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Physico-Chemical Characteristics and its Effects on Aquatic Fauna Especially in District Etawah

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Abstract - There are a number of factors that might cause fresh water bodies in tropical nations to be affected by pollution and nutrient influx, heavy metal and elemental precipitation, and continual silt inflow. Anybody of water's physicochemical properties is critical. These features are very variable in lentic bodies of water, which have lower water levels in the summer and higher ones during rainstorms. A water body's overall health may be gauged by the algal assemblage's response to these unfavourable conditions. Over the course of a year, researchers tracked a variety of physico-chemical parameters and algae diversity.

Keywords - Lakhna Devi Temple, Physico-Chemical Characteristics, CyanobacterialDiversity

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INTRODUCTION

Water is a fundamental component of life on Earth. In addition, water is a critical resource for a wide range of economic activity, from farming to manufacturing. Water supplies throughout the world are under serious strain as the global population grows. Developing and developed countries are included.

Lack of water restricts food production, putting human life in jeopardy. Additionally, water plays a critical part in the formation of the Earth's surface, temperature regulation, and pollution dilution. Although life as we know it can not exist without water, it is a vital raw element in the photosynthesis of green plants that generate sustenance for many living systems at all levels of the trophic chain. All terrestrial life relies heavily on atmospheric humidity that contains water in order to avoid dehydration.

Atmospheric water is a critical component of the hydrological cycle that covers 70% of the Earth's surface and impacts weather and global climate, as well as flora and wildlife. Because of this, it has a considerable impact on a wide range of societal and environmental issues. In the oceans, 97.2 percent of the water is salt water. When it comes to frozen ice, 2.15 percent of it is in a solid state, while the remaining 0.65 percent of water is either fresh or salty, depending on the location. As a result, the world's fresh water supply is very restricted.

To sustain human and industrial development, water is seen as the most essential resource. Population development and industrialization have resulted in a rise in the demand for freshwater in recent decades. This need is met by rivers, which provide water for human consumption and agricultural use. River water quality has deteriorated as a result of human and industrial activities, posing a threat to aquatic and human life alike. River water in India was contaminated by pollutants according to the WHO, CPCB, BIS, and ICMR, and some of the water was unsuitable for human consumption, according to these agencies. Many criteria may be used to determine river water quality, according to the literature. An efficient and practical way for determining river water quality is the water quality index, which has been proven to be effective. Using this strategy, policymakers may get a sense of the overall quality of water. The many mathematical formulae used to calculate water quality indicators combine diverse physical, chemical, and biological elements. and were the first to suggest the usage of a WQI. There have since been a number of new approaches for calculating WQIs.

The scientist suggested an alternative approach for determining WQI. Indicators of water quality in the United States include those from the National Sanitation Foundation. Water quality indexes are generally calculated using two separate processes. To begin, water quality criteria are converted into sub-index values. The second step is to add together all of these numbers to get an overall measure of water quality. Many scholars have published their findings on water quality indexes in the literature.

LITERATURE REVIEW

Hamid, A., Bhat, S.U. & Jehangir, A. (2020) A accurate understanding of the numerous natural and human variables that influence and shape stream water quality indicators is critical to water resource

conservation and management planning on a local and global scale. As environmental constraints mount on numerous dimensions, the importance of stream ecosystems in delivering regional functions is highlighted. A better understanding of the interplay between natural and human variables that influence stream water quality measures would assist policymakers and resource managers target suitable watershed management scales. This study provides an overview of the numerous natural and anthropocentric factors that influence stream water quality indicators and their effect on biota and their use.

Bhagde, Rupendra & Deshmukh (2020) The availability and quality of water is critical to all life on Earth. The plateau region of Ahmednagar district's Sangamner Taluka has minimal freshwater supplies. As a result, water resources, particularly lakes, must be managed sustainably. To determine the quality of the water, a physicochemical examination is required. Water quality monitoring for long-term usage was the goal of this research, which looked at the physicochemical characteristics in tiny lakes on the Sangamner Taluka plateau. Water samples were obtained from the research locations at various times of the year for this investigation. Physical and chemical parameters such as temperature and pH were measured using established procedures. TDS and T.D.S. concentrations were also recorded. Dissolved oxygen concentrations ranged from 5.1 to 7.9 milligrammes per litre. The concentration of dissolved carbon dioxide ranged from 32 to 48 micrograms per litre. Between 120 and 330 mg/L of alkalinity were measured. The temperature ranged from 21 to 32 degrees Celsius. 58 mg/L to 140 mg/L was the range of hardness. At several locations, seasonal changes in the physicochemical characteristics were discovered. There is a pressing need to enhance public knowledge about water conservation and management, according to the findings of this research.

