Rotifers as Sentinels of Aquatic Ecosystem – A Review
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Abstract
The review article aims to give insights into the role of rotifers as ecological indicators. It intends to point out the capability and effectiveness of known species of rotifers for biomonitoring investigations. The methodology used for this review paper involved an extensive literature search across multiple electronic databases like Google Scholar, PubMed, Scinapse, Academia and Research Gate. The methodology for this review included compiling data from various research articles on rotifers as biological indicators from 1990–2023. The number of research articles showed a steady increase over the study area. The review also points out that rotifer community structure, assemblage, abundance, diversity, distribution and composition of rotifers are profoundly influenced by the biotic and abiotic variations in the ambient environment. The sensitivity of rotifers to the alterations in these parameters makes them a valuable tool in indicating the health of aquatic systems. Whether inhabiting pristine or polluted waters, rotifers provide critical insights into the trophic status, eutrophication and pollution levels of their habitats. Notably, different rotifer species exhibit distinct responses to environmental parameters, rendering them as versatile tools for monitoring aquatic ecosystems. The review identifies species such as Brachionus spp. and Lecane spp. as reliable indicators of eutrophication and pollution. Moreover, the innovative use of indices like the Q B/T quotient, based on the abundance of Brachionus and Trichocerca species, and Trophic State Index (TSIROT), based on various other indices like number, biomass etc. highlights the rotifer’s capacity to assess trophic conditions. The subtle responsiveness of these pioneer rotifers to changes in ambient water quality and the potential to indicate various ecological alterations make them as an indispensable tool for environmental assessment and conservation efforts. As we continue exploring the micro-world of rotifers, we can enhance our capacity to safeguard and manage aquatic ecosystems effectively.

Keywords: Bioindicator; Brachionus; Lecane; Trichocerca; Q B/T quotient; Trophic State Index (TSIROT).

Indigenous Ornamental Fish Breeding Practices in India and Prospects: A Review
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Abstract
India holds significant potential in the ornamental fish industry, a lucrative branch of aquaculture. However, limited public awareness often obstructs the recognition of freshwater ornamental fishes, despite their global potential. Although researchers have made strides in breeding indigenous fish species in captivity, such efforts remain constrained. This paper advocates for the utilization of induced breeding techniques to facilitate mass propagation and conservation, alleviating pressure on natural stocks. It highlights the benefits of induced breeding techniques for rare ornamental fish species, emphasizing their importance in sustainable aquaculture development. Specifically focusing on India, this paper consolidates current practices and advancements to address knowledge gaps in breeding indigenous ornamental fish species. Through a comprehensive review of ornamental fish breeding practices in the country, it identifies industry constraints that will help understand the industry’s dynamics and identify potential avenues for improvement in sustainable ornamental fish production.

Keywords: Ornamental fish; Aquaculture; Captive breeding; Conservation; Livelihood.
Pollution Patrol in Kolong River of Nagaon, Assam Through Study of its Water Quality and Community-Led Efforts

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Abstract
Rivers are an important natural source of freshwater and all of its nutrients. Rivers are vital to human survival, but they also give threatened species a place to live. The Kolong River is one of several rivers in the northeastern state of Assam that are designated as important rivers. The Kolong River has been seriously degrading as a result of human activity. Community involvement is essential to regulating these kinds of anthropogenic activity. Conservation efforts depend heavily on how the community views and uses the Kolong River. The study found that although the population is aware of the Kolong River’s importance to their survival, they are unaware of it and show no concern for it at all. The maximum respondents of the conservation study are fishermen, farmers and school college students. Women’s roles are also appreciable. Perceptions and forms of community participation are examined based on interview data presented in a descriptive tabulation. This study includes some ideas about community participation and the role of local people in Kolong River conservation and management, causes of conservation of Kolong River and river conservation policy based on local participation, and approaches for ensuring participation in river conservation programs.

Keywords: Community participation; Kolong river; river conservation; river degradation; water quality index (WQI).

The Charophytes from Supaul District of North Bihar, India

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Abstract
The present paper deals with the description of two algal taxa (Chara braunii Gmelin and Nitella mucronata (Br.) Miquel) collected from the Supaul district of North Bihar. Of these, N. mucronata (Br.) Miquel is new addition to the algal wealth of Bihar.

Keywords: Charophytes; New record; North Bihar; Chara; Nitella.

