Chapter 12
Suicidal Analysis on Social Networks Using Machine Learning

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ABSTRACT

Suicides are the most critical issues in the present time. Early detection and prevention can assure the safety for the people's lives. As the technology increases rapidly, we are moving towards online channels to express our suicidal thoughts. In the chapter, the authors deal with suicidal ideation through the user generated post on different platforms like Twitter, Facebook, Reddit, Suicide Watch, etc. Analyzing the text, they enrich the knowledge and that can be used as an indicator for suicidal thoughts. To detect suicidal thoughts, they use text processing using NLP, and some features are generated that can be classified using different classifiers like random forest, SVM, naïve bayes, etc., and some neural network models like CNN, LSTM, BERT, etc. are also used for final prediction of suicidal or non-suicidal thoughts. In this chapter, the authors use Distill Bert model for predicting the results and also improve the accuracy by changing the hyperparameters. Here, they summarize the existing work's limitations and discuss future research directions.

INTRODUCTION

In the Present time social networking sites are exploding by the users. People are more drawn to the virtual life since the introduction of Facebook, Instagram, Twitter, Snapchat, Reddit, and other social networking websites. As these websites are quite user friendly so the no of users is increasing day by day. There are almost 900 social networking sites present on the internet at this time, and those sites have

INNOVATIVE BIO-BASED
TECHNOLOGIES FOR
ENVIRONMENTAL REMEDIATION

Edited by
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Aquatic Plants Biosorbents for Remediation in the Case of Water Pollution as Future Prospectives

By Jyoti Mehta, Moharana Choudhury, Anu Sharma, Arghya Chakravorty

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CHAPTER 11 - Cellulose-imidazole engineering hybrid materials/membrane for energy storage

Benjamin Raj [a], Mamata Mohapatra [a b], Arun. K. Padhy [c], Suddhasatwa Basu [a]

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Abstract

Nanocellulosic (crystal/fibrils) based hybrid engineering biorenewable material is worthwhile for impending green and sustainable energy technology. Various intrinsic properties of cellulose such as biocompatibility, excellent flexibility, high specific surface area and aspect ratio, high Young's modulus, remarkable strength, renewability, thermal and possible crystalline properties render them sustainable and holy materials for multidimensional field. Such materials are particularly in forefront to develop low-cost ecofriendly energy devices. For this, the surface charges of cellulose nanofibers/nanocrystals are manipulated by adopting various methods of synthesis, hybridizing the material with another conducting surface/solvent, and/or doping with organic/inorganic entities. In this direction, imidazole-based compounds play an integral role to alternate their surface charge through development of surface-charge-governed ion transport. It functionalizes the asymmetry of the hybrid composites in terms of the number density of positive and negative ions in the nanochannels nanocrystals/membrane for developing conducting battery materials/solid electrolyte. Therefore in this chapter, developmental research in designing hybrids nanomaterials/membranes composed of nanocellulosic crystal/fibrils with imidazole

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CHAPTER 15 - Integration of geospatial technology for mapping of algae: an economical perspective for assessing nanocellulose

Anamika Shalini Tirkey [a], Shashikant Shivaji Vhatkar [b], Ramesh Oraon [b]

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Abstract

The potential application of nanocellulose has attained significant attention worldwide because of its extensive application in environmental remediation as well as in energy production. Cellulose, as abundant natural polymers, has the potential to overcome challenges related to material biodegradability, renewability, cost, and energy. Cellulose can be found in lignocellulosic biomass, agricultural waste, forestry residues, and can also be extracted from microorganisms such as algae, bacteria, and tunicates. The cellulose nanocrystals can sustainably be used for water purification, water filtration membranes, nanocomposite heavy metal sensors and absorbents, aerogels, flocculants, and nanocomposite filters for groundwater remediation which can significantly reduce the costs incurred in cleaning and water treatment. The green filamentous algae for the production of nanocellulose is attractive and its spatial mapping can help resolve problems related to water pollution and its management. Remote sensing datasets pertaining to Sea-viewing Wide Field-of-view-Sensor (SeaWiFS), Moderate Resolution Imaging Spectroradiometer (MODIS), Landsat Thematic Mapper (Landsat TM), Medium Resolution Imaging Spectrometer (MERIS), and Advanced Very High-Resolution

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Role of Protected Area in Conservation and Sustainable Management of Biodiversity: An Indian Perspective

| Chapter | First Online: 19 October 2022
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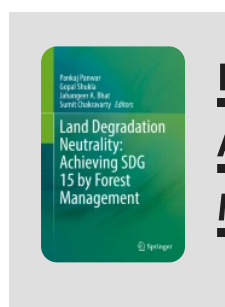
Land Degradation Neutrality: Achieving SDG 15 by Forest Management

Pawan Ekka, Kavita Parmar, Vineeta Parmar, Amit Kumar & Purabi Saikia ✉
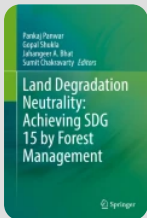
Abstract

Protected areas (PAs) are the terrestrial or marine regions that are preserved for conserving biodiversity and their habitats to serve a range of socioecological functions including scientific research and education, protection of wildlife, conservation of biodiversity, and securing a range of ecological goods and services. India has strong legislation for the protection and conservation of biodiversity through the protected area network (PAN) through government investment. In India being a developing country, PA management has a great challenge due to the rapidly growing human population and their higher dependency on natural forests for their sustenance needs and livelihood security, political and economic instability, and higher poverty. Local socioeconomic

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Indian Forests: Sustainable Uses and its Role in Livelihood Security

| Chapter | First Online: 19 October 2022

| pp 437–452 | Cite this chapter

Land Degradation Neutrality: Achieving SDG 15 by Forest Management

Nilofer Sheikh, Subhashree Patra, Amit Kumar & Purabi Saikia ✉

Abstract

Forests in India perform an important role in the economic and sociocultural life of the tribal people who live in and around the forests, as they support rural livelihoods and food security. India has a wide variety of forest types, including tropical evergreen, semievergreen, moist deciduous, dry deciduous, subtropical montane, temperate, alpine scrub, and mangrove forests, and the dominant plant species includes both deciduous and evergreen tree species like *Shorea robusta, Tectona grandis, Duabanga grandiflora, Mangifera Indica, Terminalia myriocarpa, Diospyros melanoxylon, Pterocarpus marsupium, Butea monosperma*, and *Madhuca longifolia*. Timber, fodder, fuelwood, and other variety of nontimber forest products (NTFPs) including wild edibles, oilseeds, medicinal plants, different types of resins, spices, fibres, and a variety of construction materials like

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The Idea of Self-Governance and Tribal Revolts in Colonial Period

| Chapter | First Online: 26 March 2022

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## Tribe, Space and Mobilisation

Ashok Nimesh

Abstract

Self-governance is an integral component of tribal culture in India. The institution of self-governance evolved over centuries and sustained through traditional and customary practices has helped in establishing a system of rule in tribal societies, i.e. tribal autonomy. It secures customary legitimacy of tribal societies over land, forest and other resources and helps in establishing and reinforcing identity of the tribe. Essentially, it ensures autonomy of a tribe. But colonial policies with regard to acquisition of forest and land affected survival options of the tribes and intervened in their tradition of self-governance and thus in their autonomy. Tribes resented these policies and revolted against the colonial rule, first against the British agents and loyaliss like zamindars, thikdars, moneylenders, traders, etc., and then against the British. Scholars have categorized these revolts as tribal insurgency, peasant movement, revolt against

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Vulnerability Assessment of the Indian Himalayan Forests in Terms of Biomass Production and Carbon Sequestration Potential in Changing Climatic Conditions

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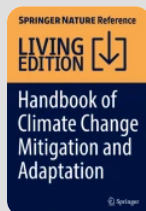
Rima Kumari, Amit Kumar, Purabi Saikia & M. L. Khan

📖 **38** Accesses

Abstract

Indian Himalayan regions (IHRs) are among the most fragile ecosystems, being highly susceptible to natural hazards and climatic change to a varied extent due to their physiographic and evolutionary distinctions. It is home to a great diversity of flora and fauna with diverse forest types exhibiting the high potential of biomass accumulation and carbon sequestration. Himalayan dry temperate forests (ca., 217.88 Mg ha^{-1}) exhibited the highest carbon stocks (Cp) followed by Himalayan moist temperate forests (ca., 216.85 Mg ha^{-1}), subalpine forests (ca., 213.15 Mg ha^{-1}), and montane wet temperate forests (ca.,

