Study on Physiochemical Parameters of Halali Reservoir

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ABSTRACT
Physiochemical Parameters of the Halali reservoir located Vidisha in Bhopal were studied in the whole year of 2016-2017. Ecological parameters like temperature, dissolved oxygen (DO), pH, conductivity and nitrogen. All physiochemical parameters give a picture of the quality parameter in pond water of the Halali. By observing the results, it can be concluded that the parameters which were taken for study the water quality are below the pollution level for ground water, which satisfy the requirement for the use of various purposes like domestic, agricultural, industrial, aquaculture etc.

Keywords- Conductivity, dissolved Oxygen, Physiochemical and Pollution

I. INTRODUCTION

Water pollution is flaming issue all over the world. Like other developing countries water pollution in India also reaches in alarming situation. While the government has not sat idle, all its money seems to be vanished in technical solutions that fail. Bhopal is located in the heart of India gifted with large numbers of water bodies in and around it. But most of the water bodies are subjected to severe pollution due to stagnant nature and numerous anthropogenic activities around them. It is very essential and important to test the water before it is used for drinking, domestic, agricultural or industrial purpose. Water must be tested with different physio-chemical parameters. Selection of parameters for testing of water is solely depends upon for what purpose we going to use that water and what extent we need its quality and purity. Water does content different types of floating, dissolved, suspended and microbiological as well as bacteriological impurities.

Madhya Pradesh is state richly gifted with inland water resources. Impoundment in this state, both artificial and natural, forms an important source of freshwater. The major reservoirs of Madhya Pradesh have different managing practices that are distinctive in nature. Five major reservoirs in state are Halali, Gandisagar, Bargi, Tawa and Barna. Madhya Pradesh is rich with different aquatic ecosystem and has 3.0 lakh hectare water areas in the form of lakes, reservoir and ponds.

Halali Reservoir is one of a major water body of central india. This is known as Samrat Ashok Sagar Project. Halali Reservoir is one of the most important reservoirs of Madhya Pradesh, about 40 km away from Bhopal (capital city of Madhya Pradesh) in Raisen/Vidisha district situated between 23\textdegree 30^\prime\text{N} North latitude and 77\textdegree 30^\prime East longitude with a catchment area of 699 sq.km, water spread of about 5259 ha with a maximum depth of about 29.57 m. It is perennial storage irrigation reservoir based on Halali River, which originates around Bhopal at an altitude of about 487.69 m above sea level and after travelling about 38 kms joins river Betwa, just downstream of Vidisha town. The Halali reservoir in its later part in vidisha district is known as Bais River. Water from river and drainage waste of Bhopal city through Patra Nallah joins the reservoir from South East and North East direction. Besides domestic discharge Nallah contains wastes from textiles, distillery and straw product factory of Bhopal are poured in Halali Reservoir [5].

Bhopal and its surrounding areas are facing the problem of decline of water bodies and water crisis, so there is need of a serious thought to this issue. Due to pollution the quality and quantity of utilizable lake water decreases which ultimately results in water crisis. So there is need for continuous evaluation of water quality and pollution level in order to promote better living condition around the reservoirs and to save the reservoirs before there extreme worst condition of eutrophication. [2] Halali Dam is located in rural area so there catchment area is different. Halali Dam is mainly used for recreational and secondary purposes. [10]

Physicochemical factors are very important in estimating the constituents of water and concentration of pollutant or contaminant. The main object of the physiochemical analysis of water is to determine the status of different chemical constituents, which are present in the natural and disturbed aquatic ecosystem. The present investigation conducted on physiochemical analysis of Halali reservoir was to determine quality of the water body.

II. METHODOLOGY

The present investigation has been carried out during the period from 2016 to 2017. Seasonal samples of water were collected from the selected sites of the Halali reservoir viz. north, south and east point during the last week of each month from March to February. The air...
temperature, water temperature, pH, conductivity, dissolved oxygen and total nitrogen were analyzed in the laboratory. All the parameter was analyzed according to the method as given in Adoni [1] and APHA [3].

III. RESULTS AND DISCUSSION

The ecological studies in fresh water involve a choice between two types of approaches, one connected with knowledge of the dynamics of aquatic species in a given area and the other relating to knowledge of water body and its physical and chemical characteristics.

