Coalesce Research Group

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7th International Conference on

ENVIRONMENTAL SUSTAINABILITY AND CLIMATE CHANGE

August 19-20, 2024
South Point Hotel, Casino & Spa, Las Vegas, USA

Coalesce Research Group
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Greenville, SC 29607, USA

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Conference Hall

Wi-Fi Details:

Username: Southpointmeetingrooms
Password not required - Open Wi-Fi

Scientific Program

Scientific Program

Monday
August 19, 2024

7th International Conference on
Environmental Sustainability and Climate Change

Day-1 : August 19, 2024	
Meeting Hall : Napa A	
08:00 - 08:45	Registrations
08:45 - 09:00	Opening Ceremony and Introduction
Keynote Presentations	
09:00 - 09:40	Multi-Scale Modeling of Coupled Hydrological and Biogeochemical Processes in Watersheds
	Junye Wang, Athabasca University, Canada
09:40 - 10:20	Land Management of Oxisols to Support Carbon Sequestration
	Michael Aide, Southeast Missouri State University, USA
Networking & Refreshments (10.20 - 11.00) @ Napa Hallway	
Oral Presentations	
Session Chair	**Junye Wang,** Athabasca University, Canada
Session Chair	**Michael Aide,** Southeast Missouri State University, USA
Sessions:	Environmental Sustainability and Development | Environmental Pollution and Control | Climate Change and Health | Climate Change Risk, Policy and Law | Recycling and Waste Management | Renewable Energy and Resources | Earth and Environmental Science | Toxicology and Environment Health
11.00 - 11.30	Examination of Maize Water Availability Depending on Climate Change
	Éva Horváth and Adrienn Kakuszi-Széles, University of Debrecen, Hungary
11.30 - 12.00	Climate Change, Air Contaminants, and Long-COVID. An Innovative Program to Assist Healthcare Providers Protect COVID-19 Patients
	John Kraemer, Southeast Missouri State University, USA
12.00 - 12.30	Energy Efficiency and Environmental Assessment of a Non-Profit Facility in Albuquerque, New Mexico
	Jalal Rastegary, New Mexico State University, USA
12:30 - 13:00	The Renewable Portfolio Standards and Climate Change
	Osei Agyeman Yeboah and Kwadwo Antwi-Wiafe, L.C. Cooper Jr. International Trade Center, North Carolina A&T State University, USA
Group Photo: 13.00 - 13.15	
Lunch (13.15 - 14.00) @ Napa Hallway	
14:00 - 14:30	Impact of Climate Change on Surface Water Status in Lithuania
	Laima Cesoniene, Vytautas Magnus University, Lithuania
14:30 - 15:00	Integrating Nanoplastics Toxicity into Nanotoxicology through Data Mining and Machine Learning
	Bing Yan, Guangzhou University, China
15:00 - 15:30	Fe_3O_4 Nanoparticles Enhancement of Bio-Hydrogen Production from Rice Straw
	Christian Toochukwu Ogbonna, University of Tsukuba, Japan
15:30 - 16:00	Greenwashing and Fast Fashion Brands: Perception Among Young Adult Consumers
	Vibha Yadav, Lady Irwin College, University of Delhi, India

7th International Conference on

Environmental Sustainability and Climate Change

Networking & Refreshments (16:00 - 16:30) @ Napa Hallway	
16:30 - 17:00	Organisational Life Cycle Assessment of Textile Manufacturing Units: Need of the Hour
	Vibha Yadav, Lady Irwin College, University of Delhi, India
17:00 - 17:30	Cellulose-based Hydrogels for Water Harvesting from Moist Air
	Simeng Li, California State Polytechnic University, USA
Poster Presentation (17:30 - 18:00)	
POSTER 01	Earthworms (Clitellata: *Lumbricidae*) of the Balkan Peninsula: A Review
	Tanja Trakic, University of Kragujevac, Serbia
POSTER 02	Breathing in Change: The Continuous Problem of Air Pollution in Kazakhstan
	Islam Suleimen, Northwestern University, USA
Day 1 Concludes followed by Certificate Felicitation	

7th International Conference on

Environmental Sustainability and Climate Change

Day 2 - August 20, 2024	
Meeting Hall : Napa A	
Keynote Presentation	
09:40 - 10:20	AI in Advance Society: An Intelligent Method for Optimizing Environmental Events
	Madjid Fathi, University of Siegen, Germany
Networking & Refreshments (10.20 - 11.00) @ Napa Hallway	
Oral Presentations	
Session Chair	**Yim Mongtoeun,** Royal University of Phnom Penh, Cambodia
Sessions:	Environmental Sustainability and Development | Biodiversity, Ecology and Ecosystems | Carbon Cycle and Carbon Footprint | Recycling and Waste Management | Climate Change Risk, Policy and Law | Coastal Zones and Ocean Science | Agriculture and Bioresources
11:00 - 11:30	Enhancing Ghana's REDD+ MRV Processes through the Estimation of Above-Ground Biomass Using Random Forest Regression Model in Google Earth Engine
	Naa Dedei Tagoe, University of Mines and Technology, Ghana
11:30 - 12:00	Hydrological Hazards, Drivers, and Policy Alignment in the Niger Delta
	Obroma Agumagu, University of York, UK
12:00 - 12:30	Impacts of Climate Change in Türkiye and USA and How Farmers are Adapting?
	Funda Yoldas, Ege University, Turkey and California State University, USA
12:30 - 13:00	Current Status of E-Waste: A Case of Toul Kork District, Phnom Penh, Cambodia
	Yim Mongtoeun, Royal University of Phnom Penh, Cambodia
Lunch (13:00 - 14:00) @ Napa Hallway	
14:00 - 14:30	Transboundary Governance issues of Coastal Habitat in Cambodia – Vietnam Coastal Zone
	Hoy Sereivathanak Reasey, Royal University of Phnom Penh (RUPP), Cambodia
14:30 - 15:00	Systems Based Assessment of Livelihood Vulnerability and Adaptation Strategies to Climate Change: Rajanpur District Pakistan
	Muhammad Afzal, University of Southern Queensland, Australia
15:00 - 15:30	An Assessment of Geotextiles' Effectiveness as an Earthen Reinforcement in Soil Structures
	Ravi Ande, Lady Irwin College, University of Delhi, India
15:30 - 16:00	Hydrologic Modeling and Risk Assessment for Urbanized Floods of Hyderabad City
	Ravi Ande, Lady Irwin College, University of Delhi, India
Networking & Refreshments (16:00 - 16:30) @ Napa Hallway	
16:30 - 17:00	Linkage between Biodiversity Conservation of Outside Protected Area and Human Welfare through Agriculture in Maraba-Huye District, Rwanda
	Nshimiyimana Frank, University of Rwanda Huye Campus, Rwanda

