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Analysis of chemical parameters of freshwater bodies of Kajali river Ratnagiri, India

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ABSTRACT

In the present study some chemical parameters were analyzed of three sampling sites of Kajali river *viz.* S1, S2 and S3. The monsoon and winter seasons show different seasonal fluctuations in various chemical parameters. The observed chemical status of these water bodies are reported to be suitable for the development on planktonic organisms and fishes. The water parameters indicate that the S2 and S3 are rich in nutrients. The life in the aquatic ecosystem is directly or indirectly depends on water quality.

Keywords: Chemical Parameters, Fish, Fresh water.

INTRODUCTION

India is a unique country with the great cultural diversity associated with all kinds of climates, rich flora and fauna. In spite of enormous volume of hydrosphere only a small portion of it is actually available as a resource. More than 97% occurs in the form of sea, whose salinity makes it useless, while fresh water makes up only 2.6%.

Fresh water ecosystems are subset of Earths aquatic system. They include lakes, ponds, rivers, streams, springs and wetland. Limnology deals with the biological productivity of inland water and with all its causal influences which determines its causal influences involve meterological, physical, chemical and biological factors, "which determine the quality and quantity of biological production. Physico – chemical analysis indicates the changes in different factors and their influence on biological status of the system. Limnological study will define the biological, chemical and physical nature of each reservoir, as well as its hydrological regime including those elements imposed by humans. India is having very rich sources of inland waters in the form of lake, reservoirs and rivers.

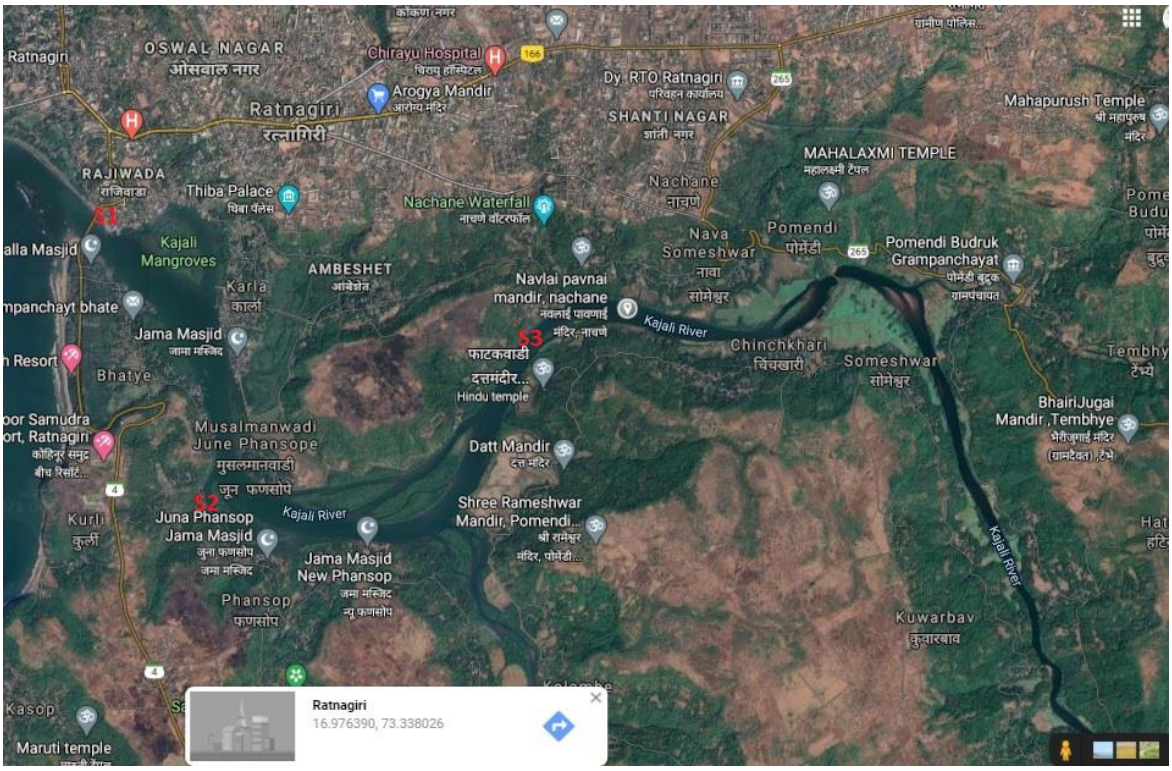

Figure 1: Satellite View of Kajali River Showing All Sampling Sites.

