Abstract Volume

MILIEURA

A VIRTUAL INTERNATIONAL CONFERENCE

One Earth for All of Us: Changing Climate & Environment

11-12 JUNE 2022

Organized by

ECOR FOUNDATION

ECOR Foundation

Knowledge Partners

Global Ambassadors of Sustainability

AFRICAN COALITION ON GREEN GROWTH

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WOMEN AND YOUTH INITIATIVE FOR MORAL AWARENESS (WAYMA)

REPUBLIQUE DEMOCRATIQUE DU CONGO ACADEMIA GROUP D.R.C. ONG "C.A.M.E.J." CENTRE D'APPRENTISAGE DES METIERS POUR L'ENCADREMENT DES JEUNES

SafishA

REACHOUT SALONE STRETCHING HANDS

GREEN 60

CHANGE 4US. YOUTH ORGANISATION

COMMON GOOD FOUNDATION Dignity Rights Justice

Serving Waters

Abstract Volume

A Virtual International Conference

One Earth for All of Us: Changing Climate & Environment

MILIEU ARA

11-12 June 2022

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ECOR FOUNDATION

PREFACE

ECOR foundation is an environmental conservation NGO registered under the Indian Trust Act and successfully registered with NGO Darpan NITI Aayog, Govt. of India. ECOR stands for Earth, Climate and Ocean Research and works from 2019 on the conservation of all these elements which are vital for human existence. As a part of the World Environment Day celebration, we organized an international conference, 'MILIEURA-2022' with the theme as 'One Earth for All of Us: Changing Climate &Environment. One of the important aspects living our life is to protect the environment from our harmful actions. The overuse of natural resources will create a situation having nothing for consumption and that's where the importance of sustainable living arises. Climate change is also a consequence by the unthoughtful actions of human which can impact the environment adversely. So, it is important to have an awareness about all the importance, causes, results and solutions of the environment and its processes. That's why the conference discussed the topics like, biodiversity and climate change, environmental, social and economic sustainability, disaster mitigation and adaptation strategies and environmental pollution as the focal themes. The conference is organized with the support of the knowledge partners includes, Global Ambassadors of Sustainability, Common Good Foundation, African Coalition on Green Growth (ACGG), and Change4us.

The conference is programmed with four technical session and a poster session to cover diverse aspects on the subthemes. This book of abstracts will hopefully highlight the various science-based findings on the climate change and the importance of climate resilience and sustainable development to students, academicians, administrators, and the public at large. At ECOR we dream for a green and a sustainable planet for our younger generations and join hands with us to educate ourselves, through our various platforms and programs.

Jishnu Panamoly Ayyappan
Founder and Director
ECOR Foundation

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TECHNICAL PROGRAMME SCHEDULE

Day 1: Technical Session 1 – Environmental pollution

Date; June 11, 2022

Duration; 5.30 PM IST to 7.30 PM IST

Chairperson: Iman Maher Ibrahim Abdullah,

Senior Hydrology, General Egyptian Mining Resources Authority

SL.No	Paper title (Oral Presentation)
1	**Soil pollution around the coal mines and application of rock dust for soil remediation** Prasenjeet Chakraborty, Ph.D Research Scholar AcSIR-Academy of Scientific & Innovative Research (Lab-CSIR-CIMFR, Dhanbad)
2	**Implications of stable water isotopes in ecohydrogical pools: a review** Bilal Ahmad Bhat, Research Scholar University of Kashmir
3	**Effects of heavy metal stress (Cadmium)on morphological physiological activity and anatomy of cow pea plant (vigna unguiculata)** Swathy Lekshmi S, MSc Student All saints' college Thiruvananthapuram
4	**Analysis of existing environmental instruments with regards to the environmental pollution** Pallabi Paul. Student Department of Law,Assam University,Silchar,Assam,India.
5	**Environmental Magnetism Present and Future** Trilok Ranjan Mudgal, Associate Professor State Institute of Engineering and Technology, Nilokheri, Karnal, Haryana
6	**Phytoremediation: An emerging green technology to remove environmental pollutants** Dr. Ravi S. Naik, Assistant Professor AcSIR-Academy of Scientific & Innovative Research (Lab-CSIR-CIMFR, Dhanbad)

	Paper title (Poster presentation)
1	**Soil Pollution** Sonal Sharma, Ph.D. scholar, MPUAT, Udaipur
2	**Water Pollution: causes, effect, repercussion, and Ministration with special Reference from Mansagar Lake, Jaipur** Sweeti Sharma, Research scholar Apex university, jaipur
3	**Review on bivalves as bioindicator of Microplastic Pollution – An Indian perspective** Abisha C, PhD Scholar, Kerala University of Fisheries and Ocean Studies, Panangad, Kochi

TECHNICAL PROGRAMME SCHEDULE

Day 1: Technical Session 2 – Biodiversity and Climate change

Date; June 11, 2022

Duration; 7.30 PM IST to 9.30 PM IST

Chairman: John Pinel,

MCIEEM Freelance Ecologist at SustainablEco-Soultion and part time lecture at JICAS, University of Exeter, UK

SL.No	Paper title (Oral presentation)
1	**Comprehensive study of land use land cover change and its ecological impact on Andaman and Nicobar Island with special reference to coral reef** Ramachandran KM. Student Mahatma Gandhi University
2	**Natural Carbon Sequester: The Giant Swimming Trees (Whales) against the Climate Change** ASHISH SAHU, PhD scholar Kerala University of Fisheries and Ocean Studies, Panangad, Cochin, Kerala- 682506, India

3	**Spatiotemporal variations in the biocoenosis of meiobenthos and nematodes in the Arctic Kongsfjord (Svalbard) in the evolving climate change scenario** Krishnapriya P.P, Research scholar Cochin University of Science and Technology (CUSAT)
4	**A vegetational change analysis utilizing Multi-Temporal Ndvi Data Series: A Case study from Ahmedabad District (Gujarat), India** Prashantkumar B. Sathvara, JRF - Ph.D. Scholar Nims University Rajasthan,Jaipur
5	**Preliminary survey of Biodiversity of Dana Pani Beach located in Suburban Mumbai, Maharashtra** Ashwit Sudarshan Shetty. Research Scholar University of Mumbai
	Paper title Poster presentation
1	**Distribution and functional diversity of free- living nematodes from the macrobenthos in the Arctic glacial Kongsfjord** Aswathy N K, Research Scholar Cochin University of Science and Technology, Kerala
2	**Comparative Assessment of the Variability of Precipitation Extremes in the Boreal Summer across India and their Impact on Biodiversity from 1951 to 1989 and 1990 to 2020** Anju M R, Research Scholar Kerala University of Fisheries and Ocean Studies
3	**Climate Change and Agriculture: Global and Local Perspectives** Divya Khatri, PhD Scholar Department of Silviculture and Agroforestry, Dr. Y.S. Parmar University of Horticulture and Forestry

TECHNICAL PROGRAMME SCHEDULE

Day 2: Technical Session 1 – Environmental, social and Economic Sustainability

Date; June 12, 2022

Duration; 5.30 PM IST to 7.30 PM IST

Chairman: Dr. Wesam Al Madhoun

Founder of Global Ambassadors of sustainability, Co- Founder of Middle East SDGs Academy and Dean of Engineering Faculty at Gaza University

Sl.No	Paper title Oral presentation
1	**Assessment of spatio-temporal changes in terrestrial carbon sequestration with special reference to the proposed silver line project (K-rail) corridor in Kerala, India** Shilpa Sudhi, Student Government Engineering College, Thrissur
2	**A Sustainable Environmental Solution: Biological Treatment of Morpholine and Its Derivatives (MAID) in Industrial Effluents** Rupak Kumar, SrTDA CDSCO, New Delhi
3	**Salvinia infestation of Satpura reservoir: A reason for environmental, social and economic destruction** Mohammad Nadim Ansari, PhD scholar Kerala University of Fisheries and Ocean Studies, Kochi, Kerala, India
4	**Plastination: An innovative technique for Fish Preservation** Suyani Nitin Kanji, Ph.D. Research Scholar College of Fisheries Science, Kamdhenu University, Veraval, Gujarat, India
5	**Silicon: An Important Nutrient for Soil Health, Crop Production and Stress Mitigation** Seema Pooniyan, Student MPUAT -Udaipur