7th International Conference on
Environmental Sustainability and Climate Change

17:00 - 17:30	A Study Examining the Load-Settling Behaviour of an Interface's Geotextile and Flyash-Covered Clay Subgrade Embankment
	Ravi Ande, Lady Irwin College, University of Delhi, India
	E-Poster Presentation (17:30 - 18:00)
E-Poster	Evaluation of the Use of Coffee Husk and Coconut Fiber in Soil Conservation in Areas Susceptible to Desertification
	Vinicius Pedro de Souza, Institute Federal of Espirito Santo, USA
	Day 2 Concludes followed by Vote of Thanks & Awards Ceremony

Virtual Program

Scientific Program

Monday
August 19, 2024

7th International Conference on
Environmental Sustainability and Climate Change

Virtual Presentations

August 19, 2024 | British Summer Time (BST)

Keynote Presentation

12:00 - 12:40	Reforming of Lignocellulosic Biomass Waste for Cogeneration of Green Chemicals and Green Hydrogen **Hong Li,** Nanyang Technological University, Singapore

Oral Presentations

12:40 - 13:00	Ecotoxicity Assessment of Consumer Product-Driven Contaminant Particles in a Marine Environment **Sung Hee Joo,** Metropolitan State University of Denver, USA
13:00 - 13:20	Scope 3 Decarbonation, Role of Microalgae, Constraints and Solutions **Jean-Louis Roux Dit Buisson,** NeoCarbons SA, ZHAW, Switzerland
13:20 - 13:40	Water Quality Index (WQI) of the Engenheiro Ávidos Dam, located in the Piranhas River Basin, Brazilian Semiarid **Érika Alves Tavares Marques,** Universidade Federal de Pernambuco, Brazil
13:40 - 14:00	Philosophical Considerations of Sustainability **Paul Comet,** Comet Environmental Consulting, USA
14:00 - 14:20	Reversing Global Heat Accumulation by Researching Recent Paleoclimatology **Thomas F Valone,** Integrity Research Institute, USA
14:20 - 14:40	Distribution of Vectors of American Visceral Leishmaniasis in the State of Rio De Janeiro/ Brazil: Municipal Vulnerability for Transmission, Ecological Niche Modelling and Predicted Geographic Distribution **Elizabeth Ferreira Rangel,** Instituto Oswaldo Cruz, FIOCRUZ, Brazil
14:40 - 15:00	The Effects of Climate Change on Health in Kenya: Challenges and Prospects **Peter Imatari Emoit,** Dublin City University, Ireland
15:00 - 15:20	The Regionally Optimized Demand and Supply of the Key Resources with Economic and Environmental Sustainability Indication **Fardin Farahnak,** Iranian Ministry of Energy, Iran
15:20 - 15:40	Scaler Theoretical and Practical Implications of Plastic Waste Segregation and Disposal Practices at the University of Ghana Campus **Victoria Nyebe Sika,** University of Ghana, Ghana
15:40 - 16:00	Evaluation of Environmental Burdens and Potential Decarbonizing Opportunities for Steel Manufacturing in Pakistan **Shamraiz Ahmad,** Sant'Anna School of Advanced Studies, Italy
16:00 - 16:20	Beyond the Hue: Navigating the Impacts of Synthetic Dyes and Pathways to Sustainable Solutions **Madhuri Nigam,** Lady Irwin College, University of Delhi, India
16:20 - 16:40	Low-Cost Activated Carbon from Nitrile Butadiene Rubber Gloves Waste and its Application for the Removal of Phenol in Wastewater **K C Nedzivhe-Mqehe,** University of Johannesburg, South Africa

Day-1 Concludes

7th International Conference on

Environmental Sustainability and Climate Change

Day-2: August 20, 2024	
Oral Presentations	
12:00 - 12:20	A Comparative National-Level Analysis of Government Food System Resilience Activities across Four Developed Countries at Varying Stages of Planning
	Jane Lloyd, Springhouse Consulting, New Zealand
12:20 - 12:40	An Assessment of Alternate Fertilizer Potential of Glauconite Deposits in India using Simple Beneficiation Methods
	Tehreen Shaikh, Indian Institute of Technology Bombay, India
12:40 - 13:00	Climate Solutions and Sustainable Entrepreneurship: A Bibliometric Review of Published Articles in 2023
	Ebenezer Takyi, University of Liverpool, UK
13:00 - 13:20	Study of Degradability and Green Waste Management of Polyethylene
	Bochu Du and Ying Ji, Hong Kong Polytechnic University, Hong Kong
13:20 - 13:40	Recycling Trends and Challenges in the Baltic States
	Natalija Cudecka-Purina, BA School of Business and Finance, Latvia
13:40 - 14:00	Treatment of Substandard Rocket Fuel 1,1-Dimethylhydrazine via its Methylene Derivative into Heterocycles Based on Pyrrolo-[3,4c] Quinolines, Cyclododeca[b]piran and Pyrrole
	Elizaveta Sergeevna Ivanova, Ulyanov Chuvash State University, Russia
14:00 - 14:20	Examining Long Term Environmental and Financial Impacts of Missing Highway Connectors
	Orianne K Wang, Westview High School, USA
14:20 - 14:40	Increased Atmospheric CO_2 Transfer to Soil through Mixing of Functionally Diverse Plants during Reforestation and Fallow (Ivory Coast and Congo)
	Armand W Koné, UFR Sciences de la Nature, Université NANGUI ABROGOUA, Ivory Coast
14:40 - 15:00	People's Perspective on Depletion and Degradation on Water in Patna and Kendujhargarh Block of Kendujhar District, Odisha, India - Climate Change Perspective
	Ranjan K Mallick, Ravenshaw University, India
15:00 - 15:20	Understanding the Impacts of Climate Change on African Indigenous Communities and Examples of Mitigation/Adaptation Responses: Case of the Baka and Bantous Local People Living at the Periphery of the Dja Biosphere Reserve
	Nwafi Ngeayi Adi, ACOBIDER, Cameroon
15:20 - 15:40	Implementation of the Global Concepts of Smart Municipalities in Jordan (Greater Amman Municipality as a Case Study)
	Reham M Alreqeb, Aljiza Municipality, Jordan
Day-2 Concludes followed by Vote of Thanks	

Day-1
Keynote Presentations

MULTI-SCALE MODELING OF COUPLED HYDROLOGICAL AND BIOGEOCHEMICAL PROCESSES IN WATERSHEDS

Junye Wang

Athabasca University, Canada

Abstract

Watersheds provide water, food, biodiversity and ecosystem service. However, the growing demand for water resources and climate change challenge our ability to provide freshwater and food when prevent environments. Particularly, watersheds are sensitive to changing climate due to their interactions between hydrological and biogeochemical processes. In this talk, I will analyze watershed system and processes in watersheds. I will explore the concept and methods of coupled hydrological and biogeochemical processes to evaluate impacts of hydrological and biogeochemical processes on water resource and water quality at watershed scale. I will identify the knowledge gaps in modelling river basins and provide a deeper insight to what we have learned over the years. Finally, I will point out the needs and directions for the future watershed modelling.