Comparative Analysis of the Biochemical and Mineral Composition of three different Algae from Thikkodi Coast

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Abstract
Seaweed, a nutrient-rich food with versatile uses, is highly valued globally for its vitamins, minerals, and antioxidants. In India, its consumption is limited due to cultural reasons, availability, awareness, preferences, and regulations. The goal of the current study is to provide detailed information about the phytochemical makeup of
three different seaweed species, including members of the Rhodophyceae, Phaeophyceae and Chlorophyceae, gathered from the Thikkodi shore. Our analysis of seaweed samples involved the examination of several factors, including moisture content, dietary fibre, ash content, carbohydrates, proteins, and aminoacids, as well as macro, micro, trace, and ultra-trace elements. Green algae were found to contain the most carbohydrates and protein among the three kinds of seaweeds examined. The highest levels of dietary fibre and moisture were also seen in green algae. On the other hand, brown macro algae exhibited the highest amounts of minerals and the highest ash content. Notably, the brown algae species, especially Padina tetrastromatica, had comparatively higher concentrations of phosphate, zinc, and aluminum. In conclusion, the biochemical and mineral compositions are thoroughly explained in this work, which can be used to generate new medical treatments. The analysis and determination of the nutritional values of seaweeds can be utilized for future commercial uses and research initiatives.

Keywords: seaweed; dietary fibre; trace elements; anti-oxidant; Thikkodi.

Hydrogeochemistry and Groundwater Quality Assessment in Ernakulam District, India using WQI and Multivariate Statistical Analysis

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Abstract
This study examines groundwater quality in Ernakulam district, Kerala, India, focusing on its suitability for agriculture and drinking, along with an examination of the hydrochemical processes that govern groundwater chemistry. To fulfil this objective, an assessment was conducted on sixty-two groundwater samples acquired in 2020. The obtained measurements were then contrasted with the drinking water standards outlined by the Bureau of Indian Standards (BIS, 2012) and the World Health Organization (WHO, 2011). The statistical order of cation concentrations in the groundwater samples was: \(Na^+ > Ca^{2+} > Mg^{2+} > K^+\), whereas anion: \(HCO_3^- > Cl^- > CO_3^{2-} > SO_4^{2-} > NO_3^- > F^-\). Piper’s diagram showed that the groundwater in the study area is predominantly of the mixed Ca-Mg-Cl type. The Gibbs diagram demonstrates that most samples fall within the rock dominance zone, suggesting that the interaction between groundwater and aquifer rock causes groundwater chemistry. Multivariate statistical analysis has verified the key factors of anthropogenic and geogenic processes on water quality. The Water Quality Index (WQI) technique, used to determine drinking water’s water quality and sustainability, discovered that most samples fall into the excellent (48.39%) and good water (45.16%) categories. Several irrigation indexes such as residual sodium carbonate (RSC), magnesium hazard ratio (MHR), Kelly’s ratio (KR), permeability index (PI), electrical conductivity (EC), sodium per cent (Na%), and sodium adsorption ratio (SAR) revealed most groundwater samples were suited for irrigation. The study could aid policymakers in identifying suitable groundwater extraction sites for drinking and irrigation, thereby enhancing water resource management.

Keywords: Groundwater; Drinking; Irrigation; Water Quality Index; Sodium Percent.

New record of Chaetophorales from North Bihar, India

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Abstract
The present paper deals with the description of two algal taxa (*Coleochaete scutata* De Brébisson and *Stigeoclonium elongatum* (Hassal) Kützing 1849) collected from the Supaul district of North Bihar. Of these, *Stigeoclonium elongatum* (Hassal) Kützing 1849 is a new addition to the algal wealth of Bihar.

**Keywords:** Chaetophorales; New record; Supaul district; North Bihar; Chlorophyceae.

**Comparative proximate and mineral analysis of fresh and sun-dried fish species with special reference to *Puntius sophore* (Hamilton, 1822), *Gudusia chapra* (Hamilton, 1822)**

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**Abstract**
Fishes are consumed as one of the main sources of dietary animal protein. However, fishes are highly perishable and hence different post-harvest methods such as sun-drying are employed to preserve fish for a longer duration of time. Presently sun-dried fishes also have a significant nutritional role in addition to fresh fish. The present study has been conducted to determine the proximate composition and mineral content of fish species namely, *Puntius sophore* (Puthi), and *Gudusia chapra* (Koroti) in fresh and sun-dried conditions. The moisture, crude protein, crude fat, ash and carbohydrate content of the fresh and sun-dried *P. sophore* and *G. chapra* revealed significantly higher (p<0.05) moisture content in the fresh fish samples than in sun-dried samples. While, significantly higher (p<0.05) crude protein, crude fat, ash and carbohydrate contents were obtained in the sun-dried samples in comparison to the samples in fresh condition. Amongst the minerals studied Na, K, Fe, and Zn were found to be significantly higher (p<0.05) in the sun-dried samples while Ca and Mg were found to be significantly higher (p<0.05) in the fresh fish samples. The present study aims to elucidate the nutritional benefits of consuming sun-dried fishes together with fresh fishes safeguarding nutritional security across a greater population.

