

# DIURNAL VARIATION OF DISSOLVED OXYGEN IN APPA LAKE

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**Abstract** -The present study was carried out to determine the diurnal variation of water quality parameter in Sharanabasveshwara lake, Kalburgi. In this study various physico-chemical parameters like temperature, pH, dissolved oxygen, biological oxygen demand and sediment oxygen demand are determined. The atmospheric temperature varied from 290C – 440C, water temperature varied from 19.50C – 300C, pH varied between 6.8 to 7.3, dissolved oxygen varied from 6.8 to 10.6 mg/L, the biological oxygen demand varied from 6.4 to 7.9 mg/L and sediment oxygen demand varied from 18.8 to 28.8mg/l. By seeing the physio chemical parameters of water obtained in the present study the dissolved oxygen is rich in water. Its beneficial for aquatic life. The physico-chemical parameters showed distinct variation in lake.

**Key Words:** Freshwater, Physico-chemical parameters, Reaeration rate constant (Ka), Deoxygenation rate constant (Kd).

## 1. INTRODUCTION

Freshwater ecosystems are considered as one of the most important natural resources for the survivability of all the living organisms of the biosphere. The alarming rate of deterioration of water quality of fresh water resources like lakes, ponds, rivers etc. is now a global problem. For sustainable utilization of the water resources, periodic examination of the freshwater bodies are very much essential. Many workers have reported that the water quality and zooplankton movement undergo rapid changes due to diurnal variation (Rana et al., 1982; Ahamad and Singh, 1991). Dissolved oxygen is a state variable, which is in indication of the general health of the aquatic ecosystem. Thus the present study has been undertaken to determine the physico-chemical characters like temperature, ph, dissolved oxygen, biological oxygen demand and sediment oxygen demand.

### 1.1 Study area

Gulbarga is township situated in the northern part of Karnataka state (76° -04" to 77° - 42" longitude and 16° - 12" to 17°-46" latitude) located 458 meters above msl. The Shri Sharanabasaveshwara Appa Lake is situated in the heart of the city and is also known is Jagat Tank. This tank spreads over an area of 0.275sq.km the mean depth is 2.2 meters with a maximum being 1.2 meters during the dry period. The tank is fully utilized by the Fisherman"s Co-operative society. Shri Sharanabasaveshwara Appa Lake

exists from many many decades. Since from early days this lake is used for cattle rearing, for bathing, for fishing, and also women used to wash their household cloths. After few decades, the municipal administration joined the sewage drains from Ward A (Shahabazaar area) of Gulbarga City into this lake. That's the point from which the lake got polluted & silted up. Incidences of fish kill happened 2 to 3 times. Very recently the City administration has taken up steps to desilt the tank and added fresh water in it, apart from that they also constructed stone lining/pitching & fencing throughout the periphery of the lake. Now it is well protected from animals and anthropogenic hindrances. It is now being used for contractual recreational boating only.

### 1.2 Objectives

- To determine diurnal variation of dissolved oxygen (DO).
- To determine diurnal variation of Biological oxygen demand (BOD).
- To compute reaeration rate constant (Ka)
- To compute deoxygenation rate constant (Kd)
- To determine sediment oxygen demand.

## 2. MATERIALS AND METHOD

### 2.1 Chemicals used

The chemicals used are Manganese sulphate, alkali-iodide-azide, concentrated sulfuric acid, 2 drops of starch, Sodium thiosulfate.

### 2.2 Experimental setup

Samples were collected every day in the morning and afternoon during month of April 2018 to May 2018. Stopped BOD glass bottles used for water sample collection were cleaned with distilled water prior to sample collection. Containers were again rinsed with sampling water before collecting water sample. Temperature was recorded immediately at the time of collection in the field and dissolved oxygen samples were fixed with alkaline potassium iodide and manganous sulphate at sites. Sediment samples were collected manually by adding some sediments from the bottom to it. The collected samples were brought to the laboratory for

analysis. The analysis is done by modified winkler’s method.

