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**Potential of Aquatic Plants for Copper and Manganese Phytoremediation: A Review**

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**Abstract**

Heavy metal contamination of water resources is a critical environmental issue. Heavy metals such as copper and manganese being micronutrients, are necessary for the growth of plants. But, excessive presence of these lead to toxicity in living organisms. There are some species of plants that have developed mechanisms to cope with this heavy metal toxicity. A revised study on plants that have copper and manganese hyperaccumulation capacity could optimize the efficiency of phytoremediation technology to reduce toxicity due to these heavy metals. Hence, potential of aquatic plants for copper and manganese phytoremediation is discussed in this review. Advanced studies on mechanisms of metal uptake and identification of metal transporter genes in hyperaccumulator plants which phytoremediate copper and manganese are discussed here.

**Key words:** Aquatic macrophytes; Heavy metals; Phytoremediation; Hyperaccumulator; Copper; Manganese.

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**Study of Zooplankton to Know Their Role in Determination of Water Quality of Various Water Bodies: A Review**

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**Abstract**

The global human population growth rate is increasing rapidly and has a significant impact on natural resources. It is affecting one of the natural resource qualities i.e., water quality. So, to determine the quality of water, we can take the help of zooplankton i.e., the water quality indicators. Zooplankton assessment provides valuable information for aquatic ecosystem restoration and management. Zooplankton are tiny aquatic animals that live all or part of their life as plankton. They provide essential food sources for aquatic animals, especially fish, in the aquatic food web. There are some zooplankton groups that act as pollution indicators. Zooplankton communities are highly sensitive to environmental variation, their growth and distribution is depending on biotic and abiotic factors. Due to this, changes in species abundance and diversity, as well as the composition of communities, can be important indicators of environmental change. In this review, we are discussing the work done on fluctuations in the population of Zooplanktonin relation to physicochemical parameters, with the effect of seasonal variation on zooplankton as well as the effect of polluted water on zooplankton.

**Key words:** Zooplanktons; Diversity; Water quality; Rivers; Physicochemical parameters.

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**Phycoremediation of Nitrogen and Phosphate from Wastewater using Green Microalgae: A Review**

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**Abstract**

Environment pollution resulting from overpopulation and industrialization has increased at alarming rates globally. The pesticides and fertilizers used in agriculture can contaminate both groundwater and surface water. This accounts for the major proportion of water pollution. The agro-industry wastewater contains high concentrations of organic and inorganic forms of nitrogen, phosphates, and various trace elements. The major limitations of conventional biological nutrient removal methods are the high consumption of oxygen and the need for an external carbon source. Microalgae-based wastewater treatment has gained popularity as a sustainable and eco-friendly alternative for biological nutrient removal. Microalgae can utilize ‘wastewater’ as a source of nutrients while photosynthetically assimilating carbon dioxide into valuable biomass. Green algae in particular have been used as food and additives for human consumption as well as animal feed. In addition, they are actively used in wastewater treatment owing to their growth potential in bacterial-contaminated wastewater. However, algae-based wastewater treatment has several techno-economic challenges for industry implementation. Further studies should focus on the selection of strains with rapid multiplication, high photosyntheticrate, high tolerance, and valuable biomass.

**Key words:** Wastewater; Nutrients; Nitrogen; Phosphorus; Phycoremediation; Green microalgae.

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**Bioproduction of PHB and EPS from Marine Bacteria: A Review**

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**Abstract**

Plastics and synthetic polymers are mainly produced from petrol chemical elements, which do not decompose and are a major cause of environmental pollution. This has led to an increased demand for natural polymers or biopolymers. Poly-3-hydroxybutyrate (PHB), a Biological polymer is a good alternative to plastic, is environmental friendly, and does not cause pollution. Exopolysaccharides or Extracellular Polymeric Substances (EPS) are produced by microorganisms as soluble or insoluble polymers and have diverse applications in various industries. This article gives an insight into PHB and EPS and their production from marine bacteria.

