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PHYSICO - CHEMICAL PARAMETERS FROM THE MANAPPADAIYUR AND SWAMIMALAI FRESH WATER PONDS

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Abstract:

Aquatic ecosystem monitoring has been carried out in India based on either chemical or biological analysis. Diatoms constitute a fundamental link between primary (autotrophic) and secondary (heterotrophic) production and form a vital component of aquatic ecosystem. Particularly P^H, Temperature, at the same time remaining parameters of salinity, O_2 and Co_2 observation was slightly changed due to some pollutes. So in this study will be given supporting to the future study among the fresh water ecosystem balance.

Key words: *Physio-Chemical, Natural Pond, Culture Pond,*

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INTRODUCTION:

Diatoms constitute a fundamental link between primary (autotrophic) and secondary (heterotrophic) production and form a vital component of aquatic ecosystem. Diatoms generally range in size from 2-200µm and are composed of a cell wall composed primarily of silica. Diatoms are amazing microscopically algae whose typical features are a siliceous coverage, called frustules, extremely diverse in shape. Diatoms live in almost all types of superficial waters. Depending on their habitats, diatoms are either planktonic (living suspended on the water), benthic (growing associated to a substrate), or both planktonic and benthic. The algal species that develop in an area depend on different environmental factors: temperature, pH, Dissolved oxygen, Co_2, salinity etc., Thus, the species that can be found in a water body will inform about some characteristics of the water.

Aquatic ecosystem monitoring has been carried out in India based on either chemical or biological analysis. The chemical approach is useful in order to determine the levels of nutrients, metals, pesticides, radioactive substances, etc., while the biological approach aids in assessing the overall effect of the chemical input on organisms. Because these microscopic organisms depend on light and nutrients, they populate the euphotic zone or the upper strata of freshwater lakes, reservoirs, ponds, and rivers. Many micro- organisms feed on diatoms and in this way they are integrated into aquatic food webs. Diatoms are frequently used as bio-indicators, and if they are not investigated live they may be perceived simply as "glass boxes" used to give information about water quality. It is worth the time to study the living communities and to note the other algae and the interactions between the algae and other micro-organisms.

Water quality is important in pond aquaculture because water quality imbalances can cause stress, poor growth, and mortality of culture species .Water quality is strongly influenced by feed inputs, and ponds with high feeding rates frequently have more severe problems with low dissolved oxygen concentrations and excessive concentrations of ammonia and nitrite than ponds with low or moderate feeding rates .Although many water quality problems can be prevented by use of conservative feeding practices and efficient mechanical aeration, there are other water quality concerns in pond aquaculture. Natural characteristics of pond waters can greatly limit possibilities for fish culture. One naturally occurring water quality imbalance is the case of pond waters with high total alkalinity and low calcium concentration. Such waters often have excessively high pH, which can limit fish culture. Many times, site water quality limitations may be alleviated through management, for example alleviating the problem of high pH and low calcium by applying calcium sulfate (gypsum) to the water to increase calcium concentration. Moreover, some pond water quality variables are strongly influenced by pond bottom soil characteristics. Fish do not grow well in ponds with acidic water, which usually are located on acidic soils, but acidity in ponds can be corrected by liming.

Water is an essential requirement of human and activities development and it is one of the most delicate part of the environment. The physic-chemical properties of water and diatom have been studied in different aquatic habitats the present study reports on the physico-chemical properties of water and diatom's recorded in Manappadaiyur and Swamimalai pond situated near Thanjavur (Dt) Tamilnadu. The aquatic ecosystem is a major subdivision of the biosphere. Almost 71% of the earth's surface area is covered by water. In terms of total volume of water, around 97% of the world's water is saline. This means that less than 3% of the water volume in the world is actually freshwater (Gleick, 1996). However, not all this freshwater is readily available for use by humans and less than 1% of is used for drinking (Grey, 1994).

There are different biological indicators that can be used to determine the ecological status of a water body: macro invertebrates, aquatic plants, and algae, especially diatoms,are all used in water quality research.

MATERIALS AND METHODS:

Description of the Study Area:

The hydrological condition of the pond water situated near Thanjavur. The pond is situated near the east and west Tamilnadu, India. My study area is starting from Manappadaiyur (Nature pond) and Swamimalai (culture pond). One of the most important features of ponds is the presence of standing water, which provides habitat for wetland plants and animals.

