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An Ecological Importance of Dams and Reservoirs towards Productivity of Fish and Fisheries

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ABSTRACT

The productivity of a particular water body relies upon the measure of microscopic fish present in a similar water body. The microscopic fish development and circulation rely upon the conveying capacity of the earth, accessibility of the inorganic supplements and the physico-substance parameters of the coastal waters. Every one of these components thusly all in all help the fishery assets of coastal ecosystem. Any progressions remembering consumption for the physical, synthetic and biological parameters would in this manner influence the soundness of the coastal ecosystem and then again diminish the fishery and fish productivity.Overwhelmingly, the planktonic life forms are limited to neritic zone because of wealth of supplements, daylight penetration, and ideal physico-concoction qualities of the water segment viz., ocean surface temperature, broke up oxygen, salinity, hydrogen particle movement of the water segment and so on. Any of these hydrobiological factors influencing the microscopic fish productivity straightforwardly influences the tiny fish feeders, for example, commercial fishes and soundness of the coastal ecosystem for the most part relies upon tiny fish network.

1. Introduction

There is expanding awareness of the requirement for legitimate use and management of assets of ecological significance from dams. The ecological factors critically significant for the survival of amphibian vegetation incorporate oxygen substance of some water reservoirs that can fundamentally diminish fish decent variety. It is important to know the physico-synthetic properties of water to examine the way of life practices of the fish in water bodies. The physico-substance parameters of water are imperative to know the trophic nature ofthe water body and furthermore give the degree of pollution in the water body. Water bodies are for the most part of three kinds Oligotrophic mesotrophic and eutrophic. Typically, mesotrophic water bodies are exceptionally productive in nature. The physico-synthetic properties of water determine the quality and amount of microscopic fish. Microscopic fish is generally essential for some fishes as nourishment. The microscopic fish is further isolated into two fundamental classes:

(1) Zooplankton
(2) Phytoplankton

(1)Zooplankton: Zooplankton is trademark indicators of water quality. They assume a significant job as grazers, suspension feeders and predators inside the zooplankton community. They additionally serve as an essential nourishment hotspot for invertebrate and vertebrate (Herzig, 1987, Rogozin, 2000).

They are the significant method of vitality transfer among phytoplankton and fish (Howick and Wilhim 1984). The connection among zooplankton and phytoplankton shapes a significant premise of evolved way of life in natural lake and essential nourishment source for micro invertebrates.

The investigation of zooplankton composition abundance and seasonal variation is useful in arranging and fruitful fishery the executives (Jhingran 1975). The point of the present examination is knows the decent variety of zooplankton gatherings and their seasonal variation in Ghagardara lake during September 2005 to August 2006.

The literature on zooplankton and organic indicators of water quality has been renewed by numerous specialists, for example, Mahajan (1981) and Arora (1966) the zooplankton showing the presence or nonattendance of specific types of fishes or populace densities.

Zooplankton bunches are trademark indicator of water quality eutrophication and contamination levels and are a significant wellspring of evolved way of life (Sharma 1983 - Saksena 1987). They assume a significant job as slow eater suspension feeders and predators with the zooplankton network.

The investigation of zooplankton composition abundance and regular variations is useful in arranging and effective fishery the executives Jhingran 1975, Ayyappan and Chakravarthy 1985, Ballada et al. 1987, Fasihuddin and Kumar 1990, Choudhary and Singh 1999.

(2). Phytoplankton: They are found in each sort of water body. Phytoplankton is the essential makers in numerous aquatic framework and structure a significant nourishment source tor different living beings. Essential productivity is entirely reliant on phytoplankton. The net absolute essential productivity of earth is entirely reliant on phytoplankton populace, which was estimated to his 1.4 x 1014kg dry weight every year. Tiny fish provides an applicable and helpful purpose of center for investigation into the component of eutrophication and for advancement of measures to control its

adverse impact on biological system. Phytoplankton is composed of green growth of size extending from under 1 pm in distance across to life form unmistakable to naked eye. Accordingly, they have been termed as ultra-plankton (0.5 to 5 pm) nano-plankton (small forms < 20p) micro-plankton (unicellular filamentous) and macro-plankton.

Phytoplankton includes green growth, diatoms, blue green growth, green growth, diatoms, desmids, euglena and so on are significant among aquatic verdure. They are biologically significant (Important) as they structure the fundamental connection in the natural way of life every single aquatic creature (Mishra 1991).

