REAL -TIME RIVER WATER QUALITY MONITORING AND CONTROLS

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PROJECT DESCRIPTION

- Farmers put fertilizers and pesticides on their crops so that they grow better. But these fertilizers and pesticides can be washed through the soil by rain , to end up in rivers.
- If large amount of fertilizers or farm waste drain into a river the concentration of nitrate and phosphate in the water increases considerably . algae use these substance to grow and multiply rapidly turning the water green.
- This massive growth of algae , called eutrophication, leads to pollution . when the algae die they are broken down by the action of bacteria which quickly multiply , using up all the oxygen in the water which leads to the death of many animals.

LITERATURE SURVEY

Cultural eutrophication of Lonar Lake, Maharashtra, India

Vyankatesh Yannawar

International Journal of Innovation and Applied Studies

ABSTRACT:

Lonar is one of the youngest Lake and is unique in the world for its alkalinity and salinity of the water. But its alkalinity, pH and salinity go on decrease day by day. An attempt has been made to examine environmental analysis of LonarLake.

Objective:

This papers aims at improving the water quality in the lakes from hyper-eutrophic to minor eutrophic conditions.

Methods:

The physical and chemical parameters were analyzed as per APHA.

Results:

It is found that majorspirulina species of algae was found in lake water. This species Spirulina having medicinal value for human body. This speciesoccupied the Lonar lake water phytoplankton about 90.0% and above. Rests of 10 % are other members of Chlorophyceae, Cynophyceae and Bacillariophyceae also found in this lake. Lonar lake water was found to be very rich in mineral nutrient contents. No fish species was recorded in the same water body.

Conclusions:

Hence this World heritage lake should bepreserved for its alkalinity and salinity. Use of agrochemicals on crater floor; nuisance of tourists; sewage disposal in the lake; constructions on the crater rim; etc. are some of the problems requiring attention. The lake urgently needs to take immediate protection from pollution and save and preserve for future generations.

Water quality assessment of lake water: a review

Rachna Bhateria , Disha Jain

Abstract

• Ever increasing population, urbanization and modernization are posing problems of sewage disposal and contamination of surface waters like lakes. Natural water gets contaminated due to weathering of rocks, leaching of soils and mining processing, etc.

• Various types of problems in lake which cause nutrient enrichment in lake have been reviewed. Land use change and longer growing seasons could increase the use of fertilizers with subsequent leaching to watercourses, rivers and lakes, increasing the risk of eutrophication and loss of biodiversity.

• Water quality can be assessed by various parameters such as BOD, temperature, electrical conductivity, nitrate, phosphorus, potassium, dissolved oxygen, etc. Heavy metals such as Pb, Cr, Fe, Hg, etc. are of special concern because they produce water or chronic poisoning in aquatic animals.

• Harmful algal blooms are becoming increasingly common in freshwater ecosystems globally. Pollution by plastic debris is an increasing environmental concern in water bodies, where it affects open-water, shoreline and benthic environments. Surface water densities of plastics are as high as those reported for areas of litter accumulation within oceanic gyres.

• Different methods have been used to analyse the water quality of lake such as Hyperion, water quality index and hazard quotient. It is recommended that pollution prevention and water re-use should be adopted in combination with the recycling of nutrients in controlled urban agriculture.

Evaluation of water quality index for River

Sabarmati, Gujarat,lndia

Kosha A. Shahl • Geeta S. Joshil

Abstract

- An attempt has been made to develop water quality index (WQI), using six water quality parameters pH, dissolved oxygen, biochemical oxygen demand,electrical conductivity, nitrate nitrogen and total coliform measured at three different stations along the Sabarmati river basin from the year 2005 to 2008.

- Rating scale is developed based on the tolerance limits of inland waters and health point of view.

- Weighted arithmetic water quality index method was used to find WQI along the stretch of the river basin. It was observed from this study that the impact of human activity and sewage disposal in the river was severe on most of the parameters.