NidhiGupta (2017) The Narmada River in Madhya Pradesh is considered holy. The Narmada River was tested for water quality using a variety of indicators. During the summer and winter, the Narmada River's water quality was outstanding to good; but, during the monsoon, the water quality was poor to unsuitable for human consumption. As a result of a lack of sanitation and a high level of human activity during the monsoon season, water quality decreased.

Amita Sarkar (2013) In addition to providing several environmental and economic advantages, wetlands are an important natural resource. For the purpose of this research, five wetlands in Mainpuri district were studied: Wetland ecosystems rely heavily on physicochemical factors. Throughout the research period, which lasted from April 2011 to February 2012, substantial changes in these parameters were discovered. Carbonates, Bicarbonates and Chlorides and Fluorides and Phosphates and Turbidity are all discussed in this study as well as the salinity of the water. Water bird species composition, especially breeding fauna, may be altered as a result of wetland ecosystem degradation, when nesting and breeding habitat utilisation is affected. Sites III and IV are IBAs under the BNHS and Bird Life International's Important Bird Areas Programs.

Pradip K. Maurya (2012) Located on the middle Indian plateau, Jhansi is known for its mineral-rich soil and rocky terrain. In the state of Uttar Pradesh, India, Barua Sagar is a historic site situated around 25 kilometres from the city of Jhansi. To honour the Barua Sagar Taal, Raja Udit Singh of Orchha erected an embankment here about two hundred and sixty years ago, creating a vast lake. Water from Barua Sagar Lake was tested for its physicochemical qualities, including its suitability for fish production, irrigation, drinking, and aesthetics, as part of the current research. Different water quality indicators were used to calculate the Water Quality Index (WQI) in Barua sagar Lake (including BOD, COD, Nitrate, Fluoride, Iron and Free Residual Chlorine). In order to obtain water samples from the whole lake, the lake has been separated into five separate areas: Some metrics, such as EC, BOD, and DO, showed the influence of diverse human activities. It is recommended that the lake's water quality be monitored on a regular basis in order to ensure optimal maintenance.

RESEARCH METHODOLOGY

The town, which has a population of about, is the study site. 10,470 people with a moderate to low degree of human impact. It is located east-southeast of the Lakhana town at 26°38'57.35" N, 79°09'03.91" E and 150 m above sea level.

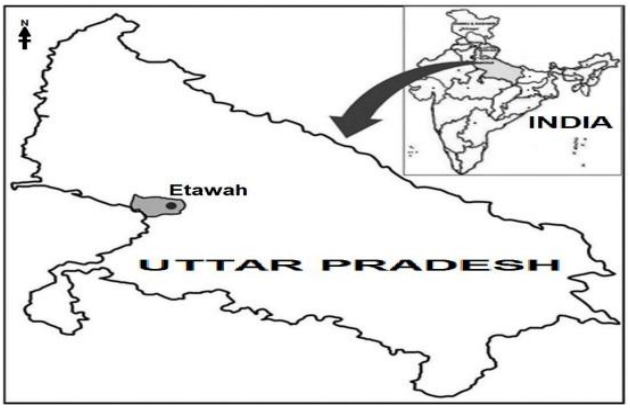

Figure 1: Location of study site, Etawah, Uttar Pradesh

Data sampling and analysis: Samples were taken from randomly chosen locations across the research sites. Every 30 days, at 10:00 a.m., water samples were taken from the fixed locations. Glass bottles (1.0 litre) with wide mouths were used to collect the samples, which were then sent to the laboratory and kept in a refrigerator until analysis was complete. Water samples were collected and analysed in accordance with established procedures. Algal flora

was collected once a month at the same time as water samples from the research locations.

DATA ANALYSIS

Table 1 lists the findings of tests on water's physical, chemical, and biological properties. As a result, algae are not only useful as bioindicators, but they also have intrinsic importance in environmental biology. On the physico-chemical and biological levels, cross contamination of water may be researched.

Temperature and depth of water in a certain area In order to calculate the total hardness, the total solids in solution, D.O. Biochemical Oxygen Demand, or BOD for short. For example, dissolved oxygen (D.O.) is referred to as dissolved oxygen. Ammonia, carbohydrate, free carbonate and bicarbonate are all carbonates. The chemical names for these two substances are T.Alka and bicarbonate, respectively. Chlorinated chloride's molecular weight and the temperature of the water in which it is present are indicators of openness.