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Soil Enzymes and Their Role in Soil Health Improvement

| Chapter | First Online: 04 May 2022

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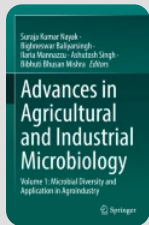
Advances in Agricultural and Industrial Microbiology

Rini Rahul, Pallavi Sharma, Ashutosh Singh, Joginder Singh ✉ & Manoj Kumar ✉

Abstract

Soil is the most vital part of terrestrial biota. Since all the related ecological communities thrive on it, the protection, maintenance and improvement of soil is of high importance. The quality of soil to function in a dynamic equilibrium with the thriving biosphere to sustain plant, animal and human life is now being considered as soil health. Assessment of soil quality solely depends on biological, chemical, physical indicators, as all of these contribute in maintaining soil health. The quality of soil can be evaluated directly by reviewing the soil enzymes. Soil enzymes are the fundamental factors of the soil system that are critical for the maintenance of ecosystem functioning and nutrient recycling. They have the capability of efficiently catalysing the decomposition of organic components in the soil system, which helps in maintaining the life processes of soil microorganisms and structural stabilization of soil. Enzymes present in soil are mostly of

Chapter 5 - Nanomaterials based sensors for detecting key pathogens in food and water: developments from recent decades

Shobha Singh [1], Sanjeet Kumar Paswan [1], Pawan Kumar [2], Ram Kishore Singh [1], Lawrence Kumar [1]

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Abstract

Across the world, the contamination of food and water generally originated through the pathogens causing various diseases in human beings. The management and conduct of food and water quality is an emerging need to be taken in concern for the health of the public and the surrounding environment. The early and prompt system of detection of the pathogens and the contamination is quite pivotal to prohibit them. There are various techniques that have been already studied and explored to a larger extent for the authentic identification, detection and recognition of the microorganisms being present in the food sample. The development in the nanoscience and technology has further provided the biosensors with new outlook and architecture by utilizing the nanomaterials and structures for elevating their performance. The triumphant amalgamation of nanoscience and technology as a stage for food and water sensors provides enormous advantages in the observation of pathogens specifically in food safety and quality based applications. Food safety and quality are the most vital facets and has grabbed the attention of public health. The consumers across the globe have started demanding food products that are completely free from contaminants. Considering to their prodigious small size, nanomaterials exhibit peculiar physically and chemically

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Chapter 12

Role of Microbes in Controlling the Geochemical Composition of Aquatic Ecosystems

Shilky (ORCID: 0000-0001-8292-0385), Subhashree Patra (ORCID: 0000-0002-4624-6968), Anamika Harshvardhan (ORCID: 0000-0002-0540-1220) **… See all authors** ⌄

Book Editor(s):Sughosh Madhav, Virendra Bahadur Singh, Manoj Kumar, Sandeep Singh

Summary

Microbes, especially viruses, microbial eukaryotes, bacteria, fungi, protozoa, and archaea, play a key part in the aquatic ecosystem and help in providing a wide range of environmental services. Microbial coalitions can be found as detrimental microbial traps, biofilms, and planktonic microalgal-bacterial complexes that help in the breakdown of organic matter and the purification of aquatic ecosystems. Rich microbial diversity depends on nutritional and current environmental circumstances that support the healthy functioning of an aquatic ecosystem. Microbes contribute significantly to the biogeochemical cycle by involving themselves in nitrogen fixation, oxygen generation, nutrient and mineral cycling, and methanogenesis. They also contribute to energy flow in aquatic ecosystems, thereby improving water quality by decaying environmental contaminants. Microbes play a critical part in the treatment of polluted water through the bioremediation process which converts harmful toxic substances to less toxic and desirable end products, such as CO_2 and H_2O. It is a less expensive technology that produces no waste as a byproduct and gives the finest alternative to traditional wastewater treatment and management technologies in order to maintain a healthy environment.

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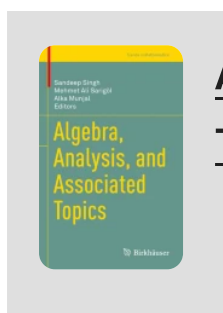
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On the Generalized k-Horadam-Like Sequences

| Chapter | First Online: 20 September 2022

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Algebra, Analysis, and Associated Topics

Kalika Prasad, Hrishikesh Mahato ✉ & Munesh Kumari

📚 Part of the book series: Trends in Mathematics ((TM))

Abstract

In this chapter, we have introduced generalized k-Horadam-like sequences of third order.
Many known integer sequences of second and third order will follow immediately as
special cases. Moreover, we have discussed some well-known identities, the Binet
formula, the Catalan and Hankel transform, and the generating functions for the
generalized k-Horadam-like sequences.

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Perspective of Organic–Based Antimicrobial Coating Materials: Implication Toward COVID–19

❘ Chapter ❘ First Online: 06 January 2022

❘ pp 75–89 ❘ Cite this chapter

COVID-19 Pandemic

Benjamin Raj, Arun Kumar Padhy ✉, Suddhasatwa Basu & Mamata Mohapatra

📖 **Part of the book series:** Materials Horizons: From Nature to Nanomaterials ((MHFNN))

Abstract

In the current scenario emerging COVID-19 pandemic has caused severe global impact over the health of the human. It was started from China at the end of November or beginning of December 2019. It is noted that the existence/survival of novel coronavirus in harsh environmental condition for 72 h virus which cause rapid spread from one person to another. To stop the communal spread of this novel coronavirus various safety measures have been taken globally including hand sanitizers, social distancing, quarantine, and the most important thing is mask. Among the commendable safety measures mask is a key technology is moderately mature, while most of them cannot

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Algae and Aquatic Macrophytes in Cities

Chapter 6 - Prospects of carbon capture and carbon sequestration using microalgae and macrophytes

Zaira Khalid [a] [†], Shahrukh Nawaj Alam [a] [†], Bhaskar Singh [a] ⌕ , Abhishek Guldhe [b]

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Abstract

The problem of increasing atmospheric CO_2 is causing severe impact on the atmosphere resulting in critical issues like global climate change, which makes carbon sequestration an urgent mitigation strategy. Carbon sequestration, being different from carbon emission reduction, offers an opportunity of reducing atmospheric CO_2 for the production of energy and valuable chemicals. Among several carbon sequestration techniques, biological sequestration of carbon through microalgae and macrophytes has gained importance due to a sustainable and promising alternative to other mitigation strategies. They have the potential to be cultivated in water and hence, there is no competition with food crop for fertile land. Their growth rate is much higher as well as CO_2 fixing efficiency is almost 10–15 times more than terrestrial plants. This chapter aims to understand biological carbon sequestration through microalgae and macrophytes. Focusing on photosynthetic techniques, tolerance mechanisms of carbon assimilation, challenges and perspective of microalgae and macrophytes based carbon sequestration and biomitigation.

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Chapter 5 - Comparative flood area analysis based on change detection and binarization methods using Sentinel-1 synthetic aperture radar data

Bikash Ranjan Parida, Arvind Chandra Pandey, Sourav Kumar, Gaurav Tripathi

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Abstract

The role of synthetic aperture radar (SAR) data for flood area mapping is well-established. Backscatter of different polarizations of SAR data interacts in varying ways over the same region and assists in differentiating land and flood pixels. This study elucidates the significance of comparing and analyzing different polarizations (vertical transmit and receive [VV] and vertical transmit and horizontal receive [VH]) of the same inundated region based on two different methods: change detection (CD) and binarization technique (BT). The C-band of Sentinel-1A SAR data was obtained to capture flood events from 2017–20 over the Bihar region. From this comparative assessment, it was observed that there is not much difference between the extent of flooding derived by cross-polarization (VH) and co-polarization (VV). Also, different methods could not realize a major difference in the estimated extent of the flooded area. However, the VV polarization image was better for estimating the extent of flooding over submerged regions than VH. Among the BT and CD methods, there were insignificant differences in flood extent maps. Both methods were capable of rapid flood mapping. Multiyear flood

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Algae and Aquatic Macrophytes in Cities

Bioremediation, Biomass, Biofuels and Bioproducts

2022, Pages 39-64

Chapter 3 - Integrated phytoremediation approaches for abatement of aquatic pollution and element recovery

Rachna [a] [b], Sanjay Kumar Gupta [a] ⌂ , Bhaskar Singh [b], Arvind Kumar Nema [a], Vimal Chandra Pandey [c]

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Abstract

Globally, the rapid development in industrialization and urbanization is the primary cause of the rising pollution problem. Because of population growth and agricultural reliance, the earth's finite natural freshwater resources will be under severe strain until 2030. The conservation of the environment necessitates a well-thought-out strategy for removing or mitigating the contaminants' reversible and irreversible effects. The conventional technologies are energy-intensive, had high maintenance and operation costs, provided insufficient treatment, along with the production of ecologically toxic sludge/wastes. Phytoremediation technology has piqued the interest of many academics across the world as an environmentally friendly clean-up option with various advantages over traditional approaches. It can also be used to recover valuable metals and can be used for the production of renewable energy. This chapter will explore the application of integrating phytoremediation of aquatic pollution with energy and element recovery as well as other ecological services. The problems associated with the application of these technologies and future prospects are also comprehensively discussed.

