

**STUDY OF PHYSICO-CHEMICAL PARAMETERS AND FAUNAL DIVERSITY OF AADHALA RIVER IN AHMEDNAGAR DISTRICT OF MAHARASHTRA STATE INDIA**

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**ABSTRACT**

Rivers are very important source of surface water. In the present study, physico-chemical parameters and fauna of Aadhala river in Ahmednagar district was studied. The water samples were collected from two sampling stations Aadhala1 and Aadhala2. They were analyzed by using methods given by Maiti. Alkalinity was found in the range of 30 to 220 mg/Lt, acidity 25 to 39 mg/Lt, dissolved oxygen 3.44 to 9 mg/Lt, carbon dioxide 9.5 to 18 mg/Lt, hardness 40.3 to 90 mg/Lt, pH 6.2 to 7.5, temperature 25 to 34 °C at two sampling stations. The animals like crabs, frogs and fishes were observed.

**KEYWORDS:** Aadhala, aquatic life, Physico-chemical parameters, river in Ahmednagar.

**INTRODUCTION**

Water is most vital resource for all kinds of life on this planet. It is getting polluted due to human activities, due to industrialization, urbanization and rapid development. Life cannot exist without water. Freshwater especially surface water as we know is needed to mankind for various purposes e.g. for drinking, agriculture, domestic animals, industries, domestic uses and so on. Since very ancient time the great human civilization has originated, evolved and flourished around water resources especially rivers. Water quality also affects the biodiversity of aquatic organisms. Therefore its quality should be good. Water quality is the physical, chemical and biological characteristic of water. Therefore, it is necessary to study the physico-chemical characteristics of water. Rivers, ponds lakes ground water are the natural resources of water useful to living beings on earth. Rivers are the main sources of water. Aadhala is a one of the major river in Devthan Village in Akole Taluka of Ahmednagar district of Maharashtra state, India. This district is having community which is mainly dependent on agriculture and livestock farming for earning. This river is vital sources of water for drinking and other such activities. Now a days number of cases of urine stone and diseases of digestive tract are increasing in study area. Therefore there is a need to do such a research work which will monitor the water quality of this river. The quality of water affects the aquatic life. Therefore along with seasonal variations in physicochemical parameters of the water it is also necessary to study the aquatic animals. Bardalo *et. al.*, (2001) studied water quality and uses of Bangpakong River in Eastern Thailand. Hanazato (2001) studied the effect of pesticides on freshwater zooplankton. Azrina *et. al.* (2006) studied anthropogenic impacts on the distribution and biodiversity of benthic macro invertebrates and water quality of Langat river in Malaysia. Assessment of surface water quality of Fuji river basin was done in Japan by Shrestha and Kazama (2007). Study of surface water quality and its control in a river with intensive human impact on the Xiangjiang River, China was done by Zhao Zhang *et. al.* (2010). Kaplan *et. al.* (2010) studied the physico-chemical and water quality assessment of Perisuyur river in Turkey. Aazami *et. al.* (2015) studies suitability of several indices while monitoring and assessing of water health quality in Tajan River in Iran. They use physicochemical parameters of water, fish and macro invertebrates as indices. Analysis of physicochemical parameters to evaluate the drinking water quality in the state of Perak in Malaysia was done by Rahmaniah *et. al.* (2015).

Much work has been done on water quality in India. Studies on water quality of Manjara project reservoir in Maharashtra state was studied by Chavan *et. al.* (2004). Population dynamics of micro-fauna of Kandhar dam water in Nanded district of Maharashtra state was studied by Surve *et. al.* (2004). Jayabhaye and Madlapure (2006) studied the zooplankton diversity in Parola dam in Maharashtra. Biodiversity assessment of macro invertebrates in Ranjit sagar reservoir in Jammu and Kashmir was studied by Adarshkumar *et. al.* (2006). Shanti (2006) studied physicochemical limnology of Varaga river in Tamil Nadu. Studies on hydrobiological status of Kansai and Dwarkeswar rivers in West Bengal were done by Giri *et. al.* (2008). Assessment of environmental variables like water temperature, dissolved oxygen, pH, total hardness etc. in Cauvery river and its tributaries was done by Mahadev *et. al.* (2010). Physico-chemical characteristics of ground water and surface water in Gohpur in Assam was studied by Pranab Sabhapandit and Abanikr Mishra (2011). Chandanshive (2013) studied the seasonal fluctuations of physico-chemical parameters of Mula