MATERIAL AND METHODS

Water sample was collected by using plastic bottle, glass bottle and polyethylene bottles no any reactive material containing container is use such care should be taken that the water sample does not change their composition before tests of analysis. Water samples from the bottle the shallow knee-depth areas were collected manually by lowering a closed glass bottle or polyethylene bottles to the bottom, opening and closing it there by hands and taking it out. Monthly water samples were collected early in the morning from three different sampling sites of Kajali river *viz* S1, S2, and S3. This water sample brings in to the laboratory and analyzed by following the prescribed Standard methods for the Examination of water APHA (1998).

RESULTS

In the present study chemical parameters of Kajali River Ratnagiri, Maharashtra were analysed for a period of six months (From August 2018-January 2019). Analytical report of water quality characteristics is presented in the figure 1 to 6.

Dissolved Oxygen (DO)

The Dissolved oxygen is one of the major parameters of water the mean value of DO of Kajali river during the study periods was 3.55±0.599 mg/L, 2.066±1.246 mg/L of S1 sampling site, 1.883±0.594 mg/L of S2 and 4.666±0.2804 mg/L of S3. The highest value of DO was recorded in the month of December on S3 which was 4.6mg/L and lowest was 0.9 mg/L on same sampling site in the month of September. Dissolved oxygen varies greatly from one site to another site. The dissolved oxygen of the water sample was found to be maximum during the winter season whereas monsoon exhibits low amount of dissolved oxygen as compared to the winter values showing Figure 2. The high DO content might be due the increased photosynthetic activity of the autotrophs while low content might increase respiration of the organisms, low photosynthetic rate and increased organic matter decomposition. Similar studies were carried out by Kumar (2013).

Carbon dioxide (CO_2):

Depending on the P^H and other biological conditions carbon dioxide is found in various forms. the carbon dioxide in turn obtained from the conversion of carbonate to bicarbonate with the rise in the pH. The

mean value of free CO_2 recorded on all three sampling site was absent. Free CO_2 was absent due to the activity of respiration in water bodies. It indicates that water contain high amounts of zooplanktons are there means respiration was more and less amounts of photosynthesis is there Dabhade (2006).

Total Alkalinity:

Alkalinity represents the buffering capacity for water and its ability to resist a change in pH and is the total measure of the substance in water that has "acid-neutralizing ability". Excessive alkalinity may cause eye irritation in humans and chlorosis in plants. Surface water with alkalinity less than 200 mg/L is potentially sensitive to heavy acid deposition. Alkalinity itself is not harmful to human beings; still water supplies with less than 100 mg-l of alkalinity are desirable for domestic use. The desirable level of total alkalinity for drinking water should be below 200 ppm (ISI, 1991). & III.

