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Hydrobiological Studies of the Shahpura Lake, Bhopal With Reference to its Management

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Corresponding Author Email:- kidtelevision@gmail.com<http://dx.doi.org/10.22147/jusps-B/300901>**Acceptance Date 8th August, 2018, Online Publication Date 2nd September, 2018****Abstract**

A lake is a large body of water surrounded by land and inhabited by various aquatic life forms. Lakes are subjected to various natural processes taking place in the environment, such as the hydrological cycle. Due to tremendous population growth of the city and rapid urban development, lakes are facing various environmental problems resulting in deterioration of its water quality. The present investigation was carried out from May 2014 to May 2015 to study the hydrobiology of the Shahpura Lake of Bhopal (M.P.), with special reference to its management. The physico-chemical parameters we have used are pH, Water temperature, transparency, dissolved oxygen, free carbon dioxide, B.O.D., Chloride, Nitrate, Alkalinity, total hardness etc. These parameters suggest that the lake is medium productive. The fish yield of the lake if managed properly on scientific lines can be enhanced.

Key words : B.O.D, Alkalinity, physico-chemical parameter

Introduction

A lake is an area filled with water, localized in a basin, that is surrounded by land. Lakes are subjected to various natural processes taking place in the environment, such as the hydrological cycle. Due to tremendous population growth of the city and rapid urban development, lakes are facing various environmental problems resulting in deterioration of its water quality.

Shahpura Lake is situated in one of the posh localities of Bhopal, the capital city of state of Madhya Pradesh. This is also one of the large water bodies, present in Bhopal and this is a man made perennial lake and construction during the period of 1974-1975. The latitude of the lake is 23°12' N and longitude of the lake is 77°25' E. Dwivedi and Pandey (2012).

It has an area of 8.29 km². The source and main use of the lake water is to rain sewage water of

residential colony, irrigation, recreation and adhacaltme also. The storage capacity of the Shahpura Lake is 2.29m^3 . The maximum depth of the lake is 5.6m and minimum depth of the lake is 1.5m. ².

This manmade lake has beer the subject of numerous investigations all over India. The present paper attempts to analyze physic chemical characteristics of the water as influenced by prevailing environmental pollution and to suggest some management practices to minimize the water pollution in the Shahpura Lake. ¹².

Material & Method

The shape of the lake is nearly rectangular the lake receives water carrying the household refuse, garbage, silt and unmeasured amount of sewage through drains. The lake water is the only source for drinking for the cattle's. An intense load of tourism extensively use the lake water for recreation, swimming, boating throughout the year. The stored water is mainly used for irrigation and fisheries. It has a catchment area of 8.259sqkm . Total submerged area is 0.96sqkm . The maximum water level of the lake is 489.00m and the Full reservoir level is 488.30m. ⁸.

General climate of the area is typically monsoonic type and with three distinct seasons (summer, winter and rainy) summer season stamps from March and ends in June. The hottest month is May and the monotonic winds reach up to the mid June. The period of mid June to mid October is rainy season. Maximum rainfall is recorded in July august rainfall finger from 130 to 180cm. the winter season extends from mid October to February.morphometric and hydrographic data for Shahpura lake are mentioned in Table 1.

Table-1 Morphometric features of Shahpura lake

1	Formation	1974-1975
2	Type of dam	Earthen dam
3	Longitude	77025'30"N
4	Latitude	23012'00"E
5	Catchment area	8.2959 km
6	Submerged area	0.96sq.km
7	Gross storage	2.2 m.cum
8	Live storage	2.07 m.cum
9	Dead storage	0.22 m.cum
10	Lowest still level	483.71 m
11	Full reservoir level	488.30m
12	Maximum water level	489.00m

Table-2

Parameter	Shahpura lake
Ph	7.4-9.4
Water temperature	12-21 degree celsius
Transparency	20-60 cm
Dissolved oxygen	2.2-11.6 mg/l
Free carbon dioxide	Nil- 18 mg/l
Alkanity	120-270 mg/l
Total hardness	100-220 mg/l
Chloride	28-90.4 mg/l
B.O.D	8.0-26.3 mg/l
Nitrate	0.6-2.2 mg/l

Water samples were collected in clear plastic containers at monthly intervals for a year (May 2014-May 2015). Water sample were collected at a distance of about 5 meters from the bank and at a depth of about 6.25 m. The samples were analysed for their physico-chemical characteristics according to APHA-AWWA-WPCF¹, Dwivedi and Pandey (2012).

Details of the morphometry and hydrology were collected from the Public work department , Govt. of M.P and from the department of Fisheries. ¹¹.

Results & Discussion

The colour of the water was clear and transparency ranges between 20-60.0 cm. during course of investigation water temperature varied between 12-26.0 degrees Celsius. The parameter of temperature is basically important for its effect on the chemistry and biological reaction in the organisms in water. At elevated temperature metabolic activity of the organisms increases, requiring more oxygen but at the same time the solubility of the oxygen decreases. The disease resistance in the fishes also decreases with the rise in temperature. The ph of the water ranged between 7.4-9.4 which remained alkaline in all the seasons. ¹²

The total alkanity ranged between 120-270 mg/l . The hardness was recorded 100-220 mg/l which was considerably medium. The dissolved oxygen was favourable ranging from 2.2-11.6 mg/l. Free CO₂ ranged from have contributed to the high content of free CO₂. The chloride content ranges between 28-9.4 mg/l. Chloride occurs naturally in all types of water. The most important source of chloride in the water is the discharge of domestic sewage. Therefore, the chloride concentration serves as an indicator of pollution by sewage.

Table-2 shows the range of physico-chemical characteristic of water samples.

The delineation of physico-chemical parameter as given in the foregoing paragraphs tends to suggest that Shahpura lake is medium productive. The fish yield of the lake, if managed properly or scientific lives can be enhanced.

Suggestions for management:

- ✓ Control of land reclamation and other encroachment
- ✓ All the sewage inflows should be diverted
- ✓ Law enforcement and public awareness
- ✓ Control insect pest population
- ✓ Maintain a gene pool of plants and animals
- ✓ Provide habitat for fish spawning and bird nesting and feeding
- ✓ Proper selection and stocking of fish seed as well as proper harvesting
- ✓ Regular monitoring of water quality should be done because the physico chemical characteristics play an important role in the species composition and distribution of various organisms.
- ✓ Cattle washing in lake may be stopped
- ✓ The lake should be exploited properly as a fishery resource

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