- The station located in highly urban area showed the worst water quality followed by the station located in moderately urban area and lastly station located in a moderately rural area.

- It was observed that the main cause of deterioration in water quality was due to the high anthropogenic activities, illegal discharge of sewage and industrial effluent, lack of proper sanitation, unprotected river sites and urban runoff.

- Effect of nitrate nitrogen Excess nitrate nitrogen can cause eutrophication of surface waters due to overstimulation of growth of aquatic plants and algae.

- It causes anaerobic conditions in the water bodies leading to fish kills, and can even “kill” a lake by depriving it of oxygen.

- High levels of Nitrate nitrogen can cause the respiration efficiency of fish and aquatic invertebrates to lower down, leading to a decrease in animal and plant diversity, and affects use of the water for fishing, swimming, and boating.

• High levels of Nitrate nitrogen in water can cause serious health hazards.

• The acute health hazard associated with drinking water with elevated levels of nitrate occurs when bacteria in the digestive system transform nitrate to nitrite.

Phytoplankton communities of eutrophic freshwater bodies

(Kerala, India) in relation to the physicochemical water quality parameters

• Joseph George Ray,

• Prasanthkumar Santhakumaran &

• Santhoshkumar Kookal

Abstract

• Algal bloom of eutrophic freshwaters is important from different aspects of sustainable developmental perspectives.

• Apart from the identification of the algal species which multiply fast in response to eutrophication, phytoplankton studies concerning water quality parameters of eutrophic waters help environment inventory of such fast-growing algal species

• The knowledge of specific environment requirements of fast-growing algae is highly significant in the control of toxic algal blooming and industrial utilization of non-toxic species in phycoremediation or as new bioresources for fuel, food or feeds. In this context, seasonal dynamics of the phytoplankton community in seven different kinds of eutrophic waters from 66 representative locations of Kerala, South India, was measured in two seasons.

• Altogether, 297 algal species belonging to 8 phyla, 11 classes and 26 orders were observed in the waters.

• Ecology and diversity of algal communities concerning physicochemical water quality parameters were compared, which enabled assessment of the ecological amplitude of several specific dominant species common to eutrophic waters in Kerala.

• The crucial roles of dissolved oxygen ($p < 0.05$), total Kjeldahl nitrogen ($p < 0.01$), and ammoniacal nitrogen ($p < 0.05$) in causing algal blooms are assessed using correlation analysis.

• The principal component analysis extracted the entire water quality parameters into five groups of components acting towards the cause of algal blooms.

Dynamics of Sundarban estuarine ecosystem: eutrophication induced threat to mangroves Suman

Manna , Kaberi Chaudhuri , Somenath Bhattacharyya , Maitree Bhattacharyya

Abstract

Background: Sundarbans is the largest chunk of mangrove forest and only tiger mangrove land in the world. Compared to the rich species diversity and uniqueness, very few studies have so far been conducted here, mainly due to its inaccessibility. This study explores water quality, density of biomass, species diversity, phytoplankton abundance and bacterial population of a tidal creek in Sunderban estuary during the post and pre monsoon period of 2008-09.

Results: Phytoplankton community was observed to be dominated by diatoms (Biacillariophyceae) followed by Pyrrophyceae (Dinoflagellates) and Chlorophyceae. A total of 46 taxa belonging to 6 groups were recorded. Other algal groups were Cyanophyceae,

Euglenophyceae and Chrysophyceae. Species diversity was highest in summer (March) and lowest in winter season (November) in all the sample stations indicating its close correlation with ambient temperature. Species evenness was fairly high in all five stations throughout the study period. Present study indicated that dissolved oxygen, nutrients and turbidity are the limiting factors for the phytoplankton biomass.

The estuary was in eutrophic condition (Chlorophyll-a >10 qg/L) in winter. During the month of May phytoplankton biomass declined and at high salinity level (21.2PSU) new phytoplankton species take over, which are definitely better resilient to the high saline environment. Bio indicator species like Polykrikos schwartzil, Dinophysis norvegica and Prorocentrum concavum points to moderately polluted water quality of the estuary.