**Keywords:** fish; mineral content; nutrition; proximate composition; sun-dried fishes.

**Effective Method for the Extraction of Seagrass Liquid Fertilizer (Sglf) *Cymodocea Serrulata***

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**Abstract**
Application of Seagrass Liquid fertilizers plays an important role in the yield of crops. Preparation of SGLF from the collected marine plants individually by employing four different methods of extraction – low temperature heating method, boiling method, autoclave method and alcohol aqueous method. Determination of the most effective method of extraction of SGLF by using germination towel experiments. From each of the 100% stock
of *Cymodocea serrulate* SGLF obtained by respective extraction method, concentrations of 0.25, 0.50, 0.75, 1.00, 1.50 and 2.00% were prepared. *Vigna radiata* seeds were soaked in the respective concentration of SGLF for 12 h, while the control seeds were soaked in distilled water. After 7 days, the morphological parameters like germination percentage, root length, shoot length, number of lateral roots, fresh weight, dry weight, Chlorophyll a, Chlorophyll b, Total chlorophyll and Carotenoids were calculated. This type of study was carried out in the present research work to determine the most effective method of extraction of SGLF which was then employed in water stress studies. However the present study revealed that the SGLF (*Cymodocea*) from all four methods (low temperature, boiling, autoclave and alcohol-aqueous) were capable of inducing increment of all the growth parameters and chlorophyll content in black gram (*Vigna radiata*) seedlings, the promotional impact was more pronounced in the case of alcohol-aqueous method.

**Keywords:** Seagrass Liquid Fertilizer; *Cymodocea*; Morphological Parameters; Alcohol-Aqueous method; Effective method.

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**Antibacterial potential of selected Green and Red seaweeds against Vancomycin-Resistant *Enterococcus faecalis***

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**Abstract**

This study involved the collection of green and red algae, including *Caulerpa chemnitzia*, *C. peltata*, *C. taxifolia*, *Ulva lactuca*, *Halimeda opuntia*, *G. prolifera*, *Hypnea musciformis*, *Gracilaria corticata Acanthophora spicifera* and *G. verrucosa*, from the Gulf of Mannar Biosphere in Tamil Nadu. The target organisms for antibacterial assessment were *Enterococcus faecalis* (MTCC 439) (*E. faecalis*) and a clinical isolate of vancomycin-resistant *E. faecalis*. Ethanol was employed to extract bioactive compounds from the selected marine macroalgae. Antibacterial assays were conducted using the disc diffusion method, along with determining minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC). The ethanolic extracts of *G. verrucosa* exhibited superior antibacterial activity compared to other extracts. In agar diffusion assays, the mean zone of inhibition against tested bacterial strains ranged from 7.8–19.8 mm. The MIC values ranged between 125–500 μg/ml were observed, while MBC values ranged from 250–1000 μg/ml. Particularly noteworthy were the significant antibacterial properties observed in the ethanolic extract of *G. verrucosa* against *E. faecalis*. The ethanolic extracts of phytochemical analysis seaweeds showed the presence of strong terpenoids, tannins and phenolic compounds. This study suggests that the ethanolic extract of *G. verrucosa* holds promise as a valuable source of antibacterial agents in the pharmaceutical industry.

**Keywords:** Green algae; Red algae; *Enterococcus faecalis*; MIC; MBC.

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**New Record of *Vaucheria* from North Bihar, India**

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Abstract

During an exploration of algal flora in the freshwater ecosystems of Supaul District, North Bihar, the presence of *Vaucheria sessilis* (Vauch.) DC was confirmed, representing its first recorded occurrence in Bihar. This study thoroughly investigates the morphotaxonomy and distribution patterns of *V. sessilis* (Vauch.) DC in the specified region, providing a detailed understanding of its characteristics and geographical prevalence.

**Keywords:** Bihar; New record; *Vaucheria*; Xanthophyceae; Vaucheriaceae.

A Study of Fish Diversity in Thekera Beel, Nagaon, Assam, India

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Abstract

This study aims to assess the fish diversity, abundance, and distribution in Thekera Wetland, located in Assam, India. The study identified a total of 26 fish species belonging to 12 families, with Cyprinidae being of utmost diversity among all. The findings revealed that ecological and environmental factors such as water quality, temperature, and vegetation cover can influence piscine diversity in the wetland. This research tries to draw special attention to the understanding of the importance of wetlands as a unique ecosystem with high production potential and noteworthy ecological and economic significance, while also putting an effort to recognize the factors influencing fish diversity in aquatic ecosystems. For the preservation of this essential resource, effective management and conservation efforts are the needs of the hour. By ensuring sustainable fishing practices and reducing pollution levels, it is possible to maintain healthy and diverse fish populations and protect the ecosystem’s integrity.