Method of Collection of Water Samples:

Water samples were collected from the fixed location in Manappadaiyur (nature pond) and Swamimalai culture pond at regular estimation of all the physico – chemical factors P^H. The pond water temperature was measured by Celsius thermometer. Dissolved oxygen was determined by Winkler's method as given by Strickland and Parsons (1968). Water samples were collected reagent bottles and fixed on the spot by adding the reagent namely Hydrogen peroxide followed by Hydrochloric acid and Sulphuric acid. Carbon-di-oxide was determined with the help of phenolphthalein indicator was present (or) absent water samples were collection in conical flask and

few drops of phenolphthalein indication if the color turns pink, free co_2 is absent, the sample titrate 0.05 N sodium hydroxide. At the end point, a pink color appears. Then the samples we brought to the laboratory to determine the salinity was measured by standard methods (Body 1979 and 1995).

The correlation co-efficient was calculated between the physical and chemical parameters of the river using the formula,

$$R = \frac{N\sum xy - \sum (x) - \sum (y)}{\sum x^2 - \sum (x^2) - \sum_y^2 - \sum_{(y)}^2}$$

Methods of Collection of Diatom Samples:

Diatom samples were collected from the fixed location, at nature pond water Manappadaiyur and culture pond water Swamimalai. Diatoms can be identified to species level though morphological features of their frustules but these will hardly be seen without a previous treatment consisting of making all the organic matter disappear, leaving their siliceous frustules empty. There are different techniques for diatom cleaning but the hydrogen peroxide method (30% H_2 O_2 solution) is the most widely used. Firstly, if formaldehyde has been added, it should be removed .the sample has to be homogenized by shaking and a tube for centrifugation has to be filled with it. Centrifuge the sample at 2,500 rpm for 15 minutes, remove the supernatant, refill the tube with distilled water and homogenize it again. This process should be repeated 3 times but after the first one the supernatant must be revised to prevent any loss of diatoms.

Once the supernatant is removed for the third time, add a few drops of Hydrogen peroxide to the pellet. Be careful because a lot of foam may appear! Some more peroxide has to be added carefully until half of the tube is filled with it. Then, the tube can be either left covered for several days until bubbles stop flowing (or) heated in a sand bath (or) a hotplate at about 90ºC during 1 to 4 hours. In both cases, the brownish suspension has to become whitish. After that, add a few drops of HCL and repeat the centrifuge process previously describe to remove all the Hydrogen peroxide.

When diatoms are cleaned and suspended in water, dispense a few drops of this water on a cover slip and let it dry. Once dried, examine the cover slip under the microscope to ensure that diatoms can be easy to count. A good number of valves are eight per field but it depends on their size and shape. If there are too many, the sample must be diluted; if there are only few diatoms, add more drops and let the cover slip dry again. If there are not enough diatom on the cover slip but there is too much inorganic matter on it, the researcher has to make a decision whether or not to add more sample to the cover slip: the addition of more sample would reduce the time of analysis but diatom would be covered by more inorganic matter, which makes the identification of species harder. After getting an appropriated number of diatoms on the cover slip, dispense a small drop of high refractive medium (such as Naphrax^{TM}) on a slide and place the cover slip on it, making sure that diatoms are in contact with the drop. Heat the preparation for about one minute; some bubbles will appear under the cover slip when the drop of high refractive medium boils but they will disappear as the slide cools again. Once cold, the cover slip should be closely adhered to the slide; if not, the preparation has to be heated again.

RESULTS AND DISCUSSION:

The observation was recorded between two stations from Manappadaiyur and Swamimalai of pond. Study of physic-chemical parameters correlation co-efficient and diatoms are shown in table 1, 2, and 3.

The maximum water temperatures below 71°F in both two stations are same repeated value. John Clegg (1986), reported by Water temperature is also important when using aquatic herbicides to treat plant or algae growth. Aquatic herbicides are most effective temperatures are between 60 and when water 75°F. The pH of water sample both stations are recorded value of 7. A significant negative relation between temperature and pH (r=-0.3835) has been observed.

Dissolved oxygen concentration of water sample I, 6.77 ml/lit. Sample II, 3.38 ml/lit. The minimum level of Dissolved oxygen 3.38 mg/lit was found in station II which received the municipal sewage and domestic water. The similar trend was also recorded in pond Sone and Dalmianagar (Bihar) by Singh and Singh (1995). A signification negative relation between Dissolved oxygen and water temperature r= -0.2906 has been observed and also negative relation between Dissolved oxygen and pH r=-0.4567. The carbon-di-oxide levels of water sample I, 2.20 mg/lit. The negative relation between Co_2 and pH r=-0.4332 and Dissolved oxygen r=0.3769. Salinity concentration of water sample I 0.437 ppt, sample II 0.6296 ppt. Singh and Singh (1995) reported that the higher level of salinity was due to increase in decomposition of organic matters. A signification negative relation between salinity and water temperature r=-0.0017, A positive relation between salinity and Co_2 r= 0.0099.

