

Impact of Physico Chemical Factors on Fish and Fisheries

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Abstract – The tidal ponds are one of the most beneficial biological systems on the planet. They are significant monetarily in fishing, biological the travel industry, and farming and for logical investigates. The nature of tidal pond water influences the species organization, their bounty and productivity of water and the human wellbeing too on account of the evolved way of life. Water quality is characterized regarding the chemical, physical and natural substance of the water. Significant physical and chemical parameters impacting the amphibian condition are temperature, pH, saltiness, broke up oxygen and redox potential. Others are all out suspended and broken up solids, supplements, overwhelming metal contaminants, and so on. These parameters are the constraining factors for the survival of sea-going creatures (greenery). In this unique situation, an investigation was directed to assess how the physico-chemical parameters (pH, temperature T, broke up oxygen DO, redox potential E, all out suspended solids TSS, complete disintegrated solids TDS, saltiness and so forth) of water and supplements (N-NO₂, N-NO₃-N-NH₄⁺ and P-PO₄³⁻) influences the development of fish in Narta Lagoon. This Lagoon, arranged in the southern piece of Albania, is one of the most significant amphibian environments because of its biological qualities and fish ranches.

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INTRODUCTION

New water is the most valuable asset for the life. Be that as it may, it is the most misused asset moreover. Indeed, out of all out water accessible on the earth, the new water accessibility is simply 3%. It incorporates the groundwater and surface water both. The crisp water accessible superficially is just 1% of it. The Fresh Water assets are being utilized for different purposes, i.e., farming, mechanical, family, recreational, ecological exercises, and so on. For all intents and purposes, these human uses require crisp water. The creative mind of existence without water is unthinkable. The crisp water bodies like streams, lakes, lakes, dams, and so on ought to be kept up appropriately. The contamination of such bodies should be limited.

The hydrobiology of the marine environment assumes a significant job in foreseeing, finding and misusing the marine fishery assets. Hydro organic highlights of any beachfront biological system control the phytoplankton network elements by deciding species synthesis, species regularity, species biomass and efficiency biomass Harris 1986). Prevalently, the plank tonic life forms are confined to the neritic zone because of a plenitude of supplements, daylight entrance, and ideal physicochemical attributes of the water segment viz., ocean surface temperature, broke down oxygen,

saltiness, hydrogen particle action of the water segment and so forth.. Any of these hydro natural components influencing the microscopic fish efficiency straightforwardly influences the tiny fish feeders, for example, business fishes and soundness of the beachfront environment principally relies upon the tiny fish network. Zooplankton is the essential buyer of the seas and touches on the phytoplankton. Phytoplankton efficiency will decide the zooplankton profitability of any amphibian biological system. Zooplankton themselves go about as imperative sustenance hotspot for enormous marine creatures, for example, sharks, whales, blade fishes and a few types of beams depend on zooplankton for their sustenance by benefiting from copepods zooplankton. The populace of fish and other amphibian living beings are accounted for to be significantly impacted by the hydro natural state of the fishing zone. Fish creation and fish get from normal sources is controlled by three significant factors, for example,

1. Innate situations and atmosphere of a locale, which choose the structure and elements of the biological systems (2. Fishing Other human prompted impedances like contamination, environmental change and so on. on marine condition and atmosphere. The

profitability of a particular water body relies upon the measure of tiny fish present in a similar water body. The microscopic fish development and appropriation rely upon the conveying limit of the earth, accessibility of the inorganic supplements and the physicochemical parameters of the beachfront waters. Every one of these components thus all things considered helping the fishery assets of the beach front biological system.

1.1.1 Current Fisheries Status of India

When the lengthy coastline of 8129 km and continental shelf of 2.02 mill. km² had been a major source of Indian marine capture fisheries, the rivers and the reservoirs constructed across them along with the vast lacustrine and floodplain system became the major source of inland capture fisheries. The contribution of marine capture fisheries to the Indian fisheries is lesser (34%) as compared to Inland capture fisheries (38.79%). The lack of proper accounting of the contribution of inland.