**Keywords:** Freshwater ecosystem; Habitat; Biodiversity; Vertebrates; Conservation.

Phytochemical Screening, GC-MS Analysis and Anti-bacterial Activity of *Desertifilum* sp. PSL17 Extract

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Abstract

*Desertifilum* is a filamentous blue-green alga which has been isolated from diverse and extreme habitats. The present investigation deals with the novel *Desertifilum* sp. PSL17, isolated from a freshwater lake from Perambalur, Tamil Nadu, India. The alga was cultivated in BG11 medium and the wet biomass was used for solvent extraction. Solvents such as methanol, acetone, and diethyl ether were used for the preparation of mixed solvent extract. Phytochemical screening of the mixed solvent extract exhibited the presence of alkaloids,
flavonoids, quinones, saponins and tannins. A total number of 25 compounds were identified in the extract in GC-MS analysis, among which two important bioactive compounds cycloheptasiloxane tetracemethyl and hexadecenoic acid are of pharmaceutical significance. Some of the compounds observed in the extract are known for their anti-microbial, anti-cancer and other biological activities. Thus, the mixed solvent extract was screened for antibacterial activity against test bacteria such as Bacillus cereus, Bacillus subtilis, Enterobacterium, Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa, Proteus vulgaris, Staphylococcus aureus, Salmonella paratyphi and Salmonella typhi. The extract exhibited significant antibacterial activity against all the bacteria. Maximum antibacterial activity was observed against K. pneumoniae followed by the other bacteria. This indicates that Desertiﬁlum sp. PSL17 is a potential blue-green alga with antibacterial activity and thus further in-depth evaluation of the extract for other biological activities might help in the discovery of important compounds with pharmaceutical applications.

Keywords: Desertiﬁlum sp.; solvent extract; phytochemical screening; cycloheptasiloxane; antibacterial activity.

A Study on Heavy Metals of Urban Wetlands for Pollutant Removal

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Abstract
Urban wetlands are crucial components of urban ecosystems because they act as a natural filter for pollutants. These ecosystems are in danger of heavy metal contamination due to anthropogenic activities, which are harmful to both the environment and people. This study explores the annual and site-specific seasonal variation of heavy metals Cu, Pb, Zn & Fe concentration in the water of two urban wetlands, Site 1 (Sandalpur pond) and Site 2 (Manikchand pond) of Patna. The study was conducted from 2022 to 2023, particularly in summer and winter. The findings of the research show that there are significant differences in the levels of copper (Cu), lead (Pb), zinc (Zn), and iron (Fe), between the two sites. Cu, Pb, and Zn levels are continuously higher at Site 1 and consistently lower at Site 2. There was no significant seasonal variation in the level of heavy metals, according to the results of analysis of variance (ANOVA) tests. On the other hand, t-tests revealed statistically significant shifts in yearly levels for heavy metals during 2022 and 2023, which may be interpreted as temporal trends. The mean concentration level of Cu, Zn, Pb & Fe (except for Fe at site 1) exceeded the permissible limit of WHO standard for drinking water showing that both the sites have high concentrations of these metals, making the water unfit for consumption. In light of the results, ongoing attention to detail and more research into the underlying reasons and potential ecological consequences are needed. The findings of this study provide crucial information for creating strategies to manage urban wetlands and remove pollutants, as well as for comprehending the dynamics of heavy metals in these environments.

Keywords: Pollutants; Heavy Metal; Urban Wetlands; Seasonal variation; Environment.

Diatoms Species Composition and Biological Diatom Index (BDI) in Rain-fed Ponds of Western Rajasthan, India

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Abstract
Physicochemical and diatom datasets were investigated from July 2022 to June 2023 in small rain-fed ponds in the semi-arid region of Rajasthan, India. The seasonal average of diatom abundance is employed to calculate diatom indices (BDI). Using the statistical programs OMNIDIA and SPSS, the data collected was subjected to descriptive (mean) and inferential statistics (diatom indices, Pearson correlation). Additionally, physicochemical parameters were also examined, and the water quality index was calculated. In the observation, four species of centric diatoms, eight Gomphonema species, seven Nitzschia species, four Cymbella species, and seven Navicula species were identified among the 58 taxa using compound microscope (LM) and standard monographs. These results reported bimodal maxima in the rainy and summer seasons of the compositions of the diatom communities. The water quality of the sampling site during the study period, as elucidated by the diatom indices, ranged between low and high qualities. The study reported the Biological Diatom Index (BDI) was an indicator of elevated levels of Dissolved Oxygen (DO).

**Keywords:** Biological Diatom Index (BDI); diatom; Rajasthan; water quality; physicochemical parameters.

### Fish Diversity Assessment in the Areethodu River of Kuttanad, Kerala, India

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**Abstract**

Kuttanad, a globally significant region in Kerala, India, characterised by its unique low-lying geography, harbours diverse aquatic fauna, notably fish species. This study focused on assessing fish diversity in the Areethodu River, a tributary of the Pampa-Manimala River System. Fish sampling was conducted across five sites using various fishing gear between December 2023 and February 2024. A total of 30 fish species were identified, with Cypriniformes dominating (35.8%), followed by Anabantiformes (23.8%) and Cichliformes (16.8%). Synbranchiformes, Elopiformes, Beloniformes, and Gobiiformes were less represented. Noteworthy were the endemic species to the Western Ghats and Kerala, including Pristolepis marginata, Parambassis thommassi, Ompok malabaricus, Horabagrus brachysoma, Channa striata, Channa marulius, Mystus armatus, and Labeo dussumieri, alongside the exotic species Oreochromis niloticus. According to the IUCN Red List, 25 species were of least concern, three were vulnerable, and two were data deficient. This study underscores the Areethodu River’s rich biodiversity in Kuttanad, hosting data-deficient and vulnerable species. Thus, conservation efforts are imperative to safeguard the faunal diversity of the Areethodu River from human-induced and other disturbances.

