Analysis of water quality using physico-chemical Parameters of Harsul Lake Aurangabad, Maharashtra

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***Abstract*: Lakes, dams are the most fertile, diverse, productive ecosystem in the World. Water quality has become a major concern due to ever increasing human developmental activities that over exploit and pollute the water resources. This study was aimed to estimate current status of physico-chemical characteristic of this Lake. The lake water quality was analyzed for physico- chemical parameters over a period of one year. Every water sample was analyzed for temperature in air and water, pH, dissolved oxygen, total hardness, total alkalinity, biological oxygen demand and chemical oxygen demand were analyzed for a period of one year from June 2017 to May 2018. The results indicated that physico-chemical parameters of the water were within the permissible limits and can be used for domestic, irrigation and pisciculture.**

***Keywords*: Physico-chemical, BOD, COD**

Introduction: The Harsul lake is located near Aurangabad city of Maharashtra. It is an important lake constructed on the Kham River in the year 1952. The basic purpose of this lake is to supply water in nearby locality for domestic use, irrigation and pisciculture. A few decades ago this lake was surrounded by agricultural fields, but due to construction activities now a day this lake is surrounded by many human colonies. The water is known to contain a large number of chemical elements, physical parameters such as temperature, turbidity and current are also known to operate lake ecosystem (Mustapha & Omotosho, 2005). The interaction of both physical and chemical properties of water plays a significant role in the composition, distribution and abundance of aquatic organisms. Apart from this, it also gives an insight into the relationship between the organism and their environment and can be used in determining water quality and productivity of the lake. The physic-chemical analysis study could also help in understanding of the structure and function of a particular water body in relation to its inhabitants.

The proper balance of physical chemical and biological properties of water in ponds, dams, lakes and reservoirs is an essential ingredient for successful production of fish and other aquatic resources. The presence or absence of chemical elements in a water body might be a limiting factor in the productivity of such water body. The physic-chemical characteristics of a lake can be significantly altered by human activities such as various agricultural practices, irrigation as well as natural dynamics which consequently affect the water quality and quantity, species distribution and diversity, production capacity and even disruption in the balance of ecological system operating in the lake.

The physico-chemical parameters and biotic communities of lentic and lotic water bodies have been already reported in detail by Yousuf (1989), Gopal and Zutshi (1998), Esmaeili and Johal (2005), Negi et al.(2006), Samrat A.D.et al.(2012).

Material and Methods: The present study deals with few physical and chemical parameters of the water to check the present status of water quality of sampling site. The water samples were collected from the lakes in Monsoon (July & August), Winter (November & December) and Summer (March & April) over twelve months from June 2017 to April 2018. For water sample collection plastic sample bottles having capacity of one liter were filled without disturbing the substratum to avoid the loose sediments in sample. The samples of water were collected from lake during morning period between 8.30 am to 10.30 am as per Lind (1974) and Welch (1953), The temperature of water were recorded at the time of sampling on the Sites by using mercury glass thermometer, pH was measured by pH meter, dissolved oxygen by wrinkles methods, and other physico-chemical parameters were analyzed by standard method of APHA (1998), Lind (1979), Wiplle (1954), Simerjit Kaur and Jasvir Kaur (2015).

Result and discussion:

PARAMETERS	MONSOON		WINTER		SUMMER	
	JULY	AUG	NOV.	DEC.	MAR	APR
1.Temperature in Air (^{0}C)	28.00	27.30	24.10	20.30	33.50	34.00
2.Temperature in Water (^{0}C)	26.00	24.40	22.00	21.00	28.10	30.00
3.pH	7.62	7.62	7.90	8.15	7.61	7.60
4.Dissolved Oxygen (mg/l)	7.4	7.2	6.0	6.8	4.0	4.8
5.BOD (mg/l)	16.1	19.4	17.8	17.5	17.1	18.6
6.COD (mg/l)	18	19.5	20.3	19.3	18.5	20.1
7.Total Alkalinity (mg/l)	21.1	16.2	23.5	24.5	32.5	33.6
8.Total Hardness (mg/l)	52.9	57.5	68.1	72.4	75.6	80.1

1) Temperature: High temperature in air and water was recorded during summer season respectively 34^{0}C & 30^{0}C and lower temperature in air and water was recorded during winter season respectively 20.30^{0}C & 21^{0}C, which is a normal feature in freshwater

reservoirs. It is also observed that the difference in air and water temperature is 2 to 4^0C. The water temperature is one of the most important physical characteristics of aquatic ecosystem, as it affects the organisms. It affects a number of water quality parameters that is one of the concerns for domestic, environmental, industrial and agricultural applications

pH: The lowest pH values were recorded during monsoon season ie 7.62, which implies the influence of run-off water entering into the water bodies. Highest pH level observed in winter ie 8.15. The desirable limit of pH recommended by drinking water specification Indian Standard – IS1 0500: 1 991 is 6.5–8.5

Dissolved Oxygen: The dissolved oxygen is an important aquatic environmental factor, which influences the health of an aquatic ecosystem. The higher value of dissolved oxygen may be due to the influence of run-off water from monsoon rain. The recorded dissolved oxygen range was within the maximum permissible limit. It was found that higher dissolved oxygen values were observed in monsoon may be due to higher water temperature, higher biological oxygen demand on account of decomposition of organic detritus during this period. It revealed that the quality of water at the residential areas was found to be safe and could be used for domestic purpose and without any treatment. Biological oxygen demand is the measure of quantity of oxygen required by bacteria and other microorganisms under aerobic condition in order to biochemically degrade and transform organic matter present in the water bodies. Maximum DO observed in monsoon ie 7.4 and minimum in summer ie 4.0

Biological Oxygen Demand: The peak values of BOD were due to high concentration of dissolved and suspended solids in water. Maximum BOD value was observed in monsoon ie 19.4 and minimum in summer ie 17.1

Chemical Oxygen Demand: It is a measure of water and wastewater quality. The COD is amount of oxygen consumed to chemically oxidize organic water contaminants to inorganic end products. Maximum COD observed in winter, it was 20.3 and minimum in monsoon ie 18

Total Alkalinity: It is a measure of the ability of the water body to neutralize acids and bases and thus maintain a fairly stable pH level of water. It depends up on certain chemicals present in water like bicarbonates, carbonates and hydroxides. Maximum alkalinity was observed in summer ie 33.6 and minimum in monsoon ie 16.2

Total Hardness: It is a measure of the amount of lime dissolved in water. Value below 100 is considered as soft water,that is drinkable water. Maximum hardness was observed in summer ie 80.1 and minimum in monsoon ie 52.9.

Conclusion:

The physical and chemical characteristics of water showed seasonal fluctuations interacting with one another and have a combined effect on animals and plants. The results show that the physicochemical parameters are within permissible limits. Hence water of Harsul Lake Aurangabad can be used for drinking, domestic and agricultural purpose. The water parameters indicate that the lake is rich in nutrients. To improve water quality there should be regular monitoring of physicochemical parameters.

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