LAND MANAGEMENT OF OXISOLS TO SUPPORT CARBON SEQUESTRATION

Michael Aide

Southeast Missouri State University, USA

Abstract

Background: Oxisols are soils, in the USA soil taxonomy system, that are considered to have extensive weathering, such that only the most recalcitrant minerals are present and soil nutrient provision to plants are typically deficient. The soils are commonly located in subtropical to tropical regions with an abundance of rainfall and warm temperatures.

Objective: Oxisols typically have small soil organic carbon concentrations and agricultural land management practices have supported soil organic matter mineralization, resulting in substantial carbon emissions. This manuscript reviews emerging soil land management options that support soil carbon capture and retention, thus reducing global greenhouse gas emissions.

Methods: This review focuses on Oxisols in Hawaii and Brazil, each region having distinct demographic and agricultural differences, yet similar approaches to maintaining food productivity and increasing soil health and carbon sequestration.

Results: In Brazil large areas of tropical rainforest are being converted to cropland and pasturelands, whereas in Hawaii, with the dominance of tourism, many of the large sugarcane and pineapple plantations have reverted to native vegetation. In Brazil, an emphasis has been placed on no-till systems to support soil health and food security, whereas in Hawaii the emphasis is placed on small acreage agriculture holdings supporting an array of food crops. In both areas, research and governmental actions support soil sustainability.

Conclusion: Two diverse regions have independently arrived at supporting an agriculture future that combats climate change and supports land management options that encourage soil health and food security.

Biography

Michael Aide received his Ph.D in Soil Chemistry from Mississippi State University in 1982 and a bachelor's degree in Chemistry and Mathematics from the University Wisconsin-Madison. He has been an educator and agronomic-soil researcher at Southeast Missouri State University since 1982. His research interests include the growth and development of rice in integrated systems involving soil fertility, water management, and mitigation of arsenic uptake. Rice research has permitted his travel to southeastern Asia, Central America, and Egypt. Dr. Aide is a certified soil scientist who has investigated the influence of climate change on rice sustainability in the Mississippi River embayment. Other interests include investigating riparian buffer zones and constructed wetlands. His professional affiliations include the Soil Science Society America and the Soil and Water Conservation Society.

Day-1
Oral Presentations

EXAMINATION OF MAIZE WATER AVAILABILITY DEPENDING ON CLIMATE CHANGE

Éva Horváth, Adrienn Kakuszi-Széles, Endre Harsányi, Tamás Rátonyi and János Nagy

University of Debrecen, Hungary

Abstract

Background: Climate change causes the increasingly frequent drought and lack of water has a negative effect on the physiological processes of maize. The speed of stomatal reactions to environmental conditions significantly affects water use and photosynthesis, thus impacting on yield development.

Objective: To show how the negative impact of the weather factor on the maize yield can be mitigated by means of analyzing the combined effect of fertilization and plant water supply.

Methods: The studies were carried out in Debrecen, Hungary (47° 33' N, 21° 26' E, altitude 111 m). Besides the non-fertilized treatment in the scope of the trial, N-fertilizer rates were applied divided as basal and top-dressing. Soil temperature and soil moisture status were measured in 10-80 cm soil layers by soil probes. Stomatal conductance and NDWI measurements were made at the different developmental stages of maize (V12, R1, R3, R6), monitoring plant responses.

Results: The openness status of stomata was most strongly influenced by the availability of water to plants in the V12 phenophase at 10 cm depth (r=0.70***) and in the R3 phenophase at 80 cm depth (r=0.68***). The strongest correlation for NDWI values was found at (R1) (r=0.825***). Soil temperature had the greatest effect on NDWI and stomatal conductance values at R3 (r=0.53**; r=0.52**), while leaf temperature had the largest effect at V12 (r=0.692**; r=0.321**). A medium correlation between NDWI and stomatal conductance was confirmed, with NDWI values influencing stomatal openness at R1 by 32%. Examining the correlation between NDWI and yield, it was the strongest at the R3 grain fill stage (r=0.949***). Stomatal activity was the determinant of yield development at R1 (r=0.53***). Fertilization influenced yield development at 96% (r=0.98***).

Conclusion: The examined two parameters are used to monitor the water availability of maize. The research has confirmed that soil temperature and water availability are of paramount importance for plants at 10 and 80 cm soil depth during the periods of silking (R1) and grain fill (R3). NDWI and stomatal conductance in these two phenophases (R1; R3) correlate closely with yield development.

Biography

Éva Horváth, graduated as an Agricultural Engineer in Environmental Management at the University of Debrecen, Hungary. In 2018 she joined the scientific work and teaching of the Institute of Land use Engineering and Precision Technology. Her research topic is the ecophysiological interrelationship between precision maize nutrient and water supply connection with climate change. She is also interested in environmental protection and land use sustainability. She obtained her PhD in 2022 and has been working as an assistant lecturer since then. Research interests are precision agriculture, maize, N supply and effects of climate change.

CLIMATE CHANGE, AIR CONTAMINANTS, AND LONG-COVID. AN INNOVATIVE PROGRAM TO ASSIST HEALTHCARE PROVIDERS PROTECT COVID-19 PATIENTS

John Kraemer, K Necas, S Pierce and A Ahmed

Southeast Missouri State University, USA

Abstract

Background: Several studies have shown the association between COVID-19 and environmental factors. The positive correlation between air pollution and the SARS-CoV-2 virus spread has been described by WHO as one of the greatest challenges of our time. It is imperative that we understand the role of airborne contaminants, climate change, and the severity of the disease, especially on the hundreds of thousands of people diagnosed with Long COVID-19.

Objective: To examine the effectiveness of an in-home environmental assessment program in identifying potential triggers that worsen the effects of Long COVID-19 and alter the socioeconomic stability in rural settings of Missouri.

Methods: Data was obtained from 350 Long COVID-19 patients (i.e., ages 21-49, 180 males and 170 females) referred by hospital health systems in Missouri. Severe symptom onset was seen in patients at home and an innovative system was implemented to identify and measure possible airborne triggers in the home. Indoor air monitoring was conducted to limit uncertainty regarding exposure levels and symptom occurrence in the patients.