**Key words:** Poly-3-hydroxybutyrate; Exopolysaccharides; Extracellular Polymeric Substances; Marine Bacteria; Lipopolysaccharides.

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**Assessment of Water Quality Index: A Case Study of Two Lakes of Mysore District**

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**Abstract**

The present Investigation was carried out in two lentic ecosystems (Varuna and Dalvoy Lake) in the Mysuru district of Karnataka state, India. Surface water samples were collected from both lakes at about fortnightly intervals from February 2018–19 and were analyzed for 19 Physico-Chemical parameters like pH, Conductivity, Total suspended solids, alkalinity, hardness, Calcium, Chloride, Nitrate, Sulphate, Dissolved oxygen and Biological Oxygen Demand were selected to conduct the study following standard methods as given in APHA. The Collected data were statistically analyzed using one-way ANOVA to find out seasonal variation in different water quality parameters. Pearson correlation analysis was performed to analyse the relationship between water quality variables. Water quality index was determined using Weight Arithmetic Water Quality Index Method. The results calculated for WQI of Varuna Lake was found to be **59.34**. It indicates that the Varuna Lake water quality is poor. Lower values of water quality index shows the status of the water body being polluted and water is suitable for domestic and agricultural purpose. The results calculated for WQI of Dalvoy Lake was found to be **369.08**, It implies that the Dalvoy lake water quality is very poor and Unfit for consumption.

**Key words:** Dalvoy Lake; Varuna Lake; Water quality; Surface water; Water quality index.

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**A Short Communication on Phycoremediation of heavy metals**

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**Abstract**

Heavy metal contamination in the environment is a matter of great concern, as few heavy metals interfere with the normal cellular processes of living things, creating public concern. Since heavy metals are non-degradable, they have to be removed from the contaminated waters. Conventional removal process is high in cost and they generate huge quantities of waste products. Hence, bio-based remediation of heavy metals from the environment will be a sustainable approach. Many biological routes have been employed to treat heavy metals based contamination of which, algae based bioremediation is an efficient and cost effective approach. Hence, in this short communication – review, bioremediation of heavy metals using algae is briefly discussed.

**Key words:** Bioremediation; heavy metal toxicity; bioaccumulation; metal detoxification; biosorption; environment safety.

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**A Study on Phytochemistry and Cytotoxicity of Methanolic Extract of Marine Red Alga, *Gelidium micropterum* Kütz.**

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**Abstract**

*Gelidium micropterum* Kütz., one of the economically important marine red alga has been used for the analysis of phytochemical components and cytotoxic potential against selected lines of human carcinoma cells such as MCF-7 (Breast), HT-29 (Colorectal) and A549 (Lung) cancer cell lines. Presence of Alkaloids, Flavonoids, Glycosides and Phenolic compounds was identified in various solvent extracts of the algae. MTT assay for cytotoxicity resulted in effective inhibition of cancer cells using appropriate concentrations of methanolic extracts of the sample. When comparing the IC50 values obtained from the sample treatment to that of standard treatment, A549 cell lines promises the most effective inhibition using a minimal concentration of the sample, i.e., 44 ± 1.0 μg/ml.

**Key words:** *Gelidium*; MTT Assay; Phytochemical; Cytotoxicity; Seaweeds.

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**A Review of the Distribution of Microalgae Collected from Paddy Fields in India**

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**Abstract**

Algae form a large group of morphologically diverse micro flora inhabiting various agricultural fields. Their contribution to enhancing soil fertility is widely studied. The shrinking of arable land and an increase in anthropogenic activities raises the need for quality and quantity from existing crops. Biomagnification and destruction of natural micro flora caused by chemical fertilizers is a matter of serious concern. This stresses the need to reduce applications of chemical fertilizers and substitute them with better alternatives. An increase in agricultural productivity can be achieved in different ways which include preventing loss due to various stresses both biotic and abiotic, and ensuring the supply of nutrients and sufficient water supply. Microalgae play a vital role in nitrogen fixation thereby increasing the fertility in paddy fields. The uniqueness of the algal community in wetland paddy fields varies depending on the water quality, changes in monsoon seasons, crop stages, fallow, and other physicochemical factors. They show great potential in flood control, recharging water, groundwater conservation, bioremediation, and wastewater reclamation and carbon sequestration. Thus microalgae are gaining immense importance due to the presence of metabolites and essential compounds as substitutes for harmful chemical fertilizers, pesticides and growth-promoting compounds. The present study attempts to review the distribution of microalgae in paddy fields in India.