	Paper title (Poster)
1	**Diversity of selected saltpan ecosystems of north coastal districts of Maharashtra** Meenatchi S, PG Research scholar ICAR-Central Institute of Fisheries Education, Mumbai
2	**Microalgae as future scope for edible oil production** Vennila M, PG Scholar Dr.MGR Fisheries College and Research Institute-TNJFU, Ponneri
3	**Winter Smog in Lahore Metropolitan: Its Causes, Health and Economic Impacts and Way Forward to its Mitigation** Rubab Nazar, Student Government College University, Lahore, Pakistan

TECHNICAL PROGRAMME SCHEDULE

Day 2: Technical Session 2 – Disaster Mitigation and Adaptation Strategy

Date; June 12, 2022

Duration; 7.30 PM IST to 9.30 PM IST

Chairman; Dr. John Richard Thomas

Hazard analyst

DEOC Pathanamthitta, Kerala, India

Sl.No	Paper title (poster presentation- General irrespective to technical session theme)
1	**Impact of Agricultural Practices on Water Pollution** Neha Khardia, Ph.D Scholar Maharana Pratap University of Agriculture and Technology, Udaipur
2	**The Kankyo Café method of environmental dialogue and SDGs** Jin Tanaka, Branch manager UNISC International, Japan
3	Mitigation the impacts of climate change on biodiversity Rekha Kharra Ph. D. Scholar Rajasthan College of Agriculture, MPUAT, Udaipur

4	**Climate change: Implications for Agriculture** Abhishek Aswal, PhD Scholar Forest Ecology and Environment Indian Institute of Remote Sensing, Dehradun, Uttarakhnad
5	**Groundwater quality and magnetic susceptibility studies along Northern Coast of, Tamilnadu.** Giridhare Cavin Balaje R, Ph.D. Research Scholar Department of Geology, CEG campus, Anna University, Chennai
6	**Climate Change: A threat to biodiversity** Deeksha Chauhan, Student Mpuat, Udaipur
7	**Impact of Biochar on Sediment Quality and Growth of Genetically Improved Farmed Tilapia** Tao kara, Research scholar ICAR CIFE, Mumbai
8	A study of fish ethnoscience as a foundation for developing ethno-conservation strategies Meenatchi S, PG research scholar Central Institute of Fisheries Education, Mumbai
9	**Loss of biodiversity of medicinal plants in India** Sampa Biswas, Student jadavpur university
10	**Spatial variation in the distribution of mesozooplankton in the Arabian Sea during summer monsoon** Suhaana M Nazar Department of Marine Biology, Microbiology and Biochemistry, School of Marine Sciences, Cochin University of Science and Technology, Kochi

Abstracts

SOIL POLLUTION AROUND THE COAL MINES AND APPLICATION OF ROCK DUST FOR SOIL REMEDIATION

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The coal mining activities is expanding everyday due to its high demand and helps in economic growth of country. But concurrently, these mining activities (coal extraction, transportation, overburden dump, generated dust etc.) are the major source of pollution in soil. The disposal of by-products of coal mining to the bare lands alter the physical, chemical, and biological characteristics of the soil. These disposed by-products releases trace elements into the soil through different geological agents. As a result, different environmental (soil acidification, increased level of contaminants), geomorphological (alteration of topography, erosion of soil), and health problems arise. The conservation of soil ecosystem is necessary for sustainable development as it provides the security of food, nourishment, earnings, sustaining of biosphere, and environment to all living beings. But the unsystematic and unplanned use of soil has attributed to soil pollution, reduction in biological activities, imbalance in physical and chemical characteristics of soil. The degradation in the quality of soil has led to reduction in growth and yield of crops, along with crop quality and consequently, decrease in economic growth. The nutrients present in the soil has been gradually decreasing due to weathering and continuous crop production which led to the production of nutrient deficient food. To cope up with such problems various international researchers have proposed the idea of adding rock dust (RD) into the soil. RD, a natural geo-resource, is ideally considered as a waste in quarrying industries and has very low commercial value, but the advocates of RD also refer it as a ‘re-mineralizer’ because these quarry fines re-

introduce the minerals to the soil. The limited research and experiments which have been carried out by several in the field of RD application for different purposes show a positive outcome. However, very limited scientific data is present for approving the application of RD and its benefits. The RD remediation technique enhances the properties of soil, growth and yields of plants, helps in carbon sequestration, acts as an alternate option for fertilizers, reduction in trace element concentration from soil and many more. As investigated by several researchers the application of RD is a relatively safe and effective method but depends on several factors such as physicochemical characteristics of soil, level of concentration of pollutant present in the soil, type of plants or crops to be cultivated, climate of the region, presence of microbes, RD type and the minerals present in them. Various

dimensions of RD application are yet to be explored and examined for validating the claimed

benefits of RD.

IMPLICATIONS OF STABLE WATER ISOTOPES IN ECOHYDROGICAL POOLS: A REVIEW

BILAL AHMAD BHAT, Research Scholar, UNIVERSITY OF KASHMIR

Water is a prerequisite component for terrestrial, aquatic ecosystems and plays an important role in domestic, agricultural, hydropower and recreational purposes. Approximately 96.5% of all the water on earth is stored in the oceans, 1.69% underground and about 1.74% is frozen and stored in ice caps and glaciers. In just three locations, we find 99.93% of the total water. Only a little fraction of the earth's total water supply comprises all the water found in various pools like rivers, lakes, soil, plants, and the atmosphere. Water vapor flows from different ecohydrological pools has been a subject of many present studies because of its distinguished role in global warming and earth's climate change. The source and movement of water vapor from one pool to another pool presents as intrinsic and proxy for deeper insight into the ecohydrological cycle studies. Since the declining trend of local, regional and global water quantity and quality as reported by (UNESCO 2009) and land use change have been the major challenges that ecohydrological studies needs to cope. Therefore, understanding how terrestrial ecosystem responses to these environmental pressures are tremendously significant for global studies. Furthermore, studies on water scarcity have mostly focused on blue water (ground- and surface water), but green water i.e., (plant and soil water returning to the atmosphere through evapotranspiration process) is also scarce, because its availability is very limited and there are challenging demands gradually for green water. As we know that grazing landscapes, crop yields, forestry and terrestrial ecosystems are all sustained by green water. Hence, the implicit distribution or the portion of limited green freshwater resources over viable pressures that regulates which economic and environmental goods and services will be produced and may affect food security and natural conservation. Therefore, keeping in view the critical importance of global ecohydrological pools in determining the freshwater resources at local, regional, and global scale, different tools and techniques have been found for number of ecohydrological studies. As evident from literature survey, water stable isotopes present noble results and helps us to provide an insight of water characteristics and different water fluxes within

the soil-plant atmosphere continuum. Accordingly, the studies will ultimately led us to understand how water available to ecosystem is used and fractionated by vegetation and influences the water budget through water stable isotopic studies and field based observations in and around the NW Himalayas. The results would finally help to improve the biosphere-atmosphere models by accurate representation of the important components of hydrological cycle. From scientific point of view, the results would be useful for urban and water resource planners, tourism industries and local residents. Consequently, the studies using water stable isotopes in different ecohydrological pools provide us novel ideas and approaches to resolve environmental issues including freshwater resource shortages, ecological degradations, sustainable development, and the spatio-temporal variations in precipitation

Keywords: Water resources; stable water isotopes; climate change; ecological degradations.

EFFECT OF HEAVY METAL STRESS (CADMIUM) ON MORPHOLOGICAL PHYSIOLOGICAL ACTIVITY AND ANATOMY OF COW PEA PLANT.