Water samples were collected in the morning hours between 9 to 11 AM, in polythene bottle. The samples were immediately brought to laboratory for the estimation of various physico-chemical parameters. Water temperature, pH and turbidity were recorded on spot at the time of sample collection, by using thermometer, pocket digital pH meter and turbidity meter. The samples were stored in 4°C. Total hardness (TH) and alkalinity was analyzed using standard procedures in the laboratory by using methods as prescribed by APHA [4] and Trivedy and Goel [12]. Significant variations in the physiochemical properties of Halali Reservoir at different sites have been recorded which is due to the various pollution loads from the incoming channels.

In order to define a particular freshwater body, it is important to analyze accurately as many physical and chemical characteristics of water as possible before preceding the biological studies. The measurements of these characteristics provide valuable information about the aquatic environment. Some of the important Physiochemical factors of the Halali Reservoir have been analyzed as under:

1. Air Temperature

During 2016-17 the air temperature gradually increased from April to August while it decreased from September to February and again it began to rise from March onwards. The minimum Air temperature during 2016-17 (18.5 °C) was recorded at St.1 in the month of January, whereas maximum (31.8 °C) was observed at site.2 in June. Air temperature recorded higher values as compared to the water temperature which is mainly governed by the local climatic conditions of the aquatic system. Earlier higher air temperature as compared to surface water temperature has also been noticed by Wangaeno [13].

![Air Temperature 2016-17](image)

Variation in Air Temperature at three sites of North, South and East of Halali Reservoir during March 2016 to February 2017.

2. Water Temperature

During 2016-17 the water temperature gradually increased from April to July while it decreased from August to February and again it began to rise from March onwards. The minimum water temperature during 2016-17 (19.2 °C) was recorded at St.1 in the month of January; whereas maximum (29.2 °C) was observed at site.1 in June. Earlier, Peyami reported water temperature being highest during summer and lowest during winter in Phadke Pada pond at Diva, Thane [9].
Variation in Water Temperature at three sites of North, South and East of Halali Reservoir during March 2016 to February 2017.

3. pH

During 2016-17, the difference between pH values at different sites in various months of the year was significant. It was observed that the range of pH was from 6.5 to 8.5. The minimum pH values 6.5 to 6.7 have been noted at site.1 in November and January. Maximum pH values 8.2 to 8.5 were recorded at site.1 and site.3 in the month of July and June respectively. Pentewar also recorded pH in the range of 7.3 to 8.6 in Godavari river in Maharashtra [8].

Variation in pH at three sites of North, South and East of Halali Reservoir during March 2016 to February 2017.

4. Conductivity

In 2016-17, month wise variations in conductivity of the surface water at three different sites is presented in (table 4.4, Fig.4.7) ranged from 128 to 251 during the month of January and April at site.1 The minimum conductivity ranges from 128 to 130 at site.1 and maximum conductivity ranges from 249 to 251 at site.1 and site.2 respectively. These results coincide with work of Raina [11] who reported variation in specific conductivity at different sites of a water body.
Variation in Conductivity at three sites of North, South and East of Halali Reservoir during March 2016 to February 2017.

5. Dissolved Oxygen

During 2016-17 the minimum concentration of dissolved oxygen was (4.0 mg/l) recorded at St.1 and site.3 in the month of June and December while the maximum (6.3 mg/l) was recorded at St.2 in the month of May. Besides this, turbulence caused by boating activity also leads to increase in dissolve oxygen. Whereas, low dissolved oxygen recorded during summer season at confluence site is attributed to the impact of sewage and higher decomposition rate of organic matter. Minimum values of dissolved oxygen were recorded during summer season. Lokhande [6] also observed similar pattern.

Total Nitrogen

During 2016-17 higher ratio (5.8 mg/l) of total nitrogen was found in August; again in July the highest value (5.3 mg/l) of nitrogen was found. This may be due to the monsoon rain. The minimum values (0.3 mg/l) were determined at St.1 in April and October. The importance of nitrogen in the aquatic environment varies according to the relative amounts of the forms of nitrogen present, be it ammonia, nitrite, nitrate, or organic nitrogen. Nitrate concentration in groundwater and surface water is normally low but can reach high levels as a result of agricultural runoff, refuge dump runoffs, or contamination with human or animal wastes [7].
Variation Total Nitrogen at three sites of North, South and East of Halali Reservoir during March 2016 to February 2017.

IV. CONCLUSION

In conclusion, the Halali reservoir, on the basis of physiochemical parameters is in good condition and support a valuable diversity of zooplanktons. However it is facing some severe anthropogenic activities like agricultural runoff, direct discharge of untreated sewage coming from religious places, commercial and residential areas situated along the side of water source channels, are likely to impact the health of this reservoir. Management strategies have been suggested to maintain balanced ecological equilibrium of the said reservoir.

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