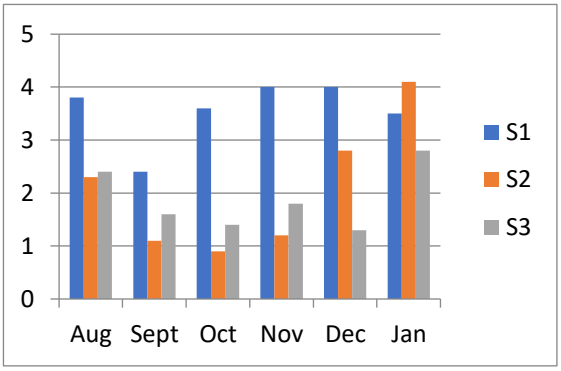

Figure 2: Seasonal Changes in the DO

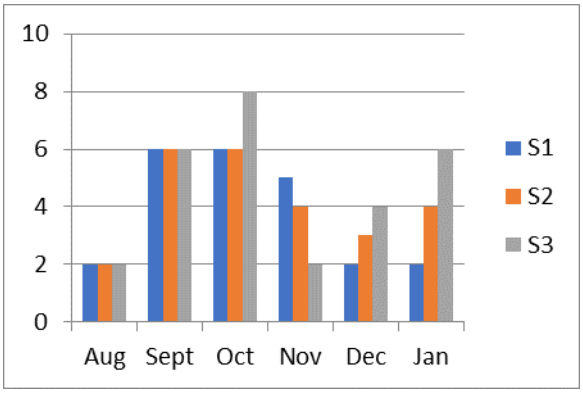

Figure 3: Seasonal Changes in the Co_3

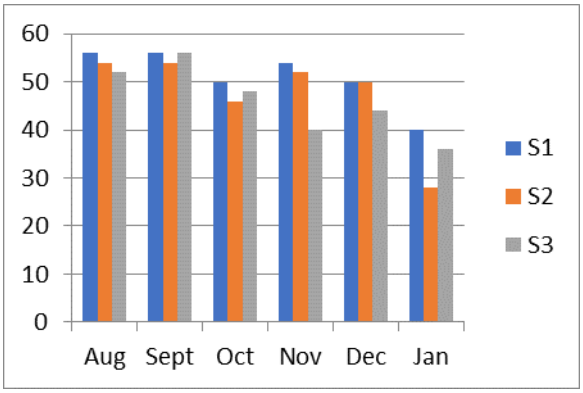

Figure 4: Seasonal Changes in the HCO_3

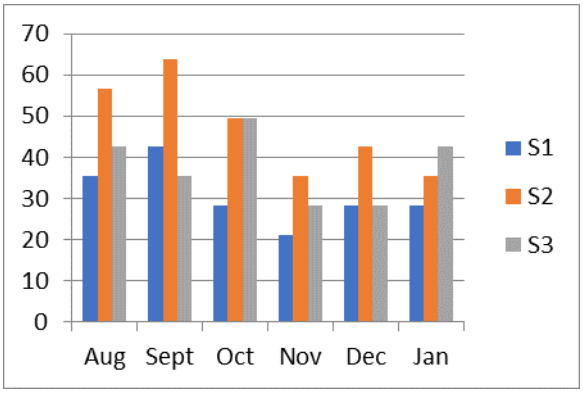

Figure 5: Seasonal Changes in the Chlorinity

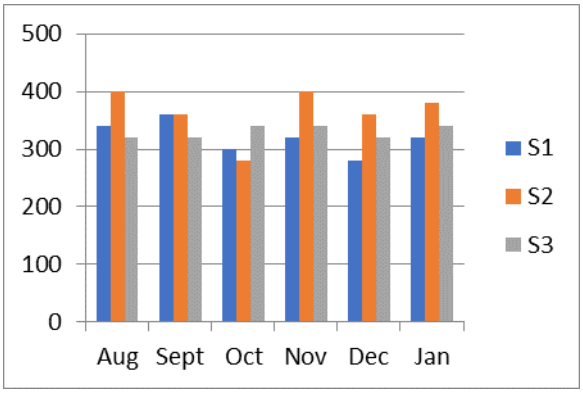

Figure 6: Seasonal Changes in the Total Hardness

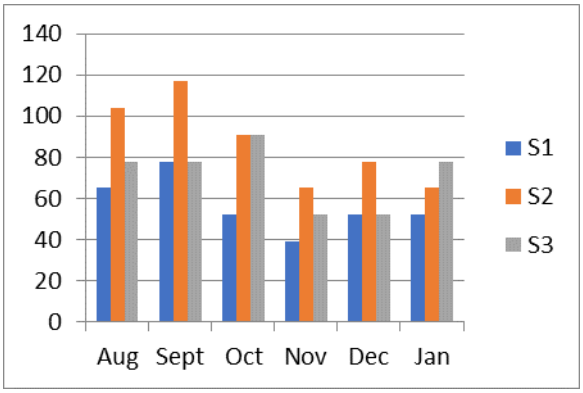

Figure 7: Seasonal Changes in the Salinity

CO3 (Carbonate Phenolphthalein alkalinity):
The mean Carbonates values of four different sampling sites during the present study was 3.285 ± 2.041 mg/L on S1, 4.166 ± 1.602 mg/L on S2 , 4.666 ± 2.422 mg/L on S3. Alkalinity was found to be increased in winter season and decreased in rainy season and decease in alkalinity during rainy season may be due to dilution ,while increase in alkalinity in winter might be due associated with values of P^H, hardness and high dissolved solids and rate of carbon assimilation in water. Similar studies were carried out by Indresha et al., (2014). Seasonal variations showing Figure 3