(Vigna uncuigulata)

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Abstract: This study was done to examine the effect of heavy metal on the growth, lipid peroxidation, antioxidant enzyme activity and some key physio-biochemical attributes in cowpea (Vigna unguiculata [L]. In this study 21 days old seedlings of Cow pea plant (Vigna unguiculata L) were subject to different heavy metal stress levels (0g, 0.1g and 0.2g Cd) at germination and early seedling growth stage of plant development. Data were analysed for growth parameters such as plant height, fresh and dry weight, leaf water content (LWC), and length of radicle and plumule during germination period, and biochemical parameters such as proline content, membrane stability index (MSI), malondealdehyde (MDA) content, chlorophyll content, and antioxidant enzyme activity Catalase (CAT) and Peroxidase (POD). It was seen that the effect of heavy metal stress reduced plant height, fresh and dry weight, LWC, radical and plumule length. Heavy metal stress reduced the biochemical activities and also chlorophyll a, chlorophyll b and total pigment content. The decrease was 0.03 and 0.003 respectively. The result showed an increase in the activity of CAT enzyme in leaves and root with increasing salt concentration. An increase CAT activity were found with 0.1g, 0.2g Cd treatment which represented values of relative increasing of 15.88 and 18.5 g/L in leaves and 9.48 g/L and 12.44 g/L in root respectively. There was increase in the activity of POD enzyme in leaves and root with increasing heavy metal cadmium concentration. The level of POD activity was found with 0.1g,0.2g Cd treatment, which represented relative reduction80.55 g/L and 86.46g/L in leave and root 81.2 g/L and 85.3g/L.

Keywords: Heavy metal, plant stress, Cadmium, Cow pea

ANALYSIS OF EXISTING ENVIRONMENTAL INSTRUMENTS WITH REGARDS TO THE ENVIRONMENTAL POLLUTION

PALLABI PAUL

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With the advancement in science and technology and man made things there is a requirement to consider the issue regarding conservation of our environment and its natural resources**.** Along with the supreme law of the land i.e Constitution which provides mandate to protect the environment and sustainable use of natural resources, there are international instruments of which India is also a signatory to protect the environment. There are numbers of international commitments and policies which are relevant for environment, which includes means for analysis, checklists, and plans. However, there are instruments for environmental policy which are there for executing this policy. In this paper, author find it's relevant to discuss the current status of Environmental Instruments in India .Further to achieve the target to improve growth in forming a standard mechanism for strong environmental governance, the UNDP Country Office has incorporated the Centre for Energy, Environment, Urban Governance and Infrastructure Development (CEEUG&ID),Administrative Staff College of India which has important function to determine the present environmental instrument with the purpose of recognising UNDP nations Office in formulating various initiatives for the implementation of the national environmental plan. There are number of legislation which governs the issues relating to Environment are The National Green Tribunal Act, 2010,The Air (Prevention and Control of Pollution) Act, 1981,The Water (Prevention and Control of Pollution) Act, 1974,The Environment Protection Act, 1986,The Hazardous Waste Management Regulations, and many others. Further highlighting various Energy or Environment related problems and Concerns, discussion has been made regarding the Action Items for eliminating or control of pollution in the environment**.**

Keywords - Pollution, environment, legislative frameworks, UNDP.

ENVIRONMENTAL MAGNETISM PRESENT AND FUTURE

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ABSTARCT:

Mineral magnetic variations, depending on the environmental context, are used as an aid towards elucidation of a diversity of problems. The technique can be applied on consolidated and unconsolidated sedimentary samples from different depositional environments that include lacustrine (lake) and marine sediments, soil and ice cores, atmospheric and road dust particulates as well as some biological entities. Present study is an attempt to use Environmental magnetism as an input for climatic analysis from different depositional environment in India.

Keywords: Environmental, Sediment, Marine, Climate.

PHYTOREMEDIATION: AN EMERGING GREEN TECHNOLOGY TO REMOVE ENVIRONMENTAL POLLUTANTS

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Abstract: As a result of rampant and indiscriminate industrialization and urbanization our environment is increasingly being contaminated with toxic pollutants. Among the toxicants, pollution by heavy metals is a major worry all over the world as they pose a great threat to human and ecosystem. Among the various techniques and methods to address this burning issue, phytoremediation has been growing rapidly in recent years. This environmental benign green technology can be used to remove heavy metals accumulated in soil and ground water using tolerant plants. Remarkable features of metabolic and absorption capabilities of plants are exploited in selective removal of toxic metals from contaminated systems. The present paper describes the heavy metals, their effects, and their removal by phytoremediation method.

Keywords: phytoremediation, heavy metals, green technology, contaminates

SOIL POLLUTION

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The agricultural activities involve addition of nutrients, pesticides and sediments to soil. On the other hand, industry and urbanization pollute the soil with solid wastes, heavy metals, solvents and several other organic and inorganic substances. Soil pollution is defined as the presence of hazardous compounds (pollutants or contaminants) in soil at sufficient amounts to endanger human health and the ecosystem. Soil pollutants such as heavy metals, plastic, polycyclic aromatic hydrocarbons, pesticides, and other non-biodegradable wastes affect the development, morphology, and metabolism of soil microorganisms by causing functional disruptions, protein denaturation, and the destruction of cell membrane integrity, as well as the functioning of the soil as a vital system and the support of its biological productivity. Concerns about soil pollution have grown in significance in the current sense of fertilizer, waste, metals, and chemical usage, among other things. The most typical causes of soil pollutions are industrial activities, agricultural chemicals, and excessive waste disposal. The concentration of such compounds in polluted soil is high enough that they endanger the environment. Also, soil pollution cause contamination of soil with toxic chemicals or other contaminants to the point where the soil quality deteriorates and it becomes uninhabitable for living organisms (e.g., insects, microbes, plants, etc.). Anthropogenic practises are primarily responsible for this increase. Soil pollutants are numerous and diverse. The most serious of these is radioactive pollution caused by nuclear radiation, such as uranium and others. Furthermore, mineral smelting releases numerous pollutants into the soil. Adoption of organic and biological agriculture, as well as biological pesticides such as beneficial bacteria and fungi, is one of the most prominent preventive methods for protecting soil and agricultural lands. Hence, in order to preserve valuable microbial resource in soil and the external environment, we must develop a holistic viable green approach to reducing pollutant entry into soil.

WATER POLLUTION: CAUSES, EFFECT, REPERCUSSION AND MINISTRATIONS WITH SPECIAL REFERENCE FROM MANSAGAR LAKE, JAIPUR

Sweeti Sharma, Research Scholar

Apex University, Jaipur (Rajasthan)

Water is the compound of which are made up of chemical elements oxygen and hydrogen. Water exists on earth surface in liquid and solid form. Water is on earth surface such an important source which is very essential for life (khan et.al.,2020) but due to the decrease in its quality and quantity day by day, it contain a lot of pollution. Mansagar lake also known as Jal Mahal is located in Jaipur city, which is manmade lake, constructed by Raja Mansingh first in 1610 A.D. Mansagar lake getting polluted day by day due to different type of untreated waste in water which cause severe contamination and also affect aquatic life. Thus, the main objective of this research is to find out the causes of water pollution and treat them. In mansagar lake, to find out the quality of water we will check some special standard test like as acidity, alkalinity, total dissolved solid, pH, BOD, COD, hardness etc. As a result of rapid urban development, improper sewage disposal, chemical waste dumping, silt formation, domestic effluents and other waste material cause water pollution which reduce water quality. Reduction in water quality cause adverse impact on aquatic life as well as human life. Various types of physiochemical studies were done in water.

KEYWORDS –

Contamination, acidity, alkalinity, BOD, COD, urban development, sewage disposal, domestic effluents, physiochemical

REVIEW ON BIVALVES AS BIOINDICATOR OF MICROPLASTIC POLLUTION – AN INDIAN PERSPECTIVE

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Recently, microplastic (MP) pollution has emerged as one of the most important global threats to the environment and human health risks. In the last few years, we could have witnessed exponential growth in the MP studies in India due to the growing interest in MPs negative impacts on the natural environment and biota and potential human health risks. Bioindicators or sentinel organisms are essential for monitoring and assessing microplastic pollution in eco-compartments. It can give a clearer idea about the prevalence of MPs pollution in a particular region and helps policymakers in terms of pollution control and management. Identifying suitable sentinel species is crucial since it can influence the relevance of the final results of MPs monitoring programmes. The feeding selectivity, a wide range of distribution, sedentary nature, high degree of tolerance to a wide range of environmental contaminants, low rate of metabolism, ease of sampling, identification, handling, and general species knowledge are considered as the major choice drivers of bioindicators. Generally, bivalves are vital for ecosystem functions as they link pelagic and benthic ecosystems and are also regarded as sensitive indicators for environmental changes, mainly environmental pollutants such as microplastics, persistent organic pollutants and heavy metals. In this review, we tried to identify the suitable bivalve bioindicators in the Indian waters based on earlier studies conducted by different authors. According to their results, mussels, clams, and oysters can be good candidates for use as sentinel organisms for monitoring MPs pollution in specific marine environments. Furthermore, studies are needed to clarify the ideal sentinel organism for microplastic pollution and its impacts on them since not many studies are there in this aspect compared to other countries.