The phytoplankton in a reservoir is a significant organic indicator of the water quality. While phytoplankton is significant essential producers, they are valuable for control of the physico-concoction and organic states of the water in any venture.

These are many definite description of phytoplankton progression being connected with changes in condition parameters especially temperature, light, supplements, accessibility and mortality factors, for example, touching and parasitism. As the varieties of phytoplankton progression is firmly connected to metrological and water stratification blending process.

The principle target of the exploration was to determine phytoplankton diversity and water quality and to contemplate the impact of physico-compound parameters on phytoplankton thickness.

Phytoplankton is the base of the majority of the lake nourishment web and fish production is linked to phytoplankton production (Ryder 1974). Also, number and types of phytoplankton serves to determine the nature of a water body.

2. Water: The essence of life:

Water is considered as an embodiment of life as it dominates the concoction structure everything being equal and no life forms can live without water. About 71% of earth's surface is secured with water. Life started in water. Water is the main substance^ which exist in normal conditions on the outside of earth in strong, fluid and fume state. It is the prime requirement for human survival and modern advancement. About 97% of all water is accessible in the sea. Out of 3% crisp water, about 2% is found as day off ice tops in the Polar Regions and high mountains and just 1 % of all out water is accessible as new water in waterways, lakes and streams and so forth.

The investigation of creatures in relation to new water habitat (for example waterways , lakes, lakes, streams) establish new water ecology, where as different physicochemical parts of new water, for example, synthetic, geographical and natural angles goes under the term limnology.

3. Limnology and Its Importance:

Prof. F.A. Forel of Switzerland coined the term 'Limnology' and defined it as a part of science which manages lakes (Welch, 1962). As indicated by Wetzel (1975) limnology is the investigation of the utilitarian relationship and productivity of new water biotic ecological parameters. On occasion, and generally, limnology is all the more explicitly defined as the investigation of lakes and open reservoirs (Marcus, 1959) or is limited to the investigation of physical and synthetic components yet not the organic components (Strom, 1929). Be that as it may, the more extensive and by and large acknowledged origination of limnology includes the investigation of all inland oceanic environments and including the natural angles (Brezonik,. 1996; Strom, 1929; Wetzel, 2003). Limnology is the investigation of the basic and utilitarian interrelationships of life forms of inland waters as they are influenced by their dynamic physical, concoction, and biotic conditions (Wetzel, 2001).

Limnology is the investigation of inland waters: lakes (both freshwater and saline), repositories, waterways, streams, wetlands, and groundwater as natural frameworks interacting with their seepage bowls and the climate. It is frequently regarded as a division of biology or natural science. It covers the organic, substance, physical, land, and different qualities of every inland water (lentic and lotic waters, crisp and saline, normal or man-made). The limnological control coordinates the practical connections of development, adjustment, supplements cycles and organic profitability with species composition, and portrays and evaluates how physical, concoction, and natural situations direct these connections.

Limnology is a relatively new science; however individuals have had a long fascination with inland aquatic biological systems, which they have depended upon for water, transport, nourishment just as a wellspring of stylish bliss and entertainment. Human fascination and curiosity has showed in this incorporated science that orchestrates such diverse trains as science, science, geography, mathematics and material science. Albeit current limnology encompasses the investigation of alt inland waters, its advancement is especially related to the investigation of lakes. A great part of the reasonable system around which the science was assembled was gotten from contemplates on lakes, and a large portion of the early limnologists were lake researchers.

4. Fresh Water Biodiversity:

Freshwater biodiversity is the superseding conservation priority during the International Decade for Action - 'Water forever' - 2005 to 2015. Crisp water covers just a minor piece of the world's surface. In any case, its significance for drinking water, irrigation, fisheries, aquaculture, and the travel industry is beyond question. Limnology is the study of inland waters, gives an important logical premise to the management of lakes and streams. New water makes up just 0.01% of the world's water and roughly 0.8% of the world's surface (Gleick, 1996), yet this little fraction of worldwide water underpins at any rate 1, 00,000 species out of around 1.8 million which is nearly 6% of every single depicted specie. Inland waters and freshwater biodiversity constitute an important characteristic asset, in monetary, social, stylish, logical and instructive terms. Their conservation and management are basic to the interests everything being equal and governments. However this valuable legacy is in emergency. New waters are encountering decreases in biodiversity far more noteworthy than those in the most influenced earthly environments, and if inclines in human demands for water stay unaltered and species misfortunes proceed at ebb and flow rates, the chance to moderate a significant part of the remaining biodiversity in crisp water will vanish before the 'Water for Life ! decade finishes in 2015.

