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Estimation of Primary Productivity of Salim Ali Lake at Aurangabad, Maharashtra (India)

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ABSTRACT: Water is the survival medium of all living organisms on the Earth. Water as a powerful solvent, most of the substances get readily soluble in the same liquid and hence water composition is very much prone to changes due to the unwanted substances. The present research work was based on the primary productivity of the Salim Ali lake in the Aurangabad city to know the ecological potential of Lake. In the year 2020 average values at spot A 118.08, spot B 122.47, spot C 128.25, spot D 151.44 and spot E 153.68. In the year 2021, average values at spot A was 133.99, spot B 146.15, spot C 146.86, spot D 123.66 and spot E 136.04. Phytoplankton biomass and primary production in lakes having large size vary at different time scales, from seasons to centuries. Every living organism required for clean, unpolluted water for its survival.

KEYWORDS: primary, productivity, lake, average, values

I. INTRODUCTION

The warming of the climate has been revealed to change the wetland ecosystems right through the globe, and it is also likely to concern the wetlands in areas where the climate is previously hot and the conditions are intense [1]. A warming affects the hydrological system of the wetlands, which largely controls the present organisms [2]. Likewise warming itself creates the stressful conditions for these organisms; change functioning of the total entire ecosystem [3].Warming usually increases the primary productivity of aquatic ecosystems. Primary production is improved by high temperatures which indirectly weaken water current in the tidal wetlands. Therefore increasing the concentrations of nutrients available to organisms i.e. phytoplankton [4, 5, 6, 7].But, changes reported in the phytoplankton biomass have been extremely variable and even contrasting, depends upon the study area [8, 9]. Hence, the local information on wetlands is necessary. The changes in the wetland ecosystem can be estimated by measuring, for example, the concentrations of the various nutrients, turbidity, oxygen and the primary production as concentration of the chlorophyll [4].Measuring only the single variables such as a particular nutrient or concentration of oxygen does not provide sufficient data for the large and spatio-temporally variable areas. A process offering the possibility of assessing environmental changes in the large areas is analysis of Landsat data [10]. This type of investigation has been shown to be useful in assessing water quality in the areas with high seasonal variation [11, 12, 13].

II. MATERIAL AND METHODS

Aurangabad is the famous historic city from state of Maharashtra and presently it is identified as one of the developed industrial place of Maharashtra. It is located in between latitude 190 53' North and a longitude 750 20' East [14].



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Fig. 1: Map showing the Salim Ali Lake in Aurangabad city of Maharashtra state (India).

The Salim Ali lake is located in between latitude $19^{\circ}53'$ North and a longitude $75^{\circ}20'$ East. Primary productivity of the pond is estimated by using dark and light bottle method described, in chemical and biological methods for pollution studies [15]. For the study, water samples were carefully collected at an average depth 2 to 4 feet on thesurface at spot A, B, C, D and E and systematically poured in to three bottles, two of them were completely transparent and third bottle was painted by black and itwas put in to black cloth bag for the incubation. The Period of incubation was 2.5 to 4.5 hours. The initial bottle shown immediately for determination of DO₂ present in the bottle *i.e.* the method is depend on estimation of oxygen released by the producers over aperiod of time. During study the initial concentration of oxygen was measured and then two bottles, one light and one dark incubated. After incubation DO from both the bottles measured by Minkler's method. The difference between initial and dark bottles respiration. Since some oxygen is also consumed by heterotrophic bacteria and other aquatic animals, this respiration is actually community respiration. The difference between the light and dark bottle is total photosynthesis or gross primary production. The two bottles light and dark were removed after the period of incubation and oxygen was fixed. DO₂ was estimated by using Winkler's Iodometric method described in Chemical and Biological Methods for Pollution studies [15]. The primary productivity was calculated and expressed as mg C/m³/hr.

III. RESULTS AND DISCUSSION

 Table 1: Average values of Primary productivity observed at site in 2020

Month	Spot A	Spot B	Spot C	Spot D	Spot E
January	104.2	144.6	149.8	171.9	141.7
February	122.7	141.7	147.9	197.2	130.7
March	191	130.7	164.9	155.3	178.8
April	171.7	178.8	171.9	122.7	136
May	267.54	198.6	197.2	108.4	190.9
June	92.53	164.7	155.3	149.8	193
July	84.51	89.7	122.7	147.9	202.7
August	85.52	84.5	108.4	164.9	98.9
September	25	78.53	86.62	118.7	106.62
October	52.1	75.51	66.7	137.7	118.8
November	108.7	87.61	68.62	155.1	151.2
December	111.4	94.64	98.9	187.7	194.8
Average	118.08	122.47	128.25	151.44	153.68
Maximum	267.54	198.6	197.2	197.2	202.7
Minimum	25	75.51	66.7	108.4	98.9

The average values of average values of Primary productivity observed at site in 2020 have been tabulated in table no. 1 and graphically represented in Fig. no. 1. The average values at spot A was 118.08, spot B 122.47, spot C 128.25, spot D 151.44 and spot E 153.68.