Results: A pilot project for 350 referred patients was conducted to determine the potential for exposure uncertainty to be reduced and to increase the effectiveness of treatment for recovery. Climate change can be shown to impact human health through disease incidence and environmental surveillance systems and a program that utilizes these systems can reduce the socioeconomic impacts and health impacts in a region.

Conclusion: The pilot program indicated the presence of 14 conditions or behaviors that had a positive correlation with Long COVID-19 symptoms, poor patient recovery, and climate change factors. A sustainable, effective system was implemented and a reduction in climate-related health occurrences was attained.

Biography

John Kraemer is a full professor in the Biology Department at Southeast Missouri State University, serves as the Environmental Science Program Director, and established the Center for Environmental Analysis to investigate ecosystem health and human health. He has secured federal funding for multiple projects for the protection of children's and adult health due to exposure to air pollution and climate change. He has worked over several years with CMS and CMMI and the Missouri Department of Social Services Medicaid providers to develop a sustainable method of reimbursements. A new program focused on Long COVID-19 patients due to poor recovery rates was requested by several hospital groups. We have implemented such a program, and the pilot program results are very promising and can be implemented on a global scale. Research interests are Climate Change, Air Pollution, Public Health, Environmental Health.

ENERGY EFFICIENCY AND ENVIRONMENTAL ASSESSMENT OF A NON-PROFIT FACILITY IN ALBUQUERQUE, NEW MEXICO

Jalal Rastegary, Patricia Sullivan, Claire K Debroux and Kyle Eagar

New Mexico State University, USA

Abstract

The Office of Outreach and Recruitment (OOR) at New Mexico State University (NMSU) assists businesses in their pursuit to increase environmental awareness, reduce energy usage, implement sustainable environmentally friendly practices, and reduce costs.

The OOR staff conducted an energy and environmental assessment for a non-profit organization that collects and distributes food to hunger-relief charities and community organizations located in Albuquerque, New Mexico. The assessment included a walk-through inspection of the receiving and shipping processes, equipment usage, waste generation and disposal, lighting, water consumption, electrical consumption, and heating, ventilation, and air conditioning (HVAC) systems. Following the walk-through, the team presented initial findings to the top management and employees who participated in the walk-through. Subsequently, the data undergoes strict evaluation through research and mathematical analysis to consolidate the recommendations provided. Finally, the OOR team prepared a detailed report with recommendations for areas of improvement. For example, the company would mitigate the release of over 20 tons of CO_2 annually by simply unplugging their machinery' charging equipment when it's not in use, which depicts the organization's energy inefficiency. Electrical consumption reductions were also identified throughout the processes, equipment, and facilities. These included reconfiguration of the empty freezer and cooler areas, upgrading outdated forklift charging equipment, installing automatic walk-in door closers, and regular maintenance of walk- in coolers and freezers. Further, a programmed code was written to help the business model different area reconfiguration scenarios for their vacant freezer and cooler spaces. The code is broken down step-by-step with all assumptions clearly stated and is user-friendly so that the business can utilize it to gain insight into the optimal cold storage areas for their current inventory. Overall, the implementation of the suggested practices within the report would allow the business to reduce electrical consumption by over 1,019,045 kWh, reduce greenhouse gas emissions by 748.8 metric tons, hazardous waste by 44.75 metric tons, and realize $177,329 in savings per year, representing a substantial economic impact on the organization, and significant progress in environmental awareness.

THE RENEWABLE PORTFOLIO STANDARDS AND CLIMATE CHANGE

Osei Agyeman Yeboah, Saleem Shaik and Kwadwo Antwi-Wiafe

L.C. Cooper Jr. International Trade Center, North Carolina A&T State University, USA

Abstract

Background: Renewable Portfolio Standards (RPS) are state-level regulations that require electricity providers to generate an increasing percentage of their electricity from renewable sources by a specific target year. These standards have been successful in driving growth in renewable energy generation in the United States since the early 2000s. RPS policies are effective in promoting investment in renewable energy infrastructure, creating jobs in the clean energy sector, reducing greenhouse gas emissions, improving energy security, and diversifying the energy supply. By setting clear renewable energy targets and creating market demand for clean energy technologies, RPS policies have played a significant role in accelerating the deployment of wind, solar, biomass and other renewable energy sources across the United States.

Objective: To examine the impact of RPS policy on U.S sectoral energy demand.

Methods: The research applies Structural Vector Autocorrelation model (SVAR) to electricity, coal, natural gas, and petroleum consumption by residential, commercial, industrial, and transportation sectors from 1990 to 2022 to examine both the short-run and the long-run impacts of the policy. A system of demand equation will be developed as a function of the following explanatory variables - renewable energy production, carbon pricing, GDP and greenhouse gas emission.

Results: The study anticipates that the consumption of coal and petroleum to reduce whereas the consumption electricity and gas to increase result of policy. Moreover, the study expects a reduction in greenhouse gas emission due to the RPS policy.

Conclusion: The shift towards the demand for cleaner sources of energy in the U.S. is evident with the implementation of RPS. The study reveals significant reductions in coal and petroleum consumption, coupled with increased electricity and natural gas usage across sectors. These finding will highlight the effectiveness of RPS policies in advancing renewable energy adoption and reducing greenhouse gas emissions, aligning with climate sustainability objectives.

Biography

Osei Agyeman Yeboah - A member of the NC A&T faculty for the past 21 years, Yeboah's scientific interests began at the KNUST in his native Ghana, where he earned his BS in Agricultural Science. He earned an MS in Production Economics from NCA&T in 1993, and Doctorate in Agricultural Economics (Resource Economics/International Agricultural Trade) at University of Nebraska-Lincoln in 1998 and served as a postdoctoral research fellow at same institution from 1998 to 2000, and Visiting Scholar at Auburn University Environmental Institute, and Department of Agricultural Economics and Rural Sociology, Auburn University Alabama, 2002-2003. He has since 2014 been a Professor and Director at NC A&T. He has earned several awards including the University's Senior Researcher Award in 2012; and College of Agriculture & Environmental Sciences Research Productivity Award in 2023. Graduate courses taught include Agricultural Marketing and Interregional Trade, International Trade Theory, International Trade Policy, Environmental Economics and Policy, and Production Economics. Research interests are environmental economics and international trade.

IMPACT OF CLIMATE CHANGE ON SURFACE WATER STATUS IN LITHUANIA

Laima Cesoniene and Daiva Sileikiene

Vytautas Magnus University, Lithuania

Abstract

Background: Poor water status can be affected by natural and anthropogenic factors. Natural - such as climate change. The growing impact of a changing climate is a growing concern for the international community. These impacts are very diverse and cover both the natural systems and the social sphere. Water resources are no exception. Changes in the quantitative and qualitative indicators of water reflect well the changes in the climate system.