### 3. RESULTS AND DISCUSSIONS

#### 3.1 Variation of DO and BOD freshwater sample from Appa lake.

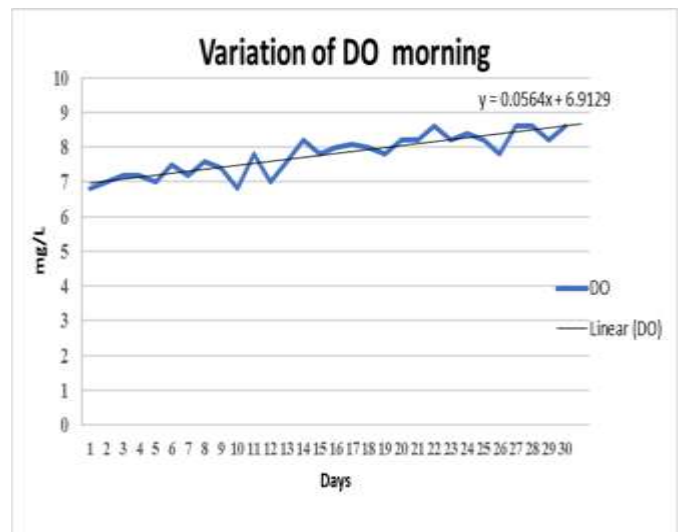
Table no. 1 shows the diurnal variation of DO and BOD. The samples were collected in morning at 8am and at 2pm afternoon. The samples were brought to the lab and were tested and results were tabulated.

The DO in Shri Sharanabasaveshwara Appa lake varied from 6.8 to 10.6 mg/L. The BOD in lake varied from 6.4 to 7.9 mg/L. The DO is high and BOD is low which is favourable for aquatic life.

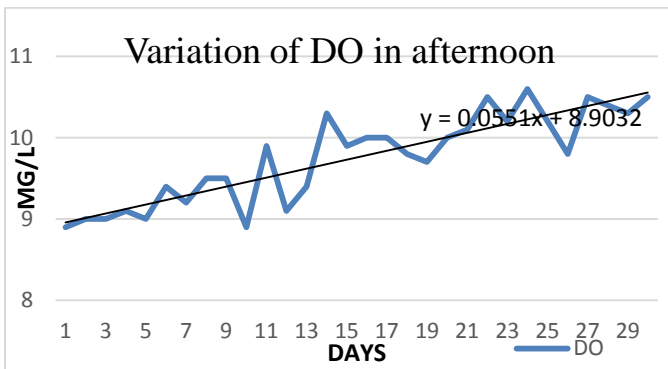
**Table -1:** Diurnal variation of DO and BOD in morning and afternoon

Day	MORNING		AFTERNOON	
	DO	BOD	DO	BOD
13	7.6	7.4	9.4	7.2
14	8.2	7.8	10.3	7.5
15	7.8	7.5	9.9	7.4
16	8	7.7	10	7.6
17	8.1	7.6	10	7.4
18	8	7.5	9.8	7.4
19	7.8	7.4	9.7	7.2
20	8.2	7.7	10	7.4
21	8.2	7.5	10.1	7.2
22	8.6	8	10.5	7.7
23	8.2	7.6	10.2	7.3
24	8.4	7.8	10.6	7.6
25	8.2	7.5	10.2	7.4
26	7.8	7	9.8	6.8
27	8.6	8	10.5	7.9
28	8.6	8.1	10.4	7.9
29	8.2	7.5	10.3	7.3
30	8.6	8.1	10.5	7.9

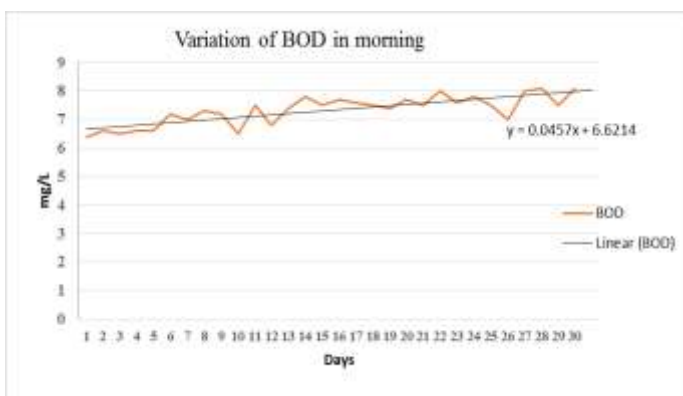
DAY	MORNING		AFTERNOON	
	DO	BOD	DO	BOD
1	6.8	6.4	8.9	6.2
2	7	6.6	9	6.3
3	7.2	6.5	9	6.3
4	7.2	6.6	9.1	6.3
5	7	6.6	9	6.1
6	7.5	7.2	9.4	7
7	7.2	7	9.2	6.7
8	7.6	7.3	9.5	7.2
9	7.4	7.2	9.5	7
10	6.8	6.5	8.9	6.2
11	7.8	7.5	9.9	7.4
12	7	6.8	9.1	6.5



