and interacts. The ecological balance maintained by the quantity and quality of water determines the way of life of a people. On the other hand, polluted water is the greatest source of disease and besides debasing the land also becomes unfit to sustain life [5]. Today the problem is not only of water availability but of environmental quality and ecological balance. With increasing industrialization, urbanization and technological advance in all fields, sources of water are getting more

and more seriously polluted. The survival of life on earth will be threatened if the present rate of pollution continues unabatedly. Natural waters are afflicted with a wide variety of inorganic, organic, and biological pollutants. In some cases, such as that of highly toxic cadmium, a pollutant is directly toxic at a relatively low level. In other cases, the pollutant itself is not toxic, but its presence results in conditions detrimental to water quality. The fluctuation in river water temperature usually depends on the season, geographic location, sampling time and temperature of effluents entering the stream [6]. Oxygen is the single most important gas for most aquatic organisms; free oxygen (O2) or DO is needed for respiration. DO levels below 1 ppm will not support fish; levels of 5 to 6 ppm are usually required for most of the fish population. The average value of DO levels (6.5mg/l) indicates the average quality of river water [7].

The utility of river water for various purposes is governed by physico-chemical and biological quality of the water. The assessment of the changes in river communities as a result of the impact of pollution is particularly interesting issue within the frame work of aquatic ecology, since running waters are becoming increasingly affected by anthropogenic discharge [8].

Methodology

To evaluate the physico-chemical analysis, methods has been adapted from American Public Health Association [7]. Twelfth edition, Workbook on Limnology by Adoni, [9]. Besides this MS-WORD, MS-EXCEL and PAST software has been used for the betterment of the results and interpretation. In the graphical representation B,C, D, E, F, G, H, I and J are different sampling sites viz; B=S1, C=S2, D=S3,E= S4, F=S5(a) G=S5(b) H=S6 I= S7 and J=S8. For the assessment of the relationship between catchment area and water quality a protocol used by [10] were also used to carry out the successful results.

Results and Discussions

Temperature:- The fluctuation in river water temperature usually depends on the season, geographic location, sampling time and temperature of effluents entering the stream [6]. Temperature of water may not be as important in pure water because of the wide range of temperature tolerance in aquatic life, but in polluted water, temperature can have profound effects on dissolved oxygen (DO) and biological oxygen demand (BOD). In Kolar River different temperatures of various sampling stations were recorded (Table 01 and 02). The temperature of water samples varies from 42^0C to 46^0C (in dry season) and 26.5^0C to $28.9.^0$C (in wet season) respectively.

pH :- The higher values of pH represent that there is high chloride, bicarbonate, carbonate etc. that means the water is alkaline. In Kolar river water there is a significant variation of pH in various sampling station in both seasons (Table 01 and 2). pH of the water samples ranged from 7.7 to 8.2 (in dry season) and 7.8 to 8.49.3 (in wet season). the permissible limit of pH for irrigation: 6.0 −8.4 [11]. 6.0–8.5 [12].

Conductivity:- The electrical conductivity measures the concentration of ions in water. The concentration of ions depends on the environment, movement and sources water. The soluble ions in the surface water originate primarily from solution of rock materials. Specific conductance of most natural water generally ranges from about 50 to 1500 µS/cm. The Electric Conductivity in the study area ranged between 420 to 480 µS/cm in dry season and 350 to 470 µS/cm in wet season (Table 01 and 02). The average and standard of EC showed a significant standard deviation.The recommended threshold (TV) EC is 0.70 dS m−10.75 dS m−1 [12].

Total Dissolve Solids (TDS):- TDS refers to the sum of all the components dissolved in water. In natural water dissolved solids are composed of mainly Na+, K+, Ca2+, Mg2+, and Cl-, SO42-, PO43-, H4SiO42-, and HCO3-. Water that contains too much dissolve matter is not suitable for common uses.TDS in the study area varies from 280 to 520 ppm in dry season and 250 to 350 ppm in wet season (Table 01 and 02). As per IS: 10500-2012 acceptable limit is 500 mg/l and permissible limit is 2000 mg/l [13-14]..

DO: The DO levels below 1 ppm will not support fish; levels of 5 to 6 ppm are usually required for most of the fish population. The average value of DO levels (6.5mg/l) indicates the average quality of river water [7]. DO values in our study ranges from 6-8.5 in dry season and 7.9-9 in wet season (Table 01 and 02**)**. while as the standard value is about 6.5 ppm. So comparison between average value and standard value of DO is less deviated (Table 01 and 02) so that it represents the good quality of river water for fish life and other aquatic life. The maximum values (9.3 mg/l) was recorded in the month of November and minimum values (7.0 mg/l) in the month of June [15].

Chloride: - In the present study the value for chloride were ranged from 17.99 to 124.99mg/l (Table 01 and 02). [16] Also recorded the value of chloride ranged from 17 to 111mg/l in Cauvery River Basin.