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Chapter19 - The potential of engineered endophytic bacteria to improve phytoremediation of organic pollutants

Raushan Kumar, Khushboo Gupta, Nirmali Bordoloi

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Abstract

Organic pollutants (OPs) are posing a serious threat to the environment due to their toxic characteristic for a drawn-out period. Therefore, the destruction and removal of OPs from the soil and water are of utmost concern throughout the world. For this, phytoremediation processes are widely used to clean these types of pollutants, but this process is less efficient. The present study shows that the application of the plants-endophytic bacteria relationship is a developing approach for the complete removal of OPs. Endophytic bacteria are a set of microorganisms that establish their healthy colonies in the plant tissues without causing any impairment to the host plant and show mutualistic relationships with plants. Endophytic bacteria get nutrient and safe habitat from the host plant and in return, it produces several types of growth-promoting substances and bioactive compounds that enhance the degradation of OPs. However, the combined application of plants and endophytic bacteria gives new perceptions to increase phytoremediation potential. Engineered endophytic bacteria have a large potential to degrade OPs and increase plant growth and ultimately improve phytoremediation efficiency. In this chapter, efforts have been made to detailed discussions about the ecology of endophytic bacteria and their interaction with host

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Advances in Microbe-assisted Phytoremediation
of Polluted Sites

2022, Pages 419-434

Chapter17 - Bioremediation of oil-contaminated sites using biosurfactants

Soni Kumari Singh, Ashish Sachan

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Abstract

Environmental pollution caused by oil spillage is an area of concern today as it binds to soil particles and inhibits the growth of microorganisms and plants. Oil produced by the petroleum industry constitutes various forms of hydrocarbons that are found ubiquitously in our environment through anthropogenic or via various petroleum activities. They are identified as hazardous compounds by different countries and regulating bodies because of their toxicity to living organisms. Oil contaminants are not easily removed from soil because of their insolubility or low solubility and high interfacial tension with aqueous solutions. At present, various chemical methods have been developed to transform or degrade the oil contaminant into a less/nontoxic compound. These methods have sometimes also been found to produce byproducts that are toxic in nature. To remove hydrophobic contaminants, surfactants can be used as a remediation tool to clean up environments. Surfactants are surface -active agents that lower the surface tension between water and oil. Biosurfactants are low molecular weight surface-active agents that reduce the surface tension (ST) and interfacial tension (IFT) of solids, liquids, and gases. Microorganisms have been explored for effective degradation of oil contaminants. This chapter focuses on the pollution spread due to overuse of petroleum products and discusses remediation strategies through

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Chapter16 - Rhizobacteria assisted phytoremediation of oily sludge contaminated sites

Susmita Karmakar [a], Rajeswari Roy [b], Arijita Bhattacharyya [c], Biswajit Kar [d], Sanjeev Kumar [a], Ritu Singh [e], Kuldeep Bauddh [a], Narendra Kumar [f]

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Abstract

A large amount of oil sludge from crude oil refineries and petroleum industries enter into the environment posing a critical threat to contaminate the environment. The toxicants like petroleum hydrocarbons present in oily sludge-contaminated areas need to be addressed properly. The petroleum-derived oily sludge contains various components which are regarded as mutagenic as well as cancer-causing agents. Intensive researches indicate that biological remediation approaches are the most effective, economical, and green options to remediate the contaminated environment. Yet microbe-assisted bioremediation is often hampered due to the toxic agents present in oily sludge. Phytoremediation often seems to be the most viable option to treat contaminated land. However, there are some limitations regarding the successful application of phytoremediation to clean up the hydrocarbons. In contrast, the application of rhizobacteria having plant growth-promoting characteristics facilitates and increases the efficacy of phytoremediation especially in the case of oily sludge contamination. The positive association of the plant root system and rhizosphere bacterial community has a tendency to intensify the degradation of petroleum hydrocarbons effectively. The advanced trends in treating oil sludge contamination utilizing rhizobacteria-assisted

Chapter4 - Phytoremediation potential of genetically modified plants

Shreya Singh #, Lala Saha #, Kuldeep Bauddh

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https://doi.org/10.1016/B978-0-12-823443-3.00010-7 ↗

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Abstract

Phytoremediation is an essential, eco-friendly, cost-effective as well as a sustainable solution to the problems leading to environmental contamination. Phytoremediation may be used in two ways either in situ or ex situ. It requires the use of plants that helps in uptake, accumulation, detoxification, translocation, and volatilization of inorganic and organic pollutants from the contaminated soil and water. The major constraints of phytoremediation are time-consuming process and limited to the accumulation and tolerance of metals from the sites having a high concentration. Thus, to improve and enhance the phytoremediation process there is a need to develop new insights. Biotechnological interventions like genetic engineering to the phytoremediator plant species have been found helpful to speed up the metal accumulation, translocation, and detoxification significantly. The most common host plants tested for phytoremediation are genetically modified (GM), including Nicotiana tabacum, Oryza sativa, Arabidopsis thaliana, Sedum plumbizincicola, etc. Hence in this chapter, we have focused to explore the phytoremediation potential of transgenic plants specially designed for the removal of heavy metals (HMs). With several case studies, the mechanism of GM phytoremediator plants is also discussed in this chapter.

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Chapter 2

Zirconium-Based Adsorbents as Promising Materials for the Sequestration of Dyes and Heavy Metals from Waterbodies

Priyanka Priyadarsini Samal and Soumen Dey[*]

Department of Chemistry, Central University of Jharkhand, Ranchi, India

Introduction

Rapid industrialization and the explosion of the population lead to water pollution and scarcity of pure water which is a major global concern (Mahmoud, Nabil, and Mahmoud 2015). Disposal of industrial effluents containing toxic materials such as dyes and heavy metals to water bodies leads to water contamination as most of the inorganic and organic substances are dissolved in water (Vigneshwaran et al. 2021). Dyes are generally used as a coloring agent in various industries such as paper, pharmaceutical, rubber, leather, printing, textile, food processing, etc. (Omidi, Khaniabadi et al. 2016). Dyes bear large aromatic rings with various functional groups and impart color to the fabrics or any surface. More than 10, 000 dyes are commercially known and $7x10^5$ metric ton dyes are produced worldwide (Momina, Shahadat, and Isamil 2018). 5-10% dye effluents are discharged into water bodies (Karimifard and Alavi Moghaddam 2018). Depending upon their charge while dissolving in an aquatic medium, they are classified into cationic, anionic, and non-ionic dyes. Based on their chemical structure, Azo dyes, Anthraquinone dyes, Indigoid dyes, Nitroso dyes, Nitro dyes, and Triarylmethane dyes are classified. Similarly, acid, basic, reactive, Sulphur, and dispersed dyes are

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Nanotechnology: an emerging strategy for combating air pollution

Raushan Kumar, Khushboo Gupta and Nirmali Bordoloi
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4.1 Introduction

