WATER QUALITY STATUS OF MAHAGAON RESERVOIR FROM
GADHINGLAJ TAHSIL FROM MAHARASHTRA.

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Abstract: The present study deals with the water quality of Mahagaon reservoir of GadHINGlaj tahsil, Maharashtra. Monthly changes in physico-chemical parameters were analyzed for a period of one year from July 2009 to June 2010. Variables analyzed from surface water of the reservoir are water temperature, transparency, turbidity, pH, EC, free CO₂, total alkalinity, total hardness, calcium, magnesium, chlorides, total dissolved solids, total nitrogen, total phosphorus, dissolved oxygen and biochemical oxygen demand. On an average the highest concentration of electrical conductivity, pH, hardness, alkalinity, chloride and total dissolved solids were observed in summer season and lower concentrations in rainy season. The fluctuating levels were found throughout the year. The physico-chemical parameters of the water were compared with WHO (1984) standards and all the values were within the permissible limit. The water of this reservoir is suitable for domestic as well as drinking purpose.

Keywords: Freshwater, physico-chemical parameters, monthly variations, potability, water quality.

Introduction

The freshwater reservoir is located at south of GadHINGlaj tehsil with Longitude and latitude of N 16° 07’ 28” and E 74° 21’ 15” respectively. The reservoir is constructed in the year 2003. Area covered by reservoir is 4.65 ha. The length and height of the dam is 260 m and 15.40 m respectively. It is used for drinking and fishing purpose.

Materials and methods

Collection of samples:

The samples of surface water were collected monthly from Mahagaon reservoir during July 2009 to June 2010. The samples were collected in plastic container in the morning hours and brought to the laboratory for further analysis. The analysis was carried out within 12 hours.
Analysis of physico-chemical properties:

Standard methods were used. Some parameters like Temperature, pH, Transparency was done at the investigation sites. The sample for DO was fixed in the BOD bottle at the sites and then brought to the Laboratory for analysis. Winkler’s method was followed for this analysis, while remaining analysis was made by the standard methods of APHA (2005) and Trivedy and Goel (1984).

Results and Discussion:

Samples were collected from two sites monthly in triplicate. Minimum, maximum, average and standard deviation of physico-chemical parameters of the Mahagaon reservoir are represented in table I

Temperature:

Atmospheric and water temperature both play an important role in the physico-chemical and physiological behavior of the aquatic system. It also exerts profound direct or indirect influence on metabolic and physiological behavior of aquatic ecosystem (Welch, 1952). Monthly variation in atmospheric and water temperature ranges from 24.03°C to 39.3°C, with an average of 29.11°C and 22.01°C to 30.03°C with an average of 25.09°C respectively. The atmospheric temperature was minimum in the month of December while maximum in the month of April whereas water temperature was minimum in the month of January while maximum in the month of April.

Transparency:

Transparency is a characteristic of water that varies with the combined effect of color and turbidity. It is universally proportional to the turbidity which intern is directly proportional to the amount of suspended organic and inorganic matter. The monthly variation in transparency ranges between 32.5 cm to 62 cm, with an average of 45.06 cm. It was recorded maximum in the month of November and minimum in the month of July. The lower transparency during rainy season might be due to silt brought into the reservoir and higher transparency during the winter season due to gradual settlement of silt. Similar trend has given by Ranjan et al. (2007).

Turbidity:

Turbidity is the suspension of particles such as clay, silt and organic matter. The monthly variation in turbidity ranges from 3.56 NTU to 42.11 NTU, with an average values 12.11 NTU. Maximum value was observed in the month of July while minimum during October. During rainy season silt, clay and suspended particles contribute to the turbidity
values while during winter season settlement of silt, clay and suspended particles resulting low turbidity. High turbidity during rainy season has been reported by Garg et al. (2006) and Nikam et al. (2011).