**Key words:** Paddy fields; Microalgae; Algal diversity; Cyanophyceae; Chlorophyceae; Diatoms.

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**Evaluation of Plant-derived Compounds and their Antibacterial Activity of Methanolic Extracts of Seaweeds from Thikkodi Coast, Kerala**

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**Abstract**

Seaweeds are a diverse collection of aquatic organisms that contain significant quantities of essential phytochemical compounds that possess various biological effects. The objective of this investigation was to identify various bioactive substances and assess their antioxidant properties and antimicrobial effects in *Gracilaria corticata.* J. Ag.*, Padina tetrastromatica* Hauck and *Caulerpa peltata*. Lamour. The procedure involved collecting the seaweed, washing it thoroughly with running water, air-drying it in the shade, and then extracting it using methanol. All three types of seaweeds underwent both qualitative and quantitative phytochemical analyses, which demonstrated the presence of phenols, flavonoids, alkaloids, saponins, tannins, and glycosides. However, terpenoids were absent in *Gracilaria*. Gas Chromatography-Mass Spectrometry (GC-MS) was used to analyze the phytochemical components present in the seaweed. The antimicrobial effectiveness of the seaweed extracts against *Enterococcus faecalis* and *Klebsiella pneumoniae* was assessed using the disc diffusion technique. Neophytadiene, 3,7,11,15-Tetramethyl-2-hexadecen-1-ol, Methyl palmitate, and Phytol were identified as shared components among the three types of seaweed based on the GC-MS analysis. The methanol extract obtained from *Gracilaria corticata* displayed greater antioxidant potential compared to other extracts tested. The most substantial zones of inhibition were observed against the gram-positive bacteria *Enterococcus faecalis* (22.33 ± 0.33) and the gram-negative bacteria *Klebsiella pneumoniae* (20.00 ± 0.57).

**Key words:** Seaweeds; Phytochemicals; Antioxidant; GC-MS; Anti-bacterial.

Indian Hydrobiology, 22(1): 79–94, 2023 Date of receipt: 31.03.2023; Date of acceptance: 27.05.2023

**Phytoplankton Diversity and Physico-Chemical Features of Vamanapuram River, India**

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**Abstract**

This study discusses the analysis of various physical and chemical parameters like water temperature, water pH, light penetration, turbidity, DO, BOD, Primary productivity (Net primary productivity and Gross primary productivity), and nutrient contents (Nitrate, Nitrite, Phosphate, Silicate) along with some of the phytoplankton population collected from different regions (Six stations) of Vamanapuram River were measured from the period of February 2022 to January 2023. The first parameter analyzed was atmospheric temperature, which reported maximum at pre-monsoon. Throughout the year, the study there has prominently the acidic nature of the Vamanapuram River sometimes, except station 6 reported beyond neutrality. While discussing temperature, the pre-monsoon season reported the highest temperature and also less dissolved oxygen content which explained the direct correlation between atmospheric temperature and the dissolution of oxygen in river water. Station 3 has maximum turbidity but yet high GPP because of the low depth of the mentioned river which was also reported in previous studies. The nutrient content was very negligible which explains the oligotrophic situation of the river. This baseline information on the water quality status of the Vamanapuram River will be useful for future ecological assessment and monitoring to conserve this river.