1.1.2 Physicochemical Parameters

In the late spring season the higher DO was watched. It might be because of increment in temperature. The more drawn out days and serious daylight, during summer quickens photosynthesis rate. The Phytoplankton uses Carbon dioxide and radiates oxygen. The Oxygen level is nearly lesser during winter season might be because of lower photosynthesis rate. It is upheld by other studies. The variety in water temperature differs the pH estimation of water. The vast majority of the biochemical and chemical responses are affected by the pH estimation of the water body.

EFFECT ON BENTHIC INVERTEBRATES

The effects of bottom trawling on benthic marine ecosystems are still a point of discussion. Investigations by means of experimental trawling showed that trawl fisheries increase the mortality of target and by-catch species, and also of benthic species not caught in the nets by damaging it when the gear passes through. The effect of trawling on demersal fish and benthic invertebrates will also depend on the type of fishing gear in relation to the vertical distribution of the species. Bottom fishing can reduce the structural complexity of benthic habitats through reducing the abundance of larger bodied epifaunal species. Trawling affects the benthic assemblage indirectly by decreasing the abundance of fauna, especially juveniles of many fish and smaller mobile invertebrate species. Experimentally it has been shown that species diversity, biomass, and the abundance of especially large, long-lived, epibenthic species, can be significantly lower when exposed to trawling. Simultaneously, an increase in the abundance of small bodied opportunistic species,

like polychaetes, have been observed in areas that have been affected by trawling activity over a longer time scale.

REVIEW OF LITERATURE

The limnological study of Ballua reservoir, Bhagalpur, Ingram et al. (2015) made interesting study on the relationship of fresh water run-off and phytoplankton response. Seasonal trend in the fluctuation of plankton and physico-chemical factor in Govindgarh lake M.P. and their relationship was studied by Mathw (2015).

Planktonic communities and the effect the environmental factors at Nanaksagar reservoir were studied by Salim and Ahmed. Malhotra and Jhingran evaluated the limnological characteristics of Gularia reservoir. Dutta and Shrivastava (2008) published natural history and systematic of fresh water fishes in India. Seasonal distribution of zooplankton on Adduky reservoir was studied by Khatri (2018). In the same year Nair investigated length-weight relationship in *Tilapia mossambicus* of Thesame Lake. Wishard and Melhotra (2008) investigated various parameters of water and correlated them with the growth of plankton. They established the abundance of plankton with the particular levels of chemical nature of water. Natrajan (2009) observed the fisheries and population fishes of Ganga river system. Jhingran (2009b) looked into the relationship of limnological status and fish production, its role of the migration in two lakes of Rajasthan. He in (2010) reported the recent advances in fresh water fisheries management. In almost all parts of India and outside of India, good amount of work is available on physico-chemical parameter of water, distribution of plankton, their abundance and trophic relationship of fresh water aquaculture. Bandhopadhyaya (2011) observed growth and production of *C. idella*, while rearing them in plastic cages. Silver carps were also observed in relation to their growth and production in cages by Kumararh (2011).

The Sukta reservoir near Khandra was studied by Deohi (2002) in context of Mahaseer fish. The limnological features of Munsharover reservoir of Bhopal were reported by Kulshreshtha (2002). An over-all plan was adopted at various steps for fisheries development in its stages for fisheries development of Heerakut reservoir as observed by Yadav and Sugnan (2012). Dubey (2014) explained implicitly the scope of fisheries management of major reservoir in Narmada basin in Madhya Pradesh. Ramkrishnan (2014) gave a new idea to develop reservoir as fish sanctuaries for rearing of endangered fishes.

