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# Water Quality Assessment of Arunavati River Near Arni Dist. Yavatmal (MH)

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***Abstract:***
*River water quality play an important role as it is used for drinking and domestic purpose, irrigation and aquatic life including fish and fisheries. The river can play a vital role to contribute social economic structure. This research presents the water quality assessment of the Arunavati river. When river passes along the city Arni, Dist. Yavatmal, it was divided into five sampling stations to cover the maximum area comprehensively during the June 2017 to July 2018. The physico-chemical parameters were observed Temperature, Transparency, pH, Turbidity, Total Dissolved Solid, Total alkalinity, DO, Total hardness, Nitrate, Sulphate and Phosphate during the study. Nutrients like nitrates and phosphate present in the river were found in the permissible limits as prescribed by WHO, BIS. The water of Arunavati river is unpolluted and safe for human consumption.*

***Key words: Water Quality, Physico-Chemical Parameters, Arunavati River, Nutrients.***

## Introduction:

Arunavati river is a sub-river of the Tapi river in India. It originates and flows from the Sangvi village and merges into the Tapti river near Uparpind village in Shirpur tehsil. River covers Darwha, Ner, Yavatmal taluka and some part of Arni and Digras taluka. It is necessary that the quality of water should be checked periodically because due to use of contaminated water biotic fauna may suffer from a variety of water born diseases Sunkund and Patil (2004). In recent times limnological studies are often related to fisheries, biodiversity conservation, pollution assessment and rejuvenation of degraded inland freshwater ecosystems (Arlinghaus et al., 2008). Zooplankton diversity is one of the most important ecological parameters in water quality assessment. In many areas,the ecological impacts from human activities will far exceed the impacts from climate change, Scholze et al., (2006) have worked on a climate-change risk analysis for world ecosystems, Islam (2007) in a pond of Rajshahi University, has investigated the effects of abiotic parameters on the variations of zooplankton population. Zooplankton is good indicator of the changes in water quality because they are strongly affected by environmental conditions and respond. Nelson et.al.,(2009)carried out a detailed study on the combined effects of urbanization and climate change on stream ecosystems: from impacts to management options. Similarly, Durance and Ormerod (2009) have investigated existing trends in water quality and the consequent discharge confound long – term warming effects on river macroinvertebrates. The study of plankton and physico-chemical property of water was carried out by various people like Mishra and Saksena (1991), Kuashik and Saksena (1995). Patel et al., (2013), Vasanthkumar and Vijay Kumar (2011), Garg et al.,

(2010). The water of Kapileshwar dam is utilized for drinking, irrigation and for fisheries activity. The present study was aimed to evaluate physico-chemical parameters of Arunavati river .

**Material and Methods:**

Arunavati atributary of river painganga in Gondvan basin. The Arunavati river is about70 miles in length. The dam is located near savanga of Digras Taluka in Yavatmal district, Maharashtra. The painganga has six tributaries of same size these are Pus, Arunavati, Adaan, Waghadi, khuni and Vidarbha. The study area was divided into 5 sampling sites .Water samples were collected regularly on monthly basis in between 8 a.m. to 10 a.m. Water pH,DO,and TDS observed at sampling site using water analysis kit(Systronic make) while other abiotic components were analyzed at laboratory condition using the method prescribed by APHA(1989).


Fig.1: Map showing the sampling sites.

**Result and Discussion:**

It is fact that maintenance of healthy aquatic ecosystem is dependent on the physico-chemical properties of water. Station wise mean values of physico-chemical parameters are summarized in Table 1.

**Water Temperature (WT):**

Temperature is one of the most important ecological factors, which controls the physiological behavior and distribution of organisms. In present study, lowest value of water temperature found in January190C and highest in Jun 31.100C with the mean values 26. 110C.that shows the optimum ranged for growth of aquatic fauna and flora. This result agrees with the reported by Swaranlatha and Rai (1998) in Banjara Lake. Salve (2006) also reported similar trends in Wan Prakalp reservoir, Nagpur.

**pH:**

pH regulated most of biological processes and bio-chemical reactions. pH value ranged from minimum 6.05 to maximum 7.48 at station-I. The pH of water tends towards alkaline nature. Minimum pH was found in the month of April(summer) and reached to the maximum in the month of December (winter).This is in agreement with the findings of Manjare et al.,(2010) who studied the Vadgaon tank of Kolhapur. Mean and range pH value of all the five stations observed was 6.98 ± 0.10.

**Transparency:**

Fresh water body in the present investigation showed no typical trend. Average mean value of water transparency evaluated is 47.68 cm. The lower values of transparency during rainy season may be attributed due to the rains which might have brought silt and mud from the catchment area making the water turbid. This is in the conformation with the observation made by Zafar (1966); Kaur et al., (2008). Mwara, (2006) also observed low transparency during rainy season in manmade reservoirs

in Kenya.It was found higher in the summer season which might be due to suspended particles accumulated during summer months or may be attributed to human activity like washing and bathing. Jaybhaye (2009) also reported similar trends in Parola dam of Hingoli district.

**Total dissolved solids (TDS):**

TDS is measure of all the dissolved substances, both organic and inorganic in water. Higher TDS attributes to high dissolved and suspended particles in to the water.At station-I the total dissolved solid was found higher 400mg/l with the mean value considering all five station was 315.71 mg/l. It is in the range of permissible limit. Similar results were also reported by Chaturbhuj et. al. (2004) in the Jamwa Ramgarh Lake, Jaipur.

