



Hydro biological Studies of Yelgaon Dam of Buldana (M.S.)

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Introduction

Water quality deals with physical, chemical, biological characteristics in relation to other hydrological properties. Present work on Hydro biological Studies of Yelgaon Dam of Buldana (M.S.) is undertaken during July 2019 to June 2021. Water is probably the only natural resource to touch all aspects of human civilization from agricultural and industrial development of the cultural and religious values. Water is essential at all levels of life, cellular to ecosystem. Industrialization of the world affects the faunal diversity of the water, as the waste water from these industries is directly dumped into the water bodies without any treatment.

The problem of water pollution in India is very critical. Several states in the country are facing problems due to over exploitation of ground water resources and pollution of surface water. Its manifestations are declining per capita water availability, falling water tables and deterioration of water quality. These increasing imbalances and anomalies shed doubt on the long availability of water resources. Accurate information on the condition and trends of water resources quantity and quality is required as a basis for economic and social development and for the development and maintains of environmental quality. Water quality becomes an important parameter for the assessment and management of surface water. The natural aquatic resources are causing heavy and varied pollution in aquatic environment leading to pollute water quality and depletion of aquatic biota.

Number of workers carried out hydrobiological investigations on the manmade water bodies in Maharashtra (Goel et. al. 1988, Hujare 2008). Population dynamics of rotifers in Ranjeet sagar reservoir was studied by Mediha Shafiq et.al. (2006).

As compared with developed countries in country like India mini aquatic Ecosystem still remained to be fully investigated (Kodarkar, 1998). A survey of literature to the hydrobiology studies has revealed that virtually no research work have been generate scientific information on the hydrobiological studies of Kalapani reservoir and hence the present studies.

Methodology-The water samples were analyzed by standards recommended by WHO (2006) and APHA (1998, 2005) methods-

1. Water sample

The selected sampling sites were visited monthly for the study of the various physicochemical and biological parameters. The study was complete in two years from February 2014 to January 2016. Surface water sample of four sites were collected during the day time to analyze the physical chemical and biological parameters. The water samples were collected in the plastic cans. Before collecting, the can was rinsed thoroughly by sampling water and the can was sealed after collecting the sample.

2. Physico-chemical Parameters.

The physicochemical parameters and biological parameters were studied during the two years periods. Some of the parameters were studied on-the-spot at sampling sites, whereas some parameters were studied in the laboratory by carried the water samples from the study area.

2.1. Physical Parameters.

The air temperature and water temperature were recorded at the fixed sites of the dam by using a mercury thermometer. The pH of water was determined by pH meter (Hanna Model Champ). The electric conductivity was measured with the electro conduct meter in laboratory

2.2 .Chemical parameters

The chemical parameters of water such as dissolved oxygen, total Alkalinity, free carbon dioxide, total hardness, calcium hardness, magnesium hardness, total dissolved solids, total suspended solids, total solids, calcium, and chlorides were determined by standard methods described by American Public Health Association (APHA 2005) and Kodarkar, et, al (1998).

3. Biological Parameters

i) Zooplankton sampling

The study of zooplankton is carried out by the monthly collection of water sample of three sampling sites for the period of two years. Water sampling done once in each month between 7:00 am to 11:00 am. The water samples for zooplankton were collected by filtering 100 liters of surface water through net of bolting silk No. 25. The Lugol's iodine solution was added in each bottle and was kept in dark for 24 hours to settle down the zoo plankton. After 24 hours the supernatant was removed with the help of pipette and zooplankton (sediment) was collected. The sediment zooplankton was diluted by adding few ml of diluted water. The zooplankton sample was again preserved in Lugol's iodine solution for further investigation.

ii) Concentration of sample

The concentration of sample was done by sedimentation technique. The sample was concentrated in series of steps by quantitatively transferring the sediment from the initial container to sequentially smaller one. The setting chamber was filled without forming vortex and kept over a vibration free surface. The supernatant was siphoned out.

iii) Mounting and preparation of slides.

0.1ml of each sample was taken on separate glass slides and cover slip was kept over the sample by rinsing the cover slip with an adhesive (clear nail polish) to prevent evaporation. For semi-permanent slides glycerin was mixed with sample, as the sample age evaporates, leaving the organisms embedded in glycerin.

v) Identification and counting

The zooplanktons were identified using methodology by APHA (1992) and Kodarkar (1998). The counting was done by using Sedgwick- Rafter counting cell. 4. Most Provable number of Coli forms Organisms (M.P.N.) - It was estimated by multiple tube fermentation technique described by APHA (1989). Using standard methods in subscribed bottles did the sampling. The samples were brought to the laboratory immediately after collection and were preceded immediately. The samples were inoculated in Mac- Conkey's broth.

Observations

In the present study emphasis is given on physico-chemical characteristics, zooplankton study, and Primary nature of fresh water of Yelgaon Dam. Observations were mainly concerned with pollution measuring indicators and parameters. The water samples from four different sites were collected and analyzed for various physico -chemical parameters were done. Observation and results were following-

Temperature:

In present investigation the monthly variation in temp of air ranged between 15.6and 42⁰C in the year 2019-20 and similarly 15.10 to 42.10 ⁰C in the year 2020-21. The minimum air temp was recorded in the month of January at all sites and maximum in the month of May at all sites.