. **Table: 1**
(NATURAL POND)

S.No	Parameters	Value
1.	Temperature	28
2.	PH	7
3.	Dissolved oxygen	6.77
4.	Co_2	2.20
5.	Salinity	0.4379

Table: 2
(CULTURE POND)

S.No	Parameters	Value
1.	Temperature	28
2.	P^H	7
3.	Dissolved oxygen	3.38
4.	Co_2	4.4
5.	Salinity	0.626

Table 3: Correlation Co- Efficient Observed Between Two Ponds Physico- Chemical Parameters In Pond Water.

Parameters	Water Temperature	P^H	Dissolved Oxygen	Co_2	Salinity
Water parameter	1.0000				
P^H	-0.3835	1.0000			
Dissolved oxygen	-0.2906	-0.4567	1.0000		
Co_2	-0.2906	-0.4332	0.3769	1.0000	
Salinity	-0.0017	0.0012	0.0054	0.0099	1.0000

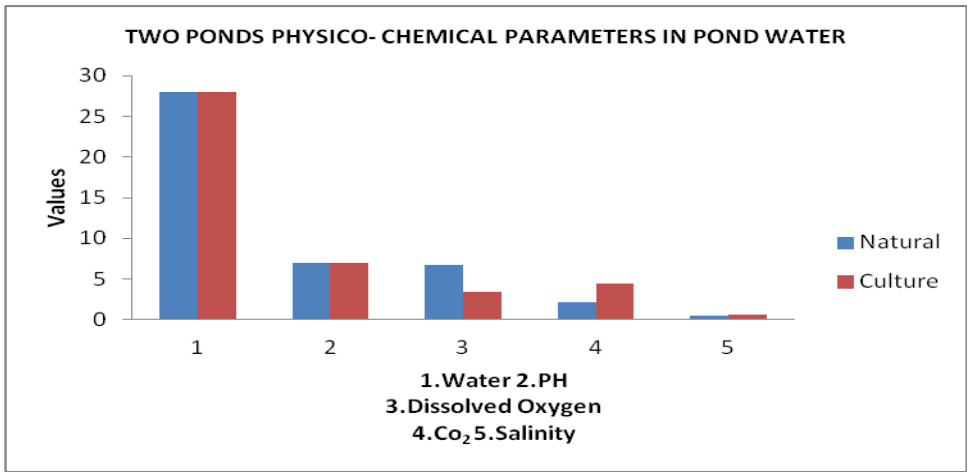

Fig1: Two Ponds Physico- Chemical Parameters in Pond Water

SUMMARY AND CONCLUSION:

This is certified that the earlier findings of thus the water temperature followed by a definite pattern and increased during day similar observation was made by Sing *et al.,* (1982) in pond water. The similar trend was also recorded in pond Sone and Dalmianagar (Bihar) by Singh and Singh (1995) reported that the high level of salinity was due to increase in decomposition of organic matter.

Thirty and 53 streams in the Kathmandu Valley (2000) and Middle Hills (1994–96), respectively, were sampled in October and November during stable flows following the monsoon. Diatoms were collected in riffles, water samples taken for chemical analysis, and habitat character of the stream channel, bank and catchment assessed using river habitat surveys. While diatoms in the Middle Hills indicate unpolluted or only mildly enriched conditions, they reveal pronounced eutrophication and organic pollution in the densely populated Kathmandu Valley.

Diatom population on which the whole aquatic life defends directly (or) indirectly largely governed by the interaction of a number of physic-chemical and biological conditions and tolerance to one or more of these conditions (Reid and Matu, 1976) diatom behavior are observed in my study area station I & II include. The present study source very low diatom diversity when compared with the station-I (nature pond)Manappadaiyur and station-II (culture pond) Swamimalai. The higher density of diatom were found in station- I (nature pond) Manappadaiyur at the lower density of diatoms were found in station-II (culture pond) Swamimalai.

Similar observation was made by station I & II. Particularly P^H, Temperature, at the same time remaining parameters of salinity, O_2 and Co_2 observation was slightly changed due to some pollutes. So in this study will be given supporting to the future study among the fresh water ecosystembalace.

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