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Seasonal impact on potable quality of water of Purna river, near Purna city, Dist Parbhani, Maharashtra

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ABSTRACT

Purna river is one of the tributary of river Godavari, and is the most important river in Parbhani district of Maharashtra, used to perform various activities such as domestic, agriculture and industrial. Potable quality of river water is affected by season and other factors. To assess the effect of season on various physico- chemical parameters such as pH, Temperature, Transparency, Dissolved oxygen (DO), Free Carbon dioxide (CO_2), Chloride, Total alkalinity, Hardness, Calcium and Magnesium two stations A & B were selected on the Purna river, Purna city. The assessment programme was conducted from July 2010 to June 2012. Obtained results are discussed in the text.

Key words: Seasonal variation, Physico- chemical parameters, Purna river, Parbhani.

Water is the most vital resources for all kinds of life on this planet. Rivers are vital and vulnerable freshwater systems and are essential for the sustenance of all life. However, the declining quality of river water in these systems threatens their sustainability and is therefore a cause for concern. River provides main water resources for domestic, industrial, and agricultural purposes[4,16]. Rivers play a major role in integrating and organizing the landscape, moulding of ecological setting of controlling the global water and hydrologic cycle and are the most dynamic agents of transport[5]. Due to Population explosion, Industrialization, Use of Fertilizers and Man-made activities. Natural aquatic resources are polluted therefore there is necessary to assess the quality of water at a regular time interval because due to use of contaminated water, human population will suffer from varieties of water borne diseases[11]. Life in aquatic environment is largely governed by physico-chemical characteristics of water[14]. Water quality assessment provides current information about the concentration of solutes at a given place in a given time and is the basis for judging the suitability of water for its designated purpose it also helps to improve existing conditions and for optimum development and management of the water resources[9].

Purna river an important river in Marathwada, is located at 19°11'N 77°03'E 19.18°N 77.05°E. The river begins from Ajanta range at Aurangabad district of Maharashtra state. It is a very important river in Marathwada. It meets the Godavari river near Kanteshwar. Considering the importance of river and terrestrial aquatic life the present investigation was undertaken to find out impact of season on potable quality of water of Purna river, at Purna.

For the assessment of water quality of river Purna two stations were selected namely A and B. These stations are on the bank of the river, Spot A is near to pump house and spot B is near to Railway Bridge. These stations are away from each other and the distance between is about 2 km. Water samples were collected for the analysis of pH, Temperature, Transparency, Dissolved oxygen (DO), Free Carbon dioxide (CO_2), Chloride, Total alkalinity, Hardness, Calcium and Magnesium. All parameters were analysed at spot as per Trivedy & Goel[15]. pH was measured by using digital pH meter and Temperature was measured by using mercury filled Celsius thermometer. Transparency was measured with the help of Secchi disc and remaining parameters were analysed as suggested by Trivedy & Goel[15].

pH:

At spot A pH was ranged from 7.47 to 7.85 at with mean value 7.61 and at spot B it was ranged from 7.5 to 7.8 with mean value 7.65. In monsoon season it was minimum during the year 2011-2012 and maximum pH was in winter season in the year 2010 -2012. Sharma *et al.*,[14] noted pH from 7.7 to 8.7 & in Pichola lake & 7.4 to 9.2 in Fatehsagar. Syed & Gupta[13] reported alkaline pH of Bindusara & Sindhfana river.

Water Temperature:

Water temperature ranged from 19^{O}C to 30^{O} C with mean value 26.1^{O}C & 26.8^{O}C at both spots. The maximum temperature (30^{O}C) was recorded in the year 2010-2012 in summer season at spot A & B it may be due to low water level and high air temperature. The minimum temperature (19^{O}C) was recorded in winter 2011-2012. Manjare *et al.*,[11], Jayabhaye *et al.*,[8] observed similar results.

Air Temperature:

Air temperature varied between 18^{O}C to 33^{O} C. Highest temperature recorded in summer (2010-2011) whereas lowest temperature 18^{O}C was recorded in winter (2010-2011) with mean value 26.5^{O}C & 27.6^{O}C at spot A & B respectively. The same reports were also recorded by Manjare *et al.*,[11], Jayabhaye *et al.*,[8] & Sharma *et al.*,[14].

Water Transparency:

Water transparency was fluctuated from 6 cm to 46.8cm secchi disc reading. The maximum (46.8 cm) reading was recorded in summer and minimum (6 cm) in monsoon 2011-12. The mean value of transparency at spot A was (30.3 cm) whereas 30 cm on spot B. Sharma *et al.*,[14] also found similar result for transparency at Pichhola lake, Udaipur.

Dissolved oxygen (DO):

Dissolved oxygen (DO) content fluctuated from 3.1 mg/L to 6.4 mg/L with mean value 5.3mg/L at spot A and 3.6mg/ L at B . The maximum DO value (6.4 mg/L) was observed in summer 2010-2011 whereas the minimum value DO (3.1 mg/L) recorded in winter 201-2011. The maximum DO value in summer is due to bright sunlight as it influences the % of soluble gases (O_2 & CO_2). The long day period with high intensity of sunlight accelerated photosynthesis which resulted to increase DO in summer. Manjare *et al.*,[11], Agarahari & Kushwaha[1] also reported high DO values in summer.

Free CO_2:

Free CO_2 ranged from 1.7 mg/L to 3.6 mg/L. The mean value 3.2 mg/L at spot A and 2.8 mg/L at spot B. The maximum value 3.6 mg/L was recorded in summer in both the years. The minimum value 1.7 mg/L was observed in winter (2011-2012). Manjare *et al.*,[11] and Agarahari & Kushwaha[1] found similar result in their study.

Alkalinity:

Total alkalinity ranged from 240 mg/L to 340 mg/L. The maximum value 340 mg/L was recorded in summer (2011-2012) and minimum 240 mg/L in winter (2010-2011). The average value 283.5 mg/L at spot A and 291.6 mg/L at spot B. Hujare[6] and Sharma *et al.*,[14] reported similar results.

Chloride:

Chlorides occur naturally in waters. High concentration of Chlorides is considered to be the indicator of pollution due to organic wastes. Chlorides are troublesome in irrigation water and also harmful to aquatic life Rajkumar *et al.*,[12]. The values of chloride ranged from 44.3 mg/L to 64.5 mg/L. The maximum value 64.5 mg/L was recorded in summer (2010-2011) at spot B whereas minimum value 44.3 mg/L recorded in winter (2010-2011) at spot A. Similar results were reported at Kodaikanal Lake in Tamilnadu by Rajkumar *et al*,[12] and Tamdalge tank in Kolhapur district by Manjare *et al.*,[11].

Total Hardness (Calcium & Magnesium):

Values of hardness fluctuated from 103 mg/L to 132 mg/L. The maximum value 132 mg/L recorded in summer (2010-2011) and minimum 103 mg/L in winter (2011-2012). Average value 113.4 mg/L at spot A and 110.6 mg/L at spot B. Values of calcium were ranged from 22.6 mg/L to 34.8 mg/L. Maximum value were recorded in summer (2010-2011) and minimum in winter (2011-2012). Values of Magnesium ranged between 8.5 mg/L to 19.7 mg/L. It was maximum in summer (2011-2012) and minimum in winter (2010-2011). Maximum values of hardness, calcium and magnesium during summer may be due to high temperature, low water level and addition of calcium and magnesium salts from detergent and soaps[1,3].

The results revealed that there were seasonal variation in some physico chemical parameters of river Purna and most of the parameters were within permissible limits. These values indicate that water is safe for drinking purpose.

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