**pH:**

pH is an important indicator which indicates acidic and alkaline nature of water. The monthly variation in pH ranges from 6.63 to 8.12, with an average 7.24. It was recorded higher in the month of April while lower recorded in the month of August. Increase of pH has recorded during summer months might be due to decrease in water level or either due to increased amount of carbonates and or photosynthetic activities by producers (Abubacker et al. 1996). The lower value during rainy season may be due to dilution of rain water. Similar trends have been noted by Latha et al. (2010), Shinde et al. (2011).

**Electrical conductivity:**

Electrical conductivity is major of water capability to transmit electric current and also it is tool to access the purity of water (Murugesan et al. 2006). The monthly variation in electrical conductivity ranges from 0.191 mhos/cm to 0.28 mhos/cm, with an average values 0.276 mhos/cm. It was recorded maximum during month of April while it was recorded minimum during month of August. Increased conductivity during summer season may be due to increased concentration of salts because of evaporation. Dilution of water during rainy season causes decrease in electrical conductance due to addition of rain water. Similar trend have been given by Krishnamurthy et al. (2010), Sharma et. al. (2011).

**Free CO$_2$:**

Carbon dioxide is one of the most important substances in the life of organisms. The carbon dioxide is necessary for the growth and development of plants and therefore for life itself, although the minimal quantities required are very small (Welch, 1952). The monthly variation in free carbon dioxide ranges from 00 mg/l to 21.26 mg/l with an average of 6.48 mg/l. It was found to be absent in the month of December to May. It was maximum in the month of August. Free CO$_2$ content in water sample was negligible in majority of the months, might be due to pollution and photosynthetic activity of algae (Sreenivasan, 1971). Similar trend has been given by Manjare et al. (2010).

**Total alkalinity:**

Total alkalinity is the measure of the capacity of water to neutralize of strong acid. The alkalinity in water is generally imparted by the salts of carbonates, bicarbonates, phosphates, nitrate, borates, and silicates etc. together with the hydroxyl ions in Free State.
The monthly variation in total alkalinity ranges from 112 mg/l to 153.33 mg/l, with an average values 134.93 mg/l. The alkalinity was maximum in the June while minimum in the month of August. Alkalinity was maximum in summer season due to increase in bicarbonate in water while minimum in rainy season due to increase in water level causing dilution. Similar results were obtained by Chinnaiah et al. (2011), Hulyal et al. (2011).

**Total Hardness:**

Hardness is governed by the concentration of calcium and magnesium salts largely combined with bicarbonates and carbonates giving temporary hardness while sulfate, chloride and other anions of mineral acids causing permanent hardness. The monthly variations in total hardness ranges between 88.5 mg/l to 136 mg/l, with an average values 114.31 mg/l. The maximum amount of hardness was recorded in the month February and minimum amount of total hardness recorded in the month of July. The higher value of hardness was during summer may be due to decrease in water level and evaporation of water. Similar trend was reported by Sahib (2011), Sangpal et al. (2011).

Kanan (1991) has classified water on the basis of hardness values as 00 mg/l to 60 mg/l is soft, 61 mg/l to 120 mg/l is moderately hard, 121 mg/l 180 mg/l is hard and greater than 180 mg/l is very hard. According to this classification water of this reservoir falls in the category of moderately hard to hard. However, hardness of this reservoir was within the permissible limit (WHO, 1984). Hardness below 300 mg/l is considered as potable.

**Calcium:**

Calcium is most abundant ion in the freshwater and is an important in shell construction, bone building and plant precipitation of lime (Jhingram, 1975). The monthly variation in calcium ranges from 24.16 mg/l to 35.55 mg/l, with an average values of 29.35 mg/l. It was minimum in the month of August while maximum in the month of April. The maximum desirable limit of calcium in drinking water is 75 mg/l (WHO, 1984). Calcium content in water of this reservoir is within the desirable limit.

**Magnesium:**

Magnesium is absolutely essential for chlorophyll bearing plants and algae. The magnesium appears to act as a carrier of phosphorus (Welch, 1952). The monthly variations in magnesium ranges from 15.25 mg/l to 25.99 mg/l with an average of 21.09 mg/l. It was minimum in the month of July while maximum in the month of February. Similar trend has been reported by Narayana et al. (2005). Permissible limit of magnesium content for drinking
purpose is 50 mg/l and maximum limit is 150 mg/l. The maximum values are found to be below the desirable limit.