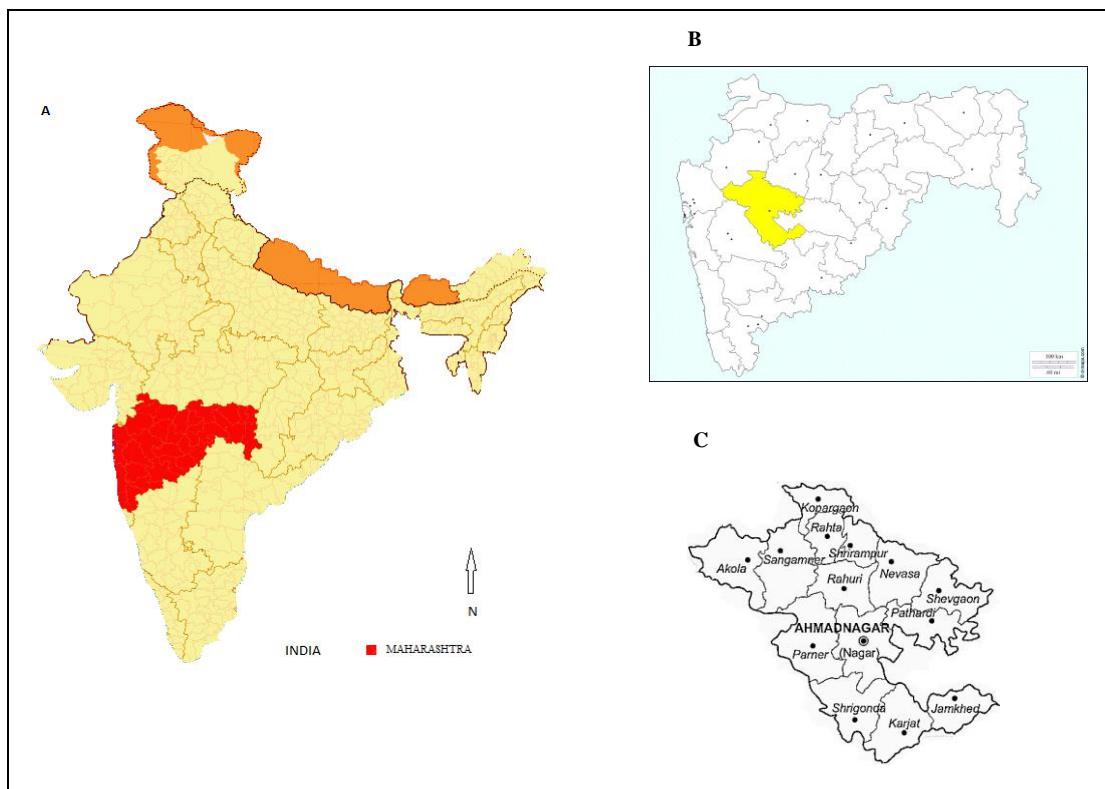
Mutha River at Pune, India and their impact on Fish biodiversity. Sharma *et. al.* (2014) while studying the water quality of River Narmada found that seasonal effects, agricultural waste, domestic and industrial waste water discharges and their organic load caused main variation in the water quality of river Narmada. Their results will assist in the water management of river water for varied future demands including human consumption, irrigation, and industrial and also for river conservation. Physico-chemical parameters of Narmada river water were studied by Malviya and Dwivedi (2015) to study various water pollutants available in Narmada River. Rout *et. al.* (2015) while doing the assessment of physicochemical parameters of River Yamuna at Agra region of Utter Pradesh found that higher values of physicochemical parameters indicate that river water is not safe for drinking and domestic uses as prescribed by BIS. Significance of this study is that latest data and status of water quality of Aadhala River will be available in Ahmednagar district of Maharashtra state. This study will be useful for monitoring and improving the quality water. It will also increase the awareness among the people about management of water resources through environmental education.