The air temp exhibited high degree positive correlation with water temperature. It also exhibited low degree positive correlation with the changes according to the seasons. The water temperature ranged between 12.10⁰C to 39.10 ⁰C in year 2019-2020 and 12.40⁰C to 39.20⁰C in year 2020-21.

pH:

pH actually shows the hydrogen ion concentration in that particular sample. The pH of water ranged between 7.15 and 8.38 in 2019-20. The pH of the Kalapani reservoir water was less alkaline throughout the year (Kodarkar 1998). Similarly, in 2020-21 minimum pH was 7.28 in the month of October and it was highest 8.48 in the month of April.

Transparency:

The transparency of water ranged between 26 cm to 96.75 cm in year 2019-20 and 26.25 cm to 96.75 cm in year 2020-21. Seasonal variations in transparency were also recorded. The light penetration in water also play important role in the transparency.

Turbidity:

The Turbidity of water was ranged between 6.25 to 23 NTU in Year 2019-20 and 5.25 to 22.50 NTU in year 2020-21 the water was more turbid in rainy season because of rain water along with other waste material makes the water more turbid

Total Dissolved solids (TDS):

Total dissolved solid fluctuated between 74.44 mg/L in the month of November and 200.50 mg/L in the month of March in 2019-2020. The TDS was 67.25 mg/lit in the month of November and 201.50 mg/lit in the month of March in 2020-21. The seasonal variations in TDS were also observed.

Conductivity:

In present investigation Electric Conductivity ranging between 135(umho/cm) and 279 (u mho/cm) in the year 2019-20. Similarly the conductivity was ranging from 136 (u mho/cm) to 279 (u mho/cm) in year 2020-21. Similar trend was found at all four sites. It was observed that the conductivity goes on decreasing from June to December but constant rise in conductivity was observed from January to May in both years.

Dissolved oxygen: (DO)

In present investigation, the values of Dissolved Oxygen ranging between 3.88 mg/lit and 7.25 mg/lit in the year 2019-20. Similarly it was ranging from 3.25 mg/lit to 7.10 mg/lit in year 2020-21. The seasonal variations in the values of dissolved oxygen were also observed.

Free CO₂:

In present investigation, the values of free CO₂ ranging between 4.58mg/lit and 6.88 mg/lit in the year 2014-15. Similarly it was ranging from 4.15mg/lit to 7.02 mg/lit in year 2015-16. Similar trend was found at all four sites. The seasonal variations in the values of free CO₂ were also observed.

Alkalinity:

The lake water was moderately alkaline throughout the year. Total alkalinity was ranged between 80.25 mg/L to 173.75 mg/L in year 2019-20 and 81.25 mg/L to 175.50 mg/L in year 2020-21. There were two peaks one was in summer and other was in rainy season.

Chloride:

During the period of investigation chlorides in the reservoir water was ranged between 44.50 mg/L to 143.25mg/L in year 2019-20 and it was ranged between 42.75 mg/L to 144 mg/L in year 2020-21. During rainy season higher values were recorded where as in winter and summer season less chloride content were detected.

Total hardness:

The lake water was moderately hard throughout the period of investigation. The total hardness ranged between 57 mg/L to 112 mg/L in year 2019-20 and 57 mg/L to 11.50 mg/L in year 2020-21. The total hardness showed maximum values during May and minimum value during July.

Sulphates:

During the period of investigation Sulphates in the reservoir water was ranged between 1.55 mg/L to 15.55 mg/L in year 2019-20 and it was ranged between 1.52 mg/L to 15.70 mg/L in year 2020-21. During rainy season higher values were recorded where as in winter and summer season fewer sulphates content were detected.

Biochemical oxygen Demand (BOD):

In present investigation BOD of reservoir water was ranged between 2.02 mg/L to 30.70-mg/L years 2019-20 and 2.05 mg/L to 30.65 mg/L in year 2020-21. The value of BOD was higher during summer and rainy months while lower during winter months.

MPN of Coli form

In present investigation MPN of Coli form was detected. It was ranged between 19 to 56.75 and 20 to 57.25 per 100 ml of sample in 2019-20 and 2020-21 years respectively. It was detected maximum during month of May and minimum during month of February

Zooplankton:

Monthly water samples from reservoir were collected to study quantitative and qualitative data of various zooplanktons. Rotifers are represented by 10 species, Cladocerans by 3 species and Copepods by 3 species.

Among the total zooplanktonic organisms rotifer come first in order of abundance. Throughout the summer month rotifer population were found to maximum during winter season.

Cladocerans were abundance in summer and early monsoon. The density of copepods population was more during summer and least during late rainy and early winter season.

Results and Discussion

The obtained results of physico-chemical parameters of water collected from Yelgaon Dam at Buldana District. It was shown that all the physico-chemical parameters were in normal ranges according to WHO which indicates that water of Yelgaon Dam is convenient for aquatic life. And also domestic life physicochemical parameters recorded for sediments were also within the normal ranges.