Keywords: Microplastics, Bioindicators, Bivalves, Indian waters

COMPREHENSIVE STUDY OF LAND USE LAND COVER CHANGE AND ITS ECOLOGICAL IMPACT ON ANDAMAN AND NICOBAR ISLAND WITH SPECIAL REFERENCE TO CORAL REEF

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Land Use and Land Cover (LULC) changes play an important role while planning for the sustainable development of an area. The present study examines the spatial dynamics of LULC changes in the Andaman Island, Little Andaman Island and Great Nicobar Island, Andaman and Nicobar, India, using remote sensing and Geographical Information System (GIS) techniques for a period of the past 30 years. Landsat satellite data from 1990, 2000, 2010 and 2020 were used to investigate the changes. LULC classes mapped are forest, built-up, mixed crop with built-up, coral reefs, waterbody, and swamps. Andaman and Nicobar Islands are vastly covered by forests. Results show that forest area has decreased whereas built-up and mixed crop with built ups has gradually increased over the years. The transition in land use prominently depends on the tourism, defence, civil, and fishing sectors which play a salient economic role in the development of the union territory. Port Blair is the capital city that connects through mainland transportation, so the density of population is high around this city. Tourism and recreational activities increase stress on the pristine coral reefs and sandy beaches. The findings of this study are intended to contribute to effective and appropriate decision-making for resource management and in preparing a holistic island development plan.

Keywords: Land Use and Land Cover, Coral reef, Geographical Information System, Climate Change

NATURAL CARBON SEQUESTER: THE GIANT SWIMMING TREES (WHALES) AGAINST THE CLIMATE CHANGE

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Abstract: Carbon in the atmosphere is a significant cause of climate change, which is the greatest threat to all life on Earth as well as an issue of great environmental concern. Global warming mitigation techniques, such as capturing carbon directly from the atmosphere and burying it deep in the earth, are complex, unproven, and pricey, but we have one solution. There's no doubt that whales are one of the most extraordinary animals in our ocean, but did you know that they're also helping to lighten the load of climate change? The carbon capture potential of whales is truly startling. Whales store a huge amount of carbon in their bodies throughout their long lifetimes, called whale carbon. When whales die of natural causes, they sink to the seafloor called whale falls and each giant whale sequesters 33 tons of CO_2, eliminating that carbon from the atmosphere for millennia. Meanwhile, a tree can absorb only up to 48 pounds of CO_2 per year. They also fertilize the ocean with their feces and urine, leading to large phytoplankton blooms. Whales bring minerals up to the ocean surface through their vertical movement, called the "whale pump." They are our allies in fighting climate change, and like rainforests, they urgently need our protection. We have to minimize every anthropogenic threat affecting charismatic species through decisive and concerted actions because whales are like giant swimming trees (whale).

Keywords: Whale carbon, Climate change, Global warming, Threats, Whale fall, Whale pump.

SPATIOTEMPORAL VARIATIONS IN THE BIOCOENOSIS OF MEIOBENTHOS AND NEMATODES IN THE ARCTIC KONGSFJORD (SVALBARD) IN THE EVOLVING CLIMATE CHANGE SCENARIO

Krishnapriya P.P., Aswathy N.K., Jima M., and S. Bijoy Nandan

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Abstract

Growing shreds of evidence are there that climate change could affect the marine benthic system, especially in the polar regions. The present study is focusing on the spatiotemporal variations of meiobenthos and nematodes in the Arctic Kongsfjord from 2015–to 2017. The meiofaunal community of Kongsfjord comprises Foraminifera, Nematoda, Ostracoda, Herpacticoid Copepoda, Kinorhyncha, Oligochaeta, Tintinnida, Bivalvia, Polychaeta, and Gastropoda wherein, foraminiferans (40%) and nematodes (34%) were the dominating groups during the study period. The abundance and biomass of meiofaunal groups were higher towards the outer basin of the fjord where the sediment disturbances caused by increasing sediment re-suspension due to glacial activity is low. Significant variation was noticed in the community structure of meiofauna in three consecutive years. All together seventy-three nematodes have been identified, Dorylaimopsis sp. (62%), Tercshellingia longicaudata (15%), and Sabatieria sp. (6%) were the dominant nematode species in the area. Nematode (Shannon weaner) diversity was found to be high in 2016 (1.99±0.29) and low in 2015 (1.85±0.33). The study established that changing depth profiles, salinity gradients, dissolved oxygen, granulometric composition, organic matter availability, and the amount of available phosphorous act as the major environmental drivers influencing the biocoenosis of meiofauna in the Arctic Kongsfjord. For the sustainable management of the polar system, studies on the benthic fauna have a huge importance in the emerging global climate change.

Keywords: Kongsfjord, Meiofauna, Nematoda, PERMANOVA, PCA, RDA, CCA

A VEGETATIONAL CHANGE ANALYSIS UTILIZING MULTI-TEMPORAL NDVI DATA SERIES: A CASE STUDY FROM AHMEDABAD DISTRICT (GUJARAT), INDIA

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The goal of this research is to improve the detection process in satellite image analysis using the Normalized Difference Vegetation Index (NDVI). The above approach is one of the best remote sensing analytical processes to simplify multispectral data. The NDVI is the most widely used indexing method for assessing vegetation and detecting changes in vegetation. The capability to compute an NDVI using any hyperspectral sensor with visible and near-IR ranges has evolved in its widespread application of Landsat image Remote Sensing data. The vegetation change analysis in this study was done utilising satellite image processing and NDVI differencing. Data from remote sensing offers information on criteria that help in vegetation ranking, such as area. For the years 1990 and 2021, an NDVI variation was done. It offers a comparison of the yearly average NDVI from 1990 to 2021. The greenish yellow pixels imply that there is more vegetation space here. Variation in vegetation analysis is a cost-effective means of monitoring changes in each land use type. Agricultural land, mountain ranges, and arid farming regions have all seen significant changes in vegetation during the last decade. As a result, NDVI is quite good at detecting surface features in the visible range, which helps policymakers formulate development plans.

Keyword: Vegetation index, geographical information system, remote sensing, multi-spectral data

PRELIMINARY SURVEY OF BIODIVERSITY OF DANA PANI BEACH LOCATED IN SUBURBAN MUMBAI, MAHARASHTRA

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Dana Pani Beach is located in Malad West, Mumbai Suburban, Maharashtra at 19°10'10.88"N Latitude and 72°47'18.20"E Longitude. There is very scanty research data available of this beach location. The beach comprises of rocky shore, sandy shore and small area of mudflat. This site is an opportunity for researcher to understand 3 types of habitats in one beach viz. Rocky, Sandy and Mudflat. The beach is a tourist site where people frequently visit for a picnic, cricket and fishing. Disturbance triggered by anthropogenic activities, probably could be the reason for erratic diversity of organisms. This is a tentative checklist of intertidal flora and fauna to investigate the diversity vis-à-vis environmental and/or anthropogenic devastation caused to the habitat. The Intertidal species with ability to withstand such vagaries (litter of the place with broken glasses of alcohol bottles, immersion of idols and littering plastic bags) were found in abundance. Two marine algal population in abundance were observed to be Ulva and Gracillaria. Mangrove community was dominated by *Avicennia marina* and *Rhizophora mucronata*. Hydrozoans and Polychaetes showed lowest diversity when compared with other group of organisms. Birds population was most abundant within the habitat. In order of abundance the animal population was represented by 27% Aves > 25% Malacostraca > 24% Gastropods > 10% Actinopterygii > 4% Anthozoans> 2% Hydrozoa > 2% Polychaetes. From the study it can be concluded that the rocky shore is quite diverse in terms of gastropod, crabs and green algae in comparison to the sandy shore and mudflat. The destruction of marine habitat, not only affects the intertidal flora and fauna but also the oceanic life, which often are unable to differentiate between plastic materials and the food they consume. However, thorough catalogue of taxonomic nomenclature of intertidal organisms that live within diverse beach arena needs to be documented with elaborate study.

Key Words: Dana Pani Beach, Intertidal region, Flora, Fauna, Anthropogenic activities.

