

Seasonal Variation of Physicochemical Parameters in Perennial Tank of Atpadi, Maharashtra

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Abstract: *Studies on physico-chemical parameters of the perennial tank of Atpadi, Sangli district, (Maharashtra), were carried out during February 2018 to January 2020. The physico-chemical parameters varied seasonally. The sacchi disc values varied from 21 cm to 38 cm. The minimum transparency was recorded in the month of August- September in monsoon and maximum in summer in May. The turbidity ranged between 2 to 32 NTU and was maximum in rainy season while minimum in the summer. The suspended solids ranged between 24 mg/L to 60 mg/l. The TDS value fluctuated between 218 mg/l to 388 mg/l. The electrical conductivity ranges between 400 $\mu\text{mho/cm}$ to 530 $\mu\text{mho/cm}$. it was found maximum in summer and minimum in winter. The pH value ranged between 8.3 to 8.475 The dissolved oxygen varied from 5.3 mg/l to 9.8 mg/l. The alkalinity ranged between 109 to 198 mg/l. The total hardness was found to be moderate throughout the period of investigation and ranged between 117 mg/l to 167 mg/l. The BOD ranged between 1.6 mg/l in December to 14 mg/l in July. The COD ranged between 4 mg/l to 55 mg/l.*

Keywords: Season, Variations, Physico-Chemical Parameters, Atpadi, etc.

I. INTRODUCTION

Considerable hydrobiological investigations have been carried out on manmade irrigation tanks and reservoirs in Maharashtra. The notable among these is of Kamat (1965), Goel et al (1988), Bhosale et al (1994), and Sathe et al (2001). The Sangli district of western Maharashtra is agriculturally well-developed area. The landscape of this district is dotted with many minor, medium and major irrigation tanks.

These tanks were constructed for irrigation purposes, however in the passing of time the water use pattern has changed from agricultural to domestic purpose such as drinking, washing, bathing, fishing, etc. there is a lack of base line data on physico-chemical characteristics of the perennial tanks in this region, therefore, present study has been carried out on the perennial tank of Atpadi for two years (2018-2020) to record the seasonal changes of selected physico-chemical parameters.

II. MATERIALS AND METHODS

The surface water samples were collected fortnightly from four sampling sites to analyse the physico-chemical parameters. The water samples were collected in plastic cans and they were transferred to the laboratory for further chemical analysis. A few tests particularly pH, DO, free CO_2 were performed at the site of research. The transparency of water to the light was measured using secchi disc. The air and water temperature were recorded at the site using mercury thermometer.

The pH was measured using pH meter (Hanna Model Champ). The electrical conductivity was determined by using control dynamics digital conductivity meter APX 185- E. The chemical parameters of water such as DO, free CO_2 alkalinity, hardness, chlorides, nitrates and phosphates were determined by following standard methods as escribed by APHA (1985) and Trivedy et al (1998).

