Assessment of the Impact of Covid-19 Pandemic on Surface Water Quality in Fox Sagar Lake

A. Rajani[1], Padala Tirupathi[2], A. Kavita[3]

[1]Head, Dept.of Botany, RBVRR Womens College, Narayanguda, Hyderabad, Telangna.
[2]Research Scholar, Dept. of Botany, Kakatiya University, Warangal, Telangana
[3]Assistant Professor, Dept. of Botany, RBVRR Womens College, Narayanguda, Hyderabad, Telangna.

Abstract: The goal of the special collection is to develop insights into the link between human activities and impact on water and associated ecological, environmental, and built and sociological human systems, both during the recovery of the natural systems during the pandemic. Three sampling stations were selected from the Fox sagar lake and are characterized as follows: Station I is located at the right side of the lake. Station II is situated at the left side of the lake. This station gets polluted due to anthropogenic activities. Station III is located 200 meter after station II. In the year 2018-19 the lake water was alkaline. Carbonates and dissolved oxygen were recorded in low concentration Organic matter, COD, phosphates and nitrates were recorded in high concentration. On the basis of physico-chemical the lake is polluted and eutrophic. But in the year 2020 due to COVID-19 impact all the physico-chemical parameters are well below the permissible limits. The water is fresh and it can be used for drinking and irrigation purpose.

Keywords: COVID-19, Corona Virus, Water, Environment and Ecology.

Introduction

Water is the most abundant substance, covering more than 70 percent of the earth's surfaceand existing in many places and forms, mostly in the oceans and polar ice caps, but also asclouds, rain water, rivers, freshwater aquifers, and sea ice (Dhere and Gaikwad, 2006). Water is also found in the ground and in the air we breathe and is essential to all known forms of life (Banakar et al, 2005). Water bodies, natural and built environment, and related sociological systems such as policy and governance, have experienced significant impact from the economic slowdown resulting from the Covid-19 pandemic. While human health and life are our primary and immediate concerns to address, water and environmental systems from local to regional scales have seen discernible positive impacts due to the reduction of pollutant loading from industries, vehicle emission, and other sources.

The present study deals with Impact on surface water quality in Fox Sagar Lake, Effluent management and water quality and virus transport in the terrestrial and aquatic environment.

Material and Methods

Fox Sagar Lake, also JeedimetlaCheruvu or KottaCheruvu, is the fifth largest lake, spread over 2 km^2, in Hyderabad, India. It is located in Jeedimetla near Kompally, Hyderabad. The lake is popular for fishing and a popular spot for picnics.

Three sampling stations were selected from the Fox sagar lake and are characterized as follows: Station I is located at the right side of the lake. Station II is situated at the left side of the lake. This station gets polluted due to anthropogenic activities. Station III is located 200 meter after station II

The water samples from the surface were collected from the three sampling stations every month in polythene cans for a period of 6 months from June-2020 to November- 2020. Water samples were collected in separate 250 ml glass bottles (BOD bottles) for the estimation of dissolved oxygen. All the samples were carried to the laboratory. The samples were analyzed on the same day for different physico-chemical factors following the standard methods (APHA, 1995). The following factors has been analysed: 1) Temperature 2) pH 3) Carbonates 4) Bicarbonates 5) Chloride 6) Dissolved Oxygen 7) Biological Oxygen Demand 8) Chemical Oxygen Demand 9) Oxidizable Organic Matter 10) Total Hardness 11) Calcium 12) Magnesium 13) Phosphates 14) Sulphates 15) Nitrates Material and Methods 13 16) Nitrites 17) Total Solids 18) Total Dissolved Solids 19) Total Suspended Solids

Results and Discussion

The main objective of physico-chemical analysis of water is to determine the nutrient status of the medium (Chaurasia and Pandey, 2007). Since the water contains dissolved and suspended constituents in varying proportions it has different physical and chemical properties along with biological variation (Hossain et al, 2013). The quality of water may be affected in various ways by pollution (Javid and Ashok, 2012). Anions like carbonates, bicarbonates, sulphates, chlorides and

cations such as, calcium, magnesium contribute to the total alkalinity of water and act as buffer systems in preserving the natural alkaline nature of the fresh waters.

