

Seasonal variations of physico-chemical characteristics of Jamgavan dam water of Hingoli District (M.S.) India.

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Abstract

Jamgavan dam is a minor irrigation dam. The water in Jamgavan dam is used for irrigation, fish culture, drinking and domestic purposes. The present investigation deal with the study of seasonal variations of physicochemical characteristics of Jamgavan dam water. The study was carried out during the year 2007 for a period of 12 months. The parameters such as atmospheric temperature, water temperature, pH, free carbon dioxide, Electrical conductivity and dissolved oxygen were studied.

Keywords: Jamgavan Dam, Physico-chemical parameter, Seasonal variation.

INTRODUCTION

Water is one of the most important natural resources. All living organisms on our earth are so intimately connected with water that life on this planet is believed to have evolved in and around water. Similarly water is equally vital for the growth of plants, agriculture development and industrial uses.

The freshwater body of India includes a large number of rivers, ponds, dams, impoundments and lakes. The riverine system with the constructed dams also presents a different area of aquatic environment. The measurement of the productivity and energy of any water body needs full assessment of the physico-chemical characteristics of the water bodies besides the aquatic organisms for perpetuality of life. The physico-chemical characteristics are altered or molded due to the activities of the aquatic biota particularly the metabolism of the aquatic organisms. Any alteration in the environmental parameters may bring in an undesirable aquatic condition which may lead to the aquatic pollution.

An attempt is made to study the physico-chemical characteristics of Jamgavan dam water. The Jamgavan dam is a minor irrigation tank its water is used for irrigation, fish culture, drinking and for such other domestic purposes.

MATERIALS AND METHODS

For the purpose of study, the water samples were collected from the Jamgavan dam for a period of twelve months during the year 2007. For convenient, three sampling stations namely A, B, C

and D were selected from the reservoir. The temperatures were recorded at the time of sampling on the spot using centigrade thermometer. pH was measured with standard pH meter. The other parameters were estimated by the procedures given by APHA [1]

RESULTS AND DISCUSSION

The monthly variations of physicochemical characteristics are given in the table 1. The climatic factors such as rainfall, temperature, pressure and humidity etc, play an important role in the geology as well as terrestrial environment. A sound knowledge of these factors help in understanding the complex process of interaction between the climate and the biological processes in water bodies, Impinging solar radiation and atmospheric temperature bring about interesting special and temporal changes in natural water which manifest in setting up of convection current and thermal scarification, Many workers such as [8, 9, 11,12,15,16,18] studied the role of climatic factors in understanding the ecology of aquatic ecosystem.

Temperature is basically important for its effects on a certain chemical and biological activities in the organism attributing in aquatic media. The water temperature and air temperature were found to go more or less hand in hand. In Indian subcontinent, the temperature in most of the water bodies ranges between 7.8°C to 38.5°C. [14]

The atmospheric temperature was found to be in the range between 28.2 to 37.7°C at station A,28.5 to 37.2°C at station B,28.5 to 37.9°C at station C and 28.5 to 38 °C at station D, The minimum values were during winter season and maximum values were during summer season at all the Four stations. Similar results were observed from Jagat tank [13]

The water temperature was found to be in the range between 23 to 31.5°C at station A,24 to 30.8°C at station B,23.2 to 31.1°C at station C and 24.1 to 30.5 °C at station D,The minimum value were during winter months at all stations. The maximum value was during summer months.

pH is the scale of intensity of acidity and alkalinity of water and measures the concentration of hydrogen ions. Most of the

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biological processes and biochemical reactions are pH dependent pH is considered as an indicator of overall productivity that causes habitat diversity [7]. The pH of water varies from 7.8 to 9.3 S.C. Gupta and Mathur [4] noticed the higher values generally seen in summer period in Lakes around Udaipur City (Rajasthan).

In the present investigation the pH varies from 8.0 to 8.8 during study period. The highest pH 8.8 was recorded at sampling station 'D' in the summer. The minimum pH 8.1 was found in the Rainy at sampling station 'A'. The values of pH are shown in table. Prapuma [10] also found the pH in alkaline trend.