Objective: To examine the assess the impact of climate change on surface water status in Lithuania.

Methods: Climatic conditions are assessed according to the data of the Lithuanian Hydrometeorological Service under the Ministry of Environment, Kaunas Meteorology. Data on average air temperature and precipitation from 1949 to 2023 were evaluated. Soil freezing data -1985-2023. Surveys of the quality of surface water bodies in the territory of Kaunas District Municipality were performed in 25 measurement sites: 4 ponds, 21 river sections in 2008-2021.Groundwater quality surveys were carried out in the villages and a total of about 80 shaft wells were assessed in period 2008-2024.

Results: After estimating the dynamics of the average annual temperature in 1949 - 2023 in Kaunas district, an increasing trend was determined ($R^2 = 0.30$). No linear upward trend in annual precipitation was observed ($R^2 = 0.01$). Precipitation fluctuates constantly. According to the NO_3 -N concentrations, the values of the good ecological status class did not correspond to all the studied water bodies. Good ecological status classes correspond to NH4-N - 12%, according to P -5%; according to N - 12% of the studied water bodies. Correlation coefficients were calculated to show a statistically strong positive relationship between mean annual temperature and BOD_7 value, total nitrogen and total phosphorus concentration, and a statistically strong negative relationship between pH value and nitrate nitrogen concentration. A statistically strong positive relationship was found between annual precipitation and BOD_7 value, ammonium ion, nitrite and nitrate concentrations, and a statistically strong negative relationship was found between dissolved oxygen and total phosphorus concentration.

Biography

Laima Cesoniene currently works as a professor at the Academy of Agriculture of Vytautas Magnus University, Faculty of Forest sciences and Ecology, Head of Department of Environment and Ecology, Lithuania. In 2003 she was awarded the degree of Doctor of Technology sciences. Dissertation topic "Influence of environmental factors on water pollution dynamics of shaft wells". Research area is - groundwater quality, surface water status, wastewater pollution - causes and ways to reduce, environmental quality and sustainable development. Scientific work experience - 23 years. Research interests are environmental quality research of agro-, hydro- and forest ecosystems.

INTEGRATING NANOPLASTICS TOXICITY INTO NANOTOXICOLOGY THROUGH DATA MINING AND MACHINE LEARNING

Bing Yan

Guangzhou University, China

Abstract

By leveraging over 140,000 research articles on nanoparticle and nanoplastics toxicology, we systematically examine these particles' physicochemical properties, uptake mechanisms, toxicity endpoints, and structure-toxicity relationships using data mining and machine learning. The findings reveal that, despite some noticeable differences in environmental abundance and incidentally generated shapes, the toxicological profiles of nanoplastics closely resemble those of other nanoparticles, especially polymer-based ones, challenging the notion of nanoplastics as a distinct and isolated risk. This comprehensive analysis not only underscores the similarities in environmental behaviors and biological impacts of nanoplastics and engineered nanoparticles but also advocates for the integration of nanoplastics toxicity into the broader context of nanotoxicology. This integrated approach promotes the efficient use of research resources, releases creativity, contributes to a more holistic understanding of nanoparticle toxicity, and aids in developing effective strategies for mitigating the adverse effects of these ubiquitous particles in our environment.

Fe_3O_4 NANOPARTICLES ENHANCEMENT OF BIO-HYDROGEN PRODUCTION FROM RICE STRAW

Christian Toochukwu Ogbonna, Chen-Yeon Chu and Helmut Yabar

University of Tsukuba, Japan

Abstract

Background: Two-stage acid-hydrolysis is a mature technique for improving the biodegradability of lignocellulosic biomass. However, recent studies show that it produces toxic acids such as furfural, which inhibits the glycolytic enzymes in hydrogen-producing bacteria, resulting in a slow rate of bacteria growth and hydrogen production. As a non-chemical-based catalyst, powdered activated carbon (PAC) and magnetite nanoparticles (MNP) have unique properties that promote biological processes. Their enhancing effect on methane production has been demonstrated, while few studies have focused on hydrogen production.

Objective: To investigate the enhancing effect of PAC and MNP on hydrogen production from anaerobic co-digestion of rice straw and food waste hydrolysate.

Methods: Rice straw and food waste were characterized by their chemical composition followed by water, or acid (0.5M, or 1M H_2SO_4) hydrolysis. The inoculum was seed sludge from an anaerobic digester. The co-digestion of rice and food waste with PAC or MNP at different dosages was carried out in an incubator with a shaker at 60 rpm and 37°C.

Results: Substrates under water-hydrolysis had an optimal COD ratio of 20 but were incapable of producing hydrogen due to low total sugar. 1 M sulfuric acid increased the total sugar concentration and subsequently higher hydrogen production. PAC enhanced gas production compared to MNP. PAC at 30g/L significantly improved gas and hydrogen production compared to the reactor without PAC. On the other hand, 10 g/L of MNP improved gas production from 9 to 11.5g COD, however, there was no observable improvement in hydrogen production.

Conclusion: This finding shows that activated carbon improves hydrogen production by removing toxic compounds. However, MNP could not result in higher hydrogen production, possibly due to ineffective mixing in the reactor as magnets are attracted downward to the meter holder. Hence, a reactor with a mixer is recommended over a shaker.

Biography

Christian Toochukwu Ogbonna is keen on renewable energy resources and biomass valorization. His current Ph.D. study focuses on anaerobic digestion technology for methane and hydrogen production. His research has been shared in conferences and 3 reputable academic journals. Beyond the academic realm, Ogbonna is actively involved in academic programs supporting young scholars in his home country and enjoys traveling around the world. Research interests are Anaerobic digestion, Hydrogen, and methane production.

GREENWASHING AND FAST FASHION BRANDS: PERCEPTION AMONG YOUNG ADULT CONSUMERS

Vibha Yadav, Nandini Aggarwal and Madhuri Nigam

Lady Irwin College, University of Delhi, India

Abstract

The significant climatic changes and expanding population over the past ten years have made sustainability one of the largest trends. One of the factors contributing to its growth is the increasing environmental concern among younger generations. Green marketing focuses on creating products that are eco-friendly and potentially less harmful to the environment and its stakeholders. However, if a company does not adhere to the principles of sustainable business operations, green marketing could easily develop into greenwashing. Several commonly used labels, including "green," "eco-friendly," "organic," and "natural," have the potential to mislead and confuse consumers.