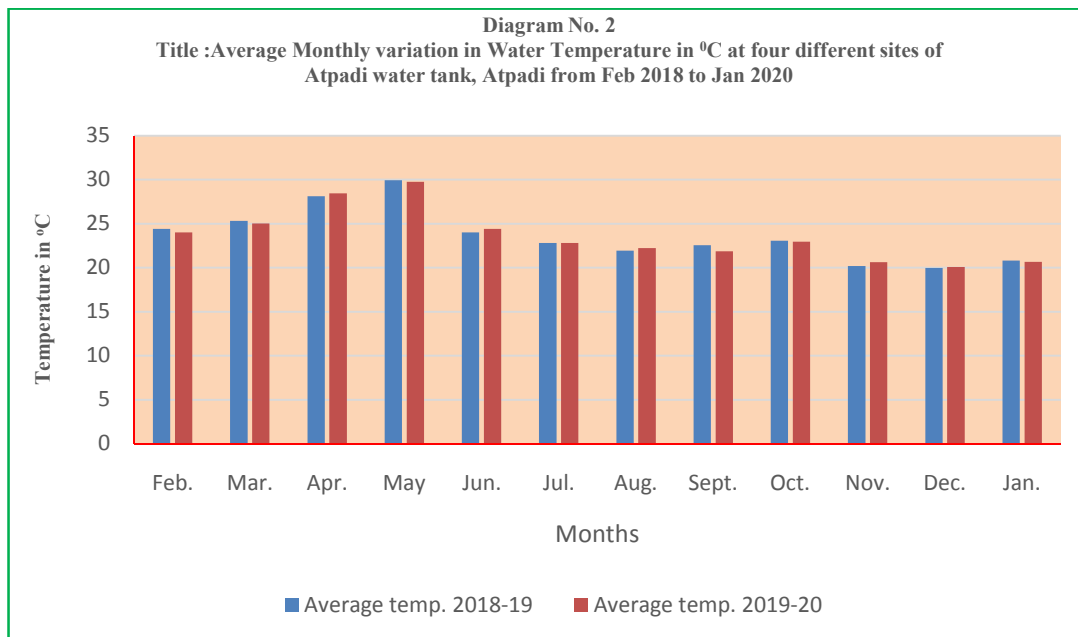
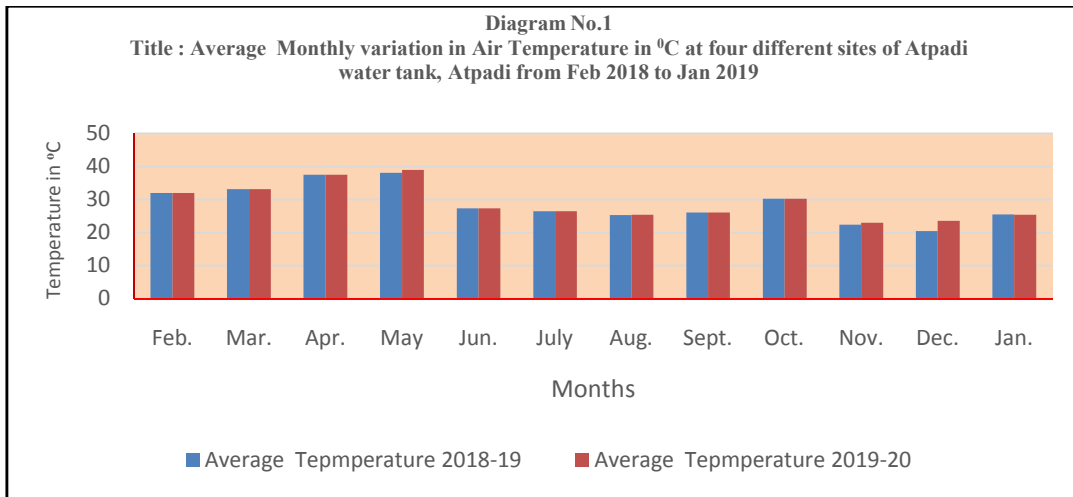
Study Area:

The perennial tank of Atpadi is situated in Atpadi Tehsil of Sangli district ($17^{\circ} 41^{\circ}\text{N}$ and $74^{\circ} 91^{\circ}\text{E}$). The Atpadi tehsil receives average annual rainfall about 549-600 mm. the area comprises fertile land of river Manganga basin. The climate of the region is tropical monsoon. The year can be divided into three seasons, summerseason (March to May), rainy season (June to October) and winter season (November to February).