DISTRIBUTION AND FUNCTIONAL DIVERSITY OF FREE- LIVING NEMATODES FROM THE MACROBENTHOS IN THE ARCTIC GLACIAL KONGSFJORD

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The study is based on the benthic samples collected in the context of the Indian Arctic Expedition in 2016 from the Kongsfjord. The sediment samples were collected from 8 stations using a van Veen grab with a 1 m^2 catching area at a depth range between 29m and 292m. Marine free- living nematodes are the most abundant metazoans in marine sediments, play a fundamental role in nutrient cycling and food web dynamics, serving as bioindicators of ecosystem health. The ecological importance of nematode biodiversity in the Arctic regions remains largely unexplored. This study revealed macrobenthic nematodes (> 500 µm) in the Arctic Kongsfjord from 8 stations at a depth range of 29m to 292m. A total of 33 genera, representing 13 families were identified. The macrobenthic nematode communities were dominated by the order enoplida and the dominant nematode species were *Viscosia* sp. (7%) was followed by *Anticoma* sp. and *Rhabdonemania major* (6%). The functional morphology reveals that the predators and omnivores (46%) were dominant feeding groups, whereas the selective deposit feeders dominating second (26%). Clavate (65%) and long/filliform (20%) were the most prevalent tail shapes. Individuals in the size category of >3mm (84%) size were dominated, and majority of the nematodes were slender in shape. Abundance, species richness, and shannon-Wiener's diversity index showed similar trend in station 5 and 6. This study provides baseline information on diversity, distribution and functional of traits of macrobenthic nematodes in the Kongsfjord.

Keywords: *Arctic, Kongsfjord, Macrobenthos, Nematodes, Enoplida, Viscosia*

COMPARATIVE ASSESSMENT OF THE VARIABILITY OF PRECIPITATION EXTREMES IN THE BOREAL SUMMER ACROSS INDIA AND THEIR IMPACT ON BIODIVERSITY FROM 1951 TO 1989 AND 1990 TO 2020

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The Indian monsoon rainfall and extreme rainfall occurrences have been the subject of several research and precipitation extremes are interpreted differently depending on how they are defined in terms of time and space scale. The present study examines rainfall patterns in each subdivision, establishes an acceptable threshold for qualifying precipitation extremes and compares the changes trends of extreme precipitation events between the periods of 1951-1989 and 1990-2020 in response to climate change. To define homogeneous regions, subdivisions with identical or nearly similar thresholds are placed together. The study then also analyses how the changes in extreme precipitation has impacted the biodiversity of that region. Floods, landslides etc are casualties of precipitation extremes during the summer monsoon periods in Assam and Meghalaya as well as Kerala and Mahe subdivisions. Some regions show an upward trend in the frequency of precipitation extremes while some others display downward trends. This study analyses the possible impact of such trends in the biodiversity of these regions.

CLIMATE CHANGE AND AGRICULTURE: GLOBAL AND LOCAL PERSPECTIVES

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Climate change denotes long term changes in climate including mean temperature and precipitation. Shifting weather patterns results in changing climate, this sort of change threatens food production through increased unpredictability of precipitation, rising sea levels contaminate coastal freshwater reserves and increase the risk of catastrophic flooding. A warming atmosphere aids the pole-ward spread of pests and diseases once limited to the tropics. Greenhouse effect is one of chief causes of climate change on earth. The greenhouse effect plays an important role in regulating the climate of the earth. In the absence of this greenhouse effect earth's surface temperature would be far below freezing. However, an increase of these GHGs could result in increased trapping of heat and rising global temperatures. Agricultural productivity is sensitive to two broad classes of climate-induced effects, one is the direct effects due to changes in temperature, precipitation, and carbon dioxide concentrations and the other is the indirect effects through changes in soil moisture and the distribution and frequency of infestation by pests and diseases. The main direct effect is generally seen on the duration of the crop. Duration of crop growth cycles are related to temperature. Therefore, an increase in temperature will speed up development. In the case of an annual crop, the duration between sowing and harvesting will shorten, for example, the duration in order to harvest a maize crop could shorten between one and four weeks. The shortening of such a cycle could have an adverse effect on productivity because senescence would occur sooner. In India impact of 1-2 o C increase in mean air temperature is expected to decrease rice yield by about 0.75 t/ha in efficient zones and 0.06 t/ha in coastal regions and impact of 0.5o C increase in winter temperature is projected to reduce wheat yields by 0.45 t/ha.

Keywords: Carbon dioxide, greenhouse gas, greenhouse effect, productivity

ASSESSMENT OF SPATIO-TEMPORAL CHANGES IN TERRESTRIAL CARBON SEQUESTRATION WITH SPECIAL REFERENCE TO THE PROPOSED SILVER LINE PROJECT (K-RAIL) CORRIDOR IN KERALA, INDIA.

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Carbon dioxide from the atmosphere is absorbed naturally through photosynthesis and stored as carbon in biomass and the process is commonly referred to as Terrestrial Carbon Sequestration. Silver Line/ K-Rail project is an upcoming major infrastructure project in Kerala, which could cause a sizeable reduction in 'Trees outside forest' which in turn affect the terrestrial carbon sequestration. This study aims to find the spatio-temporal changes and in terrestrial carbon sequestration estimation in the proposed Silver line project (K-Rail) corridor area, India. Geospatial Technology is the most efficient technology for spatiotemporal analysis. Summer and winter seasons of Sentinel- 2 image of the year 2021 is taken as the data source for this study. The extent of vegetation cover has a significant influence on the carbon variations and thus Normalized Difference Vegetation Index (NDVI) of the study area was determined and its metadata obtained was utilized for the further calculation of carbon stock, biomass, and carbon dioxide using QGIS software. Distance zone classification was performed with the help of zonal statistics in a 10m, 30m and 500m buffer distance. The result indicated seasonal changes in the terrestrial carbon sequestration and a noticeable difference in carbon, biomass, and greenery in the K-Rail corridor after the completion of the project.

A SUSTAINABLE ENVIRONMENTAL SOLUTION: BIOLOGICAL TREATMENT OF MORPHOLINE AND ITS DERIVATIVES (MAID) IN INDUSTRIAL EFFLUENTS

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The sustainable solution is an ancient core concept (ACC) that continues to be the only solution for healthy and productive life into a distant future. It is a multidimensional and multidisciplinary concept covering almost all spheres of human activity at global, national, local and individual scale. So it has become everybody's cup of tea and observed to have two obligations on its two sides of a coin. One side is the alleviation of poverty and the other, the protection of environment. A perspective solution for environmental sustainability is achieved through the biological route which is considered as one of the cleaner, greener and safer, way of sustainable waste management practices for decontaminating wide range of pollutants and its mitigation. As per U.S EPA 2010, almost 4 billion pounds of toxic chemicals were released into the environment and increases annually at the rate of 16%. Morpholine and its derivatives (MAID) is one such chemical which is extensively used in myriad industries – from power plants to petroleum refineries. Consequent to its wide range of applications and solubility, significant amount of this chemical is released via industrial effluents into environment. In the natural environment, its secondary amine functionality leads to nitrosation to form N-nitrosomorpholine, a well characterized carcinogen. The largescale annual usage of morpholine (25,000 CA) and its potentially carcinogenic effects thus have environmental interest for its sustainable solution. The focus of our research is to reduce the pollutant morpholine and its derivatives in industrial discharge and investigate the reduction in chemical oxygen demand (COD) via the route of microbial degradation to conserve the natural environment and resources, and to curb the negative impacts on biota. In this study, industrial effluent samples were acquired and the presence of MAID was estimated by spectrometric and gas chromatography analysis. Bacteria isolated from natural sources were used to treat these effluents by adapting this bacterium (mutant) into increasing concentration of morpholine up to 0.15% as the sole source of carbon, nitrogen and energy nutrition and reduced COD by 17-23% over a period of 48 hour treatment. Keyword: Industrial effluents, Morpholine and its derivatives, Carcinogen, Sustainable solution, Chemical oxygen demand