**Key words:** Nutrient; Chemical parameters; Vamanapuram River; Primary productivity; Gross Primary Productivity.

Indian Hydrobiology, 22(1): 95–102, 2023 Date of receipt: 06.02.2023; Date of acceptance: 18.05.2023

**Determination of Physio-Chemical Parameters of Drinking Water in Kodaikanal Hills, Dindigul District, Tamil Nadu, India**

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**Abstract**

Water quality analysis is one of the most important aspects of water studies. Water quality is a critical factor for assessing the pollution load. Water samples were collected from 10 different sampling stations to evaluate the water quality status of Kodaikanal Hills during 2019–2021. A total of 13 water quality parameters were analyzed. During the present investigation the levels of Temperature 26.4 and 31.5°C, pH 7.07 and 8.02, Colourless, Odourless, Electrical Conductivity 0.18 and 0.32 dsm–1, Salinity 0.39 and 0.49 ppt, Bicarbonate 1.2 and 2.2 mg/l, Chloride 0.2 and 1.8 mg/l, Calcium 1.16 and 1.8 mg/l, Magnesium 0.23 and 0.92 mg/l, Sodium 0.42 and 0.82 mg/l, Sulfate BDL and Potassium 0.08 and 0.2 mg/l. The objective of the present study was to understand the water quality of Kodaikanal hills in Dindigul District, Tamil Nadu.

**Key words:** Water quality index; Physico-chemical parameters; Water quality standards; Kodaikanal; Dindigul District.

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**Effect of Probiotic Bacteria on the Growth of Edible and Ornamental Fish, Dwarf Gourami, *Trichogaster lalius* (Hamilton, 1822)**

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**Abstract**

The present experiment was carried out for 90 days with a commercial probiotic supplement to analyze the growth of ornamental fish, *Trichogaster lalius*. After fourteen days of adaptation, fingerlings were separated into four tanks with probiotics, T1 (0%), T2 (1%), T3 (3%), and T4 (5%). In the experiment, different growth parameters like length and weight gain, specific growth rate (SGR%/day), relative growth rate (RGR), and survival rate (SR%) were recorded on a monthly basis, and different physiochemical parameters were recorded daily. In the present study highest length gain was recorded in case of tank T2 (11.65% ± 1.43) followed by T3 (10.55% ± 1.07), T4 (9.89% ± 1.62), and the lowest was found in T1 (8.33% ± 1.44). Whereas best weight gain was recorded in case of tank T2 (46.37% ± 1.09) followed by T3 (38.20% ± 2.1), T1 (26.88% ± 1.12) and lowest was obtained in T4 (21.42% ± 1.41). Both SGR%/day (0.58 ± 0.07) and RGR (0.7 ± 0.09) were found to be maximum in case of tank T2 and minimum SGR%/day (0.21 ± 1.27) and RGR (0.23 ± 1.15) was recorded in case of tank T4. From the present investigation, it can be concluded that 1% probiotic supplementation can be used to enhance the growth rate of the dwarf gourami, *Trichogaster lalius*.

**Key words:** Aquaculture; Probiotics; Growth; Ornamental fish; *Trichogaster lalius*.

Indian Hydrobiology, 22(1): 109–118, 2023 Date of receipt: 17.03.2023; Date of acceptance: 22.05.2023

**Transfiguration of Mangrove Colonies territory or dominion for Conservation of Coastal avian diversity and Ecotourism in Mumbai, West Coast of India**

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**Abstract**

The expansion of Mumbai City caused heavy encroachment in the adjacent coastal regions, resulting in a huge reduction of mangrove colonies and biodiversity in the last three decades. Rapid and extensive land-use change in intertidal foraging habitat and coastal roosting habitat is thought to be driving major population declines of coastal birds including rare migrating birds. This study aimed to explore the possibility of Mangrove Park in Bhandup Salt-Works near Mumbai City, primarily to promote biodiversity and ecotourism due to favorable ecological features and existing biodiversity.Hydrological analysis of important physicochemical parameters was conducted at five stations of salt pans. Studies on the diversity of plankton, mangrove, and birds were carried out during the study period. The area is inhabited important diversity of vertebrates and invertebrate species. The present study recorded a total of 29 species of birds belonging to 40 families. Salt pans provide important roost habitats, particularly for shorter-legged birds. Hydrological analysis, and biodiversity of flora and fauna in the study area are very encouraging to build the conceptual Mangrove Park. It is the utmost need for the restoration of natural habitats and biodiversity as well as the conservation of mangroves, which in turn will support ecotourism.