Table 1: Annual variation of Physico-chemical characteristics

Months	W.L.D.	T.H.	T.S.	D.O.	BOD	F.A.	pH	Carb.	Bicarb.	T.Alka.	Chlori.	W.Tem.	Trans.
Jun.08	220	149	568	1.9	19	1.23	7.98	61	21	82	20	37	9
Jul. 08	300	123	563	2.1	17	1.25	7.90	51	16	67	17	28	8
Aug.08	320	113	584	2.2	13	1.35	7.73	47	12	59	16	26	10
Sep.08	290	95	602	2.7	14	1.68	7.43	45	11	56	17	24	13
Oct.08	210	124	624	2.8	15	1.85	7.35	49	14	63	14	23	15
Nov.08	170	130	640	3.2	18	2.03	7.28	52	16	68	19	18	17
Dec.08	160	133	659	3.5	16	2.11	7.38	54	18	72	21	9	20
Jan.09	140	177	588	3.1	10	2.08	7.64	65	45	110	24	9	18
Feb.09	130	176	584	2.8	9	1.82	7.91	67	42	109	25	17	17
Mar.09	120	170	633	2.7	14	1.80	7.88	68	44	112	28	25	12
Apr.09	118	169	643	2.4	16	1.76	8.22	70	46	116	27	30	11
May.09	100	160	632	2.2	18	1.81	8.06	67	40	107	25	36	10

Table 2 lists the frequency and incidence of the algal samples used in the research. In a year, 31 species of algae belonging to the Cyanophyceae class were detected in the aquatic environment. During the research period, just one species, Microcystis aerughinosa, was taken from the water body monthly. During the research site's harsh winters, 25 species were gathered, whereas only 18 species were obtained during the study site's hot summers.

Table 2: Annual variations of Distribution of algal diversity (1 = present and 0 = absent).

Algal spp. (Year 2008-09)	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan	Feb.	Mar.	Apr.	May.
Microcystis aerughinosa	1	1	1	1	1	1	1	1	1	1	1	1
Microcystis flos aquae -	0	0	1	1	1	0	1	1	1	1	0	0
Microcystis robusta	0	0	0	0	0	0	1	1	1	0	0	0
Chroococcus minor	1	1	1	0	0	0	0	1	1	1	1	1
Chroococcus minutes	0	0	0	0	1	1	1	1	1	1	1	0
Gloeocapsa magma	0	0	0	0	0	1	1	1	1	0	0	0
Aphanocapsalittoralis	0	0	0	0	1	1	1	1	1	1	0	0
Aphanothece microscopic	0	0	0	0	0	0	0	1	1	1	1	1
Coelosphaeriumkuetzingianum	0	0	0	0	0	0	1	1	1	1	0	0
Merismopedia glauca	1	1	1	0	0	0	0	0	1	1	1	1
Merismopediatenuissima	1	1	0	0	1	0	1	1	1	1	0	0
Arthrospiraspriulinoides	1	0	0	0	0	0	1	1	1	1	1	1
Spirulina gigantea	0	0	0	0	0	1	1	1	1	1	1	0
Cylindrospermum minutissimum	0	0	0	0	1	1	1	1	1	1	1	0
Nostoc commune	0	0	0	1	1	1	1	1	1	0	0	0
Nostoc punctiforme	0	0	1	1	1	1	1	1	0	0	0	0
Anabaena oscillarioides	1	1	0	0	0	0	1	1	1	1	1	0
Anabaena oryzae	0	0	0	1	1	1	1	1	1	1	0	0
Calothrix gloeocola	0	0	0	1	1	1	1	1	1	1	1	0
Rivularia aquatic	0	0	1	1	0	0	0	0	0	0	1	1
Gloeotrichia pisum	0	0	1	1	1	0	0	0	0	0	1	1

BOD levels were lower in the winter, when greater cyanobacterial diversity was detected, but higher in the summer, when the study site's cyanobacterial diversity was decreased. There are higher quantities of dissolved oxygen and free ammonia (F.A.) during winter, but lower concentrations in summer. There are no better physical or chemical signs of water pollution than the Boards of Directors of the Environmental Protection Agency and the Food and Drug Administration. If you're seeing a lot of high F.A. Water that is more contaminated (i.e. more polluted) results in a higher DO. BGA diversity is associated with reduced BOD as well. As a result of this research, it seems that algae, particularly Cyanobacteria, may be the most beneficial in removing inorganic toxins from the water, as well as providing oxygenation and a wide range of microbe profile possibilities. According to the results of this study, indicator species such as Rivularia aquatic, Gloeotrichiapisum, and Lyngbya contorta were beneficial in identifying higher F.A. levels. This is because of their evasiveness at the FA's highest echelons. This sacred water source has been recommended to be avoided for bathing and drinking because to the presence of allergic algae such as Anabaena, Microcystis, and Oscillatoria. Certain aspects of the current study seem to have academic and practical value.

CONCLUSION

Aside from farming and industry, water is an essential resource for a broad spectrum of economic activities. There is a tremendous pressure on the world's water resources as the population expands. Included are both developing and established nations. Physical, chemical, and biological aspects of water tested. As a consequence, algae play an important role in environmental biology beyond their value as bioindicators. The D.O.'s Board of Directors may conduct research on water contamination at the physico-chemical and biological levels. F.A.A. and physico-chemical markers of water pollution are the most essential F.A. scores that are too high might be a red flag. Greater dissolved oxygen (DO) is indicative of more contaminated water.

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