SALVINIA INFESTATION OF SATPURA RESERVOIR: A REASON FOR ENVIRONMENTAL, SOCIAL AND ECONOMIC DESTRUCTION

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The present study is mainly focused on the *Salvinia* sp. infestation in the Satpura reservoir, a medium sized reservoir of Madhya Pradesh of India and its impact on environmental, social and economic status of fishermen. For impact estimation of *Salvinia* infestation, a survey was performed by questionnaire formation. The questionnaire prepared for so is having both open and close ended questions with 25 indicators, of which 19 belonged to social and 6 to economic status assessment. 185 fishermen from existing 3 co-operative societies viz. Satpura, Gopinathpur and Basanti Fisheries Co-operative Societies of reservoir has been surveyed and the data were analyzed by using MS Excel software of Microsoft Office. For environmental impact of *Salvinia,* experimental fishing was performed as well as survey was involved with this kind of question. Per day catch of fish's ranges from 1.5 – 5 kg round the year whereas in off-monsoon season (around 8 to 9 months), it ranges from 1.5 – 2 kg / day, which indicates the threat to biodiversity, abundance of fishes and the deviated composition of catch from the reservoir. About 43.85% fishers are using only tin boards (traditional) as craft. The monthly income out of fishing and expenditure of a fishermen family is worked out to be 1920.67₹ and 5093.85₹ on monthly basis, which indicates the Below Poverty Line (BPL) status of fishermen as well as impotency of fishery as fulfillment of daily needs. Officially 95.71% fishers are lying in BPL category. Increased expenditure and lower income out of fishing is forcing fishers to shift their occupation temporarily, partially, or permanently. The other sources of income, the fishers are forced to do are - agriculture, labourship (migratory and local), business and others. The study provides basic and first reporting of socio-economic status of the fishers' and environmental destruction of fish ecology of Satpura reservoir. This data could be helpful in policy and rulemaking for environmental, social and economic sustainability attainment of reservoir and the scientific sustainable management.

PLASTINATION: AN INNOVATIVE TECHNIQUE FOR FISH PRESERVATION

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Abstract

Anatomical learning has changed significantly over the last decade to match up with changing curriculum design concepts. Most taxonomic and research facilities currently use alcohol and formaldehyde to preserve fish, which is detrimental to one's health. Plastination is a novel technique developed by Dr. Gunther Von Hagens in 1977 to preserve perishable biological tissues and specimens, including fish in a dry and odorless state. Fishes are fixed in synthetic compounds such as silicone polymers and epoxy resins, resulting in dry, robust, portable, non-toxic, and natural-looking specimens that can be preserved for a long period of time and can be permanently stored at room temperature without visible morphological modifications. Plastinates retain their natural color and consistency, as well as remain dry and free of formalin vapors, giving them numerous advantages over conventional formalin-fixed specimens. This method has been shown to be quite useful in anatomy and taxonomy for both instructional and research purposes. Fish plastinates are also essential for documenting and describing global biodiversity over time.

Keywords: Anatomy, Acetone, Plastination, Polymer, Taxonomy

SILICON: AN IMPORTANT NUTRIENT FOR SOIL HEALTH, CROP PRODUCTION AND STRESS MITIGATION

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Silicon (Si) is ubiquitous and second most abundant element in earth's crust after oxygen. Silicon is a beneficial element which influences the growth, development, and yield of many crop plants especially rice,sugarcane and maize. Despite of its abundance in soil, silicon exists as SiO_2, a form not available for plant uptake. Monosilicic acid (H_4SiO_4) is the form of silicon used by plants. But natural release of monosilicic acid from silica is a slow process. The concentration of H_4SiO_4 in the soil solution is influenced by the soil pH, amount of clay mineral, organic matter, oxides and texture. Silicon may be a yield-limiting element for rice production particularly in soils with deficient or low in available silicon. Therefore, it is necessary to provide exogenous silicon fertilizer for an economic and sustainable crop production system. Silicon increases the resistance of crop to biotic and abiotic stresses. The effect of silicon in mitigating disease significantly contributes to increased yields, but silicon has also been observed to increase yield in the absence of disease.

Keyword: Monosilicic acid, biotic, abiotic, organic carbon

DIVERSITY OF SELECTED SALTPAN ECOSYSTEMS OF NORTH COASTAL DISTRICTS OF MAHARASHTRA

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Solar salterns are an extreme habitat with high sodium chloride concentrations, occasional quick fluctuations in water activity, low oxygen concentrations, and intense UV light. They are often subjected to a wide range of environmental stressors, primarily salinity variations. The brine ecosystem is distinguished by its biotic simplicity, with a limited number of species in each trophic level, which may be ascribed to stress circumstances on the biotic population. A research was conducted using samples collected from the saltpans of Maharashtra's Bhayandar, Saphale, Thane, Wadala, Morva, Naigaon, and Bhandup. Samples were collected in 500ml polythene bags. They were kept in 95% ethanol and examined under a microscope. We collected and identified the following organisms from the research area. Fabrea salina, copepods, Navicula. Sp, Thalassionema.sp, Magrove crab, Fabrea salina, Wyeomia smithii, Tubifex worm, and Nitzschia.sp. As a result, it suggests that while many hypersaline conditions are hostile to macroscopic life, they are the preferred homes of a wide range of microorganisms. The kind of saltpan may be very effectively used as a natural food source for all cultivable fishes. The above-mentioned organisms might be suggested to cultivate in the salt-pans region during salt production based on their abundance in the salt-pans and market needs.

Keywords: Saltpan, ecosystem, diversity, live food cultivation

MICROALGAE AS FUTURE SCOPE FOR EDIBLE OIL PRODUCTION

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Microalgae have a lot of oil production potential, not just for biodiesel but also for culinary oils. Because of their superior photosynthetic efficiency, biomass production, growth rate, and CO_2 fixation rate, they create more oil than plants. They can also be cultivated in areas where agriculture isn't possible and doesn't require potable water. Microalgal oils have the potential to replace vegetable oils in culinary products while also delivering health benefits. Because microalgae have an abundant source of PUFAs. The oil from microalgae is used as raw materials or additives for edible oil from conventional sources to improve the nutritional and edible value of the latter. Food researchers have focused on microalgae, an effective, sustainable, and promising source of food and fuel supplies. Microalgae are used as a source of edible oil to save agricultural resources. This paper overviewed the appropriateness of microalgal lipid compositions for edible oil production and suggests a species list. The process of extracting and refining edible oils from microalgae is compiled and presented. This paper is thought to provide a theoretical framework for the actual production of microalgae edible oil, as well as inspiration for future research on microalgae oil synthesis, accumulation, extraction, and processing.

Key words : Microalgae, Edible oil, Lipid Extraction, PUFA

WINTER SMOG IN LAHORE METROPOLITAN: ITS CAUSES, HEALTH AND ECONOMIC IMPACTS AND WAY FORWARD TO ITS MITIGATION

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Globally, smog is one of the worst consequences of air pollution with dynamic impacts. Smog in India and Pakistan shares mutual causes including unsustainable urbanization, industrialization, agriculture, and transportation. The states around Delhi and major cities of Pakistan continuously get covered with the layer of smog since 2016. Open field burning of rice crop residues is recognized as the major cause of the episodes of winter smog in these two countries. The time period of smog runs from February to October when rice crops has to be harvested and wheat has to be sown. The environmental, social, economic, and health impacts of winter smog are seen very drastic for Lahore Metropolitan where urbanization related issues keep on expanding. Consequently, the smog crisis results in poor air quality of Lahore due to high PM 2.5 concentration of 136.5µg/m3 and air quality index of 598µg/m3 as recorded in 2019. The economic and health impacts of smog in Pakistan cannot be ignored as 128,000 people die annually from air pollution-related diseases and its economic burden is 5.88% of the country's GDP. In this paper, a comprehensive overview of existing causes of winter smog has been presented, analysis of economic and health impacts has been done and extensive solutions have been given to better this situation for Lahore Metropolitan. The improvement should be ensured in air quality monitoring, fuel quality, environmental legislation, and harvesting techniques. The governments of India and Pakistan should announce subsidy for farmers to uplift the usage of sustainable harvesting machines. Keywords Environmental Pollution, Air Pollution, Smog, Air Quality, Health, Lahore, Pakistan, India

IMPACT OF AGRICULTURAL PRACTICES ON WATER POLLUTION

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Abstract

Agriculture is the significant contributor of nonpoint source contamination of surface water and groundwater around the world. Such sources are probably going to be significantly more critical in emerging nations, including India, where farming and country territories are as yet predominant, in contrast to the G7 or other prosperous industrialized countries. In comparison to developed countries, India's use of chemical fertilizers and pesticides (or any other agricultural chemicals) is still low and eutrophication due to high levels of washed-off nutrients has been observed in rural ponds and other stagnant bodies of water receiving agricultural drainage. High nitrate concentrations contaminate the groundwater in many states such as Punjab and Haryana. Heavy silt loads, together with enormous amounts of dissolved salts, fertilizers, organics and even heavy metals and microbiological pollutants washed off during floods, appear to be the main source of agricultural pollution. The silt clogs the flow channel, which encourages seasonal floodplain agriculture even more. After the floods, high salt and nitrogen concentrations foster the growth of weeds and macrophytes. Organics, heavy metals, and bacterial pollution make stream water unsuitable for in-stream usage or abstraction. As a result, limiting the environmental and ecological impact of long-term chemical/pesticide use and sustainable agriculture has become a need. The right policies and incentives such as prohibitions on pollutant discharge, limits on the marketing and sale of risky items and restrictions on agricultural practices on farm location can reduce water pollution. Along with this policies must modify farmer behaviour and incentivize the adoption of sustainable agricultural practices.