Wahav et al. (2012) studied the bottom feeder carps and common carps their relationship and effect on polyculture. Pawar et al. (2002) studied the benthic fauna of Shiror reservoir and

Yadav (2004) studied fish diversity in Panch National Park. Sarkar and Pathak (2006) reported richness of seasonal fish species, diversity and habitat etc. in Ganga river. Proosti et al. (2007) gave some new addition to fish fauna to Kavala Dew National Park, a world heritage site in India. Sindey (2009), Bibyet al. (2009); Rai (2009) and Jagpath (2009) studied the fish diversity of Ravra river, Viyamkayal Undmannikovar and Beed district, respectively. Vyas et al. (2012) reported the fish biodiversity of Betva river. Choudhary in the same year presented the assessment of fish culture in some fresh water pond of Dhan. Likewise Goor river of Jabalpur was studied with reference to its fish Biodiversity by Ponical et al. (2012); Adholiya (2009) studied the hydrobiology of river Betwa and fisheries resources. Jain et al. (2005-06) measured physico-chemical parameters of Dubala pond Rahatgarh and hydrobiological characteristics of Sonar river of Sagar. In (2007) they also reported physico-chemical characteristics of Babus River in Beena.

Recent studies in limnology using advanced space technology and laser fluorescence system have been done by a few workers in American and Canada. Strong et al. (2004), have described 'Chemical Whitening due to calcium carbonate precipitation in lake Michigan by utilizing the data from the NoAA-2 and EPTS-1 Satellites. Strong (2008) has studied the 'Chemical whitening' and chlorophyll distribution in the Gnat lake as viewed by Landsat. Reid (2018) used 'Geostationary operational environmental satellite (GOES) system to collect hydrometric, hydro meteorological and water quality data like water temperature, pH, dissolved oxygen, conductivity and turbidity.

Kimmel and Lind (2012) suggested that phytoplankton production is limited by low photophae availability, while Lehn (2002) reported that with increasing phosphate concentration the efficiency of phytoplankton production in the basin of lakes decrease logarithmically. He (2005) also noted that with the increase of oxygen the number of phytoplankton increases, Lande (2013) observed that in back water that highest primary production was found in July when the transparency was also high. Casim (2013) concluded that primary production in bark waters is governed by salinity light and nutrients A considerable knowledge has been gained in recent years on the organic production and limnology of natural water bodies but scanty of work is done on the tropical ponds and reservation.

A notable contribution in the field of primary productivity has been made by Kana et al. (2010) Singh et al. (2011) Flemmer (2010) and Kloet (2012). Antonio et al. (2009) estimated the growth of pacific sardine in Mexico. Their growth studies more confined to length based only. They relidatco both of types of parameter symptomatic and asymptomatic of length. Environmental factors influence the

metabolism which in reflected through length to measure the growth. Likewise Isajloric et al. (2003, 2009) tried to measure the age, growth and length of *C. caelorhincus*, both in male and female. Length-weight and length-length, fork, standard and total lengths, relationship were derived for *Salmo trutta*, inhabiting Kanstream, Turkey by Arsalan et al. (2004).

OBJECTIVES:

1. To understand the zooplankton population density and its species composition together with the role on the fishery productivity.
2. To estimate the fish catch, fishery productivity patterns in the fishing grounds to estimate the sustainable fish catch of the Tiruchendur coastal waters.

RESEARCH METHODOLOGY

Material and Method

The present investigation depends on the information gathered from Rengali Reservoir from March 1990 to February 1992 covering a time of two years. Plankton tests were gathered at fortnightly interims from three segments of the supply, in particular lentic, intermediate and lotic by separating 100 liters of surface water through a plankton net made of No. 25 blasting silk. The accumulation was made promptly toward the beginning of the day from two stations in every segment and the tests were preser/ed in 5% formalin. The recognizable proof of plankters were made with the assistance of monographs (Hustedt, 1930; Ramanathari, 1954; Desikchary, 2013 and Gonzalves, 2013) and accessible writing (Gonzalves and Joshi 1946; Krishnamurthy 1954; Bongale and Bharati, 1980). A Sedgewick Rafter checking cell was utilized for tallying the planktonic organisms and the plenitude of different species and gatherings were communicated as unit per liter (u).