Electrical conductivity is a measure of water capacity to convey electric current. This ability depends on the presence of ions, their total concentration, ability, valance and relative concentration and on the temperature measurement. Solutions of most inorganic acids, bases, and salts are relatively good conductor. As most of the salts in the water are present in the ionic forms, capable of conducting

current, therefore, conductivity is a good and rapid measure of the total dissolved solids. Conductivity of water varies directly with the temperature and is proportional to its dissolved mineral matter content in the present investigation the electrical conductivity varies from 640 $\mu\text{mho/cm}$ to 972 $\mu\text{mho/cm}$ in the year 2007. The highest EC was 972 $\mu\text{mho/cm}$ encountered on sampling station 'D' in the month of October 2007. The lowest record of EC 640 $\mu\text{mho/cm}$ was observed on the sampling site 'A' in the month of May 2007. The maximum readings of 940 $\mu\text{mho/cm}$, 949 $\mu\text{mho/cm}$, 955 $\mu\text{mho/cm}$ and 900 $\mu\text{mho/cm}$ while the minimum 640 $\mu\text{mho/cm}$, 645 $\mu\text{mho/cm}$, 648 $\mu\text{mho/cm}$ and 650 $\mu\text{mho/cm}$ was observed on the sampling station A, B, C and D respectively for the year 2007

Khataavkar [6] studied on water quality parameter of river Panchganga near Kolhapur and Ichalkaranji (MS) and observed the average Conductivity values at sites 1 to 3 were below 150 μS , but were trebled at sites 4 and 5 (488 to 520 μS).

Table 1. Monthly Variation of Physicochemical parameter of Jamgavan dam in the year 2007.