In the last few decades, several destructive environmental issues are faced by society. These destructive issues are not happening themselves, the principal causes at all levels are massive industrial and agricultural activities (anthropogenic practices). Therefore, environmental pollution is one of the major concerns facing the world today through these activities. It grows every year and leads to a significant and dangerous effect on the earth (Mohamed, 2017). Contaminated soil, water, and air contain various types of pollutants like organic, inorganic, heavy metals, several toxic gases which ultimately affect the existing and future ecosystem. In the current scenario air pollution is one of the world's utmost grave issues. Air pollution is defined as changes in the natural atmospheric composition induced by the presence of pollutants viz. chemical, biological and physical in nature, resulting from various anthropogenic activities. These pollutants may include carbon monoxide (CO), chlorofluorocarbons, heavy metals, hydrocarbons, nitrogen oxides (NO_x), sulfur oxides (So_x), organic chemicals [volatile organic carbons (VOCs), and dioxins], and biological substances (Araújo et al., 2014; Yu et al., 2009). These contaminants decrease air quality and cause a variety of fatal diseases, including cancer, respiratory ailments, and cardiovascular disease. Therefore, the need for an imminent solution to reduce the effects of such emissions requires the implementation of an environmentally friendly approach (Yarima et al., 2020). Earlier various methods, that is, filtration, adsorption, thermal catalytic degradation, and photocatalytic oxidation have been used to reduce or remove air pollutants but these methods have their limitation that includes less efficiency, time-consuming, labor-intensive, expensive, etc. Hence, there is a want to find more proficient with cost-efficient approaches to the prevention and regulation of air pollution. However, the application of nanotechnology is fetching emerging strategies in air

30 - Energy policies in the context of third-generation biofuels

Zaira Khalid [a], Shahrukh Nawaj Alam [a], Bhaskar Singh [a], Abhishek Guldhe [b]

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Abstract

The exploitation of fossil fuels has contributed to the increased greenhouse gas emissions as well as fluctuating fuel prices. It has driven the rise in the demand for energy leading to the shift in interest from fossil fuels to biofuel. Biofuel acts as an alternative energy source that plays an important role for the security as well as sustainability of the energy sector. It is regarded as the carbon neutral source of energy. The first generation of biofuel is derived from edible biomass that ignites the controversy of food-verses-fuel. The problem with the second generation of biofuels is its dependence on feedstock derived from nonedible plant residues that require additional pretreatment and processing steps resulting in high production costs. The third-generation biofuel is mainly produced from algal biomass. The cultivation of algae assists in CO_2 capture while producing oil. It does not require arable land space and in comparison, with other energy crops, it produces biomass at a faster rate. Strategies and policies have been set and put forward by different policy-making bodies worldwide for the implementation and development of biofuel. This chapter focuses on the energy policies for the third-generation biofuel, given its various positive externalities. Prior to the recommendation of policies, the infrastructure of a country with regard to biofuel production feasibility, compatibility of engines, exhaust emission, and performance behavior needs to be understood. Taking into consideration the availability of feedstock

Chapter 6 - Sustainable bio-based technologies for waste and wastewater treatment integrated with value-added products

Khushboo Gupta, Raushan Kumar, Nirmali Bordoloi

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Abstract

The human population is perpetually growing, so it is important to reduce their dependency on finite natural resources. The concept of bio-based technologies not only creates many job opportunities but also assists in the growth of cleaner technologies and environment protection, which move toward the sustainable development approach. This crucial article presents various modern bio-derived technologies, which are used for the treatment of waste and wastewater through various bio-based products such as biopolymers, chemicals, ceramic, filters, nanofibers, rhamnolipid, etc. Day-by-day bio-based technologies are gaining market demand because they are economically achievable and eco-friendly in nature. Numerous microorganisms and value-added products are recovered from waste and wastewater. The inbuilt potential of miscellaneous bacteria available in the wastewater is effectively utilized for generating bioenergy. This chapter also provides extensive literature on diverse applications of technology in industries along with future perspectives.

Chapter 1 - Biodiesel and an overview of waste utilization at the various production stages

Shahrukh N. Alam [a], Zaira Khalid [a], Abhishek Guldhe [b], Bhaskar Singh [a]

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Abstract

Cost effective production is requisite for biodiesel production to realize its potential as alternative renewable fuel. Conventional feedstocks and catalysts used for conversion are the major contributors towards the production cost of biodiesel. The cost of production can be reduced by integration of waste material as a feedstock, utilization of waste for generation of feedstock and using inexpensive waste derived catalysts in the process. Recently researchers are identifying potential waste materials and developing strategies for incorporation in biodiesel production process. Waste feedstocks such as waste cooking oil and animal fats are gaining popularity. Promising feedstocks such as microalgae and oleaginous fungi can be cultivated using waste streams and material. Several waste materials such as animal bones, egg shells and plant residues have been studied for synthesis of catalysts used in transesterification reaction. These strategies not only make biodiesel production process economical but also offer environmental benefits in terms of waste utilization and management.

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Chapter 15 - Human-induced stresses on the rivers beyond their assimilation and regeneration capacity

Moharana Choudhury [a], Asma Pervez [b], Anu Sharma [c], Jyoti Mehta [d]

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Abstract

The great civilizations of the world flourished at the banks of the major rivers like Indus, Ganges, Nile, Tigris, Yellow River. In the ancient times, the population was less and resources were enormous. The pollution levels were almost nonexistent and the carrying and regeneration capacity of the earth was high. The waste generated was not toxic and killing as it is these days. The lifestyle of human beings was very much in consonance with natural capacity of assimilation and regeneration of the nature. Over the decades and centuries, the life began to change with the emergence of industrialization and new kind of urbanization. The change was slow and restricted in the initial decades, but the things changed drastically in the last few decades. In the initial decades, with the emergence of new kind of growth and development, the change was not very prominent but with increasing population and pollution, there are many human induced pressures like industrialization, urbanization, land use pattern, waste generation, plastic, nonjudicious use of water, electricity and other natural resources, and natural resource based products. They act as drivers to change in the ecological balance. The change is visible in every sphere of our lives. It has hampered almost every part of the earth. In addition to these there are many other anthropogenic factors responsible for the degradation of the rivers which have been explained in the chapter. Thus, based on the

Chapter 10 - Sources of ions in the river ecosystem

Ashish Kumar [a], Vinod Kumar Tripathi [a], Pradeep Sachan [b], Amitava Rakshit [c], R.M. Singh [a], Sushil K. Shukla [d], Richa Pandey [e], Anusha Vishwakarma [f], Kanhu C. Panda [a]

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Expansion and intensification of agriculture, urbanization, and industrialization have put the unpreceded pressure on the natural riverine ecosystem. Impact of these activities put pressure to adopt preventive measures of river ecological balance for sustainable development of mankind and aquatic species. In the present study, determinant water quality parameters were analyzed and discussed along with impact of toxic ions on these parameters. Thermal regime of the river, flow regime, light/opaqueness, water conductivity, concentration of dissolved gases, acidity and alkalinity of river water, major cations and anions in the river, dissolved nutrients, land use/land cover alteration and expansion in urban settlement were the key determinant parameters, which were considered for the determination of water quality of the riverine system. Overland flow through agricultural fields and groundwater flow to river, sewage water flow to river, industrial waste discharge into the river and runoff from the dump yard are the main driving agents for water quality degradation. Dissolved phosphorus, nitrate and ammonia, silica, iron, major cations (calcium, magnesium, sodium, and potassium), major anions (like bicarbonate, carbonate, sulfate, and chloride) and heavy metal ions like selenium, lead, copper, mercury, arsenic, and manganese are the major impurities in water bodies resulting noxious impact on aquatic habitat. In the long-term, these ions

Chapter 12 - Current status of available techniques for removal of heavy metal contamination in the river ecosystem

Rahul Mishra [a], Aman Kumar [a], Ekta Singh [a], Sunil Kumar [a], Vinod Kumar Tripathi [b], Santosh K. Jha [c], Sushil K. Shukla [d]

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Abstract

Heavy metal contamination in river ecosystem is a worldwide problem that is of great environmental concern. These heavy metals concentration in river water has expanded rapidly over the last few decades. As indicated by a Central Water Commission study, India's 42 rivers have at least two heavy metals in excess of the safe limit. Ganga, India's National River, has been found to be polluted with five heavy metals, namely Fe, Ni, Cu, Cr and Pb. Other than Ganga, more concentrations of these metals were found in Arkavathi, Orsang, Rapti, Sabarmati, Saryu, and Vaitarna. Moreover, it is of more concern because they disturb the ecological stability of river ecosystems due to its long-term negative influences. Consequently, concentrations of toxic metals have increased at alarming rates in grains and vegetables grown in contaminated soils. Because of its toxicity, non-biodegradability, and bioaccumulation it poses a serious threat to humans and the environment. Membrane filtration, reverse osmosis, chemical precipitation, charcoal/activated carbon adsorption, phytoremediation and biosorption have been widely used techniques for treatment of wastewater. The present chapter attempts to provide the status of these techniques and scenario of river ecosystems with respect to heavy metal contamination.