**Keywords:** Areethodu River; Pampa-Manimala Riverine System; Kuttanad; Fish Taxonomy; Cypriniformes; Endemic Fish; Anabantiformes.

### Phytochemical Screening and In Silico Prediction of Binding Affinity of the Compounds in *Gracilaria verrucosa* (Hudson) Papenfuss with Prosaposin Protein Associated with Atherosclerosis

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Abstract
Atherosclerosis is the thickening of the arteries caused by plaque buildup. Prosaposin protein is closely related to atherosclerosis. The study was conducted in *Gracilaria verrucosa*, a marine red alga which was collected from Thirumullavaram beach of Kollam district, Kerala to screen the phytochemicals and to use it in modern drug designing through molecular docking. Phytochemical analysis was conducted in three different extracts. Chloroform extract contains carbohydrates, protein, reducing sugar, fat and oils. The methanol extract contains steroids, fat and oil, tannin and phenolic compounds. Aqueous extract contains fat and oil, alkaloid, steroid, tannin and phenolic compounds. Compounds like chlorogenic acid, caffeic acid and epicatechin present in this alga exhibit atherosclerosis inhibition activity. Docking is performed to find the binding affinity of these compounds with prosaposin protein by using Hex. This study reveals that the highest energy value obtained for the three compounds with the target chlorogenic acid with an energy value of -227, epicatechin with an energy value of -217 and caffeic acid with an energy value of -180. From this result, it can be concluded that the compound chlorogenic acid and epicatechin have less energy value and hence strong interaction with the prosaposin protein when compared with caffeic acid.

**Keywords:** Prosaposin protein; Chlorogenic acid; Caffeic acid and Epicatechin; Molecular Docking; *Gracilaria verrucosa*.

Biodegradation of Phenanthrene using Free and Immobilized Marine Hydrocarbonoclastic Bacteria

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Abstract
In recent years, there has been a rapid expansion in the application of biological approaches employing microorganisms to solve environmental contamination challenges. Numerous studies have shown how effective, stable, affordable, and adaptable these techniques are for bioremediating hydrocarbon-contaminated water bodies. One of the most prevalent polycyclic aromatic hydrocarbons that is present in the marine environment as a contaminant is Phenanthrene. Thus, the present study was aimed at investigating the biodegradation ability of three marine isolates - *Alcanivorax dieselolei*, *Rhodococcus pyridinivorans* and *Halomonas titanicae*, as free culture, mixed culture and immobilized culture. The substrate specificity analysis showed abundant growth in Phenanthrene and Tween 80. Wheat bran which is known to possess good porosity and diffusion properties was used as the carrier to immobilize the bacterial cultures. SEM images revealed the surface morphology of the test cultures, especially the immobilized samples presented a dense extracellular matrix with prominent growth. All the test cultures showed notable degradation of Phenanthrene, however, the immobilized mixed culture showed a maximum degradation of 93% proving its ability to utilize Phenanthrene. Also, among the three test bacteria *Halomonas titanicae* exhibited a higher level of degradation in free-state (66%) and 87% degradation in immobilized form.

**Keywords:** Phenanthrene; biodegradation; wheat bran; immobilization; substrate specificity; SEM.

Sublethal Toxicity of Sodium Hypochlorite on Behaviour and Oxygen Consumption in Tilapia

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Abstract
Sodium Hypochlorite is commonly used in various industries as a bleaching agent or a sterilizing agent. In the study, LC 50 of sodium hypochlorite was found to be 45 ppm. The toxicity of sodium hypochlorite on Tilapia was determined and the effect on oxygen consumption at 1/10, 1/5 and 1/3 sub-lethal concentrations at 24, 48, 72 and 96 h was assessed. Oxygen consumption of Tilapia at 1/10, 1/5 and 1/3 for 96 h was found to be 0.45, 0.42 and 0.37 ml/h/g compared to the control which was 1.42 ml/h/g. Several behavioral changes were observed in fish Tilapia after exposure.

Keywords: Sodium Hypochlorite; Tilapia; behavioral changes; oxygen consumption; bleaching agent; textile industry.

Antidiabetic and Anticancer activity of *Pistia stratiotes* L.

