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Limnological Study of Malav Talav of Ahmedabad with reference to Physico-Chemical Properties and Plankton

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Abstract
Water is one of the most important factors for all living beings. Only 3% of total available water on earth is freshwater, of this less than 1% is in the form which can be utilized by living forms. Urbanization, Industrialization, increase in population causes pollution which affects water bodies and their quality. Therefore, its conservation is very much important. Water quality can be determined by conducting study of physico-chemical and some biological properties. Plankton are one of the pioneer sp. In aquatic food chain. They are very sensitive for their environment hence are considered as ecological indicator to predict water quality and status of waterbody. They are indicative of eutrophication process of water body also. Therefore study of plankton diversity along with its physico-chemical factors was carried out.

Keywords: *Malav talav, Plankton, Physico-chemical factors*.

Introduction

Freshwater is one of the basic necessities for the existence and sustenance of life. Urbanization, Industrialization, Population growth are the key factors for over exploitation which causes the water pollution.

Malav talav is located in south western side of Ahmedabad. Initially it was a natural pond. But govt. authorities constructed the pond and made walkway surrounding it inweding a garden on one side of the talav. There is a temple of goddess amba near the pond, the waste water of the temple is discharge into the talav. Some portion of the talav becomes dry during the summer season. The talav covers an area of 16,196 m^2. And its latitude and longitude are $23^0$00'24.52" N and $72^0$32'22.49" E respectively.

The present study involves effects of physico-chemical properties with reference to plankton diversity and population.

Materials and Methods

The present study was carried out to assess water quality using physico-chemical and biological parameters. The samples were taken separately by applying standard methods suggested by APHA and other workers.

Plankton:

The total count per ml and per liter was recorded for the study. Plankton are observed carefully under 4x, 10X or 45 X objective lens wherever required. Then with the help of digital camera attached with microscope is being used to capture images of plankton. Identification of plankton was done by using various online sources and print sources like book Fresh water algae- Prescott, Indian freshwater microalgae –Dr. N. Anand (1998), "Freshwater Biology" by Ward & Whipple, Fresh water zooplankton of India by Battish S. K. (1992).

Results and Discussion

Physico-chemical parameters play an important role in the productivity of plankton Physico-chemical parameters are highly important with regard to the occurrence and abundance of plankton species.(Koorosh Jalil Zadeh et al.(2009)) The consideration of physico-chemical parameters in the study of limnology is basic in understanding the trophic dynamics of the waterbody. Each factor does play its individual role but at the same time the final effect is really the result of interaction of all the factors (Hulyal & Kalwal,2008).

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In study area the water level was quite low and almost shallow during the winter and hence such huge difference in physico-chemical factors was recorded. The pH recorded somewhat alkaline nature of water. The temperature is slightly towards higher limit specially in winter and summer as water body turns into shallow water body. DO is vital parameter for aquatic organisms. Temperature plays an important role in determining DO in aquatic body (Vasumathi Reddy et al. (2009). It is compared to winter, recorded less in summer and monsoon. As new water enters into waterbodies it also increases the turbidity which reduces the DO in monsoon while, in summer low water level were the main causes for decreasing DO level. BOD: A requirement of oxygen needed for biochemical degradation of organic material. By assessing BOD pollution level of waterbody can be determined.

Among biological parameters phytoplankton and zooplankton were counted by using Sedwitch Rafter chamber. The total count per ml and per liter was recorded for all the four sites. There are total 33plankton species were recorded. Out of this 27 were phytoplankton while rest zooplankton species. Among phytoplankton Chlorophyceae was more abundant during monsoon season while Bascillariophyceae were recorded maximum during the summer and winter season.

The physico-chemical factors and plankton species recorded during the study were shown in Table 1, 2 and 3 respectively.

Table:1 Seasonal variations in physico-chemical parameters at Malav talav

Sr. No.	Parameters	Season		
		Monsoon Mean ±SE	Winter Mean ±SE	Summer Mean ±SE
1	Temperature ^{0}C	29.5 ± 0.29	18.5 ± 4.22	23.5 ± 3.93
2	pH	7.60 ± 0.3	7.8 ± 0.11	8.23 ±0.07
3	Turbidity in NTU	4.1 ± 1.89	0.67 ± 0.13	0.38 ± 0.07
4	EC mhos/cm	1.28 ± 0.34	0.99 ± 0.09	0.50 ± 0.11
5	TDS	365 ± 24.67	545 ± 119.55	480 ± 21.22
6	TA	160 ± 17.80	220 v 13.54	217.5 ± 2.50
7	TH	155 ± 22.55	207.5 ± 20.57	202.5 ± 10.31
8	Mg $^{2+}$ hardness	14.03 ± 3.50	15.76 ± 3.74	19.38 ± 4.08
9	Ca^{2+} hardness	39 ± 4.13	42.75 ±4.27	50 ± 5.04
10	Nitrate	0.84 ± 0.07	0.75 ± 0.09	0.77 ± 0.05
11	Phosphate	0.69 ± 0.04	0.7 ± 0.05	0.71 ± 0.06
12	DO	4 ± 0.93	6.04 ± 0.39	5.82 ± 0.90
13	BOD	6.5 ± 1.85	6.25 ± 1.03	6.25 ± 1.11
14	Chloride	68.75 ± 18.97	100 ± 46.86	95 ± 15.55

Table: 2. Seasonal population of Phytoplankton at Malav talav

Plankton		Seasonal population		
Class	Genera	Monsoon	Winter	Summer
Cyanophyceae	*Oscillatoria sp.*	10	12	08
	Cylindrospermum sp.	05	03	04
	Gleocapsa sp.	05	12	28
	Nostoc sp.	10	04	05
	Anabaena sp.	08	04	03
	Merismopedia sp.	03	08	02
	Total	**41**	**43**	**50**
Bascillariophyceae	*Gomphonema sp.*	04	08	03
	Cymbella sp.	08	04	03
	Navicula Sp.	23	12	15
	Nitzschia sp.	03	06	04
	Synedra sp.	10	04	06

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	Cyclostella sp.	08	03	05
	Total	**56**	**37**	**36**
Chlorophyceae	*Spirogyra sp.*	15	10	02
	Cosmarium sp.	04	06	10
	Pediastrum sp.	06	05	08
	Scenedesmus sp.	10	12	07
	Closterium sp.	08	07	02
	Ankistrodesmus sp.	08	03	00
	Zygnema sp.	10	04	08
	Total	**61**	**47**	**37**
Total plankton count/ml		**158**	**127**	**123**
Total plankton count/L		**94800**	**76200**	**73800**

Table: 3. Seasonal population of Zooplankton at Malav talav

Plankton		**Seasonal population**		
Group	**Genera**	**Monsoon**	**Winter**	**Summer**
Flagellata	*Euglena sp.*	06	08	09
	Total	**06**	**08**	**09**
Copepoda	*Cyclops sp.*	08	05	07
	Diaptomus sp.	12	07	08
	Total	**20**	**12**	**15**
Rotifera	*Brachionus sp.*	14	05	07
	Rotifera sp.	02	06	08
	Total	**16**	**11**	**15**
Total plankton count/ ml		**42**	**31**	**39**
Total plankton count/L		**25200**	**18600**	**23400**

Conclusion

During study total 19 phytoplankton species were recorded which represented three different groups. Of this, *chlorophyceae* and *Bascillariophyceae* were most abundant during winter, while *cyanophyceae* is more abundant during summer. Among 05 zooplankton species, copepods and rotifers were more recorded than flagellates. It is indicated it may lead to organic evolution which may cause eutrophication of water body.

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