Changing Forest Fire Regime in Relation to Climatic Conditions over Western and Eastern Himalaya, India

By *Somnath Bar*, *Bikash Ranjan Parida* ID,
*Arvind Chandra Pandey* ID, *Santosh Kumar Panda*

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ABSTRACT

The forest fire regime has been altering due to changing climatic patterns and the increasing human footprint. The present study examined changes in the forest fire regime (e.g., spatio-temporal distribution, trend, peak fire time, and size of burn spots) and its connections with regional climatic conditions over Himalaya (India, Nepal, and Bhutan) in the last two decades. A moderate resolution imaging spectroradiometer (MODIS)–derived MCD64A1 burn area dataset was used to extract the fire information (i.e., burn area and date). For the climatic variables (i.e., maximum temperature, minimum temperature, precipitation, and Palmer Drought Severity Index), data from TerraClimate were used to quantify their trend and variability and their connections with changing forest fire regimes. Over the last two decades, the highest annual average burn area was 3156 (σ = 1958) km^2 in Eastern Himalaya (including Bhutan). We observed an increasing trend in burn area (837.82km^2 $year^{-1}$) in the first decade (2001–2010) and a decreasing trend (–297.22km^2 $year^{-1}$) in the last decade (2011–2020), particularly over Eastern Himalaya (257.82km^2 $year^{-1}$). The

Gauss–Newton–Secant Method for the Solution of Non-linear Least-Square Problems Using ω-Condition
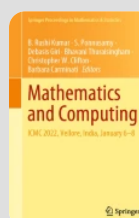
Mathematics and Computing

(ICMC 2022)

Naveen Chandra Bhagat ✉, P. K. Parida, Chandresh Prasad, Sapan Kumar Nayak, Babita Mehta & P. K. Sahoo

Abstract

The convergence of iterative process, based on the combination of Gauss-Newton and Secant's method, for the solution of nonlinear least-square problems in Banach space

Hydropower technology as a renewable energy source of power generation and its effect on environment sustainability

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Mohamed Dawood Shamout ; Kashmiri A. Khamkar ; Arvind Lal ; Puli Danaiah ; Almagul Mukasheva ; Namarta Kaushik   **All Authors**

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II. Related Work

III. Proposed Methodology Based on Gaussianprocess Energy Efficient Maintainable Environment(GPEEME)

IV. Result and Discussion

» Conclusion

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Abstract:

Hydropower technology energy is one of the most important renewable energy sources in the world. However, its development has been accompanied by environmental and social ills. Problems related to environmental degradation and power generation can adversely affect hydropower. Sustainable hydropower projects are possible, but meeting the challenges requires good planning and careful system design. All around arranged hydropower projects assist with giving maintainable energy. Feasible advancement is made conceivable by the utilization of economical energy and by guaranteeing that residents approach reasonable, solid and supportable current energy. With solid government support and worked on financial circumstances, is at the front of being one of the most alluring environmentally friendly power markets on the planet. In proposed method for Gaussian Process Energy Efficient Maintainable Environment (GPEEME) for programs and a liberal environment to attract foreign investment to rapidly expand the country in the renewable energy market. The renewable energy sector is expected to generate more domestic jobs in the coming years. The purpose is to present the key decisions, opportunities, forecasts, power generation and challenges, investments and job opportunities for renewable energy development in India. In this review, the renewable energy sector. Globally, the overall impact of power generation on existing hydropower is expected to be small or slightly positive. However, the possibilities vary greatly from region to region and region to region. Finally, the general assessment of hydropower is that economy and established technology plays a significant role in mitigating power generation and plays a key role in changing water availability for power generation. However, great care must be taken to reduce the huge environmental and social costs.

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Hydropower technology as a renewable energy source of power generation and its effect on environment sustainability

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Hydropower technology energy is one of the most important renewable energy sources in the world. However, its development has been accompanied by environmental and social ills. Problems related to environmental degradation and power generation can adversely affect hydropower. Sustainable hydropower projects are possible, but meeting the challenges requires good planning and careful system design. All around arranged hydropower projects assist with giving maintainable energy. Feasible advancement is made conceivable by the utilization of economical energy and by guaranteeing that residents approach reasonable, solid and supportable current energy. With solid government support and worked on financial circumstances, is at the front of being one of the most alluring environmentally friendly power markets on the planet. In proposed method for Gaussian Process Energy Efficient Maintainable Environment (GPEEME) for programs and a liberal environment to attract foreign investment to rapidly expand the country in the renewable energy market. The renewable energy sector is expected to generate more domestic jobs in the coming years. The purpose is to present the key decisions, opportunities, forecasts, power generation and challenges, investments and job opportunities for renewable energy development in India. In this review, the renewable energy sector. Globally, the overall impact of power generation on existing hydropower is expected to be small or slightly positive. However, the possibilities vary greatly from region to region and region to region. Finally, the general assessment of hydropower is that economy and established technology plays a significant role in mitigating power generation and plays a key role in changing water availability for power generation. However, great care must be taken to reduce the huge environmental and social costs.

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Deep Learning–Based Object Detection: An Investigation

| Conference paper | First Online: 16 November 2022

| pp 697–711 | Cite this conference paper

Futuristic Trends in Networks and Computing Technologies

Kanojia Sindhuben Babulal ✉ & Amit Kumar Das

Abstract

Computer vision has one most important and challenging problem of object detection because of its wide application in field of deep learning such as medical image analysis and security monitoring autonomous driving. Object detection tasks have been greatly improved as object detection has compact association with video evaluation and image processing, and it has enticed the notice of researchers in adjunct years and describe the reference datasets at the beginning. This paper provides a complete review of a range of object detection technique, in a structured way detailing about the two-stage and one-stage detector, including the algorithms used both in detectors and in R-CNN, fast R-

Location based Routing Protocols and its Performances in Wireless Sensor Networks: An Investigation

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III. Challenges in Location
Based Routing

IV. Analysis and Simulation
Results

V. Conclusion

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Abstract:
A Wireless Sensor Network (WSN) is a network that comprises of independent sensor nodes which communicate with one another to share data. The routing techniques, regarded as a fundamental component of WSNs, govern how a node can transfer data in real-time. Location-based routing is one of the routing strategies used in wireless sensor networks to convey data by utilizing the position information of the node. In this article, a variety of location-based routing protocols such as GAF, GEAR, GPSR, and DREAM used in wireless sensor networks are considered for the study. In addition to that, the performance of selected location-based protocols is investigated using simulations based on several network parameters such as network delay, data loss ratio, data delivery ratio, and network throughput against different sizes of the network. The simulation results prove that, based on only the network parameter, picking up the best protocol is critical because the performance of each protocol also depends on the size of the network.

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THE DISSOCIATION TEMPERATURES AND SUPPRESSION STUDY OF THE BOTTOMONIUM STATES FOR THE LHC ENERGY

Manohar lal[a], Siddhartha Solanki[a],[1] Rishabh Sharma[a], and Vineet Kumar Agotiya[a]

[a]*Department of Physics, Central University of Jharkhand Ranchi, India, 835 205*

We revisited the suppression study of the bottomonium states using modified form of the Cornell potential as suppression is known for a long time as the signature for the existence of the quark-gluon plasma. We have employed the quasiparticle Debye mass for obtaining the binding energies and the dissociation temperature for three flavor quarks. The binding energy and dissociation temperatures thus obtained have been further used to deduce the suppression of the bottomonium states. Finally, a significant comparison has been made between the theoretical results and experimental data for the various energy scales of LHC in Pb-Pb collisions and there is good agreement between the two.