**Key words:** Mangrove park; Salt-Works; Animal diversity; Conservation; Ecotourism.

Indian Hydrobiology, 22(1): 119–126, 2023 Date of receipt: 20.03.2023; Date of acceptance: 11.05.2023

**Ichthyofauna of Puthanar, a Confluent Zone of Pampa and Manimala River of Upper Kuttanad, Kerala, India**

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**Abstract**

Pampa and Manimala are two major rivers of Kerala. The present study was conducted to analyze the taxonomy of fishes occurring in Puthanar, a branch of the Pampa-Manimala River of Upper Kuttanad. Fishes were collected from four different sites of the river from 5th December 2019 to 22nd March 2020. Different gears such as gill net, cast net, hook and line, traditional bamboo traps were used for collecting samples. The fishes were examined for various metric meristic characters and the samples were preserved for the further studies. Total of 31 fish species were collected and identified during the investigation period. The analysis of result showed that the dominant orders of the study area were Cypriniformes followed by Siluriformes. Out of the 31 species identified, 10 species were endemic. Species belonging to vulnerable, near threatened and data deficient category were also present in the study area. This investigation shows that the Puthanar, a branch of Pampa-Manimala River of Upper Kuttanad is rich in fish diversity. Therefore, the Puthanar area of Pampa-Manimala River of Upper Kuttanad shall be treated as a river with conservation importance.

**Key words:** Puthanar River; Fish Taxonomy; Hotspot; Freshwater fish; Cypriniformes.

Indian Hydrobiology, 22(1): 127–144, 2023 Date of receipt: 25.03.2023; Date of acceptance: 30.04.2023

**First Report on the Phytoplankton of Athirappilly Waterfall Area in Chalakudy River, Kerala Western Ghats, India**

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**Abstract**

Algae play crucial roles in determining the habitat characteristics in which they grow. Many water bodies in Kerala are inadequately documented to understand the algal communities. No research was done to understand the algal species of the unique waterfall in Athirappilly on the Chalakudy River. The present study is aimed at a systematic analysis of the physicochemical environment and phytoplankton of the waterfall. Sampling was done between February and July 2018. Three study locations (A1, A2 and A3) were fixed. Water temperature, pH, dissolved oxygen (DO), dissolved phosphate, and dissolved nitrate were analyzed. The highest pH was observed both in A2 and A3 (7.2). The highest DO was observed at A2 (7.8 mg/L). The highest amount of dissolved phosphate was recorded at A3 (0.61 mg/L). The highest amount of nitrate was recorded at A3 (0.42 mg/L). A total of 85 taxa of phytoplankton were identified. The highest plankton density was at A2 (4933 no./L). The highest number of taxa of periphyton was observed at A1 (33). The highest number of taxa of benthic algae was observed at A2 (16). The phytoplankton belonged to five different Classes, such as Cyanophyceae, Euglenophyceae, Chlorophyceae, Charophyceae, and Bacillariophyceae. *Cosmarium*, *Gomphonema*, and *Nitzschia* were the most prominent genus.