The physico - chemical characteristics exhibited certain interrelationships. The pH and carbonates are directly correlated. The pH and carbonates are inversely proportional to bicarbonates. Chlorides showed an inverse correlation with carbonates (Kamath et al, 2006 and Murugesan, S and Sivasubramanian, 2008). Dissolved oxygen shows an inverse correlation with organic matter and biological oxygen demand. The total hardness negatively correlated with carbonates. Sulphates and phosphates showed positive correlation with chlorides. Nitrates showed positive correlation with carbonates, bicarbonates, calcium and negatively correlated with total dissolved solids.

Conclusions

The goal of the special collection is to develop insights into the link between human activities and impact on water and associated ecological, environmental, and built and sociological human systems, both during the recovery of the natural systems during the pandemic and possible subsequent degradation pathways as economic activities pickup up, including assessment of niche habitats that may provide long residence times for the virus and/or adverse impacts on ecosystems. Direct impacts include water quality improvements owing to reduced industrial effluents while indirect impacts include changes in urban climate or land-atmosphere interactions owing to reduction in water pollution. Opportunities for assessing the cause and consequences of existing policies and practices, and development of alternate effective policies to preserve the recovered systems or guide systems for recovery, mitigate adverse impacts or enhance resilience are also possible.

In the year 2018-19 the lake water was alkaline. Carbonates and dissolved oxygen were recorded in low concentration Organic matter, COD, phosphates and nitrates were recorded in high concentration. On the basis of physico-chemical the lake is polluted and eutrophic (Table-1). But in the year 2020 due to COVID-19 impact all the physico-chemical parameters are well below the permissible limits. The water is fresh and it can be used for drinking and irrigation purpose (Table-2).

Acknowldgment

The author is very thankful to Principal, RBVRR Womens College, Narayanguda, Hyderabad and Department of botany for providing laboratory facilities.

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Table-1

COMPARISON OF THE 2018-19 DATA WITH ISI AND WHO AND STANDARDS

Parameters	Station-I	Station-II	Station-III	ISI 1991	WHO 1971
pH	8.25	8.20	8.18	6.5 - 8.5	6.5-8.5

CO_3^{2-}	17.30	14.13	12.62	.	.
HCO_3^-	213.14	217.63	216.68	.	.
Cl^-	364.95	375.99	365.72	.	250 mg/L
DO	2.90	3.10	2.95	6 mg/L	3 mg/L
OM	17.00	16.43	18.05	.	.
TH	529.27	530.08	530.94	300 mg/L	300 mg/L
Ca^{2+}	79.15	82.46	82.13	200 mg/L	75 mg/L
Mg^{2+}	67.14	70.78	71.21	75 mg/L	30 mg/L
PO_4^{3-}	3.60	3.10	3.50	.	.
NO_2^-	0.28	0.20	0.25		
NO_3^-	6.80	6.25	4.20	45 mg/L	.
SO_4^{2-}	43.00	38.00	33.00	200 mg/L	150 mg/L

Table - 2

COMPARISON OF THE JUNE - 2020 TO NOVEMBER- 2020 DATA WITH ISI AND WHO AND STANDARDS

Parameters	**Station-I**	**Station-II**	**Station-III**	**ISI 1991**	**WHO 1971**
pH	8.02	8.10	8.06	6.5 - 8.5	6.5-8.5
CO_3^{2-}	6.30	12.13	6.62	.	.
HCO_3^-	113.54	117.63	116.60	.	.
Cl^-	224.82	235.99	214.22	.	250 mg/L
DO	4.90	3.12	4.96	6 mg/L	3 mg/L
OM	7.00	6.42	4.06	.	.
TH	328.26	330.08	313.96	300 mg/L	300 mg/L

Ca^{2+}	59.12	52.46	52.12	200 mg/L	75 mg/L
Mg^{2+}	37.12	40.78	22.21	75 mg/L	30 mg/L
PO_4^{3-}	1.60	1.80	1.52	.	.
NO_2^-	0.12	0.10	0.14		
NO_3^-	3.80	3.92	3.20	45 mg/L	.
SO_4^{2-}	23.00	28.00	23.00	200 mg/L	150 mg/L