I. INTRODUCTION

The leading role of the facilities like RHIC and LHC is to recreate the form of the matter known as quark-gluon plasma. Equation of states of the quark-gluon plasma reaffirms to us that there is a crossover rather than the transition occurring at the critical temperature T_c on the order of 170MeV [1–5]. At RHIC and LHC the Au-Au nucleus collided at the energy density 200GeV and 2.76TeV respectively. The initial temperature generated for these energy densities would be 450MeV and 550MeV [6] respectively. It has been purposed that LHC runs with an energy density of 5.5TeV, with an estimated temperature equal to 700-800MeV. At such large scales of temperature, there is phase transition occurs from the hadron to the deconfined quarks and gluons. This leads to the effect of the Debye screening which is well known for the strongly interacting quark-gluon plasma, hence dissociation occurs [7]. Potential models played an important role in studying the dissolution of the hadronic states. *J/ψ* suppression has been found in a heavy-ion collision based on the nonrelativistic potential models [8, 9]. Cornell potential has been effectively used for the proper understanding of quarkonium using effective QCD [10–12]. Non-relativistic potential models briefly explain the spectral function of the quarkonia in [13–19]. Laine et.al in [20, 21] calculated the Landau damping for the first time using the imaginary part of the potential. Effective

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Charmonium Suppression in an Anisotropic Hot QCD medium using Quasi-Particle Model

Siddhartha Solanki [a], Manohar lal [a], Rishabh Sharma [a] and Vineet Kumar Agotiya [a]

[a] Department of Physics, Central University of Jharkhand, Ranchi, India, 835205

We have studied the properties of charmonium states through the in-medium modifications to both perturbative and nonperturbative terms using the Cornell potential. The flavor dependence of the binding energies of the heavy quarkonia states in isotropic as well as anisotropic cases has been obtained by employing the quasi-particle Debye mass with baryonic chemical potential at a fixed value of μ_b=300MeV, which is computed by employing the quasi-particle picture. There is significant comparison has been made for the variation of binding energy using different Debye masses such as quasi-particle Debye mass, leading order Debye mass and quasi-particle Debye mass with baryonic-chemical potential in isotropic and as well the anisotropic cases. Further, we observe that the dissociation temperatures of anisotropic medium are higher than the isotropic medium using quasi-particle picture in full QCD case. By using these dissociation temperatures as input we explore the sensitivity of prompt and sequential suppression at LHC [1].

I. INTRODUCTION

Quark-Gluon-Plasma behaves more like a perfect fluid rather than a non-interacting ultra-relativistic gas of quarks (anti-quarks) and gluons [2–4] in relativistic heavy-ion collisions (RHIC). Among different experimental observations, quarkonium suppression has been proposed as a clear probe of the QGP formation in the ongoing collider experiments [5, 6]. The pioneer attempt to study the charmonium dissociation due to the color screening in the deconfined medium at finite temperature was carried out by Matsui and Satz [7]. Since then, this area of research has undergone several refinements [8–13].

In the present paper we extend the recent work of [14] for an isotropic medium to a medium that exhibits a local anisotropy in the momentum space and here the properties of heavy quarkonia especially charmonia J/ψ and $\psi^{'}$ in the anisotropic medium by correcting the full Cornell potential for recently purposed hot QCD equations of states using Quasi-particle model [15, 16]. In relativistic heavy-ion collisions (RHICs) there exist two novel phenomena - cone and ridge, which were not present in *pp* or d+Au collisions, has been observed in [17]. Quark-gluon plasma which is produced either at RHIC, Geneva or BNL, USA during heavy ion collisions is not an ideal gas of quarks and gluons, it is rather a liquid having very low shear viscosity to entropy density (η/s) ratio [18–21]. This is strongly delivered that QGP may lie in the non-perturbative domain of the Quantum-Chromodynamics which is very tough to address the both

Sustain-Deplete approach for State-of-charge management in e-vehicles

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Shashank Kumar Jha ; Chakrapani Gandikoti ; Bishnu Mohan Jha   All Authors

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2. Motivation

3. Proposed BeCs optimization-based ANN classifier for energy management in electric vehicle using the dual converter topology

4. Results and Discussion

5. Conclusion

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Abstract:

The battery life of an electric vehicle is usually affected by its accumulated heat, rapid usage, and overall energy efficiency. In the electric vehicle, adding an ultracapacitor to the battery provides improved flexibility in running and using the battery more adequately. The overall system performance and its efficiency are determined by the energy management scheme in the dual-energy storage systems. In order to drive the electric motor, they utilize the energy which is stored in the rechargeable batteries when it is plugged in to a charge point. In this research, to manage the state of charge (SOC), sustain BeC-Artificial Neural Network (BeC-ANN) controller and deplete-BeC-ANN controller are proposed, which manages the energy charging and discharging phenomenon. The main aim of this developed method is to balance the amount of energy when it is driving during an extended period. Depending on the vehicle velocity while driving mode, the remaining energy in the battery and SOC is evaluated using the proposed approach. Controlling of SOC in battery and ultracapacitor is achieved by the two-stage artificial neural network dependent scheme named sustain-BeC-ANN controller and deplete-BeC-ANN controller, which is developed through the integration of the BeC algorithm with the classifier for optimal controller-tuning. The battery and ultracapacitor energy efficiency and its vehicle velocity are considered as measures for evaluation. The Energy storage system in an electric vehicle that the battery achieves better energy efficiency and increased lifetime in this newly developed approach. Eventually, the experimental results reveal the applicability of the developed method.
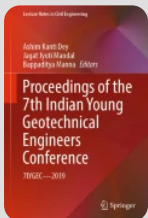
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Strength and Deformation Aspects of Glass Fibre-Reinforced Clayey Soil

| Conference paper | First Online: 17 March 2022

| pp 137–143 | Cite this conference paper

Proceedings of the 7th Indian Young Geotechnical Engineers Conference

(IYGEC 2019)

Suchit Kumar Patel ✉ & Baleshwar Singh

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Indian Young Geotechnical Engineers Conference

Abstract

Effect of glass fibre inclusion on the shear strength and deformation mode of clayey soil has been investigated in this study by conducting consolidated undrained triaxial test under varying confining pressure. Three different lengths of glass fibres (10, 20 and

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Chapter 2 - Major challenges in the urbanizing world and role of earth observations for livable cities

Manjari Upreti [1], Purabi Saikia [2], Shilky [2], Preet Lal [3], Amit Kumar [1] *

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Abstract

The urbanization process has been accelerating worldwide, presenting a set of complex challenges for the urban dweller, planners, policymakers, and researchers. The increase in population density and the expansion of urban areas have significant impacts on the environment, human health, and society. As urban areas continue to grow, cities face various challenges, such as providing adequate housing, transportation, and infrastructure, competition in accessing essential services, reducing environmental pollution and mitigating the urban heat island effect. In this context, earth observation (EO) technologies play a crucial role in providing valuable information to support decision-making processes toward sustainable and livable cities. EO technologies, such as satellite-based imagery and ground-based sensors, provide high-resolution data on various environmental and social parameters, including accurate information on land use/cover, tree canopy, air quality, surface temperature, water resources, and infrastructure that will help in developing evidence-based solutions to the urban challenges. However, despite the potential of EO technologies, there are still significant challenges that need to be addressed to fully leverage their potential. These challenges include the integration of EO data with other types of data, the standardization of data

Chapter 22 - Structural tenets of efficient bioeconomy and role of biofuels

Rohan Rao [1] *, Chandan Sahu [2] *, Kuldeep Bauddh [1]

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Abstract

The nexus between circular economy, bioeconomy, and biofuel has a huge potential in achieving sustainable development goals. Although the magnitude of the existing relationship has not received sufficient attention to date, its impact on the bio-circular economy has already been realized. In this connection, the present chapter intends to highlight the multisectoral implementation of bioeconomy while justifying its role in various spheres of economic sustainability. This study also deciphers the contribution of biofuels to the global economic sector and its importance in governance and bio-diplomacy. The work is expected to bridge the knowledge gap in addressing the issues of the bio-circular economy.

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Ionic Liquids for Atmospheric CO$_2$ Capture: A Techno-Economic Assessment

Kumar Abhisek, Helen T. Mathew, Shashikant S. Vhatkar, Dipti S. Srivastava, Rahul Minz, Ramesh Oraon

Summary

Existing carbon footprints have alarmed the communities throughout the world. As a result, climate remediation techniques have acquired researchers' and academicians' interest worldwide. Among many such methods, a promising technique involving ionic liquids (IL) for trapping carbon dioxide (CO$_2$) has been reported recently. ILs present several advantages, including reusability, thermal stability, better surface area, chemical stability, and their ability to affect the carbon footprint. Owing to these advantages, ILs have been extensively deployed in remediation technologies, including anthropogenic-based emissions. Apart from these, ILs have also been reported to be used in conjunction with existing conventional CO$_2$ management practices, thereby making the technology cost-effective. This chapter features role of ILs and methodologies for CO$_2$ capture with respect to advanced monitoring techniques such as carbon budget. We have also focused on factors affecting efficacy and cost to environment. In addition to these, challenges related to commercial implementations and environmental emissions have also been discussed.