Notably, younger generations are the customer demographic that prefers to invest in companies and goods that uphold the values of sustainability. Fast fashion, on the other hand, is a trend that prioritises the creation of inexpensive apparel quickly and is notorious for its huge environmental impact and has recently been taking affirmative action in moving towards more sustainable approaches in manufacturing fashion goods. However, there is some ambiguity in the factual information provided and the green claims perpetuated in countless advertisements by fast fashion brands to support their sustainability initiatives.

Keeping this into consideration, the present study was conducted in Delhi NCR, with the help of a comprehensive questionnaire administered to the selected sample size of 100 (18-35years). Since, young consumers are the major target market of fast fashion brands, therefore it was important to research the phenomena and provide young customers with the information they need to make informed decisions and avoid future manipulation by fast fashion manufacturers.

The study helped in determining consumer's lack of awareness of the subject and even though consumers have demonstrated a high preference for ecologically friendly goods and businesses, there is a large discrepancy between what customers say and what they actually do. Not all environmentally conscious customers may ultimately choose to buy green products.

It was found that the impact of greenwashing on the respondents' purchasing decisions is frequently influenced by other relevant parameters including pricing and a lack of access to more environmentally friendly options. It is also worth noting that the credibility and brand goodwill of a company can suffer if it is caught engaging in greenwashing practices.

Biography

Vibha Yadav is a keen researcher in the field of sustainability in textiles and fashion. She has several years of experience in research, evaluation and teaching at the university of Delhi. Her research interests include sustainable fashion and textiles, life cycle assessment, carbon footprint, consumer and market research. Research interests are sustainable fashion and textiles, life cycle assessment, carbon footprint, consumer and market research.

ORGANISATIONAL LIFE CYCLE ASSESSMENT OF TEXTILE MANUFACTURING UNITS: NEED OF THE HOUR

Vibha Yadav, Sabina Sethi and Madhuri Nigam

Lady Irwin College, University of Delhi, India

Abstract

The textile industry worldwide is one of the major industries of the world, worth over $995 billion in 2022 and expected to grow to US$ 1440 Billion through the assessment period of 2022-2032. However, it is also marred by the fact that it's one of the most polluting industries, impacting land, water, air, as well as human health. It has been estimated to generate 1.2 billion tonnes of CO_2 equivalent or nearly 10% of the world's GHG emissions (UNFCCC, 2018). The 12th SDG of "sustainable production and consumption! states that sustainable production can only be achieved when manufacturing processes account for the future needs of society and work within the planetary boundaries (www.unep.org). Despite our increasing understanding of sustainability issues and solutions to tackle environmental impacts, the current production and consumption models are largely unsustainable (Barletta et al, 2021). Life cycle assessment (LCA) is one of the most reliable and recognized methods worldwide, used to measure the environmental impacts of a product or service from its production to its end of use phase. Moreover, the consumers are increasingly demanding to know how the products they buy have been made and what environmental impact do these products cause while being produced and consumed. Many consumers are already using life cycle information to make their purchase decisions (UNEP, 2009). To make a more comprehensive assessment of environmental impacts throughout the value chain of textile products, organizational approach of measuring LCA is being considered more relevant to assess the overall environmental performance of a textile company or organization. Organizational LCA or O-LCA is a compilation and evaluation of the inputs, outputs and potential environmental impacts of the activities associated with the organization adopting a life cycle perspective (UNEP, 2015). LCA studies in India are still in the nascent stages across various industries. This study attempts to fill the gap in available data and provide insights about the impact reduction opportunities in the value chain of a textile manufacturing unit/s of an organization. In initial studies it has been found that the fabric production stages have a higher contribution to the carbon footprint as compared to fibre production or use phase. Fabric production utilizes the highest amount of electricity thereby its environmental burden is the highest.

Biography

Vibha Yadav is a keen researcher in the field of sustainability in textiles and fashion. She has several years of experience in research, evaluation and teaching at the university of Delhi. Her research interests include sustainable fashion and textiles, life cycle assessment, carbon footprint, consumer and market research. Research interests are sustainable fashion and textiles, life cycle assessment, carbon footprint, consumer and market research.

CELLULOSE-BASED HYDROGELS FOR WATER HARVESTING FROM MOIST AIR

Simeng Li, Desarae Tasnady and Hailey Mcintyre

California State Polytechnic University, USA

Abstract

Background: In the face of deteriorating climate change, water is an increasingly scarce resource for agriculture in arid regions like Southern California. To increase crops' water, use efficiency, superabsorbent hydrogels can be applied in agricultural fields as reservoirs for excess irrigation water.

Objective: In this research, nanocellulose and cellulose derivatives were extracted from crop residues and separated from each other using a stepwise combination of high intensity ultrasonication, electrospinning, and chemical pretreatment.

Methods: Nanocellulose-based superabsorbent hydrogels were then synthesized through aqueous solution polymerization and electromagnetic irradiation induced polymerization. Surface properties of the superabsorbent hydrogels were further treated to enhance their hydration properties.

Results: Our preliminary results indicate that considerable air moisture was able to be captured by hydrogels when the water vapor density is above 12 g/m^3, i.e., at relative humidity > 50% at 77°F and 1 atm under laboratory conditions. Pot studies and field investigations will be carried out using subsurface drip systems to deliver ambient air for its moisture to be captured by and stored in the "green" superabsorbent hydrogels.

Conclusion: The success of this study shall provide a sustainable nexus solution to tackle the issues of water scarcity and agricultural waste generation at the same time. The circular flow of carbonaceous materials in agriculture will also contribute to achieving the United Nation's carbon neutrality goal. In addition, air moisture may become an alternative water source with the assistance of superabsorbent hydrogels.

Biography

Simeng Li joined the faculty of civil engineering in August 2019 after completing his Ph.D. and M.Eng both from Florida State University. His academic and research interests are firmly rooted in the fields of environmental and water resources engineering, driven by a profound commitment to sustainability and environmental enhancement. His work focuses on developing innovative strategies to enhance water system resilience, pioneering new approaches to convert waste into valuable resources, and addressing environmental challenges by remediating both legacy and emerging contaminants. During his tenure at Cal Poly Pomona, Dr. Li has had the privilege of instructing a wide array of courses catering to both undergraduate and graduate students. His is passionate about fostering academic growth by consistently providing valuable experiential learning opportunities to aspiring students. Research interests are water sector resilience, waste-to-resource solutions, remediation of legacy/emerging contaminants.

Day-1
Poster Presentation

EARTHWORMS (CLITELLATA: *LUMBRICIDAE*) OF THE BALKAN PENINSULA: A REVIEW

Tanja Trakić[1], Filip Popović[1], Jovana Sekulić[1] and Davorka K Hackenberger [2]

[1]*University of Kragujevac, Serbia*

[2]*J J Strossmayer University of Osijek, Croatia*

Abstract

Background: The earthworms from the Lumbricidae family present filogenetly the youngest family in the subclass of worms (Oligochaeta). The largest number of endemic species, as expressions of the fauna's character, are present in Europe on the Balkan and Pyrénées Peninsula and to a lesser extent in the Carpathians and the Caucasus.