Conclusion: Eutrophication as well as presence of toxic Dinoflagellates and Cyanophyceae in the tidal creek of Sundarban estuary definitely revealed the deteriorated status of the water quality. The structure and function of the mangrove food web is unique, driven by both marine and terrestrial components. But little attention has been paid so far to the adaptive responses of mangrove biota to the various disturbances, and now our work unfolds the fact that marine status of Sundarban estuary is highly threatened which in turn will affect the ecology of the mangrove. This study indicates that ecosystem dynamics of the world heritage site Sundarban may facilitate bioinvasion putting a question mark on the sustainability of mangroves.

IoT Based Real-time River Water Quality Monitoring System

Mohammad Salah UddinChowdwy, Talha BinEmran, Science Direct — 2018

This paper proposes a sensor-based water quality monitoring system. The main components of Wireless Sensor Network (WSN) include a microcontroller for processing the system, communication system for inter and intra node communication and several sensors. Real-time data access can be done by using remote monitoring and Internet of Things (IoT) technology.

Review of Water Quality Monitoring using Internet of Things (IoT)

Mr. A. P. Roger Rozario, R. Surya IEEE, 2019

The quality of the water must be monitored in real-time to ensure its safety and supply. Monitoring water in traditional ways takes longer, which can take up to from 24 to 96 hours to identify contaminants in water supplies, which are more time taking. This project aims at developing a water quality monitoring system using sensors and IoT (Internet of Things). The water quality parameters like temperature, pH, and turbidity are measures using sensors and the water quality index is determined. The measured values from the sensors will be processed using a microcontroller, and alert message will be sent to the user via an android application developed using MIT app inventor in case of any abnormalities

A Development and Implementation of Water QualityAssessment Monitoring (WQAM) System using the Internet ofThings (IoT) in Water Environment

Muhammad Farhan Johan, S. Abdullah, A. Zanal Saurabh S. Soman, HamidrezaZareipour , Om Malik JEVA , 23 November 2021

- This paper presents the development and implementation of Water Quality Assessment and Monitoring (WQAM) system.

• The system development used Wi-Fi enabled microcontroller to connect with the IoT environment and store the data in the IoT cloud server.

• The microcontroller used is Arduino UNO that interacts with three types of sensor probes which are pH, turbidity and temperature probe. All the data measurements is transferred using a Wi-Fi module which is ESP8266. The IoT cloud used to utilize the data frame is Thing Speak.

• This system was implemented on Bandar Pereda Lake and Deraa River in Pulao Pinang with two systems implemented at each location.

• The sensors were placed on the water surface for more accurate measurements. This system continuously measures the readings of pH, turbidity dan temperature on the lake/river for every 1 hour.

• Twenty readings were taken for every 1 hour within the first 20 minutes with 1 minute interval and the readings were stored in the IoT cloud server.

IoT-based System for Real-time Water Pollution Monitoring of Rivers

Mohammad Ariful Islam Khan; Mohammad Akidul Hoque; Sabbir Ahmed **IEEE** September 2021

• The research proposes a system to remotely monitor the water quality of a river so that the authorities can gather better insights about the condition of that particular river and predict the critical future phenomena.

• Consequently, they will be able to take auspicious steps in order to protect the rivers and save the environment.

- The proposed framework can observe the real-time value of pH, conductivity, turbidity, temperature and flow of the water by utilizing various sensors.
- Furthermore, through our device, effective predictions about imminent floods can be made.
- Thus, authorities can commence early warning for floods and ensure prompt evacuation. Thus, our technique can significantly minimize the casualties caused by this disaster.
- In this context, real-time feeds are obtained through Internet of Things (IoT). For wireless data transmission Message Queuing Telemetry Transport (MQTT) is used.