THE KANKYO CAFÉ METHOD OF ENVIRONMENTAL DIALOGUE AND SDGS

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The 2030 Agenda for Sustainable Development states the need for regional-level dialogue. Scientists and the public have been engaging in dialogues, known as “Kankyo Cafés” since 2015. The Café is an event at which an environmental dialogue takes place with the aim of deepening the participants’ understanding and promoting empathy. The cafés generally last for about 60 to 90 minutes. Each café has about four to eight participants. In Japan, cafés related to a safe and secure society and harmonious coexistence with nature have been held, with themes related to SDGs. Cafés have also been held on SDG themes at universities in the United States etc. In addition, the type of environmental dialogue represented by the café is related to other interactive environmental educational activities and more generally to SDG 4 (education). We hope to continue this activity by inviting not only students but also a broader range of participants, and hope that the sharing of various opinions from people of different cultures and educational backgrounds will contribute to a better understanding of environmental issues. We predict that using this method for education, consensus building, and policy advocacy will help to promote a society that pursues SDGs in the future.

MITIGATION THE IMPACTS OF CLIMATE CHANGE ON BIODIVERSITY

Rekha Kharra[1] and U. N. Shukla[2]

Climate change is a major threat to biodiversity, ecosystem services and human wellbeing. Mitigating its effects on living organisms and societies is increasingly at the heart of environmental management strategies, which need to be informed by the best science available in order to succeed. Predicting the ecological, economical and societal consequences of climate change requires a novel scientific approach that goes beyond traditional ecological research – we now need to capitalize on novel technologies, encourage collaboration between research disciplines, engage with society and support decision-making processes at local, National and International scales. Forest ecosystems are critical to mitigating greenhouse gas emissions through carbon sequestration. However, climate change has affected forest ecosystem functioning in both negative and positive ways, and has led to shifts in species/functional diversity and losses in plant species diversity which may impair the positive effects of diversity on ecosystem functioning. Biodiversity may mitigate climate change impacts on (I) biodiversity itself, as more-diverse systems could be more resilient to climate change impacts, and (II) ecosystem functioning through the positive relationship between diversity and ecosystem functioning. By surveying the literature, we examined how climate change has affected forest ecosystem functioning and plant diversity. Based on the biodiversity effects on ecosystem functioning (B→EF (biodiversity-ecosystem function), we specifically address the potential for biodiversity to mitigate climate change impacts on forest ecosystem functioning. For this purpose, we formulate a concept whereby biodiversity may reduce the negative impacts or enhance the positive impacts of climate change on ecosystem functioning. Further B→EF studies on climate change in natural forests are encouraged to elucidate how biodiversity might influence ecosystem functioning. Forest management strategies based on B→EF have strong potential for augmenting the effectiveness of the roles of forests in the mitigation of climate change impacts on ecosystem functioning.

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CLIMATE CHANGE: IMPLICATIONS FOR AGRICULTURE

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The effects of climate change on crop and food production are already evident in several regions of the world, with negative impacts more common than positive ones. Without adaptation, climate change is projected to reduce production for local temperature increases of 2°C or more up to 2050, although individual locations may benefit. After 2050, the risk of more severe yield impacts increases and depends on the level of warming. Climate change will be particularly hard on agricultural production in Africa and Asia. Global temperature increases of 4°C or more, combined with increasing food demand, would pose large risks to food security globally and regionally. Recent extreme climatic events, such as heat waves, droughts, floods, and wildfires, are combining with long-term trends including rising temperatures and changes in precipitation patterns, with broad and deep implications for the agricultural sector and global food security. Greenhouse gas emissions over many decades are already affecting production of rice, wheat and maize. Without adaptation, local temperature increases of 2°C are expected to reduce yields further. While CO2 in most cases has a stimulating effect on plant growth, ozone reduces growth. Elevated ozone levels have very likely suppressed global production of crops, causing estimated losses of 10% for wheat and soybean. These are some aspects of a complex picture involving interactions between CO2, ozone, mean temperature rise, temperature extremes, reduced water availability and changes to the nitrogen cycle, whose overall effect is difficult to predict. In addition, areas suitable for cultivation of coffee, tea and cocoa, which support millions of smallholders in over 60 countries, are likely to be significantly reduced by temperature rise and other factors. The quality of some foods is likely to be affected. Growing wheat, rice, barley or potato in high CO2 concentrations reduces the protein content by 10–14%. Some crops may also show reduced mineral and micronutrient concentrations. Keywords: Climate change, greenhouse gas, ozone, productivity.

GROUNDWATER QUALITY AND MAGNETIC SUSCEPTIBILITY STUDIES ALONG NORTHERN COAST OF, TAMILNADU.

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The Saline water intrusion & Submarine Groundwater Discharge (S.G.D.) are the two major processes occurring in coastal aquifer. The coastal aquifers are exploited to meet the increasing demand of fresh water for domestic and industrial needs. This resulted in seawater intrusion along the coastal zones and thereby deteriorates the quality in several parts of the world. In latter case, some regions along the coastal zone, we can find a subsurface flow of ground water which gets discharged into the sea and hence this subsurface discharge of groundwater into the sea is called as S.G.D. These zones have higher groundwater recharge capability, and they are usually high potential aquifers. The Chennai, which is one of the densely populated metropolitan falling along the East coast of India is affected by sea water intrusion. Along the East Coast Road (Pulicat to Mahabalipuram), the saline water moves landward due to several reasons, such as raise in sea-level, over exploitation, lack of freshwater infiltration even though a significant rainfall is available. Though there are major rivers such as Adayar, Koovam & Kosasthaliyar which functions as natural recharge zones, the saline water intrusion is prominent in the coastal zone of Chennai city.

A study has been initiated to understand the effects of blooming population, industrialization, and rapid urbanization along the ECR, Chennai. The study area comprises the region from Pulicat to Mahabalipuram, which is about 115.8 km stretch. A detailed field investigation was carried out during the pre-monsoon and post-monsoon periods between 2019 and 2020. Insitu samples of 50 numbers were collected from hand pump, borewells and open wells, along ECR, Chennai during 2019 to 2020. Insitu data of water quality such as EC, TDS, PH and salinity were collected during the fieldwork. In this study, investigation on water quality using the insitu data collected and a geospatial analysis on Land use and land cover for last one decade were carried out. In addition to the above analysis, magnetic susceptibility data are collected and are being analysed. The results of the above analyses will be presented.

CLIMATE CHANGE: A THREAT TO BIODIVERSITY

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Every change in the ecosystem process or in ecological balance works on the principle of Newton's law of motion (Every action has an equal and opposite reaction) which may be damaging or complimentary. Climate change poses a potential threat to the earth's biodiversity. Climate change refers to any change in the environment due to human activities or because of natural processes. Climate change alters entire ecosystems along with all the plants and animals that live there. Millennium Ecosystem Assessment (MEA) predicts that climate change is likely to become the dominant direct driver of biodiversity loss by the end of the century.