III. RESULT AND DISCUSSION

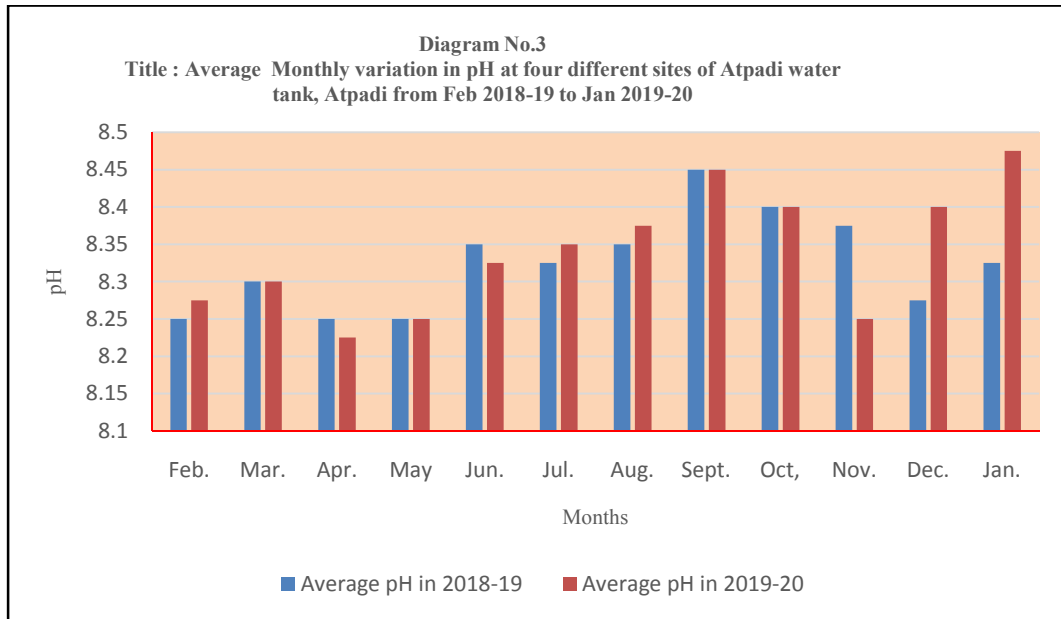
Temperature

During the year 2018-2019 the air temperature ranged from 20⁰ C to 38⁰ C and in 2019-2020 it ranged from 22.8⁰ C to 39.3⁰ C while surface water temperature ranged from 19.8⁰ C to 30.2⁰ C in 2018-2019 and 20⁰ C to 30⁰ C in 2019-2020. The minimum atmospheric temperature was recorded in the month of December at all sites and maximum in May, similarly the surface water temperature was recorded minimum in December and maximum in May.



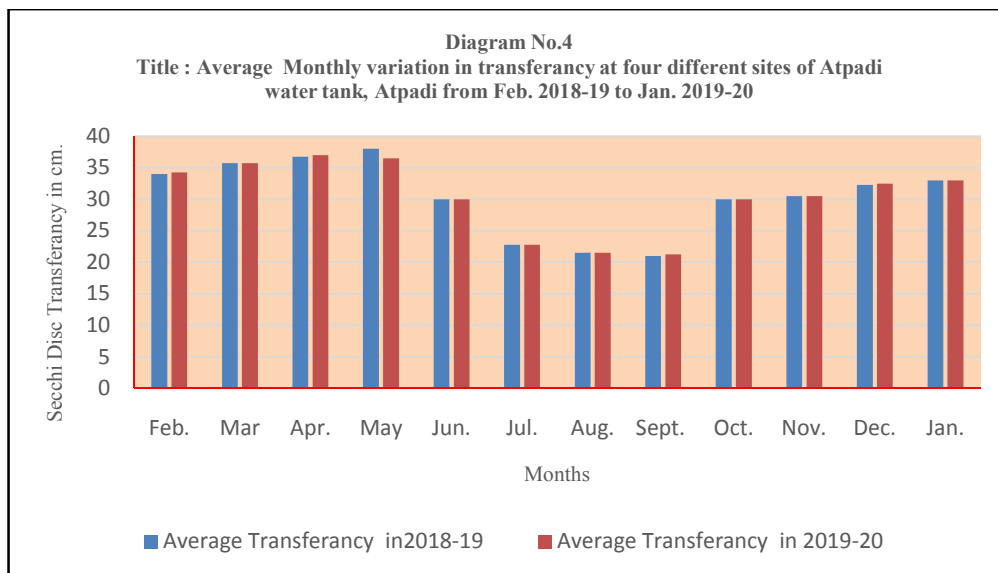
pH

The pH of water ranged in 8.2 to 8.6 in both years. The pH of the water body was less alkaline throughout both years. The pH was found to be minimum in summer and maximum in rainy season. The present pH range showed that the water of this lake was suitable for aquatic life, irrigation and domestic use.