Observation

Plankton populace of the supply is mail ly made out of phytoplankton and zooplankton. Phytoplankton established 85.03% and 88.18% of the all-out plankton during the first and second year individually. Zooplankton faired just a minor piece of plankton populace and comprised 14.96% and 11.81% separately during first and second year. The phytoplankton of the store was spoken to by three gatherings: myxophyceae, chlorophyceae and bacillariophyceae arranged by bounty, while zooplankton was made out of protozoa, rotifera, copepoda and cladocera. The arrangement; ton

populace of the supply was seen to be made out of 69 species having a place with 45 genera.

The normal rate composition of various planktonic gatherings is spoken. Myxophyceae was the predominant planktonic gathering and established 48.09% of all out plankton and 56.56% of the phytoplankton during first year, while in the second year it framed 47.82% of all out plankton and 54.23% of phytoplankton. The myxophycean populace of the store was spoken to by twenty one animal groups having a place with six genera. The genera experienced arranged by plenitude were *Microcystis*, *Oscillatoria*, *Phormidium*, *Lyngbya*, *Chroococcus* and *Anabaena*. *Microcystis aeruginosa* was the prevailing species found during the time of examination pursued by *Microcystis*, *Oscillatoria tenuis*, *Oscillatoria limosa* and *Phormidium luridum*.

Habitations

A few hillocks and goliath stones are as yet noticeable inside the reservoir (Plate I). Other than the fundamental stream, two different rivulets Gohira and Mankada void their substances into the reservoir on either side. The reservoir was topped off during the monsoon of 1985.

METEOROLOGY

The atmosphere of Orissa by and large and the reservoir region specifically is tropical and is represented generally the storms. The reservoir is exposed to extreme sunlight as it is arranged inside the tropics. From October to March, typically cloudless skies win with the exception of brief span when mists show up during this period briny intermittent showers*. Both South West storm and North East Monsoon wins in the zone. Of the two restricting storms, the southwest rainstorm is progressively more grounded and brings the main part of precipitation during the blustery season. During the advances 1 months of April and November serious cyclonic tempests unique to the Bay of Bengal and hit the abutting coast. Meteors - intelligently three primary seasons are knowledgeable about the diverse areas of Orissa, to be specific: summer (March-June), rainy (July-October) and winter (November-February). The normal month to month precipitation and greatest and least temperature recorded at Rengali by the experts of Rengali dam venture annexed in.

PHYSICAL EXAMINATION

Temperature: The surface water temperature was controlled by a centigrade mercury thermometer graduated up to 0.1°C. The temperature was recorded following collection of water sample in a bucket. Thermometer was dipped directly into the water container, kept steadily for about a minute and the temperature was thus noted.

Turbidity: The turbidity of the water sample was determined following Jhingran (1969). In this method a standard Secchi disc was used to measure light penetration or Secchi disc transparency. The Secchi disc is made of a circular metal plate of 20cm diameter divided into four equal quadrants and painted alternatively with black and white. The disc was lowered into water and the depth at which it disappears (d) was noted. The disc was then lifted up and the depth at which it reappeared was noted (2).

3.7.1 Calculation

$d_1 + d_2 \dots \dots 2 = \text{in cm}$ gives a measure of light penetration or Secchi transparency

Conductivity: Conductivity is the limit of water to convey an electrical ebb and flow and shifts both with number and sorts of particles the arrangement contains, which thus is identified with the grouping of ionized substances in the water. Conductivity of the water test was resolved a conductivity meter (Systronics Type 311) and communicated as miniaturized scale mhos/cm.

3.7.2 Substance examination

Dissolved oxygen: Dissolved oxygen was resolved after Winkler's changed technique (Welch, 1948). In this strategy 0.5 ml of Manganous sulfate arrangement was added to the water test pursued by 0.5 ml of basic iodide. Because of compound response oxygen present in the example oxidized the scattered divalent Manganous hydroxide to its higher valency which hastened as a dark colored hydrated oxide. On fermentation, the encourage broke down after few minutes and manganese returned to divalent state and freed iodine from Potassium iodide equal to the first dissolved oxygen. Just 50 ml of this arrangement was transferred to a cone shaped cup and titrated with 0.025N sodium thiosulphate utilizing one to three drops of starch arrangement as marker.