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Abstract
The water lettuce (*Pistia stratiotes* L.) is a free-floating aquatic plant. The plant has many therapeutic values. The present investigation was carried out to study anticancer and antidiabetic activity in the plant leaves. The anticancer activity exhibited against the A549 cell line and results compared with the standard cisplatin drug. The IC₅₀ of cell inhibition of *Pistia stratiotes* L. was found to be 198.03 μg/ml and diabetic alpha-amylase activity was measured with the standard Metformin which resulted in a positive response with the plant extract 174.85 μg/ml. The plants showed a positive response towards anticancer and antidiabetic activity. This work helps to explore to bring new insight into the drug industries.

Keywords: Anticancer, antidiabetic; alpha-amylase; Metformin; *Pistia*.

Assessing the Purity of Potable Water: A Comprehensive Case Study

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Abstract
Drinking water is a precious resource that must be protected. Chemical and microbial contaminants can make drinking water unsafe, so it is important to test water regularly and take steps to remove contaminants. The study of physico-chemical parameters such as pH, Acidity, Alkalinity, Total Dissolved Solids, Ca Hardness, Mg Hardness, Total Hardness, Chloride Content, Dissolved Oxygen, Chemical Oxygen Demand etc. determine the behaviour and quality of water. The current study was based on the assessment of drinking water quality of the industrial area of Angamaly. The water samples were collected from the wells situated at the premises of the five different industries of Angamaly and compared for the Physico-Chemical parameters. The utilization of above findings will allow us to assess the scope and origin of the ground water pollution in the area.

Keywords: Total Dissolved Solids; Total Hardness; Chloride Content; Dissolved Oxygen; Chemical Oxygen Demand.
New records of Freshwater Diatoms (Bacillariophyta) from Tamil Nadu, India

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Abstract

Diatoms are unicellular photoautotrophic eukaryotes, which exhibit a wide range of diversity due to the polyphylectic lineage of evolution. Diatoms are of vital importance for monitoring the biotic condition of water. They play a significant role in various biotic interactions in aquatic ecosystems and influence the global biogeochemical cycle. The various levels of harmful chemicals and nutrients present in marine and freshwater habitats can be indicated by using diatoms. An investigation into the taxonomy and diversity of freshwater diatoms occurring in the Erode District of Tamil Nadu, India was carried out. A total of 22 families which include 29 genera and 96 taxa have been recorded. A total of 51 taxa were recorded for the first time and it accounts for 14% addition to the present diatom flora of Tamil Nadu. Among the 29 genera, Gomphonema shows a maximum of 13 taxa followed by Nitzschia (9), Navicula (6), Pinnularia, Ulnaria, (5) Caloneis, Cymbella, Tryblionella (4) Encyonema, Hantzschia and Sellaphora (3). Of the 13 taxa of Gomphonema, 5 taxa have been reported for the first time from Tamil Nadu. This study summarizes the taxonomic characters of the above-mentioned taxa.

Keywords: Erode District; Gomphonema; Gobichettipalayam Taluk; Tamil Nadu Diatom flora; Sathyamangalam Taluk; Sellaphora.

Morpho-Functional Classification of Freshwater Phytoplanktons of Pathanamthitta District, Kerala (India)

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Abstract

The traditional taxonomic approach to vegetation classification may not necessarily reflect the perceived ecological functions as often taxonomic units include phylogenetically similar yet functionally diverse individuals. Whereas to study community dynamics and demystify the intricate workings of ecosystems, classifications based on an individual species’ adaptation techniques may be a helpful tool. The objective of this work is to classify phytoplanktons based on the morphological and functional characteristics (size, motility, nitrogen fixation ability, presence of gelatinous envelopes and demand for silica), with the use of multivariate methods, across three physiogeographic regions (lowland, midland and high land) of Pathanamthitta District, Kerala (India) to understand the dynamics of the phytoplankton community. Across 15 wetlands selected for the study, a total of 60 genera of phytoplanktons were identified. Cluster analysis resulted in 20 morpho-functional
groups (MFG). A clear difference in groups across the regions was observed. Further, 15 physical and chemical parameters of water samples of sites estimated and subjected to Principal Component Analysis (PCA) also showed differences in prominent parameters across the region. To analyze the relationship between physical and chemical variables & MFG, Canonical Correspondence Analysis (CCA) was performed. The overall results of the study confirm that investigation along functional characteristics of species independent of taxonomic affiliations proves to be a promising approach to aid in a better understanding of ecological dynamics.

Keywords: Phytoplanktons; Functional classification; Multivariate analysis; Traits; Freshwater ecosystem.