## MATERIALS AND METHODS

Aadhala is a one of the major river in Devthan Village in Akole Taluka of Ahmednagar district of Maharashtra state, India. Water samples were collected from two sampling stations Aadhalal and Aadhala 2, in the month of August, September, December, January and April. Temperature was recorded by using thermometer, pH was measured by using Hanna pen pH meter. Water samples were collected in D.O bottles and oxygen was fixed on the spot by using Winker A and B solutions. Water samples were also collected for other parameters and brought to the laboratory and analyzed by using methods given by Maiti (2011).

## RESULTS

The results are shown in Table 1, 2; Graph 1, 2; Figures 1, 2 and 3.



**Figure 1.** A- Map of India  
B-Map of Maharashtra  
C- Map of Ahemadnagar District

**Table 1.** Physico-chemical parameters and faunal diversity of Aadhala -1 (Spot -1) River in Ahmednagar District.

Month	Alkalinity (mg/lit)	Acidity (mg/lit)	D.O. (mg/lit)	CO <sub>2</sub> (mg/lit)	Hardness (mg/lit)	pH	Temp (°C)
August	133	33	9	13.2	44.3	7.3	28
September	105	25.6	7.2	10.2	40.3	6.9	29
December	110	36	5.3	9.53	56	7.1	26
January	140	39	6.2	12.2	65	7.5	25
April	30	27.5	3.44	18	60	7.3	32

**Table 2.** Physico-chemical parameters and faunal diversity of Aadhala -2 (Spot -2) River in Ahmednagar District.

Month	Alkalinity (mg/lit)	Acidity (mg/lit)	D.O. (mg/lit)	CO <sub>2</sub> (mg/lit)	Hardness (mg/lit)	pH	Temp (°C)
August	126	28.33	7.15	16	53.3	6.7	29
September	110	27.33	6.2	11	49.33	6.2	30
December	220	30	8.7	12.4	85	7.4	27
January	122	32	7.9	9.5	90	7.3	28
April	105	25	6.5	11	82	7.1	34

Alkalinity was found in the range of 30 to 220 mg/Lt, acidity 25 to 39 mg/Lt, dissolved oxygen 3.44 to 9 mg/Lt, carbon dioxide 9.5 to 18 mg/Lt, hardness 40.3 to 90 mg/Lt, pH 6.2 to 7.5, temperature 25 to 34 °C at two sampling stations (Table 1 and 2; Graph 1,2; Figure 1,2 and 3). From the tables and graphs it is observed that there is variation in all the water parameters in different months and at different stations. It suggests that seasons have great impact on the physico-chemical properties of water. In the Aadhala river crustaceans like crab, amphibians like frog *Rana tigrina* and fishes like *Labio rohita* were observed.

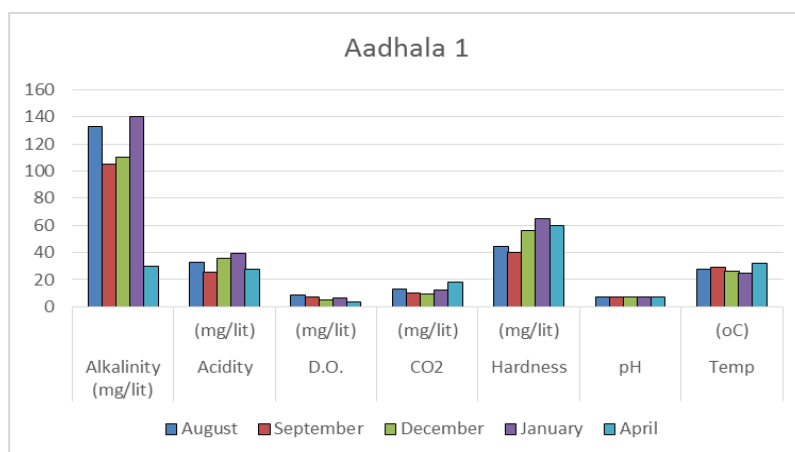


**Figure 2.** Study location: Aadhala -1 (Spot -1). River in Devthan Village in Akole Taluka of Ahmednagar district of Maharashtra state, India.