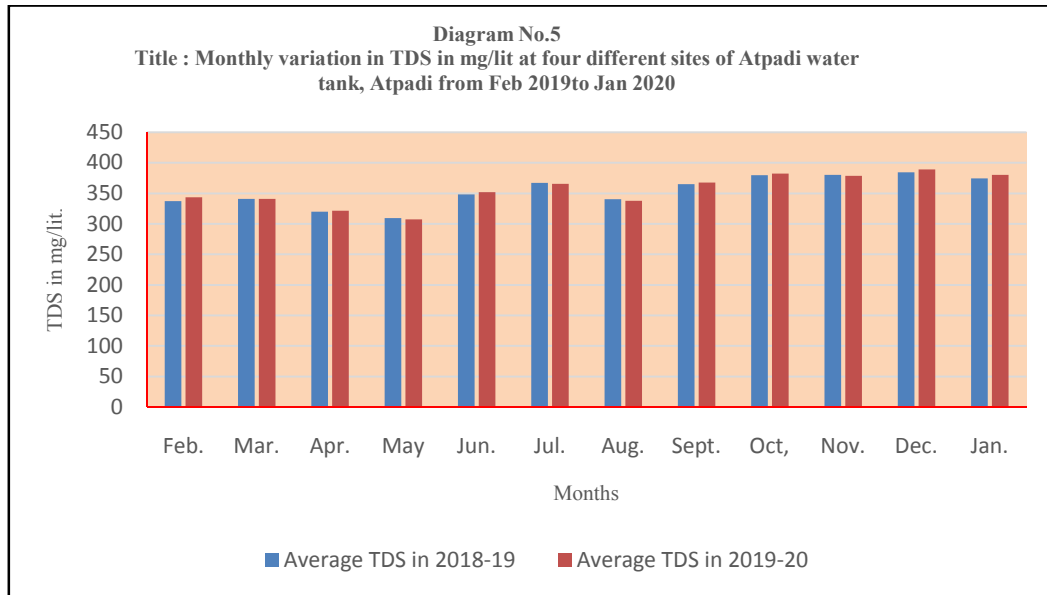
The Transparency

The transparency values were low indicating high tropic status of the lake. The present transparency values were declining in the rainy season due to sewage contamination from rain water from the surrounding area. Turbidity values were high in monsoon due to the addition of silt load with the influx of monsoon run off and earthen bundh.



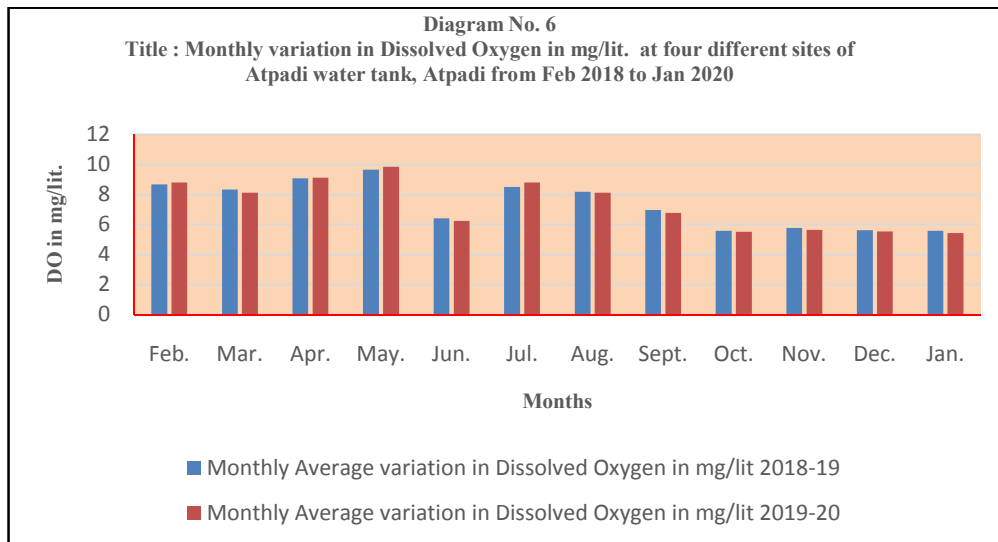
Total Dissolved Solids

Total dissolved solid values were low in the summer season and high in winter and rainy season that may be due to the gradual disturbances in sedimentation of solids. Electric conductivity values were high in rainy; this may be due to contamination of water by sewage, domestic waste, and high built of salts.