**Key words:** Athirappilly waterfalls; The hydroelectric power project; Phytoplankton; Western Ghats.

Indian Hydrobiology, 22(1): 145–152, 2023 Date of receipt: 31.03.2023; Date of acceptance: 20.05.2023

**Application of phycoremediation technology in the treatment of ETP water – An assessment with *Spirulina platensis* (Nordst.) Gomont**

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**Abstract**

Nature suffers from various types of pollution, most of them in water bodies. This adversely affects organisms throughout the food chain and negatively affects the sustainability of the ecosystem. There exist natural resolutions to defeat these issues. Algae are aquatic organisms that can be used for wastewater treatment because of their capacity of absorbing nutrients. *Spirulina platensis* (Nordst.) Gomont. is a microscopic, filamentous cyanobacterium widely used for its biosorbent property and high nutritional value. This study aimed at the cultivation of *Spirulina platensis* in different levels of effluent treatment plant (ETP) water and suggested ETP water as a medium for *Spirulina platensis* culture over a chemically defined medium. The study also aimed to assess the biotransformation of pollutants from sewage water by analyzing the parameters such as pH, COD, BOD, suspended solids, oil and grease, chlorides, sulphates, fluorides, nitrates, ammoniacal nitrogen, and phosphate. The growth pattern of *Spirulina platensis* was studied in different concentrations of ETP water and Zarrouk’s medium. The growth was estimated through the measurement of cell concentration using a hemocytometer, determination of turbidity using a spectrophotometer, and specific growth rate evaluation. The results obtained reveal that *Spirulina platensis* has appreciable nutrient scavenging properties and lower concentrations of PT-ETP water and higher concentration of FT-ETP water can be utilized for culturing *Spirulina platensis*. ETP water can be utilized as a nutrient medium for *Spirulina platensis* in controlled concentrations.

**Key words:** *Spirulina platensis* (Nordst.) Gomont.; phycoremediation; ETP water; nutrient medium; growth estimation.

Indian Hydrobiology, 22(1): 153–158, 2023 Date of receipt: 14.11.2022; Date of acceptance: 10.02.2023

**GC-MS analysis and prediction of bioactivities in the chloroform extract of *Nitophyllum marginale* (Kützing) J.Ag.**

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**Abstract**

In recent years, a several novel metabolites with effective pharmacological properties have been discovered from the marine macro algae which are considered to be the richest sources of the bioactive compounds, suitable for therapeutic and medical applications. An emerging trend of increasing new molecules from marine algae promotes marine science toward the potential research area of drug discovery. With this background, the present study was carried out for the presence of biochemicals using GC-MS analysis and the prediction of bioactivities in the chloroform extract of *Nitophyllum marginale* (Kützing) J.Ag. The active biological components in the chloroform extract of *Nitophyllum marginale* were studied using Gas Chromatography-Mass Spectroscopy (GC-MS), and the biological activities were predicted by the Prediction Activity Spectra for Substance (PASS) technique. The analysis exposed only one bioactive compound such as Phenytoin (100.00%). Out of 1735 biological activities predicted in Phenytoin in the study, only 24 were highly active with their Pa score above 70%. There were 10 different activities predicted in Pa > 0.7. The present study afforded the bioactive components present in the chloroform extract of *Nitophyllum marginale* (Kützing) J.Ag. by GC-MS analysis and the Prediction Activity Spectra for Substance (PASS).

**Key words:** GC-MS; PASS; Macro algae; Bioactive compounds; *Nitophyllum marginale*

Indian Hydrobiology, 22(1): 159–162, 2023 Date of receipt: 29.03.2023; Date of acceptance: 15.05.2023

**Physicochemical Characteristics of Thengapattanam Estuary, South West Coastal Zone, Tamil Nadu, India**

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**Abstract**

This study was aimed at estimating the Physico-chemical characteristics of Thengapattanam estuary located in Kanyakumari District, Tamil Nadu. Parameters like temperature, pH, salinity, dissolved oxygen, nitrate, ammonia, and inorganic phosphate were estimatedfor a period of one year from June 2020 to May 2021. All these values are within the range recorded in various estuaries across the world.