Objective: This publication presents the fauna of the earthworms of the Lumbricidae family on the territory Balkan Peninsula, based on the current taxonomic status of species and genera, all literary and unpublished data of the authors.

Results: The lumbricid fauna of the Balkans is very rich and, according to previous research, numbers 163 taxa distributed in 19 genera. All Balkan countries from west to east are included in this research, and summarized data indicates the presence of earthworm species and subspecies (Serbia: 79; Croatia: 68; Slovenia: 61; Greece: 59; Macedonia: 57; Bosnia & Herzegovina: 48; Balkan Montenegro: 43; Bulgaria: 42; Albania: 31; part of Turkey: 15). Numbers from Serbia, Slovenia, and Croatia include areas that do not belong to the Balkans, such as the Pannonian parts of Serbia and Croatia, and most of Slovenia. Out of the total number of all registered Lumbricidae in the Balkans, more than half are endemic species (55.21%).

Conclusion: Our study shows that the degree of endemism on the Balkan Peninsula is extremely high suggesting an important process of autochthonous speciation on the Balkan Peninsula. Historical explanations refer to the huge, specific, and complex geological processes that determined the distribution and richness of species on the Balkan Peninsula, which, due to its peculiar development and role as a refugium during the Ice Age, is the most important center of biodiversity in Europe.

Biography

Tanja Trakić - Assistant Professor at the Faculty of Science, at the Institute of Biology and Ecology, University of Kragujevac. Dr. Tanja Trakić is actively engaged in scientific research in the fields of Ecology, Biogeography, and Environmental Protection. Her research focuses on taxonomic, ecological, biogeographical, and ecotoxicological investigations of earthworms from the family Lumbricidae Rafinesque-Schmaltz, 1815. Dr. Tanja Trakić has published the results of her scientific work in more of 80 bibliographic units. She possesses extensive pedagogical experience, spanning over 15 years. Tanja Trakić was selected as the limnobiological expert for data control of earthworms in Serbia and the Balkan Peninsula during the project meeting in Lisbon. She is Mentor master theses and doctoral dissertation; Mentor and member of the commission at the Regional Center for Young Talents; Scientific reviewer for the Biodiversa+; Member Reviewer of different journals (Biodiversity and Conservation, North-Western Journal of Zoology, Acta zoologica Bulgarica, Ecologia Balkanica).

BREATHING IN CHANGE: THE CONTINUOUS PROBLEM OF AIR POLLUTION IN KAZAKHSTAN

Islam Suleimen

Northwestern University, USA

Abstract

Air pollution poses a significant environmental challenge in Kazakhstan, a Central Asian nation heavily reliant on fossil fuel production. Rapid urbanization and industrialization have led to alarmingly high levels of air pollution, particularly in major cities, adversely impacting public health and the environment. This paper examines the state of air pollution in Kazakhstan, the effectiveness of measures, and potential solutions for the future.

Kazakhstan ranks 40th out of 131 countries for poor air quality, with an average annual PM2.5 concentration significantly exceeding the World Health Organization's standards. The nation's dependence on fossil fuels is a major contributor to this issue, with industrial output forming a substantial part of its GDP. Despite efforts to boost industrial enterprise competitiveness, the increase in fossil fuel emissions remains a critical concern.

The study highlights the severe health implications of air pollution, including respiratory and cardiovascular diseases, and its economic burden. The government's initiatives, such as the Environmental Code and commitments under the Paris Agreement, are assessed for their effectiveness in mitigating air pollution. However, the results indicate that these measures have not achieved the desired outcomes, and air quality continues to deteriorate.

The paper proposes several solutions, including the increased use of renewable energy, improved air quality monitoring, and enhanced public awareness. Collaborative efforts involving local, regional, and international organizations are crucial to address the issue comprehensively. By implementing and enforcing stricter regulations and investing in cleaner technologies, Kazakhstan can reduce air pollution and ensure sustainable development.

In conclusion, tackling air pollution in Kazakhstan requires persistent dedication and coordinated actions at both national and global levels. Only through such efforts can a healthier and more sustainable future be envisioned for Kazakhstan, Central Asia, and the world.

Day-2
Keynote Presentation

AI IN ADVANCE SOCIETY: AN INTELLIGENT METHOD FOR OPTIMIZING ENVIRONMENTAL EVENTS

Madjid Fathi

University of Siegen, Germany

Abstract

Artificial intelligence is providing advanced and public oriented support for all areas of society and, with the newly found focus on sustainable actions, especially under them environmental activities. Furthermore, AI is tailored to and supported by common knowledge and knowledge based in regard to the resources and methods such as, machine learning, decision support systems and recommender systems. Several proven applications exist in a range of fields, like engineering, medicine, smart society and in and in overlap with environmental areas.

In this keynote I will sketch the perspectives of artificial intelligence for a desired, smart society in general, as well as showing how effective methodologies for integrating data and knowledge are. Smart factories and the space of smart city is continuously leading us to a smart(er) society, which is cumulating now into the concept of Society 5.0. A newfound major focus of modernizing, smarter societies is to integrate further environmental aspects in an intelligent way, with environmental health, environmental engineering, controlling of air-pollution, and ensuring water security.

We get support by approaching novel intelligent learning methods and multi-agent systems for an individualized handling of smart society and their influence in common environmental and ecological factors integrated for sustainable economy and technology. This is an essential need, that leads us to and the need for semantic connections of structured and unstructured data and fundamentally knowledge wherever it exists. The solution for such integration is captured in the recent emergence of applying Knowledge Graphs (KG) as a reusable, machine readable, flexible and extendable knowledge representation instrument for a semantic search for options, error causes and in environmental processes that may lead to more lasting change for society.

Knowledge Graphs are not just a method for defining semantic connections, but also for creating intelligent and explainable recommendations for exploring and better understanding complex environmental events, both expected, as well as unpredictable by regular learned methods. KG technically provide an explorative and integrative space for applying and facilitating data driven methods, such as collected by sensors techniques integrated in and driven by cyber physical systems and their resources, which provide further facilities to optimizing and solving environmental issues, independent of existing limitations.