The DO

The DO was high in summer that would have created favorable conditions for the development of blue green algae. The low values of DO might be also because of its enhanced utilization by micro-organisms in the decomposition of organic matter. The dissolved oxygen and transparency can be used all over for continuous monitoring of freshwater lakes.

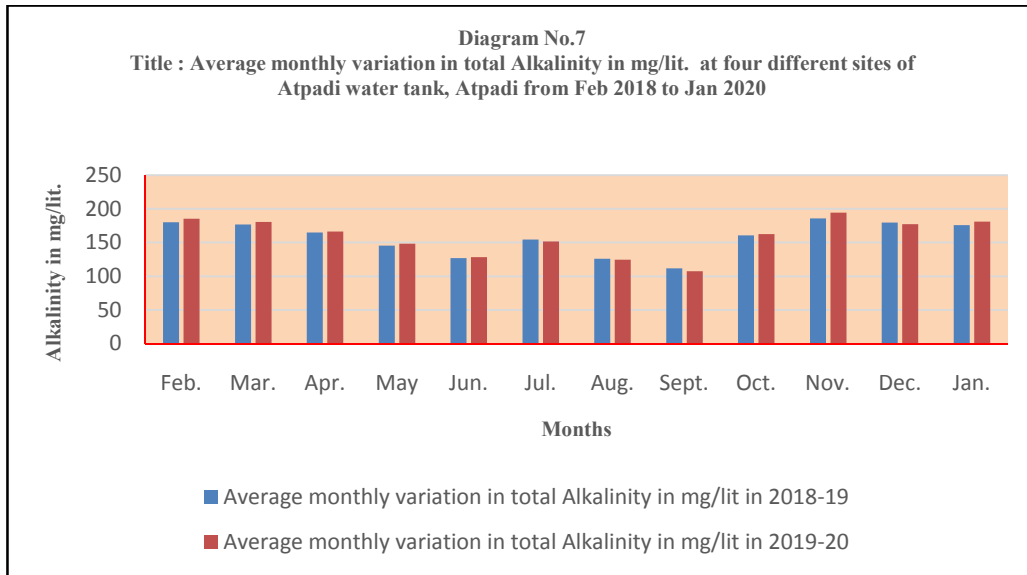


Free CO₂

Free CO₂ was not detected in the lake water throughout the period of investigation. The absence of the free CO₂ may be due to its complete utilization in photosynthetic activity.

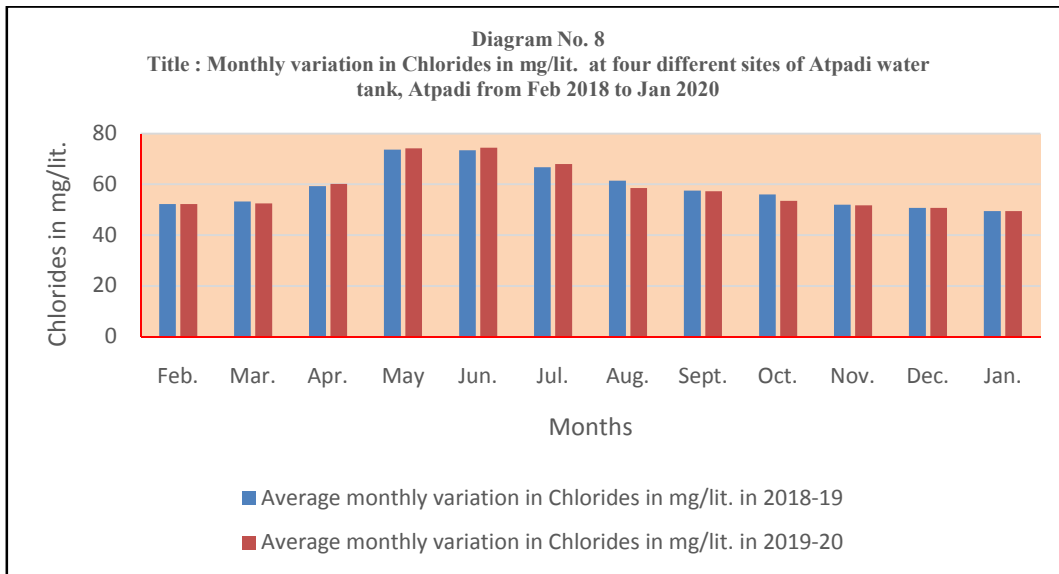
Total alkalinity

Total alkalinity values were higher in winter. The presence of total alkalinity indicates that the lake seems to be productive. Thus, present water of lake seems to be moderately polluted due to domestic sewage and agricultural runoff, which indirectly suggest the beginning of eutrophication.