**Key words:** Physicochemical parameters; monthly variations; salinity; pH; Thengapattanam estuary.

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**Diversity and Morpho-Taxonomy of the Genus *Scytonema*: A Heterocystous Cyanoprokaryote from Tripura, India**

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**Abstract**

The genus *Scytonema* is a heterocystous and pseudobranch forming Cyanoprokaryotes and commonly found growing in sub-aerial habitats. The genus has characteristic isopolar, uniseriate, and usually constricted trichomes covered by a coloured or colourless sheath. The present investigation deals with the diversity and distribution pattern of the genus *Scytonema* from Tripura. In the present study, we are reporting ten species of genus *Scytonema* of the family Scytonemataceae. These species include *Scytonema bivaginatum*, *S. chengii*, *S. coactile*, *S. hormocystum*, *S. millei*, *S. ocellatum*, *S. praegnans*, *S. pseudohofmannii*, *S. twymanianum* and *S. zellerianum* from the different habitats of Tripura. All ten species are a new addition to the flora of Tripura, India.

**Key words:** Cyanoprokaryotes; diazotrophic; heterocystous; diversity; Tripura.

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**Role of the Cyanobacterium, *Chroococcus turgidus* (Kützing) Nägeli in Heavy Metal Removal of Copper, Cadmium and Chromium**

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**Abstract**

Due to the increase in population growth and limited sources of freshwater, it is necessary to use wastewater after treatment at the ecological and environmental levels. Phyco-remediation is one of the eco-friendly successful techniques to remove contaminants. Copper, Cadmium, and Chromium are toxic heavy metals at high concentrations because they always disrupt biological life in an ecosystem. Blue-green algae are a promising biosensor for heavy metals in bioremediation. Accumulation of heavy metals Copper, Cadmium, and Chromium by the Blue-green algae *Chrococcus turgidus* (OQ701098) was investigated. Cells of *Chroococcus turgidus* (Kützing) Nägeli were collected from Eloor a municipal island along Periyar River which is the industrial belt in Kerala, resulting in one of the top pollution hot spots in the world. *Chroococcus turgidus* were tested for its potential to bind metal ions from solution. The study was designed using Flame Atomic Absorption Spectroscopy with an analytical wavelength of Cu-327.4, Cr-359.4 and Cd-229 nm. Experiments have been set for the optimum binding pH at Cu-7, Cr-5, and Cd-6, pH, time dependency studies, and Binding capacities for heavy metal along with desorption of the metal bound. Time dependency studies showed that *Chroococcus turgidus* (OQ701098) had rapid binding while capacity experiments showed that *Chroococcus turgidus* (OQ701098) recover Copper at 61.8%, Cadmium at 46.28%, and Chromium at 59.3% respectively. According to the findings of this analysis, it was observed that *Chroococcus turgidus* can eventually remove Copper, Cadmium, and Chromium heavy metals from contaminated water. This technique can be used in small and large-scale industries, by farmers, in villages and towns where sewage treatment plants facility is not available. By using genetic engineering of algal strains, this technique can be made more beneficial.

**Key words:** Bioremediation; Heavy metal; Cyanobacterium; Analytical wavelength; Flame Atomic Absorption Spectroscopy.

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**Influence of environmental variables on the abundance of black clam *Villorita cyprinoides* in Vembanad Lake, India**

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**Abstract**

The black clam, *Villorita cyprinoides* is an edible bivalve that provides the major livelihood for coastal communities around Vembanad lake. This study examined the relationship between clam populations in Vembanad lake and a biotic environmental conditions in order to develop an understanding of the biological and ecological processes that could beused to improve their management and exploitation. Eight zones were established along the lake. Data were collected from April 2020 to September 2021. The results showed that salinity (Sal) and concentrations of total suspended solids (TSS) were the water quality parameters most closely related to population densities of black clams. Among bottom sediment parameters, pH and ferrous and ferric ion concentrations gave the strongest correlations to calm densities. The result revealed that the water quality (Sal and TSS) and the bottom sediment (pH, ferrous and ferric iron) were the main significant parameters influencing the abundance of black clam in Vembanad lake.

**Key words:** Black clam; *Villorita cyprinoides*; environment; population; Vembanad Lake.