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Studies on Physico-chemical nature and diversity of phytoplankton in Chickan Lake, District Dadu, Sindh

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Abstract: Chickan Lake is one of the oldest lake in vicinity of Dadu district, Sindh. It holds the water throughout the year and importantly counted in saline water lake, the salinity reaches up to 9.5 ‰ in winter and decline 6.0%. Because there is not enough literature on this particular lake a study was conducted in 2015 to 2016, for the determination of physical, chemical and biological characteristics in different seasons in monsoon and winter. During the study all physico-chemical parameter were higher in winter than those of monsoon season. Plankton studies reviled that the total 20 species belong which is covering 4 classes. Cyanophyceae comprised of 7 species followed by Chlorophyceae 6 species, Bacillariophyceae 4 species and Euglenophyceae 3 species were recorded. Growth of cyanophyceae is dominated over bacillariophyceae, euglenophyceae and chlorophyceae.

Keywords: Chickan Lake, Cynophyceae, Phytoplankton, Physico-Chemical Analysis

1. INTRODUCTION

Dadu district is rich in freshwater bodies. River Indus passes from the east of the district trough the start of district to end. River Indus has connection with Mancchur Lake which is the largest lake in Asia. Chickan Lake is characteristically different than Mancchur lake in sense of salinity. Chichan lake consist about 9.0‰ and called as saline lake in the vicinity. Chikan lake is located near Palh village, The area of the lake is 140 hectors. Chickan lake receives rain water and also connected with small agriculture channels of Dadu Canal. This lake is about 5 to 12 meters deep; the shallow water is due to in silting and deposition of decaying plants.Chickan Lake was ignored by the researchers and those of biological scientist. Looking the importance of the lake its study utmost. Population living in the surrounding of the lake depend fishing and other resources such as birds etc The Lake was declared as a wildlife sanctuary under section 14 of Sindh Wildlife Protection Ordinance in October 1972, of Sindh Wildlife Department. It has also been designated at Ramsar site 1976.

2. MATERIALS ANDMETHODS

Total 4 sites of collection of water were selected are station 1. Palh Village (Inlet), Station 2. Centre point and Station3.Miyani Village. 4. Chandio Village(Outlet of the lake). All the samples of water were taken monthly and transported to the laboratory from 2015 to 2016. The water samples were analaysed for the water quality of the lake and determind the composition of phytoplankton in this saline water lake.

Physico-Chemical Parameters Analysis

Water samples were collected through standard water sampler poured in plastic bottles and placed in ice box immediately in order to preserve the parameters. The process of analysis was carried out in laboratory according to standard methods of APHA (1992). Water temperature, pH, DO, TDS and salinity were examined on spot with the help of digital meters.

Phytoplankton Analysis And Identification:

Plankton net mesh size 25µ was used for phytoplankton collection. 3 % formalin of collected samples were preserved and brought to laboratory for analysis which was collected in plastic bottles on the research area. Algal flora was identified by considering keys which used by Majeed, 1935: Patric and Reimer, 1966 (bacillariophyta): chlorophyta and forcyanophyta by desikachary, 1959; Prescott, 1962; and for chrophytes the keys used by wood and imhori 1962. For quantitative analysis of phytoplankton, the methods was used to strain one litter water of surface water through nanoplanton net (mesh 30µ). In edwick rafter chamber the major genera were counted. Under trinocular microscope, species were identified.DCM mini pixel (350-0.1) connected with computer was used for photographic purpose of species on the study area.

3. RESULTS AND DISCUSSIONS

Physico-Chemical Parameters

Temperature

The climate of study area is intensively hot in summer and cold enough in inter; in the months of

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June July the highest range of temperature was found 36^{0}C while lowest ranges were found 14^{0}C in December and January.

Transparency

Transparency means to discover penetration of light into water body. Intensity of light penetration water can be shown through transparency. The amount of suspended inorganic and organic material is directly proportional to the turbidity of water. In this research study recorded highest value in winter was 197 cm, when water was in stagnant position and solids are settled in at the bottom of lake. Lowest value was starting to be 42 cm, due to maximum level of suspended solids and water become turbid in summer.

pH

The deviations in pH may happen in the water on account of alteration within temperature, photosynthetic disclosure to biological endeavor. Thus, that resorts to carry out the specific alternation water quality and ecology. While 6.1 to 9 levels, the pH as found in lake and estimated of alkaline nature.

Total suspended solids (TSS)

Entire debarred artifacts presence in water of lake is thoroughly associated with the quality of water in lieu of turbidity. Further, association covered ultimately on basis of emitting the discarded components including nitrogen, phosphorus and BOD. The more range as estimated within June month (44 mg/l) and lower most detected within December month (16 mg/l).

Total dissolved solids (TDS)

The manifestation of much level of TDS in the aquatic noticed as plausible for survival of living beings and the influence upon aquatic biota inhabits. In a sequel, the environment prevailing in water-lake becomes changeable in this perspective. The aquatic floras mainly reasoned because of more material of liquefied items in aquatic that enhance soil salinity. The greater significance of TDS as illuminated 1248mg/l and less significance numbered as 956mg/l. The variation in TDS depends on dilution and availability of water in lake.

Salinity

Much salinity may infringe with the progress of marine plants and its influences on the other aquatic being procedures. Salinity significance within the current literature in form of sampling noted as No. 3& 4 which become higher in December month while less significance level in September month. Thus, the level of salinity within an aquatic river alters, and some extent the oscillation as documented the overall within such the situation.