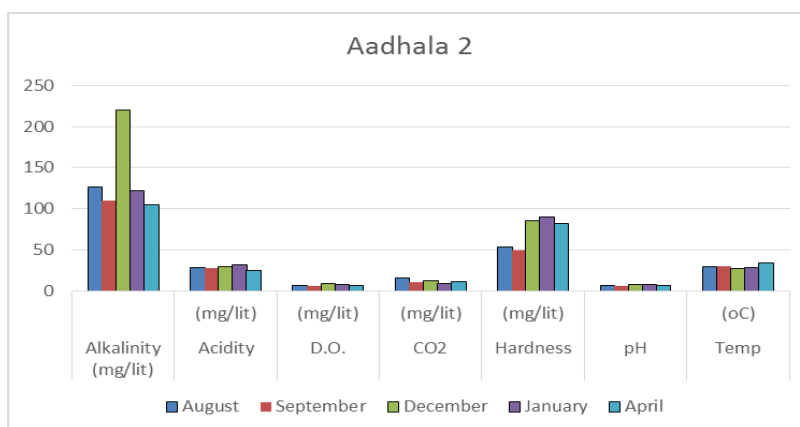




**Figure 2.** Study location: Aadhala -2 (Spot -2) River in Devthan Village in Akole Taluka of Ahmednagar district of Maharashtra state, India.



**Graph 1.** Physico-chemical parameters and faunal diversity of Aadhala -1 (Spot -1) River in Ahmednagar District.



**Graph 2.** Physico-chemical parameters and faunal diversity of Aadhala -2 (Spot -2) River in Ahmednagar District.

## DISCUSSION

Many researchers have done research on the water parameters of rivers and also the hydrobiology (Shaikh *et al.*, 2010; Jagtap, 2012). They observed that seasonal variations occur in the physicochemical parameters of the water. It has great impact on the faunal diversity of the aquatic ecosystems. Surve *et al.* (2004) studied the monthly variations of microzootic faunas such as Protozoans, rotifers, helminth eggs and arthropods. They found that minimum population was during summer while maximum during monsoon seasons rotifers were the most dominant groups followed by arthropods, helminth eggs and protozoans. About 19 zooplankton species were observed during study.

Chavan *et al.* (2004) studied the water quality of Manjara project Reservoir in Beed district of Maharashtra and found that the water body is acceptable for the drinking purpose. The permissible limit of pH for potable water ranges within 6.0 to 8.5. D.O. during the study varied between 5.1 to 9.9 mg/lit. Indicating sufficient aerated state and the water to some extent can withstand organic pollution Total hardness 20-116 permissible. Minukumari *et al.* (2013) studied the physicochemical parameters of Narnada reservoirs. They observed that the changes occur in pH and salinity as well as in the concentration of nutrients. pH values were highest in summer season and lowest in rainy season. Low values were recorded in the rainy season due to influence of freshwater influx dilution of lake low temperature. TDS was maximum in a pond while minimum in C pond in rainy season and winter season respectively. Due to contamination of domestic waste water, garbage fertilizers etc. in the natural surface water body; the value of TDS was reported to be high. Pradhan *et al.* (2006) studied river systems in Bengal. They observed that ecological gradients determining the density and diversity of Rotifera in a fresh water river system of South West Bengal, India. Species composition, abundance and distribution of different species of rotiferan communities have been found to be influenced by a number of physicochemical and biological factors like temp, pH, alkalinity, hardness, conductivity, TDS, Total suspended solids, DO, COD, BOD and nutrient contents. Besides current of water intra and inter specific competition have also been found to be greatly influence the species composition of this zooplankton community. From the study of all these researchers it is confirmed that seasons have great influence on the physicochemical parameters. The observations in the present study is in accordance with the earlier researchers.

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