Freshwater biological systems likely could be the most endangered environments on the planet. Decreases in biodiversity are far more prominent in new waters than in the most affected terrestrial environments (Sala et al., 2000; Dudgeon et al., 2006). What makes freshwater living spaces and the biodiversity that they support particularly vulnerable to human exercises and ecological change? The principle reason is the proportionate richness of inland waters as a living space for plants and creatures. More than 10,000 fish species live in crisp water; around 40% of worldwide fish decent variety and one fourth of worldwide vertebrate assorted variety (Lundberg et al., 2000). At the point when creatures of land and water, amphibian reptiles (crocodiles, turtles) and mammals (otters, waterway dolphins) are added to this freshwater fish complete, it turns out to be evident that as much as 33% of every vertebrate specie are bound to crisp water. However surface freshwater natural surroundings contain just around 0.01% of the world's water and spread uniquely about 0.8% of the Earth's surface (Gleick, 1996). The dangers to worldwide freshwater biodiversity can be gathered under five collaborating classes viz. over abuse, water contamination, stream adjustment, obliteration or debasement of natural surroundings and intrusion by exotic species (Allan and Flecker, 1993; Jackson et al., 2001; Rahel, 2002; Postel and Richter, 2003). Over exploitation principally affects vertebrates, mostly fishes, reptiles and a few amphibians though the other four risk classifications have consequences for all freshwater biodiversity from microorganisms to super fauna.

5. Fresh Water Fishery Resources:

More than 24,000 types of Fishes are known on the planet and a majority of them are known from warm tropical waters. Around 10,500 species inhabit freshwaters, of which 10,000 are considered as exclusively freshwater angles. They are dominated by 3 requests viz., Perciformes - roosts, scats, cichlids, and so on, Cypriniformes - carps, thorns, loaches, and so on and Siluriformes - catfishes (Daniels, 2002). Fish are important wellspring of high evaluation protein and other natural items. They involve a huge position in the financial texture of the South Asian nations by giving the populace: the nutritious nourishment as well as pay and work openings. Of the 21,723 fish species known to science, over 40% live in crisp waters and majority of them live in tropics between scope 23°5' N and 23°5' S. India is blessed with huge territory of open inland waters as waterways, channels, estuaries, characteristic and man-made lakes, backwater, bitter water and .mangrove wetlands. The significant streams of India and their tributaries navigate through shifted geo-atmosphere zones showing high decent variety in their abiotic.and biotic characters. These streams leave a mosaic of biotypes like the lentic flood plain, Oxbow lakes, profound pools and lotic estuaries. Indian fish fauna is a gathering of around 2,500 species, delineating different characters, of which 930 species having a place with 326 genera inhabiting inland waters (Talwar and Jingran, 1991). For bridling these oceanic assets, a logical comprehension of fish species as for their morphological, organic and adaptive characters alongside their characteristic conveyance is basic to back up their ideal misuse (Talwar and Jingran, 1991). Day (1889) recorded 1,418 fish sp. under 342 genera from the faunal furthest reaches of India. Talwar (1991) evaluated 2,546 species of fish having a place with 969 genera, 254 families, and 40 orders Jayaram (1981) recorded 742 freshwater types of fishes under 233 genera, 64 families and 16 requests from Indian area.

This has expanded the interest of researchers for limn logical examinations and arranged long haul looks into in tropical and temperate regions. Prior biological investigations were bound on diversity of verdure in different biological systems. Be that as it may, quantitative estimation of living life forms just isn't adequate to see all aspect of biological examinations.

6. Wetlands:

Indian sub-continent is wealthy in water assets. These water assets are of two classes for example marine and new water assets. Crisp water bodies include huge and little stream frameworks, numerous normal and artificial lakes, supplies and lakes. Water bodies or water assets which are considered as wetlands show changed attributes, work as indispensable life and ecological supporting frameworks, they are extremely significant for natural life not just regarding the sheer number of individuals yet additionally for tremendous assorted variety of species they support. The financial significance of wetlands is credited to this wealth and assorted variety of greenery hindering them. Wetlands are ripe, rich, by and large differing and productive biological systems that are basic sustaining, reproducing and rearing reason for some species.