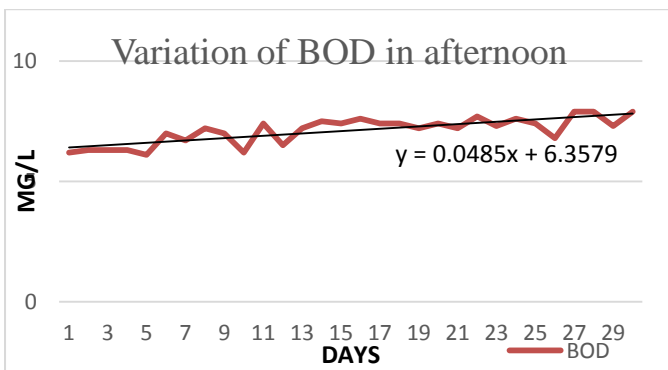
**Graph -1:** Diurnal variation of DO in morning



Graph -2: Diurnal variation of DO in afternoon



Graph -3: Diurnal variation of BOD in morning



Graph -4: Diurnal variation of BOD in afternoon

- a) Average reoxygenation constant (Ka):  $(0.0564+0.0551)/2=0.055$
- b) Average deoxygenation constant (Kd):  $(0.0457+0.0485)/2=0.047$

### 3.2 Diurnal variation of DO and SOD

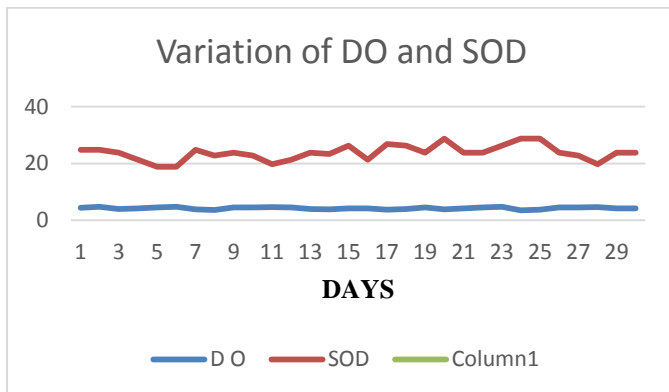
Table no. 2 shows the diurnal variation of DO and SOD. The sediment samples were collected. The samples were brought to the lab and were tested and results were tabulated. The DO in Shri Sharanabasaveshwara Appa lake varied from 3.6 to 4.8 mg/L. The SOD in Shri

Sharanabasaveshwara Appa lake varied from 18.8 to 28.8 mg/L.

Table -2: Diurnal variation of DO and SOD.

DAY	DO in mg/l	SOD in mg/l
1	4.46	24.8
2	4.8	24.8
3	4	23.8
4	4.25	21.3
5	4.5	18.8
6	4.8	18.8
7	3.9	24.8
8	3.6	22.8
9	4.6	23.8
10	4.5	22.8

DAY	DO in mg/l	SOD in mg/l
11	4.7	19.8
12	4.6	21.3
13	4	23.8
14	3.9	23.3
15	4.2	26.3
16	4.2	21.3
17	3.8	26.8
18	4	26.3
19	4.5	23.8
20	3.85	28.8
21	4.2	23.8
22	4.6	23.8
23	4.8	26.3
24	3.5	28.8
25	3.8	28.8
26	4.6	23.8
27	4.5	22.8
28	4.7	19.8
29	4.2	23.8
30	4.2	23.8



**Graph -5:** Diurnal variation of DO and SOD in mg/l.

#### 4. CONCLUSION

Since the lake is receiving fresh cum treated water from Bhima River, the water quality is good. All anthropogenic activities are barred in the lake water viz., bathing, swimming, Cattle's washing etc., since the lake is well protected by pitching and fencing. The Physico-chemical characteristics of Shri Sharanabasaveshwara lake at different sampling points were analysed. The atmospheric temperature during the study period varied from 29°C – 44°C in the morning and noon and the water temperature varied from 19.5°C – 30°C at morning and noon. The pH in Shri Sharanabasaveshwara lake is in between 6.8 to 7.3. The DO in Shri Sharanabasaveshwara lake varied from 6.8 to 10.6 mg/L. The BOD in Shri Sharanabasaveshwara lake varied from 6.4 to 7.9 mg/L. The observed reoxygenation rate constant (Ka) and deoxygenation rate constant (Kd) are 0.055 and 0.047 respectively. The sediment oxygen demand (SOD) is 23.97 mg/L. Shri Sharanabasaveshwara lake is now being utilized only for boating, even fishing activities has been stopped by authorities.

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