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PHYTOREMEDIATION POTENTIAL OF MEDICINAL AND AROMATIC PLANTS

A Bioeconomical Approach

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Chapter 2. Ferrite Nanomaterials: Preparation, Properties, and Applications in Electrochemical and Optical Sensor Technologies
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Chapter 3. Applications of Ferrite and Ferritic-Based Materials in Tokamak
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Chapter 4. The Magnetic Properties of Nanostructured Spinel Ferrite for Hyperthermia Applications:
Current Status and Future Prospects
Sanjeet Kumar Paswan[1], Shobha Singh[1], Mukesh Shekhar[3], Pawan Kumar[3], Suman Kumari[2], Manoranjan Kar[2] and Lawrence Kumar[1]
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Chapter 5. The Synthesis and Catalytic Applications of Magnetically Active CuFe2O4 Nanoparticles
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Department of Chemistry, Rajiv Gandhi University, Rono Hills, Doimukh, Arunachal Pradesh, India

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A. Rajan, S. K. Solaman and S. Ganesanpotti
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P. R. Jyothi and M. Kurian
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Editors' Biographies

12 Role of Risk Aversion and Insurance Adoption in Extreme Climatic Shocks: Evidence from Indian Paddy Growers

Asis Kumar Senapati[1,2]*

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Abstract

This chapter highlights the determinants of the risk attitude of farm households in India. We used a lottery choice experiment to elicit the risk attitudes of farming households. Empirical results suggest that factors such as operator age, education, farm size and winner of the modified Holt–Laury lottery choice experiment significantly influence the risk attitude of Indian farm households. Similarly, the study shows that in flood regions, operator education, farm age, past disaster experience and access to credit significantly influence the adoption of crop insurance. On the other hand, in the drought-prone region, farm age, experience, land ownership and willingness to pay the amount affect crop insurance adoption. Though, theoretically, risk attitude and climatic shocks are associated with insurance adoption, the study found no direct effect of the interaction term on insurance adoption, although it affects it indirectly.

12.1 Introduction

Despite the importance of risk in agricultural production and its consequences for agricultural households, it has been argued that our understanding of the effects of risk and uncertainty is limited (Newbery and Stiglitz, 1981). Two schools of thought discussed risk as a probabilistic phenomenon – the objectivist and the subjectivist. The objectivist school observes probability through repetitive experiments or considers it external. The subjectivists consider probability as the expression of an internal state, i.e. a state of knowledge or confidence (Kaplan and Garrick, 1981). In other words, the knowledge of the probability distribution of an event or the information about the likelihood of an event differentiates risk from uncertainty. In this context, it should be noted that the information about the likelihood of an event can be associated with objective probabilities and subjective probabilities (Savage, 1954). Knight (1921) considers the risk to be attached to objective probabilities, which are true probabilities and not subjective (perceived likelihoods or degrees of belief about outcomes). This view of risk implies that we are concerned with the degree of uncertainty when we talk of risk. When we speak of uncertainty, we refer to the decision maker's state of mind in which they perceive alternative outcomes of a particular action (Roumasset *et al.*, 1979). Kaplan and Garrick (1981) argue that risk is uncertainty plus damages, implying a connotation of loss or damage

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Chapter

Fundamentals of Functional Materials

Applications for Clean Environment

By Vidya Spriha Kujur, Mrinal Poddar, Tarun Kumar Dhiman, Avinash Kumar Singh, Rahul Kumar

ABSTRACT

In the 2^{1s}t century, nanotechnology is leading and has ushered a new era in the field of science. This has been possible due to continuous research and development carried out to study nanoscience in different fields for over five decades. It has enabled the development of newer functional materials, newer techniques and newer mechanisms for various applications. Polluted environments are one of the major problems of this century. The lower availability of freshwater, the treatment of wastewater and the presence of toxic chemicals in the environment are some of the major components of this problem. In solving these problems, nanotechnology can play a major role. In this chapter, the authors investigate the role of nanotechnology-enabled highly functional materials for clean environment applications.

Chapter 1

Assessment of Start-Up Ecosystems for Tribal Women Entrepreneurs in India

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Central University of Jharkhand, India

Ashok Nimesh
Central University of Jharkhand, India

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Indian Institute of Technology, Kharagpur, India

ABSTRACT

India has made a notable transition toward laws that support new businesses and an atmosphere that is conducive to entrepreneurship known as a start-up ecosystem. The start-up ecosystem in India has seen significant growth in recent years, with increased government support and investment from venture capital firms. Despite facing various challenges such as lack of access to funding and networks, cultural biases, and work-life balance difficulties, women entrepreneurs have made significant contributions to the global economy. Women from indigenous communities who are working to build successful businesses are referred to as tribal women entrepreneurs. Indian tribal women have historically been underrepresented and marginalised in many facets of society. Tribal women have, however, begun assuming more entrepreneurial roles recently and utilizing their traditional expertise to develop new businesses. In this chapter, the role of the start-up ecosystem for tribal women in India, opportunities, challenges, and future perspective has been discussed.

Chapter 4

Ionic Liquids as Green Solvents: Are Ionic Liquids Nontoxic and Biodegradable?

Helen Treasa Mathew, Kumar Abhisek, Shashikant Shivaji Vhatkar, Arvind Kumar, Ramesh Oraon

Summary

The implementation of cleaner and greener methods has aided in sustainability and alleviating chemical toxicity. Among many such implementations, ionic liquids (IL) were seen as a potential green solvent. Their toxicity can be mitigated by tuning their physicochemical properties with suitable cations and anions. These can also be deployed in numerous chemical reactions as substitutes for volatile organic solvents owing to their regioselective processes and stability. Further, the ability to dissolve even highly polar substrates also employs ILs in nonaqueous enzymology. IL-mediated chemical reactions also offer recycling catalysts, improving yields and reducing reaction times. Besides, the use of these liquids in extraction and purification methods promotes energy-efficient, safer, and environmentally friendly practices. For instance, their negligible vapor pressure prevents them from being inhaled, combusted and released into the atmosphere. However, the inherent properties of the ionic constituents can contribute toward the toxicological effects of ILs. This has been evaluated through their interaction with various aquatic and terrestrial organisms. Finally, we have also featured ioNanofluids that exhibit exceptional physical and thermochemical properties.

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Chapter 15 - Geoinformation for urban Geoenvironmental hazard-risk and vulnerability assessment

Amit Kumar *, Arvind Chandra Pandey, Diksha

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Abstract

The increased frequency of disasters and their impact on urban areas are often exaggerated due to the rapid population growth and unplanned urban expansion over the last few decades. Other than the natural hazard, urban areas are susceptible to a variety of urban complexities including high population density, built-up density, ambient air and noise pollution, loss of green cover and groundwater, and the proliferation of slums that induce much risk to the existing population and affect the livability and health of urban dwellers. People living in informal settlements and peri-urban areas are more vulnerable to natural disasters because they tend to live in high-risk areas with poor shelters, have limited access to basic and emergency services, and have a general lack of economic resilience. The present chapter provides an overview of various Geoenvironmental variables and associated hazard-risk in urban areas using statistical analysis and geospatial methods. The study provides insight into the existing urban complexities of a growing city and the implication of natural and Geoenvironmental hazards in a spatial framework, which entails the adoption of suitable guidelines to strengthen the Geoenvironmental scenario of the city.

Nature-based solutions and ecological urban planning and design for the sustainable urban environments

16

Shilky[1], Pawan Ekka[1], Manjari Upreti[2], Amit Kumar[2] and Purabi Saikia[1],*

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[2]*Department of Geoinformatics, Central University of Jharkhand, Ranchi, Jharkhand, India*

16.1 Introduction

Anthropogenic alterations in land use and land cover are causing irreversible losses of ecosystem services (ESs) on Earth's surface (Beach et al., 2016). Human activities have caused significant environmental alterations that result in a changing climate with higher stormwater events, rising soil and air pollution rates, groundwater deficits, etc. (Pauleit et al., 2017). The planet is urbanizing at a rapid pace, and 68% of the world's population would live in cities by 2050 (United Nations, 2018), leading to enhanced urban heat islands (UHIs), floods occurrences, environmental pollution, wastes generation, and lack of wildlife habitats (Langergraber et al., 2020). Rapid urbanization is also transforming urban microclimates along with their urban and peri-urban environments (Shen et al., 2020). The urbanization affects meteorological and hydrological dynamics of a region as the release of particulate matter affects precipitation and generates convective thunderstorms during summer (Jin & Shepherd, 2005). Cities serve as hubs for the exchange of ideas, cultures, technologies, and goods and are frequently positioned near rivers and oceans to enable exchanges, exposing them to several risks, including coastal erosion, storms, flooding, cyclones, and sea level rise (De Sherbinin et al., 2007). In addition, cities depend on natural landscapes and marine environments, including protected areas, to provide basic ESs including food, clean air and water, and defense against floods, coastal storms, and other natural disasters (Gómez-Baggethun et al., 2013).