Wetlands are defined as 'lands transitional among terrestrial and oceanic eco-frameworks where the water table is for the most part at or close to the surface or the land is secured by shallow water (Mitsch and Gosselink, 1986). The Ramsar Convention characterizes wetlands as "wetlands are zones of bog, fen, peat land or water, regardless of whether fake or characteristic, lasting or brief with water that is static or streaming, new, salty or salt, including territories of marine water the depth of which at low tide doesn't surpass six meters". The estimation of the world's wetlands are progressively accepting due consideration as they add to a sound situation from numerous points of view. They hold water during dry periods, accordingly keeping the water table high and moderately steady. During periods, of flooding, they mitigate flood and to trap suspended solids and attached supplements. Along these lines, streams streaming into lakes by method for wetland territories will move less suspended solids and supplements to the lakes than if they stream straightforwardly into the lakes. The expulsion of such wetland frameworks on account of urbanization or different factors regularly causes lake water quality to exacerbate. What's more, wetlands are significant sustaining and rearing zones for untamed life and give a halting, spot and asylum for waterfowl. Similarly as with any regular living space, wetlands are significant in supporting species diversity and have a complex of wetland esteems.

Wetlands in India occupy 58.2 million hectares, including zones under wet paddy development (Anon, 1993). India has absolutely 27,403 wetlands, of which 23,444 are inland wetlands and 3*959 are beach front wetlands (Scott, 1989). It is evaluated that freshwater wetlands alone help 20 % of the known scope of biodiversity in India (Deepa and Ramachandra, 1999) Wetlands are frequently depicted as "kidneys of the scene" (Mitsch and Gosselink, 1986). Hydrologic conditions can legitimately modify or change synthetic: and physical

properties, for example, supplement availability, level of substrate. Anoxia, soil saltiness, dregs properties and pH. These adjustments of the physiochemical condition, thusly directly affect the biotic reaction in the wetland (Gosselink and Turner, 1978). Henceforth, hydrologic conditions in wetlands change even somewhat, the biota may react with gigantic changes in species creation and extravagance and in biological system efficiency.

7. Threats to Wetlands:

Wetland misfortunes are considered as a danger to natural equalization Wetlands are one of the most undermined habitats of the world. Wetlands in India, as somewhere else are progressively confronting a few anthropogenic pressures. In this manner, the rapidly growing human populace, huge scale changes in land use, expanding advancement ventures and inappropriate utilization of watersheds has all caused a considerable decrease of wetland assets of the nation. Unsustainable degrees of grazing and angling activities.Jiav_e_also brought about degradation of wetlands. The present misfortune rates in India can prompt genuine outcomes, where 74% of the human populace is country (Anon., 1994; Prasad et al., 2002) and a large number of these individuals are dependent on wetland assets. Solid wetlands are fundamental in India for sustainable nourishment generation and consumable water availability for people and domesticated animals. Solid wetlands are fundamental in India for sustainable nourishment creation and consumable water availability for people and animals. India is enriched with impressive territories of inland water bodies where quickly developing fishes of high open interest are accessible in acceptable numbers that structure a potential catch fishery. They are additionally essential for the proceeded with presence of India's various populaces of untamed life and plant species; an enormous number of endemic species are wetland dependent.

Initially India was an agriculture based society and gradually it changed to a horticultural industry based society. In that capacity utilization of fertilizers, gathering of modern squanders, sewages, cleansers and bug sprays in the habitat are expanded. Be that as it may, the pollution of crisp water assets is massive and no waterway, streams, lakes in India are liberated from it. Consistently the pollutants .of various classes are tossed into or brought into the waterways, lakes, lakes or streams and so on causing water contamination. Natural contamination has become extreme that human existence is in harm's way. The different verdure of the biological system are additionally in harm's way and their thriving existence presently become diminishing with the fanciful stroke to life. Debasement of these water bodies is expected to hydrologic modification, corruption of water quality, ground water depletion, presented species and extinction of local biota.

8. Hydrologic Alteration:

Alteration in the hydrology can change the character, capacities, values and the presence of wetlands. The adjustments in hydrology incorporate either the expulsion of water from wetlands or raising the land surface elevation, with the end goal that it never again floods.