Physico-Chemical Parameters of a Freshwater Pond Sagar in Konch, India

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Abstract

Ponds and small lakes are particularly susceptible to various environmental challenges, including habitat degradation, excessive nutrient accumulation, chemical contamination, climate change, and the introduction of non-native species. A freshwater pond known as Sagar, is situated in the urban area of Konch. It has been adversely affected by human activities. The objective of this investigation is to assess the physical and chemical characteristics of the pond water throughout a 12-month duration spanning from January 2022 to December 2022. Data is collected every month and categorized by season. This study investigated various physico-chemical parameters, including water Temperature, pH, Dissolved oxygen, Biochemical Oxygen Demand, Total alkalinity, Total Hardness, Nitrate-Nitrogen, and Phosphate. The results suggest that the pH level of the pond water surpasses the permissible limit established by the World Health Organization. Although certain variables may fall within acceptable limits, a significant number of them surpass the authorized range. Based on the current study, it is clear that the water in the Sagar pond is just below the pollution threshold, making it unfit for human consumption and the survival of local fauna. Reducing the impact of human activities and speeding up municipal treatment shown to improve pond water quality.

Keywords: Sagar pond; fresh water; physico-chemical characters; B.O.D; eutrophication.

Introduction

Temporal assessment of land use land cover dynamics in Ernakulam district, Kerala, India: A Remote Sensing and GIS Approach

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Abstract
This research aimed to analyze and comprehend land use land cover (LULC) changes in the Ernakulam district for 2002, 2012 and 2022, employing remote sensing and Geographic Information System (GIS). For this investigation, LULC maps were derived using Landsat 7 Enhanced Thematic Mapper Plus (ETM+) images from 2002 and 2012, along with Landsat 8 Operational Land Imager (OLI). Detailed analysis was applied to the image preprocessing and classification, with a separate assessment of accuracy using the kappa coefficient. A supervised approach with the maximum likelihood classifier (MLC) was employed to generate and classify LULC maps for the selected periods. The study area was characterized by five main LULC classes: built-up area, barren land, agricultural land, forest, and waterbodies. It was observed that agricultural land and forest cover dominated the landscape between 2002 and 2022. The results showed that overall accuracy in the study area was 86, 87 and 90%, and kappa coefficient of 81.97, 82.43 and 86.70% for the years 2002, 2012 and 2022, respectively, placing it within the almost perfect agreement scale. Over the past two decades, agricultural land has consistently decreased (−245.49 km²), while built-up areas have significantly risen (+254.20 km²), indicating ongoing urbanization. The positive change in a forested area (+18.97 km²) suggests conservation efforts, emphasizing the need for continued attention. Barren land conversion to built-up areas (−21.80 km²) reflects human encroachment and the minor decline in waterbodies (−5.88 km²), signaling the need for conservation measures and potential changes in water management. The study’s results emphasize critical policy implications for sustainable LULC management in Ernakulam district, Kerala.

Keywords: Geographic Information System; Kappa Coefficient; Land Use Land Cover; Remote Sensing; Supervised Classification.

Correlation between water parameters and zooplankton diversity of some selected ponds of North 24 Parganas, West Bengal, India

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Abstract
A pond is a shallow water body, the habitat for plankton and other aquatic organisms. Planktons are the base of productivity in the aquatic ecosystem. The high quantity of zooplankton is also the reason for production at the consumer’s level. Plankton composition in different seasons also indicates the effect of environmental variables on the occurrence of different aquatic species. Various physicochemical water parameters like dissolved oxygen, free CO₂, hardness, salinity, pH, temperature etc. provide the idea about the impact of the environment of the aquatic habitat. The present study has been performed to correlate the diversity and seasonal variation in the quality and quantity of zooplankton of 10 pond of sub-urban areas of North 24 Parganas district of West Bengal. It has been observed that the most abundant zooplankton was *Mesocyclops*. Their density during February month. Water samples with much higher hardness and more free CO₂ than dissolved oxygen result in zooplankton depletion. The abundance of *Mesocyclops* may be due to their adaptability to the adverse conditions of polluted water. The use of detergents, soap & other anthropogenic activities should be controlled to keep the pond water clean.

Keywords: Zooplankton; Hardness; Salinity; *Mesocyclops*; Aquatic organisms.

Hydrogeochemical and Irrigation quality evaluation of surface water of the Semi-arid region of Kolar taluk, Karnataka, India

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Correlation between water parameters and zooplankton diversity of some selected ponds of North 24 Parganas, West Bengal, India

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Abstract
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Keywords: Zooplankton; Hardness; Salinity; *Mesocyclops*; Aquatic organisms.

Hydrogeochemical and Irrigation quality evaluation of surface water of the Semi-arid region of Kolar taluk, Karnataka, India

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Abstract  
The study was focussed on evaluating the water quality of thirty selected lakes in Kolar taluk by depicting physico-chemical parameters as per Standard Methods during the pre-monsoon period 2022. The analytical results showed that the lake water samples were slightly higher salinity and organic loads, illustrating the non-potability for drinking purpose. Nutrient enrichment with a Phosphate value from 0.04–0.82 mg/L, while Nitrate concentration of 17.5–89.0 mg/L. About 26.67 and 70.0% of the samples witnessed higher Phosphate and Nitrate values were indicating slightly increased in organic load, attributed to anthropogenic contributions like entry of raw sewage, agricultural runoff, etc. The irrigation water quality parameters of SAR and RSC values indicated that the lakes were suitable for irrigation, whereas, the percent sodium values observed in a few lakes were unsuitable for irrigation purposes as exceeds the limits. However, the study suggested for regular monitoring of the quality of lake water to reduce water pollution and restore aquatic habitats.