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Fig 1: Graph shows average values of Primary productivity observed at site in 2020

Month	Spot A	Spot B	Spot C	Spot D	Spot E
January	106.7	114.9	118.7	86.62	84.51
February	118	136	137.7	66.7	85.52
March	151.2	190.9	155.1	68.62	25
April	194.8	193	187.7	98.9	191
May	242.7	202.7	209.8	107.7	171.7
June	172.6	194.62	196.8	117.63	267.54
July	110.9	171	173.6	125.7	164.7
August	98.8	119.8	123	108.9	89.7
September	95.6	98.9	107.7	209.8	84.5
October	99.7	106.62	117.63	196.8	78.53
November	112.5	118.8	125.7	173.6	196.8
December	104.4	106.6	108.9	123	193
Average	133.99	146.15	146.86	123.66	136.04
Maximum	242.7	202.7	209.8	209.8	267.54
Minimum	95.6	98.9	107.7	66.7	25

Table 2: Average values of Primary productivity observed at site in 2021

The average values of average values of Primary productivity observed in 2020 have been tabulated in table no. 2 and graphically represented in Fig. no. 2. The average values at spot A was 133.99, spot B 146.15, spot C 146.86, spot D 123.66 and spot E 136.04

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Fig 2: Graph shows average values of Primary productivity observed at site in 2021

IV. CONCLUSION

Estimates of annual primary productivity in lakes have been usually depend on the measurements of phytoplankton photosynthesis carried out over long period of time to capture the numerous seasonal variations of the incident light, water transparency, temperature, nutrients and even phytoplankton biomass. The present research work was based on the primary productivity of the Salim Ali lake in the Aurangabad city to know the ecological potential of Lake. In the year 2020 average values at spot A 118.08, spot B 122.47, spot C 128.25, spot D 151.44 and spot E 153.68. In the year 2021, average values at spot A was 133.99, spot B 146.15, spot C 146.86, spot D 123.66 and spot E 136.04. Phytoplankton biomass and primary production in lakes having large size vary at different time scales, from seasons to centuries.

REFERENCES

- 1. Erwin, K.L. (2009): Wetlands and global climate change: The role of wetland restoration in a changing world. *Wetl. Ecol. Manag.*, 17, 71–84.
- 2. Kobayashi, Y.; Ralph, T.J. (2013): Gross primary productivity of phytoplankton and planktonic respiration in inland floodplain wetlands of southeast Australia: Habitat-dependent patterns and regulating processes. *Ecol. Res.*, *28*, 833–843.
- 3. Rojo, C.; Mercedes, M. (2010): Sustained primary production with changing phytoplankton assemblages in a semiarid wetland. *Hydrobiologia* 639, 55–62.
- Mitsch, W.; Gosselink, J. Wetlands (2015): Available online: https://www.wiley.com/enam/Wetlands%2C+5th+Edition-p-9781118676820.
- 5. Mitsch, W.J.; Gosselink, J.G.; Zhang, L.; Anderson, C.J. (2009): Wetland Ecosystems; John Wiley & Sons: Hoboken, NY, USA.
- Al-Zaidy, K.J.L.; Parisi, G.; Ali Abed, S.; Salim, M.A. (2019): Classification of the Key Functional Diversity of the Marshes of Southern Iraq Marshes. In *Journal of Physics: Conference Series*; IOP Publishing: Bristol, UK, Volume 1294, p. 072021.
- 7. Rodríguez, P.; Vera, M.S.; Pizarro, H. (2012) : Primary production of phytoplankton and periphyton in two humic lakes of a South American wetland. *Limnology* 13, 281–287.
- Waltham, N.J.; Alcott, C.; Barbeau, M.A.; Cebrian, J.; Connolly, R.M.; Deegan, L.A.; Dodds, K.; Gaines, L.A.G.; Gilby, B.L.; Henderson, C.J.; et al. (2021): Tidal marsh restoration optimism in a changing climate and urbanizing seascape. *Estuaries Coasts* 44, 1681–1690.
- 9. Burford, M.A.; Webster, I.T.; Revill, A.T.; Kenyon, R.A.; Whittle, M.; Curwen, G. (2012): Controls on phytoplankton productivity in a Wet–Dry tropical estuary. *Estuar. Coast. Shelf Sci.113*, 141–151
- 10. Molinari, B.; Stewart-Koster, B.; Malthus, T.J.; Bunn, S.E. (2021): Assessing Spatial Variation in Algal Productivity in a Tropical River Floodplain Using Satellite Remote Sensing. *Remote Sens.* 13, 1710



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- Zefrehei, A.R.P.; Hedayati, A.; Pourmanafi, S.; Kashkooli, O.B.; Ghorbani, R. (2020): Monitoring spatiotemporal variability of water quality parameters Using Landsat imagery in Choghakhor International Wetland during the last 32 years. In *Annales de Limnologie-International Journal of Limnology*; EDP Sciences: Les Ulis, France, Volume 56, p. 6.
- 12. Vargas-Lopez, I.A.; Rivera-Monroy, V.H.; Day, J.W.; Whitbeck, J.; Maiti, K.; Madden, C.J.; Trasviña-Castro, A. (2021) :Assessing chlorophyll a spatiotemporal patterns combining in situ continuous fluorometry measurements and Landsat 8/OLI data across the Barataria Basin (Louisiana, USA). *Water* 13, 512.
- 13. Stumpner, E.B.; Bergamaschi, B.A.; Kraus, T.E.C.; Parker, A.E.; Wilkerson, F.P.; Downing, B.D.; Dugdale, R.C.; Murrell, M.C.; Carpenter, K.D.; Orlando, J.L.; et al. (2020): Spatial variability of phytoplankton in a shallow tidal freshwater system reveals complex controls on abundance and community structure. *Sci. Total Environ.* 700, 134392.
- 14. Boralkar, Dilip B. (2012): Bioremediation of sewage Disposal in the Kham River, in Aurangabad (Maharashtra). Project Proposal Submitted to District Planning & Development Council under the aegis of District Magistrate & Collector, Aurangabad, India.
- 15. Trivedi, R. K. and Goel, P. K. (1986): Chemical and Biological Methods for Pollution studies. Env. Pub. Karad (M.S.).





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