9. Degradation of water Quality:

Water quality is legitimately proportional to human populace and its various exercises. In excess of 50,000 little and huge lakes are polluted to the point of being considered Dead' (Chopra, 1985). The major contaminating elements are sewage, mechanical contamination and horticultural overflow, which may contain pesticides, composts and herbicides. Truth be told, there are just a couple of totally normal wetlands left without being influenced somewhat by human movement (Hollis and Jones, 1991).

10. Lakes and Wetlands of Odisha:

Every single normal lake is lentic ecosystem with customary nourishment production consumption and rummaging cycles. These are self managed and adjusted (Abbasi, 1997). Lake has its very own physical and substance attributes and holds enormous number of life forms (Hussainy, 1967). The personal satisfaction is linked with nature of condition. Consequently the organic parts of new water rely exclusively upon physicochemical conditions. Examination of physical and concoction parameters of water is subsequently basic. The microscopic fish are the indicators of biological conditions and uncover previous history of a lake and substance nature shows its ongoing condition. In the event that natural conditions are modified, at that point change in populace is unavoidable which is supplanted by species to species The utility of tiny fish as immediate or indirect nourishment for angles and their utility in surveying water quality have now settled (Salodia, 1996).

Wetlands are one of the crucial normal assets. Odisha situated in the east bank of India, bestowed with 6.66 lakh hector of new water assets. The significant wetland types in Odisha are waterways/streams (2, 23,522 ha) comprising around 32 % of degree wetlands followed by reservoir/torrent (1, 89,972 ha), tanks/lakes (29,301 ha), tidal pond (89,023 ha), between tidal mudflats (25,514 ha) and mangroves (23,395 ha). Chilika is the biggest brackish water pool of Odisha. Sara is another sweet water lake situated close to Puri. It is 5 km long and 3 km in broadness. Kanjia is another sweet water lake with around 134 sections of land of territory situated in Nandankanan of Cuttack locale close Bhubaneswar. Anshupa Lake is .another new water wetland situated along the waterway course of Mahanadi (Anon., 2010).

The Sar Lake, Samagara pata, Tampara are just 3 old tidal ponds initially cut off from Bay of Bengal which have been silted, as it were, and now evaporate throughout the late spring. They are close to the Puri coast (Sinha, 1971). Chilka, Kuanria wetland, Kanjia wetland, Daha wetland, Anusupa Lake are recognized under National Wetland Conservation Program (Anon, 2010 a).

The rich and fluctuated fish fauna of Chilika comprising crisp, saline and marine components has been considered by numerous investigators. A sum of 217 types of fishes comprising 147 genera, 71 families and 15 requests so far known from the Ghilika lake (Rao, 1995). A sum of 143 types of crisp water angles having a place with 65 genera less than 25 families are recorded as happening in the Orissa state (Dutta etal., 1993).

11. Conclusion

The general outcomes and statistical investigations prompted induce that adjustments in rainfall and freshwater

release from the land and Punnaikayal estuary assumed a decisive job in the phytoplankton dynamics off Tiruchendur coast. While considering all the three angling grounds together, both high and low supplements were observed in the present investigation with occasional changes. Along these lines, it was estimated that Biddulphia sinensis, Coscinodiscus ecentricus, Chatoceros spp, Gonyaulax spinifera and Skeletonema spp were adjust to different supplements systems of the Gulf of Mannar and prosper. Absolutely physical elements viz. barometrical temperature and ocean surface temperature, salinity, light straightforwardness and profundity of the euphotic zone applied significant job in phytoplankton species creation and distribution.Fleeting and spatial variations of saltiness appropriation were recorded at the three fishing grounds. In light of the yearly variations in precipitation wonder, unmade and bimodal swaying in saltiness was reported he studies. Saltiness exhibited a positive correlation with SST, euphoric zone, Secchi profundity and negative correlation with the Broken down oxygen, pH, and TDS. The blending of two water masses from Palk and Gulf of Manner is vital in bringing about similarity in the hydrological conditions during specific periods of the year and furthermore changes the salinity condition in the angling grounds. Southwest Monsoon Current brought saline water into Bay of Bengal and caused the elevated level salinity in Gulf of Manner during Southwest storm. The DO fluctuated from 4.15 to 6.3mg/l while a more significant level of DO content was seen during from October to December which thus could be credited to the contribution of DO rich crisp water during the upper east rainstorm. The overflow carried supplement rich water to the coastal waters and consequently upheld the natural efficiency.

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