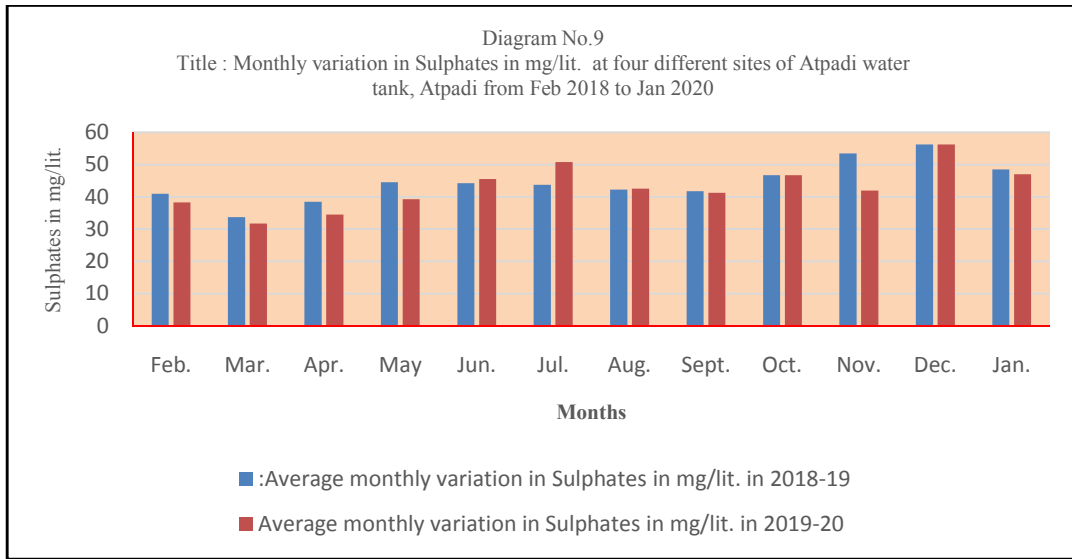
Chlorides

Maximum chlorides were in rainy season, which may be attributed to the addition of considerable amount of domestic sewage. Lower values of chlorides in summer may be due to their deposition in the soil and evaporative loss of water.