Present study was conducted in order to analyze physicochemical parameters of water collected from Yelgaon Dam. The water sample which is collected from Yelgaon dam is having different parameters like pH, temperature, alkalinity, salinity, hardness. Sulphates, conductivity, turbidity, BOD etc. The water sample has small creatures i.e. zooplanktons more in number. Direct and in indirect way, these parameters affects the decreasing and increasing zooplanktons fauna. In our study water temp found in the range between 15.6 and 42^oC in the year 2019-20 and similarly 15.10 to 42.10 ^oC in the year 2020-21. The fluctuation in water temp usually depends on the season sampling time and temp of effluents entering the stream. High temp of water recorded because of low water level and high atmospheric temperature (Zubia Masood et.al.2015) Correlation studies between the variables of the physico-chemical parameters indicate that during rainy season, DO was found to be highly significant with chlorine, free CO₂, with total alkalinity, Ca hardness and conductivity, total alkalinity with Ca hardness and total hardness with Mg hardness. In summer, pH was found to be highly significant with Cl, BOD, with free CO₂. In winter, temperature was found to be highly significant Ca hardness, total alkalinity with Mg hardness and total hardness with Ca hardness. These relationships show that DO and free CO₂ are the most important parameters of water quality parameters which indicate the pollution status of water quality. (Maqbul Hussain et.al.2021) The pH values of the samples ranged from 7.15 to 8.38 were most of the samples. All variables except pH do showed significant spatial variations due to the effect of anthropogenic activities (Varol, M.Spatio 2020). Total hardness was recorded at 57 mg/L to 112 mg/L similar findings are also found (Arivoli Appavu 2016) In present investigation Electric Conductivity ranging between 135(umho/cm) and 279 (u mho/cm) through the year. The Conductivity of water is affected by the suspended impurities and also depend upon the concentration of ions in the water. Our present investigation the value of chlorides is maximum in summer season and minimum in season mansoon. The maximum value of chlorides is in summer indicating body related diseases. (Rohit Sharma et. al. 2020) The maximum value of the biochemical oxygen demand (BOD) in jan which indicates more polluted water and the minimum value is in the April which is indicates that less polluted water (Rohit Sharma et. al. 2020)

Conclusion

The data presented are discussed on the basis of three seasons. The temperature of water varied between 21 .6^oC and 23.7^oC at the sampling site Aji Reservoir. At the sampling site Nyari it ranged between 21 .65^oC and 23.55^oC and at sampling site Lalpari ranged between 21 .85^oC and 23.80^oC. In all the three sampling locations high temperature was recorded during summer season and lower temperature recorded during winter season, which is a normal feature in freshwater reservoirs. Poonam Bhadja, Ashokkumar Vaghela(2013). The calcium and magnesium hardness also suggest the comparatively hard quality of the lake waters. The total dissolved salt content was also high in the entire lake leading to rise in its hardness. The Total Alkalinity (TA) values clearly indicate that currently the lake water is moderately hard to hard. The calcium concentration shows that the good portion of calcium has been deposited from the soil erosion. Sumedh Humane et. al.(2018)

Zooplankton of fresh water body Gangapur dam consisting of Rotifers, Copipods, Cladocerans and protozoan. An attempt has been made to analyze the percentage variation among all zooplankton counted weekly during the said period. Salve et. al. (2013). In this present study by and large the status of dissolved gases like dissolved oxygen, free carbon dioxide and chloride remained within the optimum ranges required. Dissolved oxygen value was ranged from 3.77 to 10.9 mg/l with an average of 7.19 mg/l for entire year; minimum dissolved

oxygen is recorded during monsoon and maximum during winter season. The biological oxygen demand (BOD) and chemical oxygen demand (COD) for the water samples were estimated to qualify the water qualities suitability for fisheries purpose. The data indicates that the reservoir is not having either organic or inorganic pollution threats, therefore is suitable for fish stocking Goswami and Mankodi(2012)

The present investigations suggest that there is an urgent need to study the physico-chemical status of water of Yelgaon Dam for the assessment of quality in future. Though the water bodies under investigation are not severely polluted requires careful monitoring in the future to maintain quality of water by proper means. Supervision of experts and remedial measures are essential for rehabilitation and conservation of for long duration. In order to reduce the incidence of heavy pollution following suggestions have been recommended. Bathing, washing of clothes, vehicles, domestic animals etc. should be avoided. Continues disposal practices of the agricultural and domestic effluents should be strictly avoided. Adequate water supply schemes must be implemented for the residents to avoid unlimited misuse of water. Preliminary treatments should be performed before using the water for drinking. Recycling of waste waters through proper methods of purifications should be applied for saving water. Formation of reservoir Management Authority to protect, preserve and revive the water bodies. Government agencies, organizations, citizens, groups and NGO should collectively work to achieve common goal of protecting, preserving and reviving water bodies. Take measures to minimize generation of waste and its discharge to (the) aquatic environment. This could be achieved by reducing the consumptive use of water and goods.

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