Keywords: Water quality; Lake water; RSC; SAR; Kolar taluk.

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Exploring the Aqua feed potential of three mangrove plants: Antioxidant properties and Impact on Growth, Survival and Food Conversion Ratio in farmed Etroplus suratensis  
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Abstract  
Aquafeed plays a critical role in the aquaculture industry, influencing the growth, health, and survival of cultured fishes. This study explores the aquafeed potential of three mangrove plants, Rhizophora apiculata, Lumnitzera recemosa, and Aegiceras corniculatum, for farmed Etroplus suratensis. Phytochemical profiling and antioxidant properties of the plant extracts were assessed, followed by evaluating their impact on the growth, survival, and Food Conversion Ratio (FCR) of the fishes. The results revealed that all three mangrove species contain various bioactive compounds with antioxidant properties, contributing to their potential as functional feed additives. Additionally, the IC50 values and Total Antioxidant Capacity (TAC) demonstrated significant antioxidant activity in all plant extracts, with L. recemosa and A. corniculatum exhibiting stronger antioxidant potential. Furthermore, feeding trials indicated that diets enriched with Rhizophora apiculata and Lumnitzera recemosa foster enhanced survival rates, weight gain, and FCR compared to Aegiceras corniculatum. The present study showcases substantial IC50 values (e.g., 103.10 μg/mL for R. apiculata) and TAC levels (e.g., 163.2 mg GAE/g for L. recemosa), confirming its potent antioxidant efficacy. Proximate analysis of the feeds revealed variations in nutritional composition, with higher protein and fat content observed in diets containing Rhizophora apiculata and Lumnitzera recemosa. Overall, these findings highlight the potential of Rhizophora apiculata and Lumnitzera recemosa as alternative aqua feed ingredients, offering benefits in terms of growth performance and feed efficiency in farmed Etroplus suratensis.

Keywords: Aqua feed; Mangrove plants; Antioxidant activity; Growth performance; Etroplus suratensis.

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Ichthyofaunal Diversity, Traditional Fishery and Aquaculture Potential of Thottiyar Check Dam at Valara (Idukki), Foot Hills of Western Ghat Section, Kerala
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Abstract
Fisheries and Aquaculture in Kerala gained a steep momentum due to governmental and nongovernmental assistance and subsidies, which was the main attraction for start-ups and new farmers during the lockdown period of the pandemic, Covid-19. Several fish farms and intensive culture methods like biofloc and aquaponics systems were started and practiced state-wide during the period, but a majority of them were along midland or coastal regions of Kerala. High ranges of Kerala, represented by the Western Ghat section of Nilgiri Rain forests mingled with revenue land are also bestowed with freshwater ponds, rivers, rivulets and reservoirs, in which fish and fisheries are practiced on a medium scale but aquaculture practices are not that common along the high ranges except a few. The present study was undertaken to assess the ichthyofaunal diversity and aquaculture potential of the Thottiyarcheck dam (reservoir) at Valara, Idukki district, which is located 556 m MSL along the Western Ghat section of Nilgiri forests.

A detailed survey of fishes in the dam was assessed by collecting of specimens from local fishermen from October to December 2023. A total of 22 fish species were identified from the study of which Dawkinsia filamentosa and Garra mullya were common and contributed a major chunk of the local fish market. Two full-time local and traditional fishermen actively engaged in fishing employing gill nets, cast nets and local methods using mosquito nets and towels. An average of 10–15 kg of fish is obtained per net operation daily and sold locally. Among the diverse fishes, 9 species, including indigenous and alien are found suitable for fish culture. Indigenous Channa gachua, Dawkinsia filamentosa, Eptoplus suratensis, Garra mullya, Mystus gulio, Tor malabaricus and Xenentodon cancilla and invasive Clarias gariepinus, Cyprinus carpio and Oreochromis mossambicus may be recommended for fish culture as these species already inhabits in the ecosystem. Extensive culture systems, cage culture and pen culture systems can be recommended for the reservoir to increase its productivity. Common culture species like Indian major carps, pearl spot and cold water species like mahseers can be proposed for culture after experimental evaluations for resource utilization and competition with indigenous species. Aquaculture along the high ranges of Kerala should be given priority as there are a lot of check dams and reservoirs, which are under-utilized. Collective initiatives must be taken by the Fisheries department to liaison with other departments like Irrigation, Forests and Wildlife etc., to foster sustainable fish production and thereby employment opportunities.

Keywords: Reservoir Fishery; Freshwater Fishes; High-range Culture Fishes; Muvattupuzha River; Check-dam Aquaculture.