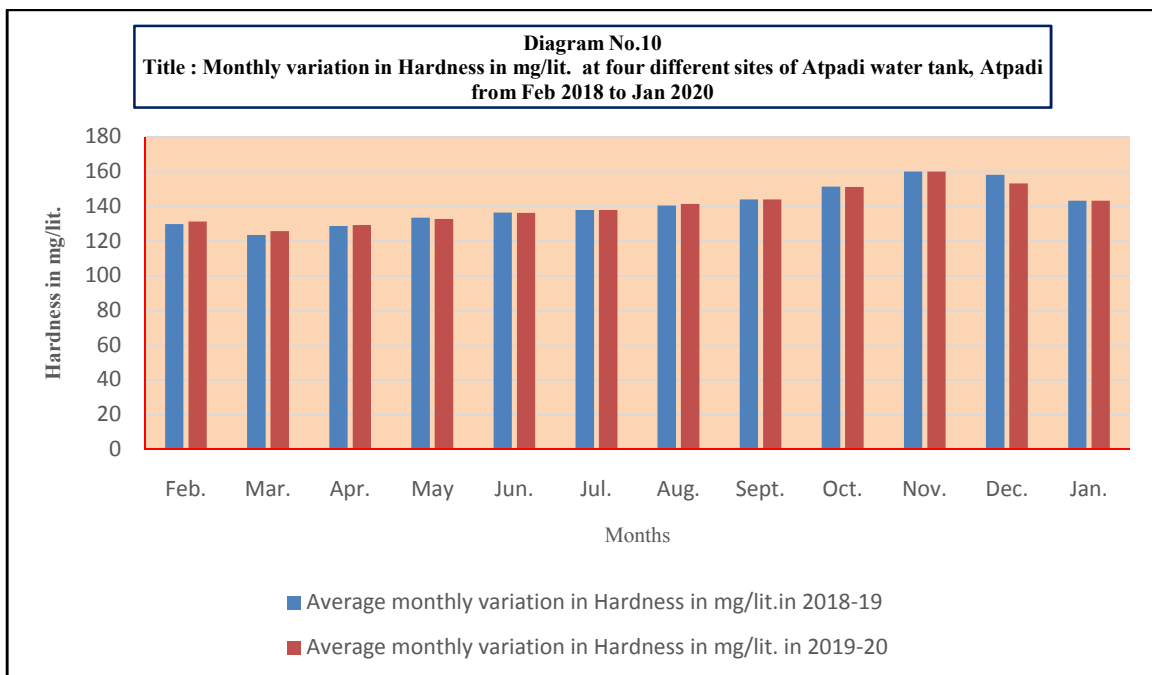
Sulphates

Sulphates were ranging between 30 to 60 mg/l. An increase in sulphates was observed from January, February and March. The higher values of sulphates during summer can be attributed to the deposition in the soil of water.



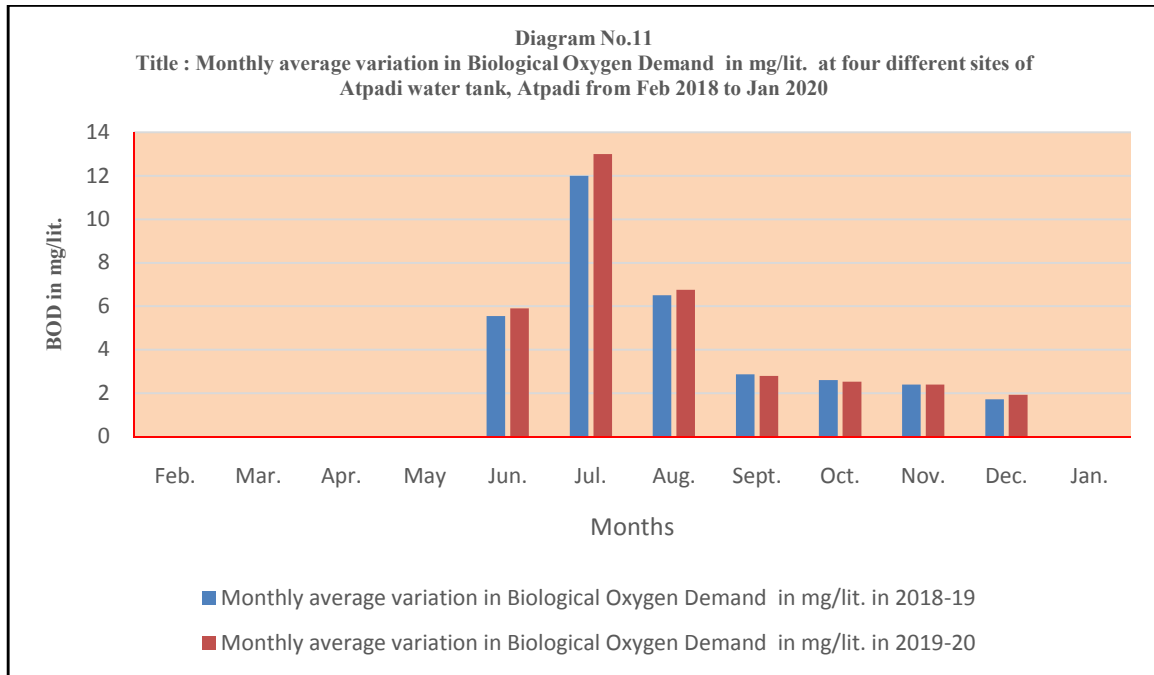
Total Hardness

Total hardness was ranged between 117 mg/l and 167 mg/l and it seemed that the water of the present wetland was suitable for the growth of organisms.



BOD

BOD values of the lake were higher in winter season due to high rate of organic decomposition from agricultural run-off. The absence of BOD values in monsoon and less in winter may be due to decrease in the temperature of water, which in turn retards the microbial activity.



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