| Months | Jan | Feb | March | April | May | June | July | August | Sept | Octo | Nov | Dec |
|-------------------------|------|------|-------|-------|------|------|------|--------|------|------|------|------|
| Sampling site A | | | | | | | | | | | | |
| Atmospheric Temperature | 28.7 | 32.9 | 34.8 | 37 | 37.7 | 35.7 | 34 | 32.2 | 29.8 | 28.2 | 28.2 | 28.5 |
| Water Temperature | 24.3 | 24.6 | 25.5 | 26.8 | 31.5 | 30.2 | 28.7 | 27.6 | 27 | 24.4 | 23 | 24.1 |
| pH | 8.3 | 8.3 | 8.4 | 8.2 | 8.3 | 8.1 | 8.2 | 8.1 | 8.2 | 8.1 | 8.2 | 8.3 |
| Electrical Conductivity | 792 | 694 | 684 | 664 | 640 | 670 | 685 | 705 | 925 | 952 | 916 | 810 |
| Free Co2 | 0.01 | 0.01 | 0.02 | ND | 0.01 | 0.02 | ND | ND | ND | 0.01 | 0.02 | 0 |
| Dissolved O2 | 8.6 | 8.9 | 8.4 | 8.2 | 7.9 | 7.5 | 7.8 | 7.8 | 7.9 | 8.4 | 8.2 | 8.2 |
| Sampling site B | | | | | | | | | | | | |
| Atmospheric Temperature | 28.9 | 31.2 | 32.2 | 33.2 | 37.2 | 37.2 | 35.9 | 33.7 | 31.9 | 30.1 | 28.5 | 28.7 |
| Water Temperature | 24.5 | 23.9 | 26.7 | 27.5 | 30.8 | 30.4 | 29 | 28 | 27.8 | 25 | 24 | 24.3 |
| pH | 8.3 | 8.4 | 8.5 | 8.3 | 8.4 | 8.2 | 8.3 | 8.3 | 8.3 | 8.2 | 8.3 | 8.2 |
| Electrical Conductivity | 790 | 697 | 683 | 667 | 645 | 677 | 640 | 709 | 929 | 959 | 917 | 815 |
| Free Co2 | 0.02 | ND | 0.03 | 0.01 | 0.02 | ND | 0.03 | ND | ND | 0.02 | 0.02 | 0.01 |
| Dissolved O2 | 8.5 | 8.8 | 8.2 | 7.9 | 7.6 | 7.3 | 7.7 | 7.6 | 7.6 | 8.1 | 8.4 | 8.3 |
| Sampling site C | | | | | | | | | | | | |
| Atmospheric Temperature | 28.8 | 31.5 | 31.7 | 34.2 | 37.9 | 37 | 35.2 | 33 | 31.5 | 29.5 | 28.7 | 28.5 |
| Water Temperature | 24.6 | 24.8 | 27 | 28.2 | 31.1 | 30 | 28.5 | 28.1 | 28 | 25.7 | 23.2 | 24.4 |
| pH | 8.4 | 8.5 | 8.6 | 8.5 | 8.6 | 8.5 | 8.5 | 8.6 | 8.3 | 8.5 | 8.5 | 8.4 |
| Electrical Conductivity | 787 | 695 | 687 | 669 | 650 | 679 | 692 | 718 | 934 | 965 | 920 | 807 |
| Free Co2 | 0.01 | 0.02 | 0.04 | 0.03 | 0.03 | 0.02 | ND | 0.03 | 0.01 | ND | 0.02 | 0.02 |
| Dissolved O2 | 8.3 | 8.5 | 7.9 | 7.8 | 7.4 | 7.2 | 7.8 | 7.4 | 7.4 | 8.2 | 8.2 | 8.3 |
| Sampling site D | | | | | | | | | | | | |
| Atmospheric Temperature | 28.5 | 31.3 | 31 | 33.9 | 35.1 | 38 | 36.1 | 34.2 | 32 | 30.2 | 29.1 | 28.6 |
| Water Temperature | 24.4 | 24.2 | 27.2 | 28.5 | 30.5 | 30 | 28.4 | 27.6 | 28.5 | 26 | 24.1 | 24.2 |
| pH | 8.5 | 8.6 | 8.6 | 8.6 | 8.8 | 8.6 | 8.6 | 8.7 | 8.4 | 8.8 | 8.7 | 8.6 |
| Electrical Conductivity | 782 | 700 | 690 | 672 | 655 | 683 | 697 | 722 | 942 | 972 | 924 | 805 |
| Free Co2 | 0.03 | 0.04 | 0.02 | 0.02 | 0.04 | 0.06 | 0.05 | 0.04 | 0.02 | 0.06 | 0.04 | 0.04 |
| Dissolved O2 | 8.3 | 8.4 | 7.4 | 7.6 | 7.5 | 7.1 | 7.6 | 7.2 | 7.8 | 8.4 | 8.1 | 8.2 |

Dissolved oxygen is one of the important parameter in water quality assessment and reflects the physical and biological processes prevailing in the water. Its presence is essential to maintain the higher form of biological life in the water and the effect of waste discharge in a water body is largely determined by the oxygen balance of the system. Non-polluted surface water is normally saturated with dissolved oxygen. The dissolved oxygen was found to be in the range between 7.5 to 8.9 mg /lit. at station A, 7.3 to 8.8 mg /lit station B and 7.2 to 8.5 mg /lit at station C and 7.1 to 8.4 mg/lit at station D during study. The high temperature and low dissolved oxygen during summer create favorable conditions for the development of blue green algae [5].

Carbon dioxide is vital in the life of plants and micro-organisms. It is produced; as a result of respiration of aquatic organisms. As carbon dioxide is highly soluble in water, it is found to be in larger amount in polluted water as compared to fresh water

bodies. Wright found the evidence of carbon, dioxide limitations of photosynthesis when the; density of the standing crop of phytoplankton was high in Canyon Ferry Reservoir, Montana. a he carbon dioxide values were observed in the range between 0.0 to .02mg/lit at A, 0.0 to 0.03mg/lit at B, 0.00 to 0.04 mg/lit at station C and 0.02 to .06 mg/lit to D during study. Dwivedi [3] found the free carbon dioxide high in pre-monsoon and monsoon period while low in winter season.

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