**Turbidity:**

The water was less turbid as observed during study period. Monsoon months particularly showed turbid water which is attributed to the surface runoff in the rainy season from the catchment area; recently Manjare et.al.,(2010) have reported higher turbidity in summer season. Average mean turbidity values of the entire sampling site calculated to 39.95 NTU.

**Total alkalinity:**

Total alkalinity of water is the quality of water and kinds of components present in water such as bicarbonate, carbonate and hydroxide. Total alkalinity was in the ranged from 106mg/l to 330mg/l at sampling station –II and sampling station-V (Table-1) respectively. The maximum value recorded in the month of January(winter) and minimum in the month of August(monsoon).The alkaline water was found productive. Spence (1967) classified the lake into three categories based on alkalinity. On the basis of this classification, Arunavati river considered as a nutrient rich river.

**Dissolved oxygen (DO):**

Dissolved oxygen is an important limnological parameter indicating level of water quality, organic production and reflects the physical, biological processes prevailing in the dam water. It ranged was 5.00mg/l to 9.10 mg/l. The level of DO was found less during the month of may(summer). This is because of the low solubility of gases at high temperature Hynes, (1978); similarly, during summer water volume also decreased and became more concentrated with the pollutants, Decreased DO in summer correlates with the higher solubility of oxygen at lower temperature. This is in agreement with the recent findings of Garg et al., (2010) who found that dissolved oxygen was less during summer season. Average DO in the present study also exceeded the limit of 5mg/l as per European Environmental Commission Chapman (1997) and mean value observed in the present investigation was 7.91 mg/l. Therefore, it can be concluded that water is safe for human consumption.

**Total hardness:**

The hardness of water is mainly governed by the content of calcium and magnesium which largely combine with bicarbonates & carbonates (temporary hardness) and with sulphate, chlorides and other anions of minerals (permanent hardness).In the present study, mean value of total hardness of five different stations was observed as 127.17 mg/l . The minimum and maximum evaluated was 86 mg/l and 226 mg/l respectively. It was found in permissible limit.

**Nitrates:**

Nitrate is basic nutrient, which is determined the productivity of lake. In the fresh water nitrate content is meager. In the present study the average values of nitrate of all the sampling stations were observed to be 0.48 mg/l. there was no seasonal trend in the concentration of nitrates and minimum concentration was found 0.19mg/l at station-I while maximum 0.87 mg/l at station-

IV.Nitr ates were estimated more in winter season. This is in agreement with the findings of Islam(2007).

**Sulphate:**

Most of the sulphate ions are probably derived from the solution of calcium & magnesium ions. Sulphate is naturally occurring ion found in all types of water and wide ranges in nature. Occurrence of sulphate in water is due to influx of runoff and leaching process. The average mean of water sulphate content was found to be 12.46 mg/l which is in permissible limit. Bhagat (2008) have also observed minimum sulphate content in Ambadi dam, near Akot Dt. Akola.

**Phosphate:**

The lower and higher values fluctuated from 0.02 mg/l to0.60 mg/l at station- V and station-II respectively. Average mean of all the five stations calculated 0.25 mg/l. Winter months contribute higher concentration as compared to monsoon and summer seasons. Higher values may be due to accumulation of surface agricultural runoff and washing activities that contributed to the inorganic phosphate contents.

**Conclusion:**

The pollution indicators phytoplankton and zooplankton were less in number at all the stations similarly As no industrialization has taken place in the surrounding areas, menace of effluent discharge and subsequent pollution is not evident in the dam. Abiotic components are found in the safe limit which confirms that the water is safe for drinking and also for healthy fish culture. The present status of river is mesotrophic and unpolluted hence, the water can be utilized for irrigation, drinking and fishery activities.

**Table 1: Parameters of Arunavati river during June 2017 to July 2018**

| Parameters | Sampling stations | | | | |
|---|---|---|---|---|---|
| | I | II | III | IV | V |
| Water temperature($^0$c) | 25.82 | 25.36 | 25.66 | 26.11 | 25.76 |
| Transparency(cm) | 43.95 | 70.64 | 61.29 | 27.11 | 25.76 |
| Total Dissolved Solid (mg/l) | 251.43 | 264.29 | 260.00 | 315.71 | 282.86 |
| pH | 6.95 | 6.93 | 6.82 | 6.98 | 7.05 |
| Turbidity( NTU) | 41.57 | 32.40 | 38.17 | 44.40 | 43.20 |
| Total alkalinity(mg/l) | 153.00 | 163.57 | 158.14 | 185.14 | 208.29 |
| DO (mg/l) | 7.41 | 6.47 | 6.20 | 7.91 | 7.12 |
| Total Hardness(mg/l) | 128.57 | 128.57 | 126.29 | 117.43 | 135.00 |
| Nitrate (mg/l) | 0.43 | 0.45 | 0.49 | 0.49 | 0.52 |
| Sulphate (mg/l) | 9.68 | 9.27 | 13.69 | 19.89 | 9.75 |
| Phosphate (mg/l) | 0.31 | 0.29 | 0.16 | 0.32 | 0.18 |

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