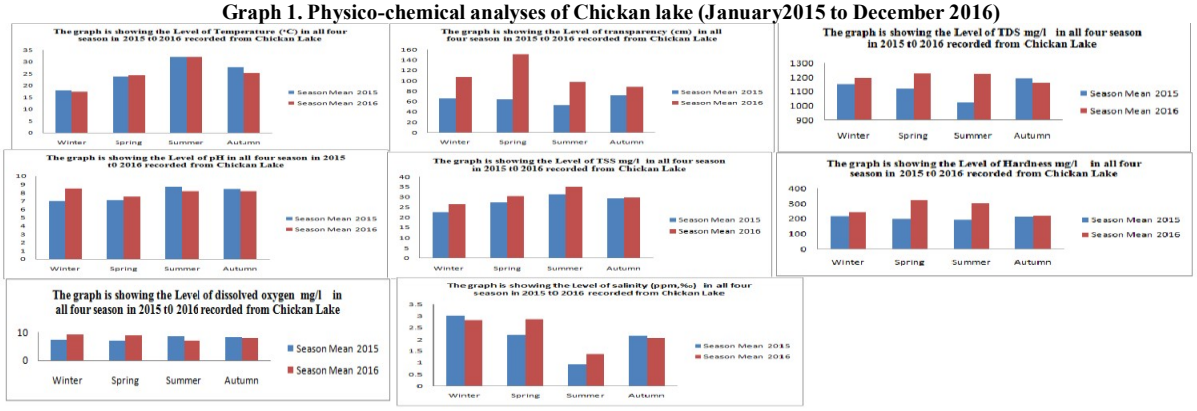
Hardness

Severity within aquatic is explicitly stated as the assets of aquatic that hinders the construction of lather and enhancing the steaming level of aquatic while other resulting of totality of the polyvalent cations liquefied in aquatic. Severity of aquatic reasoned as existence salt, calcium, and magnesium. The more level perceived in June month (388. mg/l) and lowermost noticed as in September month (142mg/l).

Dissolved Oxygen

Liquefied oxygen range within the water that is consisted of physical chemical and biochemical accomplishments in the aquatic form. The oxygen is an obligatory for the entire respiratory organism whether they are found in troposphere or in the hydrosphere. Liquefied oxygen is main factor of aquatic for the mechanism of ecological contamination. The binary base of DO in the aquatic one is troposphere and other is manufacture bases at the time of algal photosynthesis procedure. The investigation for DO from river as found a leading factor and authorizing the level of aquatic contamination and their control of contamination. It is one of the main hydrological factors for aquatic eminence, the model liquefied oxygen (DO) focus for numerous fish is between 7and 9 mg/l. The ranges of DO higher and lower respectively in months of March with 6.1 mg/l and January with range of 9.9 mg/l.

Graph 1. Physico-chemical analyses of Chickan lake (January2015 to December 2016)



All parameters are expressed mg/L except Water temperature, Turbidity, pH

Phytoplankton Diversity

It is a common fact that more than 80% production of fishes feeding depend on plankton at one or other stage of their life cycle. The estimation of fish production can be essential by assessment of dual productivity of water body. Plankton is varying group of plant and animal are commonly referred as phytoplankton and zooplankton respectively. Phytoplanktons are key components of aquatic biomass. Algal flora consisted of taxonomic groups (cyanophyta, chlorophyta, euglenophyta and bacillariophyta) are the major species phytoplankton **(Table 1).** List of Micro algae at Chickan lake in (January 2015 to December 2016)

Class Cyanophyceae	Winter	Spring	Summer	Autumn
Chroococcus Minor	4	3	0	5
Microcystis	0	8	15	10
Oocystis	9	8	8	6
Anabaena	4	2	1	16
Nostoc	3	0	4	1
Oscillatoria	8	0	12	14
Lyngbya	8	3	7	12
Class Chlorophyceae				
Pediastrum	9	3	5	3
Navicula	12	8	5	3
Scenedesmus	2	7	4	12
Closterium	4	1	5	0
Spirogyra	5	4	6	7
Cladophora				
Class Bacillariophyceae				
Pinnularia	2	0	7	6
Cyclotella	6	0	0	5
Navicula	12	8	5	3
Gyrosigma	1	4	3	6
Class Euglenophyceae				
Euglena	14	13	3	1
Phacustortus	0	4	5	8
Euglena viridis	1	4	5	6

4. CONCLUSION

1. This research Study shows the trend of increasing eutrophication in chicken lake and also that the lake is polutated by the inhabitants of sroundings.
2. The presence of huge amount of nitrogen and orthophosphates were suitable for development of phytoplanktons.
3. In the distribution of phytoplankton, definite seasonal variations were observed, during the summer and pre monsoons seasons the cyanopyceae were dominent over there, repectively in pre monsoons chlorophyceae were dominanted and in summer seasons caillariophyceae were dominanted and in last during the post monsoon's season euglenophyceae were dominanted.
4. Chlorophyceae, euglenophyceae and bacillariophyceae were dominantated by cyanophyceae algal growth.
5. This research study show that the phytoplankton species whic are mostly dominant, were not considered as harmfull for helath of inhabitants living sroundings of it.
6. Anabaena, oscillatoria and mirocystis type of species are known as the causes of skin damages, neuritoxin and hepatotoxin.
7. Alkline waters and higher tempratures are very suitbale for gorwth of cyanophycean becouse these are very tolerant organisms.
8. Lake water reserves huge amount of contaminated waters. Thus, proper maintanance of water bodies are recomanded. Public awarness about envoirmental and proper sanitation standards are also recomanded to keep clean and safe the envoirnment of these water bodies. Redirection of sewege water , presence of percolate of nutrients from catchment area through plantations would yeild healthy hygienic and also provides sustanable envoirnment.

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