Assessment with relation to Catchment Area:

The relationship between catchment area and water quality from the selected study area were found overall satisfactory. Numerous studies have documented declines in water quality, habitat, and biological assemblages as the extent of agricultural land increases within catchments. In the present research the impact of catchment was not much favored the deterioration, but in the future may be the relationship between catchment area and water quality will be in negative form so the monitoring is essential.

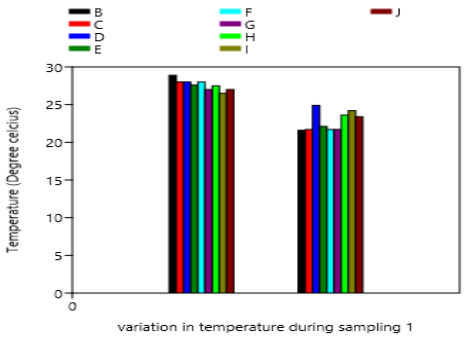
Table 1: Water quality parameters of sampling-I

Station	Near Reservoir	Lavakheri	Water Filtration Plant	Sath Bhavdi	Old Bridge	Old Bridge	Dana Baba	Amdoh	Stop Dam
Parameters	S1	S2	S3	S4	S5(a)	S5(b)	S6	S7	S8
Air temperature^{0}C	28.9	28	28	27.6	28	27	27.5	26.5	27
Water temperature	21.6	21.7	24.9	22.1	21.7	21.7	23.6	24.2	23.4
pH	8.1	7.8	8.2	8.3	8.4	8.2	7.9	8.1	7.8
Conductivity(µS/cm)	390	390	420	470	380	350	390	380	420
TDS(ppm)	300	250	270	300	240	230	260	300	350
DO(mg/l)	8.6	7.9	8.4	8.9	9	8.3	8.2	8.6	8.7
Chloride(mg/l)	23.99	17.99	18.99	19.99	124.99	124.99	122.99	123	120.99

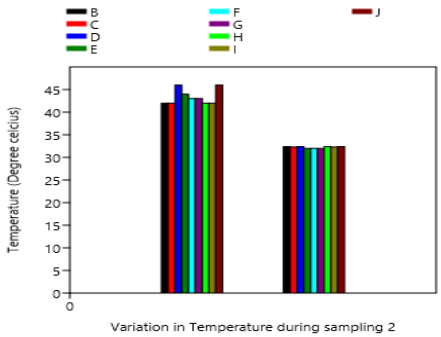
Table 2: Water quality parameters of sampling-2

Station	Near Reservoir	Lavakheri	Water Filtration Plant	Sath Bhavdi	Old Bridge	Old Bridge	Dana Baba	Amdoh	Stop Dam
Parameters	S1	S2	S3	S4	S5(a)	S5(b)	S6	S7	S8
Air temperature^{0}C	42	42	46	44	43	43	42	42	46
Water temperature	32.4	32.3	32.4	32	32	32	32.4	32.3	32.4
pH	7.9	7.7	8	8.1	8.2	8.2	7.9	7.7	8
Conductivity(µS/cm)	430	420	480	480	400	420	430	420	480
TDS(ppm)	280	370	330	520	360	440	280	370	330
DO(mg/l)	7.5	6	8	7.3	9	8.5	7.5	6	8
Chloride(mg/l)	32.6	36.8	42.5	100.7	38.2	73.75	32.6	36.8	42.5

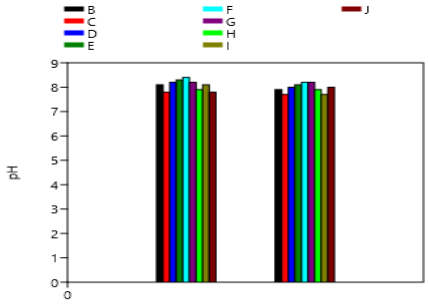
Graphical representation of the physico-chemical and their variations of Table 1 and 2



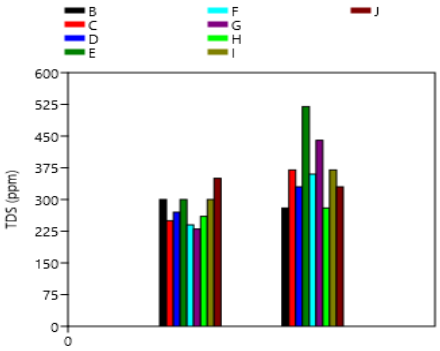
variation in temperature during sampling 1



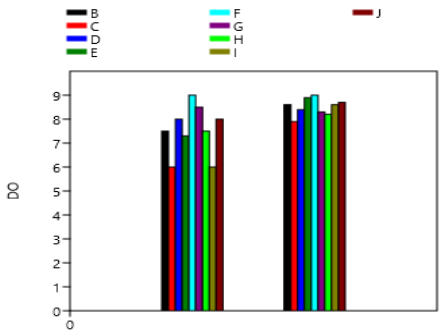
Variation in Temperature during sampling 2