Roads and highways, power grids, and systems that transport or treat potable water, sewage, and stormwater are examples of traditional infrastructure designs known as gray infrastructure (Depietri & McPhearson, 2017). However, the coherence and sustainability of urban ecosystems are seriously jeopardized by landscape change, habitat loss, and habitat fragmentation brought on by the growth of gray infrastructure (Kjølle et al., 2012). Further, the incapability of traditional gray infrastructures to cope with climate change consequences are evident in terms of growing incidents of flooding, air pollution, and traffic congestion in cities (Kessler, 2011) that results in a high priority for developing green

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Chapter 18 - Earth observations for urban policies and future pathways for urban environmental research

Pawan Ekka [1], Manjari Upreti [2], Shilky [1], Purabi Saikia [1], Amit Kumar [2], Prem C. Pandey [3], Prashant K. Srivastava [4] *

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Abstract

Urban research is now evolving, and there are several challenges that need to be addressed in the near future, which has led to pathways for further development. The scientific community must consider a multitude of options for urban monitoring, evaluation, planning, and management. In this chapter, we have provided a brief overview of different models for urban studies and research based on Earth observation datasets. This chapter discusses a variety of potential research areas, including satellite-based monitoring of urban areas, IoT and cloud computing in urban management, and the use of machine learning in urban environmental research. In addition to digitization, the availability of big data sets, machine learning (ML), and artificial intelligence (AI) will revolutionize the way urban areas are analyzed and planned, opening up new possibilities for sustainable urban challenges. The chapter outlines qualitative and quantitative methods utilizing predictive models and scenario analysis for identifying and implementing urban environmental policies. The recommendations provided in this chapter can be used for further urban studies, research, and the development of smart and resilient cities.

Chapter 1 - Introduction to earth observation in urban monitoring

Amit Kumar [1], Manjari Upreti [1], Pawan Ekka [2], Alisha Prasad [1], Purabi Saikia [2] *, Prashant K. Srivastava [3]

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Abstract

The rapid urban growth and increasing demand for natural resources lead to the considerable environmental degradation and habitat loss. The application of earth observation-based methods enables a better understanding of urban complexity with different spatio-spectral resolutions at temporal scales and contributes to addressing the adverse ecological impacts. There is an urgent need to understand the interdependencies of ecological conditions and changing urban growth to formulate a city-specific framework for sustainable urban development. Therefore the present chapter elucidates the fundamental components of the urban system emphasizing the earth observation-based technologies available to assess the urban environmental conditions that help in defining the settlement pattern and segregation of different land cover features. The inclusion of advanced artificial intelligence and machine learning algorithms provides precision analysis for future predictions and formulation of mitigation strategies. Furthermore, it helps in the determination of factors responsible for urban risk and of societal importance as well as in the implementation of significant policies and reforms for sustainable urban planning, monitoring, and management.

Chapter 12 - Monitoring urban ecological conditions using remote sensing

Manjari Upreti [1], Amit Kumar [1], Alisha Prasad [1], Prashant K. Srivastava [2], Purabi Saikia [3] *

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Abstract

Urban ecosystem assessment and monitoring is a complex and dynamic blend of socioeconomic and physical components. The significant changes in land surfaces and pollutant concentrations in the atmosphere due to anthropogenic influences may pose risks and susceptibility to ecological hazards in urban areas as they concentrate more on population, assets, infrastructure, etc. Satellite-based remote sensing observation provides an understanding of urban evolution and its capacity to preserve natural resources and plays an important role in evaluating the ecosystem service value, seasonal dynamics, and vegetation structure. Evaluation of green infrastructures as an important instrument for reducing carbon footprint, effects of land transformation and fragmentation, and boosting the opportunities for the better integration of land use and ecosystem services in different geographical regions. The utilization of a remote sensing-based ecological index approach exhibiting the Pressure-State-Response framework to assess eco-environmental conditions in urban areas. The advances in satellite-based earth observation with the inclusion of emerging tools and algorithms in different spatiotemporal scales have made it possible to strategize multiple ecological workflow models to study urban ecological conditions. Therefore it has provided improved scientific opportunities for sustainable monitoring, management, and planning of biodiversity conservation, and ecosystem restoration, especially in urban ecosystems.

Chapter

Cloud computing in education

By S. Singh, A. Singh, A. Singh

Book   Artificial Intelligence, Blockchain, Computing and Security Volume 1

ABSTRACT

India has grown tremendously in Information Technology (IT) and IT-enabled services over the decade. Cloud technology is also witnessing rapid growth in India. This paper discusses the importance and use of cloud computing technology in education and explores the trend and growth of cloud computing in the higher education market. The move to cloud computing has provided educational institutions with several benefits, including improved student-institution collaboration, innovation and learning, educational outcomes, efficient supervision, information sharing, and student counselling brought additional benefits. Now leading institutions are trying to use cloud technology to gain a competitive advantage.

Chapter

Modeling and Simulations on Medical Implementations of Bioceramics

By *Ritambhara Dash*, *Poorti Yadav*, *Ram K. Singh*, *A.S. Bhattacharyya*

Book   **Advanced Bioceramics**

Edition	1st Edition
First Published	2023
Imprint	CRC Press
Pages	9
eBook ISBN	9781003258353

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ABSTRACT

With the improvement in medical technology, bioceramics are used profusely as prosthetic implants in orthopedics and dentistry. Optimization of the parameters is the most important aspect when we replace a biological system with an artificial one. The modeling and simulation techniques are on the rise and have been very useful in designing implants, scaffolds, prosthetics and also in terms of analyzing complex molecular interactions. The molecular dynamics simulations using ab initio and other techniques, finite element modeling, artificial neural network, 3D printing, microchromatography, etc., are used for the purpose. This chapter throws light on some of the important areas of bioceramic modeling and simulation, and gives an idea of the processes and ways to execute the methods involved.

Chapter

On the norms of Toeplitz and Hankel matrices with balancing and Lucas-balancing numbers
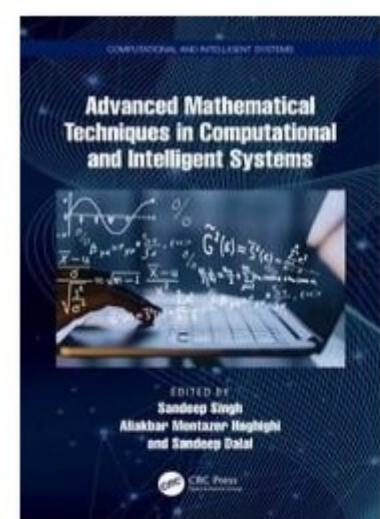
By Munesh Kumari, Kalika Prasad, Hrishikesh Mahato

Book   Advanced Mathematical Techniques in Computational and Intelligent Systems

Edition	1st Edition
First Published	2023
Imprint	CRC Press
Pages	15
eBook ISBN	9781003460169

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Nanocellulose Materials

Fabrication and Industrial Applications

Micro and Nano Technologies

2022, Pages 179-198

CHAPTER 10 - Application of nanocellulose as nanotechnology in water purification

Birendra Bharti, Vibhanshu Kumar, Himanshu Kumar

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Abstract

Nowadays nanotechnology (NT) is an incipient discipline of science that has displayed potential to edify different life aspects running from medication to mechanical equipment. One such solicitation of NT is for the purification of water. We have no hesitation in adage that the water's idiosyncrasy is diminishing step by step and there is a gigantic requirement for embracing another unconventional practice for water purification as a whole. In this regard the solicitation of NT may demonstrate assistance to the human race by giving a progressive approach to water treatment. As of late, a lot of considerations have been engaged onto the utilization of nanostructured nanocellulose (NC) materials as adsorbents or impetuses to eliminate toxic and detrimental substances from wastewater and air. NC as a mainstream in NT can possibly contribute toward long haul water quality, accessibility, and suitability. A variety of membranes have been used for treating water purification that is nanofiltration), forward osmosis, reverse osmosis, microfiltration, and ultrafiltration. NC materials can possibly give the most noteworthy water immaculateness; nonetheless, NC as nanofiltration film has been explored as another unconventional approach for decontamination of water. This chapter illustrates the basic concepts of NC mechanism as water purification.