Calculation $\text{ml of sodium thiosulphate used} \times 2 = \text{dissolved oxygen (ppm)}$

Free carbon dioxide: Free carbon dioxide was resolved after Welch (1948). In this technique phenolphthalein was utilized as a marker. To 100 ml of test around 10 drops of phenolphthalein marker was included and titrated against N/40 sodium hydroxide. Free carbon dioxide responds with sodium hydroxide to form sodium bicarbonate. Culmination of the response was shown by the improvement of pink shading because of the nearness of phenolphthalein.

Count No. of ml of N/40 sodium hydroxide required $\times 10 = \text{ppm of free carbon dioxide}$. 4.3.3.3 pH: The pH of the water test was resolved

following accumulation by pH meter (Systronics Type 327).

Total alkalinity: Alkalinity of the example was resolved after (Welch, 1948). In this strategy to 100ml of test 4 drops of phenolphthalein pointer was included and titrated against N/50 sulfuric corrosive until pink shading was vanished. To another 100ml of test 4 drops of methyl orange pointer was included and after that titrated against 1/50 sulfuric corrosive.

Count P = No. of ml N/50 H₂SO₄ in titration with phenolphthalein $\times 10$ = phenolphthalein alkalinity.
 M = No. of ml N/50 H₂SO₄ in titration with methyl orange $\times 10$ = methyl orange alkalinity. T = entirety of P and M = all out alkalinity. In every one of the cases during the time of investigation

$P < H.T.$ So $OH = 0$ CO alkalinity (carbonate alkalinity) = $2P$ HCO alkalinity (bicarbonate alkalinity) = $T - 2P$
 4.3.3.5 Total hardness: Total hardness was evaluated following EDTA titrimetric technique (APHA, 1989). In this technique to 100ml of water test .5ml of cushion arrangement was included trailed by 5 drops of Eriochrome dark T pointer. Ca and Mg particles create wine red shading with Eriochrome dark T under alkaline condition. The substance was titrated against EDTA arrangement. Calcium and Magnesium divalent particles get complexed bringing about a sharp change from wine red to blue which shows end-purpose of the titration. Figuring: Hardness as mg CaCO₃/L = $A \times \frac{1000}{B} \times 3$ ml of test Where A = ml of EDTA utilized. B = mg CaCO₃ equal to 1 ml of EDTA titrant.

Calcium hardness and Calcium: Calcium exposed state and Calcium was assessed following EDTA titrimetric method (APHA, 1989). In this technique to 100 ml of test 2 ml of N NaOH was added to get a pH of around 12. At this high pH Mg^{++} particle encourages and just Ca^{++} particle stay in arrangement. To this arrangement 0.2gm of Murexide (Calcium indicator) was included. The Murexide pointer shapes a pink shading with Ca^{++} in the high pH. At the point when EDTA arrangement was included to it as titrant, the Ca^{++} particle got complexed bringing about a difference in shading from pink to purple and that was the end point of the titration.

DATA ANALYSIS

Physico-Chemical Parameters

A solid situation is essential for any living thing, since life depends on the continuation of an authentic exchange of fundamental substances and energies between the animals and its condition. Water has an intriguing spot on planet as it supports life on earth. The entire surface of life is woven around it. Man uses this noteworthy resource accumulated in

depressions on earth or makes discouragements by deterring the streams and building stores, because of mechanical improvement and unconstrained urbanization. This critical resource forever has been sullied to a point of crisis.