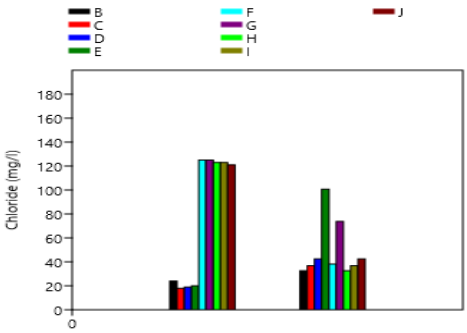
pH variation during sampling 1 and 2



Variation in TDS (ppm) during sampling 1 and 2

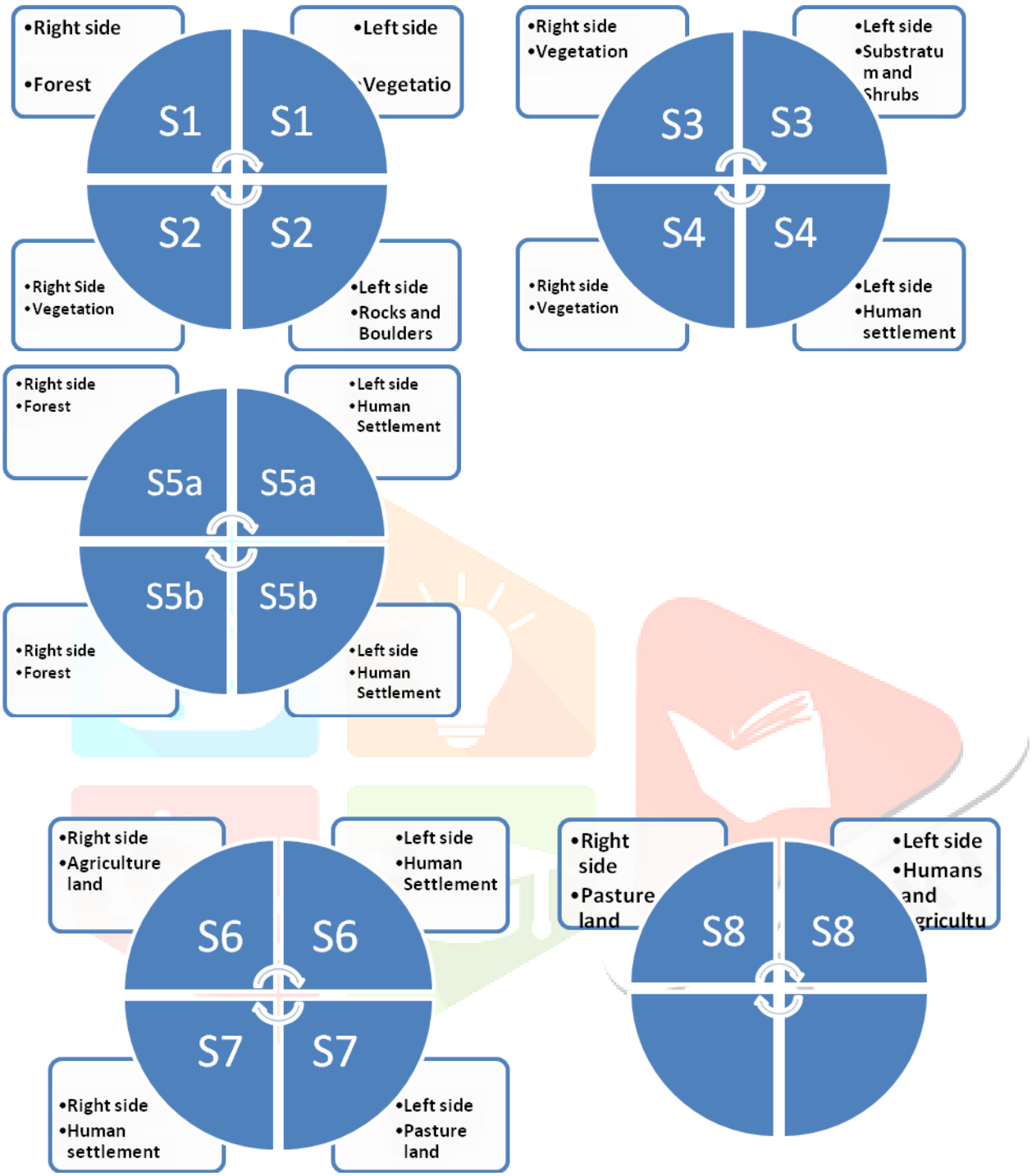


Variation in DO during sampling and 2



Variation in Chloride (mg/l) during Sampling 1 and 2

Representation of different Catchment area of the Sampling sites used in study



Conclusion

The research was conducted to assess the relationship between catchment area and water quality of Kolar River. The overall result was satisfactory. Kolar river is the main source of drinking water for the Bhopal city. In order to protect the environment in general and preserve a good water quality in particularly, especially of the kolar river from Sehore, shared by so many communities. The primary responsibility for water quality and wetlands management lies with state and territory governments, which manage water supply and quality with the support of jurisdiction-specific guidelines, regulations, policies, processes and standards. Hence the Madhya Pradesh government should take measures to maintain the suitability of water in Kolar River.

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