Human pressures on ecosystems are causing changes and losses at rates not seen historically. People are changing ecosystems more rapidly and more extensively than over any other period in human history. Climate change adds yet another pressure on natural ecosystems. Emissions of greenhouse gases due to human activities, such as the burning of fossil fuels, farming activities and land-use changes resulting in increased global warming. Even small rises in temperature are accompanied by many other changes. Only a small change in pattern of climate has severe impact on the biodiversity, altering the habitats of the species and presenting a threat for their survival, making them vulnerable to extinction.

Climate change poses impact on many ecosystems such as - marine and coastal ecosystem, himalayan ecosystem, island ecosystem, inland water ecosystem, forest ecosystem, agriculture, dry lands and grassland and on humans too. In Agriculture- Climate change leads to variability in rainfall patterns, heat stress, spread of pests and diseases greater leaching of nutrients from the soil during intense rains, and shortening of the crop cycle and affecting plant growth and production.

To maintain the balance of ecosystem, interaction between the plants, animals and biodiversity needs to be understood, hence promoting its conservation and protection by

designating the hotspots as biosphere reserves, increasing afforestation, reforestation and agro-forestry practices. Increasing our understanding of the effects of climate change on biodiversity, developing ways of mitigating such effects and reduced anthropogenic activities are critical to limit such damage.

Keywords: Biodiversity, climate change, ecosystem, global warming

IMPACT OF BIOCHAR ON SEDIMENT QUALITY AND GROWTH OF GIFT TILAPIA

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The problems of global warming, soil degradation, and increasing water pollution are most important issue in the present scenario and most importantly we need to shift from capture fisheries to culture fisheries. India has vast area of Inland saline soil, it can be used for aquaculture, as it is not suitable for the agriculture purpose due to lack of some important nutrients. These problems can be reduced to great extent by amendment of sediment with biochar. Sediment amendment with Biochar improves the sediment quality and water quality in Aquaculture system. Biochar incorporated feed improves the growth performance of the animals. In this context 45 days experiment was conducted in ICAR - CIFE Centre Rohtak, (Haryana) India, to study the impact of biochar on sediment quality and growth of GIFT Tilapia (Oreochromis niloticus). Sugarcane bagasse and paddy straw biochar was used in this study. Characterization of biochar was done for different physical and chemical properties like bulk density, water holding capacity, pH, EC, total & available potassium, total Calcium, and functional groups by FTIR analysis. Biochar was applied in sediment @ 9 t/ha and incorporated in commercial feed containing 35% protein @ 0.5% on w/w basis. In this study it was found that sediment and water quality was improved. Water holding capacity (%) was increased from 34.14±1.33 to 54.7±3.73, CEC and organic carbon (%) were also increased. In water, available potassium was increased, and Nitrite was decreased. SGR, FER, WG (%) were increased and FCR was decreased in GIFT Tilapia. Overall, the study provides a substantial data for the validation of the hypothesis that biochar improves the survival and growth of Gift Tilapia, physicochemical properties of inland saline pond sediment, and water when used as an amendment in the sediment as well as incorporated in feed. The findings of the study will serve as baseline information for developing a standard protocol for the application of biochar in the Inland saline aquaculture system.

A STUDY OF FISH ETHNOSCIENCE AS A FOUNDATION FOR DEVELOPING ETHNO-CONSERVATION STRATEGIES

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The environment greatly influenced people's lives and activities in the early stages of human history. According to historical archives, they were quite close to aquatic and natural resources. Arthasastra, Manushutra, Sathapatha Bhramanas, Vedas, Manusmrti, Brhat- Samhita, Ramayana, Mahabharata, and Rajtarangini were ancient Indian scriptures that highlighted the principles of the importance of fish and conservation in a sustainable way. Fish constitute a prominent component of faunal remains discovered from numerous South Asian and Arabian Sea sites. Fish has held a privileged status as a deity since prehistoric times, as evidenced by ancient vedas, literature, temple decoractive architecture, and so on. Mahseer (*Tor* spp.), a vulnerable group of cyprinid fishes, for example, are referenced in numerous holy scriptures as being treasured for propitiating the souls of departed ancestors and cherished by forest-dwelling saints. Kurmavatar sculptures in Kahajuraho Lakshman temple in Madhya Pradesh and Osiyan temple in Rajasthan. Fish are fortunate emblems that appear on pandiyan flags. The national police emblem of Uttar Pradesh depicts the confluence of the Ganges and the Jumna as a wavy pall between two fishes. From ancient times, religion has fostered assistance in the protection of freshwater fisheries in India. People have been aware of the importance of fish conservation and its utility since ancient times. Various strategies for fish and biodiversity protection are being established in many nations today, but they are all directly or indirectly impacted by the traditional wisdom gained in ancient India. A thorough ethnoscience study of the relevance of fish and conservation strategies will aid in the development of a very effective ethno-conservation plan.

LOSS OF BIODIVERSITY OF MEDICINAL PLANTS IN INDIA

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The world is home to many thousands of plant species that are used in human daily activities as resources. At present There are only a few hundred species that are domesticated and traded around the world and rest are all wild species used by humans in every biogeographical region and habitat type. Most wild species are poorly studied in terms of their biodiversity. It is often difficult to identify the plants and classify them appropriately, leading to considerable confusion when the plants or their products are traded. Further, little is known about their detailed distribution, range, size, diversity, breeding behaviour, and pollination mechanisms. Most species under consideration have never been cultivated or have been cultivated semi-domestically on a local scale. Therefore, their basic agronomy can barely be imagined, and it is essential to rely on knowledge developed over many decades by local farming societies. The importance of capturing and preserving this local knowledge, which is an important resource in itself, is essential for future generations. Medicinal plants are among the most valuable groups of wild plants in terms of their contribution to the economy and welfare of farm households. As a matter of fact, medicinal plants are found in a variety of environments: tropical forests, temperate forests, secondary forests, scrublands, meadows, swidden fallows, agricultural field crops, houses, and gardens.

Developing countries are a major source of higher plants used as drugs in modern and traditional medicine, as well as culinary herbs. The use of wild sources can result in unpredictable production, with rapid fluctuations between scarcity and oversupply as a result. There are other disadvantages to wild harvesting medicinal and culinary plants. Increasing demand does not bode well when the supply decreases so rapidly.

A large amount of wild medicinal plants harvested uncontrolled, leading to the eventual depletion of resources, Wild medicinal plant material is collected by members of estate homes for agents who have been contracted bypssharmaceutical companies to supply them, constantly with large

quantities that are unsustainable. may push the wild harvesters to over collect to gain reasonable earnings for their sweats.

Spatial variation in the distribution of mesozooplankton in the Arabian Sea during summer monsoon

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The zooplankton fauna of the Indian Ocean is very diverse, owing to its unique pattern of ocean currents, upwelling, high primary productivity, and salinity. Study on mesozooplankton is a prerequisite for assessing the ecological status and productivity of an ecosystem. They are the connecting link between primary producers and higher trophic levels, and they also act as the key indicators of climate change and pollution in the marine ecosystem. The samples were collected from seven locations in the Arabian Sea (Kochi to Kanyakumari coast, Summer Monsoon, 2018) forms the basis of this study. The focus of the present study was to analyse the seasonal variability in community structure and diversity of mesozooplankton with special reference to thaliaceans. The average biomass and numerical abundance of mesozooplankton were 0.189 ± 0.11 ml/m^3 and 855 ± 564 no/m^3 respectively. The mesozooplankton is composed of 16 functional groups which includes : Chaetognatha, Cladocera, Copepoda, Ctenophora, Decapoda larvae, Fish Egg, Fish larvae, Foraminifera, Megalopa larvae, Molluscan larvae, Mysidacea, Oikopleura, Ostracoda, Polychaete larvae, Lucifera, Thaliacea, Zoea larvae. Copepoda (83.21%) was the dominant taxa followed by Chaetognatha (3.55%) and Thaliacea (3.21%). Thaliaceans was represented by three species namely *Dolioleta gegenbauri*, *Doliolum nationalis and Thalia democratica*. MDS plot showed an overall similarity of 20 % in the numerical abundance of mesozooplankton between the stations. Major environmental factors influencing the distribution of mesozooplankton were nitrite, nitrate, salinity, temperature, silicate, phosphate, and ammonia. Changes in the distribution of mesozooplankton, in turn, affect the balance of the marine food chain. So, this study is of prime importance in the persisting scenario of global warming and climate change.

Keywords: *zooplankton, mesozooplankton, thaliaceans, Arabian Sea, MDS, PCA*

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