**Chloride:**

Chloride is an important parameter in accessing the water quality. It controls the salinity of water and osmotic stress on biotic communities (Banerjee, 1967). The monthly variation in chloride values ranges from 12.3 mg/l to 64.37 mg/l, with an average values 32.91 mg/l. The maximum amount of chlorides was recorded in the month of April while minimum amount of chloride was recorded during August. Higher chloride concentration during summer season due to high temperature and higher evaporation while lower concentration in rainy season due to dilution. Similar trend were reported by Khabade and Mule (2005) and Sumitra et al. (2007).

**Total dissolved solids:**

Total dissolved solids are the solids present in water in the dissolved state. The monthly variations in the total dissolved solids ranges from 98 mg/l to 172.66 mg/l, with an average 136.31 mg/l. It was recorded maximum in the month of May while it was recorded minimum in the month of August. It was recorded maximum during summer season owing to loss of water due to heat and concentration of salts present in water. It was minimum during rainy season due to dilution of water. Similar trend have been reported by Chinnaiah et al (2011), Ajagekar et al. (2011).

**Nitrogen:**

Nitrites enter in an aquatic body from various sources like erosion of natural body or soil, as well as artificially fertilized soil and through rain fall and sewage (Kapoor and Bamniya, 2011). The monthly variations of nitrogen ranges from 0.263 mg/l to 2.57 mg/l with an average value 0.668 mg/l. it was minimum in the month of January while maximum in the month of July. High nitrogen concentration during the rainy season might be due to influx nitrogen rich flood water. Similar values have been observed by Shinde et al. (2011) and Verma (2012).

**Phosphorus:**

Phosphorus is considered to be the most significant among the nutrients responsible for eutrophication of lakes, as it is the primary limiting factor. Atmospheric input may account for significant proportion of the influx of nutrients to the lakes (Krishna et al., 2007). Monthly variation in phosphorus ranges from 00 mg/l to 0.225 mg/l with an average of 0.0262 mg/l. It was absent in the month of January, March and May while maximum in the
month of August. The high values of phosphorus in the rainy months mainly due to rain, surface water runoff, agricultural runoff etc. Similar results were obtained by Simpi et al. (2011).

**Dissolved Oxygen:**

Dissolved oxygen acts as an indicator of trophic status and magnitude of eutrophication in freshwater ecosystem. The exchange of oxygen across air water interface depends upon temperature, partial pressure of gases in atmosphere, dissolved salt concentration, wave action, relative solubility, photosynthetic activity of plants and respiration by bacteria, plants, animals in the water (Krishna et al. 2007). The monthly variations in dissolved oxygen range from 6.081 mg/l to 12.026 mg/l, with an average values 8.627 mg/l. The maximum values were recorded during December while minimum values were recorded during May. Lower oxygen concentration was observed in summer season because dissolved oxygen decreases with increase in temperature and vice versa. Similar observations have been reported by Khuhawar et al. (2009) and Verma et al. (2012).

**Biological oxygen demand:**

BOD is the measure of degradation of organic matter present in water. The BOD refers the oxygen used by the micro-organisms in the aerobic oxidation of organic matter. The monthly variation in BOD ranges from 0.945 mg/l to 8.518 mg/l with an average of 3.88 mg/l. It was minimum in the month of July while maximum in the month of December. Higher values of BOD during winter season were due to input of an organic waste and enhanced bacterial activity. The present values are similar as reported by Devi et al. (2009) and Verma et al. (2012).

**References**


Hosahalli tank in Shimoga District, Karnataka, India. Global J. of Science Frontier Research, 11 (3): 30-34.


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**Table I: Physico-chemical parameters of Mahagaon reservoir**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Minimum values</th>
<th>Maximum values</th>
<th>Average values</th>
<th>Standard Deviation</th>
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<td>39.03333</td>
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