The opposing impact is felt on the remarkable physical and chemical properties of water. The fish and distinctive living creatures that have these repositories are in like manner influenced which in this way impact the components of the vault. Nature of water is huge for drinking, water framework, fish creation, entertainment and various purposes. The water quality disintegrating in repositories ordinarily results from maturation, significant metal debasement, natural contamination, unpalatable fishing practices and super supplement information that prompts eutrophication. The impacts of these imports into the store not simply influence the money related components of the archive conversely, yet furthermore lead to the loss of fundamental biodiversity of the supply. The physico-chemical properties of water quality assessment offer an authentic hint of the status, productivity and supportability of a water body. The modifications in the physicochemical traits like temperature, straightforwardness and chemical parts of water, for instance, broke up oxygen, nitrate and phosphate give significant information on the idea of the water, the source (s) of the assortments and their impacts on the limits and biodiversity of the store.

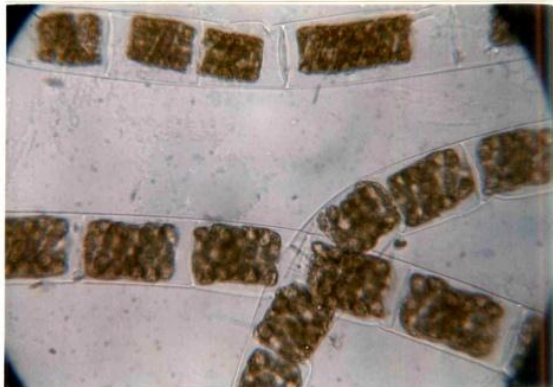
OBSERVATION

Microscopic fish Population:

Plankton populace of the store is mainly made out of phytoplankton and zooplankton. Phytoplankton (97%) established 85.03% and 88.18% of the all out microscopic fish during the first and second year separately. Zooplankton formed just a minor piece of microscopic fish populace and established 14.96% and 11.81% separately during first and second year. The phytoplankton of the supply was spoken to by three gatherings: myxophyceae, chlorophyceae and bacillariophyceae arranged by wealth, while zooplankton was made out of protozoa, rotifera, copepoda and cladocera. The arrangement; total populace of the supply was seen to be made out of 69 species having a place with 45 genera. The normal rate structure of various planktonic gatherings is spoken to in Fig. 5.1 and the month to month bounty of various planktonic species is appeared in

Myxophyceae : Myxophyceae was the overwhelming planktonic gathering and comprised 48.09% of all out tiny fish and 56.56% of the phytoplankton during first year, while in the second year it shaped 47.82% of complete microscopic fish and 54.23% of phyto-tiny fish. The myxophycan

populace of the repository was spoken to by twenty one animal types having a place with six genera. The genera experienced arranged by wealth were Microcys - is, Oscillatoria, Phormidium, Lyngbya, Chroococcus and Anabena Microcystis aeruginosa was the predominant species found during the time of examination pursued by Microcystis, Oscillatoria tenuis, Oscillatoria limosa and .Phormidium luridum.



CONCLUSION

The period of the formation of cortical alveoli occurs in the fall in the asp, white-eye bream, roach (including its stocks in the Lake Balaton), ide and nase. In the 3-4 months preceding spawning, already developed cells in the stage of vitellogenesis develop further. This is not an increase in their numbers but rather in size. Results on the changes in GSI and oocyte diameters confirm earlier observations that the asp, white-eye bream, roach, ide and nase are singlespawner species. Not only quantitative changes are present in the ovary of the barbel in the late fall and Winter months as shown by the significant increase of GSI values. The number of cells in the stage of cortical alveoli has significantly decreased between October and April while the number of oocytes in the stage of vitellogenesis has increased. This qualitative change means that the formation of vesicles finishes in the cells in the stage of cortical alveoli and the process of vitellogenesis starts. In the barbel and the white bream (including those in the Lake Balaton) formation of cortical alveoli continues in the spring months. This period is characterized by quantitative as well as qualitative changes, meaning a transition from one stage to

another. Results on GSI and oocyte diameter confirm earlier observations that the barbel and the white bream are multiple spawner species. A better knowledge of reproductive processes of individual species allows the precise timing of induced spawning of riverine species and ensures the period of brood stock capture and maintenance. This is considered an important trait at a fish farm. Precise timing allows the reduction of stress on the brood stock to be spawned.

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