HCO_3 (Bicarbonate or Methyl Orange alkalinity):
The mean Carbonates values of four different sampling sites during the present study are 51 ± 6.033 mg/L ,on S1, 51.33 ± 9.933 mg/L ,on S2, 46±7.483 mg/L, on S3. The comparative changes in the bicarbonate are Seasonal variations showing Figure 4.

Chloride (Cl^-)
Chlorides occur naturally in all types of waters, in Natural freshwaters, however, their concentration remains quite low and generally less that of sulphate and bicarbonate. The seasonal variations in the chloride value of all sampling sites are 35.45mg/L, 42.54mg/L, 28.36mg/L, 21.27mg/L, 28.36mg/L, 28.36mg/L of S1, 56.72mg/L, 63.81mg/L, 49.63mg/L, 35.45mg/L, 42.54mg/L, 35.36mg/L of S2, 42.54mg/L, 35.35mg/L, 49.63mg/L, 28.36mg/L, 28.36mg/L, 42.54mg/L of S3. The average chloride concentration during the present study was found to be 30.723 ± 7.322 mg/L, in S1, 47.266 ± 11.57 mg/L in S2 , mg/L 37.979±8.592 mg/L in S3. The comparative changes of chloride are shown in Figure 5.

Total Hardness:
Total hardness is defined as the concentration of multivalent metallic cations in solution. Water hardness is very important parameter of water quality. High concentration of hardness points out toward eutrophication of the aquatic ecosystem (Rai, 1974). During present investigation the average concentration of total hardness of S1 was found to be 320±28.284 mg/L, 363.33±44.57 mg/L in S2, 330±10.954 mg/L in S3. The similar studies were carried out by Indresha et al., (2014) and Muralidharan and Waghod (2014) and it also supports to the finding of Shinde *et al.,* (2011). The comparative values of total hardness are shown in Figure 6.

Salinity:
Salinity has been defined traditionally as the total solids in water after all carbonates have been converted to oxides, all bromide and iodide have been replaced by chloride and all organic matter has been oxidized. Salinity is an important unit less property of industrial and natural waters. It originally concived as a measure of mass of dissolved salts in a given mass of solution. The seasonal variations in the salinity of all sampling sites are 65.05g/L, 78.06g/L, 52.04g/L, 39.03g/L, 52.04g/L, 52.04g/L of S1, 104.08g/L, 117.09g/L, 91.07g/L, 65.05g/L, 78.04g/L, 65.05g/L of S2, 78.06g/L, 78.06g/L, 91.07g/L, 52.04g/L, 52.04g/L, 78.06g/l of S3. The average concentration of the salinity during the present study was found to be 56.376±13.43 g/L in S1, 86.733±21.24 g/L in S2, 71.555±15.93 g/L in S3. All the three sampling sites shows the slight fluctuations in the salinity during the present study and the similar studies were carried out by Indresha *et al.,* (2014). The comparative values of salinity are shown in Figure 7.

SUMMARY AND CONCLUSION

In the present study total chemical parameters viz. DO, CO_2, CO_3, HCO_3, Chloride, salinity, Total hardness of four fresh water bodies viz. S1, S2 and S3 were analyzed. The monsoon and winter seasons shows different seasonal fluctuations in various chemical parameters. The observed chemical status of these water bodies are reported to be suitable for the development on planktonic organisms and fishes. The water of present reservoirs is useful for irrigation as well as fish culture. The water parameters indicate that the S2 and S3 are rich in nutrients. The life in the aquatic ecosystem is directly or indirectly depends on water quality.

Conflicts of Interest: The authors declare no conflict of interest.

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