Day-2
Oral Presentations

Coalesce Research Group

7th International Conference on

Environmental Sustainability and Climate Change

August 19-20, 2024 | South Point Hotel, Casino & Spa, Las Vegas, USA

ENHANCING GHANA'S REDD+ MRV PROCESSES THROUGH THE ESTIMATION OF ABOVE-GROUND BIOMASS USING RANDOM FOREST REGRESSION MODEL IN GOOGLE EARTH ENGINE

Naa Dedei Tagoe and E Ashun

University of Mines and Technology, Ghana

Abstract

Background: Accurate estimation of above-ground biomass (AGB) is essential for monitoring forest resources and supporting initiatives such as the Reducing Emissions from Deforestation and Forest Degradation (REDD+) Measurement, Reporting, and Verification (MRV) process. This paper presents a methodology to improve Ghana' MRV process within REDD+ programme. Successful execution REDD+ programme depends on establishing robust capabilities to consistently and accurately monitor changes in forest areas, carbon stocks, above-ground biomass (AGB), and associated greenhouse gas (GHG) emissions and removals. The Global Ecosystem Dynamics Investigation (GEDI) mission launched by NASA in 2018 collects lidar measurements along ground transects at 60 m intervals, with a spatial resolution of 25 m. The dataset allows for an in-depth study of forest ecosystems, including assessments of aboveground biomass, canopy structure, and carbon storage. A limitation to this dataset is that it is point-based, consisting of discrete measurements rather than continuous coverage. To address this challenge, and to integrate the GEDI dataset into Ghana's forest monitoring systems, reliable modelling and prediction of areas without GEDI AGB data is necessary.

Objective: To estimate above-ground biomass using GEDI and other open-source Earth Observation datasets to support Ghana's MRV process within REDD+ programme.

Methods: The methodology adopted involves preprocessing Sentinel-2 images. Google's CloudScore+ was used to apply a cloud mask and create an annual cloud-free Sentinel-2 composite image. Spectral indices such as the Normalized Difference Vegetation Index (NDVI) were extracted from these composite images. Elevation and slope were computed from the Copernicus GLO-30 DEM data. The spectral bands of the Sentinel-2 images, spectral indices, elevation and slope served as independent variables, while the point estimates of the GEDI L4A Raster AGBD served as dependent variables in the regression model. A Random Forest (RF) regression model was trained with the GEDI L4A Raster AGBD point estimates, which also served as ground truth data. The model predicts AGBD across the study area. The predictions were aggregated to estimate the total AGB after masking non-vegetated areas.

Results: The relationship between observed and predicted AGBD is described by the equation: agbd_predicted = 0.588 × agbd + 55.503, with a strong predictive performance indicated by R^2 values between 0.782 and 0.792. The evaluation metrics include RMSE ranging from 48.50 to 50.801 Mg/ha, MAE of 31.369 Mg/ha, and rRMSE of 38.201%. The total AGBD for the study area was 96,620,390.49 Mg/ha.

Conclusion: This study demonstrates the potential of using GEE, open source EO datasets and RF regression model for estimating AGB, supporting Ghana's REDD+ initiatives.

Biography

Naa Dedei Tagoe is a Geospatial professional with an environmental background. She is a senior lecturer at the University of Mines and Technology, where she has been teaching since 2010. Additionally, she serves as the Environmental Sustainability Advisor to the Ministry of Environment, Science, Technology, and Innovation (MESTI). Her research interests include the application of geospatial tools and technologies for environmental sustainability and climate change.

HYDROLOGICAL HAZARDS, DRIVERS, AND POLICY ALIGNMENT IN THE NIGER DELTA

Obroma Agumagu

University of York, UK

Abstract

Vulnerability of the Niger Delta from the effect of climate change, human activities, and the lack of effective policy implementation in the area are a huge threat to human development, owing to its low adaptive capacity and the fragility of the ecosystem. Therefore, this research aims to investigate the past, present, and future hydrological hazards in the Niger Delta, their drivers and the policy alignment. The climatic data, and the land use land cover change were analysed. The policies that cut across environment, climate change, agriculture, water, forest and petroleum were also examined using the qualitative document analysis method. It reveals that, if the Niger Delta continue to develop unsustainably, the future situation would be likely to in line with the Shared Socioeconomic Pathways (SSPs) 5-8.5. By 2100, the Niger Delta region would be more vulnerable to flooding as a result of high rainfall, river floods, storm surges and sea level rise. And the key drivers include urbanization, deforestation, industrialization, agricultural activities and population growth. For the policy alignment, it shows that the alignment of the national policies in hydrological hazard management is found to be low across the risk sectors. To conclude, it is vital that Nigeria's policies need to be reviewed to deliver a more integrated with multi-sector involvement for a better management of climate change impacts.

IMPACTS OF CLIMATE CHANGE IN TÜRKIYE AND USA AND HOW FARMERS ARE ADAPTING?

Funda Yoldas[1] and Cynthia Daley[2]

[1]Ege University, Turkey and California State University, USA
[2]California State University, USA

Abstract

Climate change has reduced food and water security due to warming, altered precipitation patterns, loss of crucial elements, and more frequent and intense climatic extremes. These changes disrupt the balance of natural resources essential for agriculture, leading to decreased crop yields and compromised water supplies, which in turn threaten the livelihoods of farmers and the stability of food systems worldwide. Although agricultural productivity has increased overall, climate change has slowed global growth, negatively affecting agricultural production.

Changes to Earth's climate affect the environment. For example, causing sea levels to rise, etc. Additionally, the geographic ranges of plants and animals are shifting, and plants and trees are blooming sooner, decline in soil health, decreased productivity of agricultural land, changes in farmland use, and reduction of agricultural areas. Rising temperatures and extreme weather events, such as droughts and floods, reduce crop yields, cause soil erosion, and increase the spread of pests and diseases. Changes in precipitation patterns also heighten the risk of forest fires.

Farmers are becoming increasingly vulnerable to extreme weather events caused by climate change. They are adapting by various means, including, going out of production, ceasing to grow certain products, using shade or solar panels, and growing different crop varieties. The effects of climate change on agriculture in Turkey and the USA are a growing concern. Governments and farmers are working to adapt to these changes through measures such as more efficient irrigation practices, the use of drought-resistant crops, improved water management strategies, etc.

Biography

Funda Yoldaş has dedicated her academic career to the field of horticulture, with a particular focus on sustainable agriculture and organic farming practices. Dr. Yoldaş's extensive research and contributions have significantly advanced our understanding of plant growth, yield optimization, and quality enhancement in various horticultural crops. Research interests are sustainability, agriculture, organic growing, climate change etc.

CURRENT STATUS OF E-WASTE: A CASE OF TOUL KORK DISTRICT, PHNOM PENH, CAMBODIA

Yim Mongtoeun, Hoy Sereivathanak Reasey, Lim Sousan, An Mengly, Chuorp Ponleu, Nao Sinat and Heng Pancha

Royal University of Phnom Penh, Cambodia

Abstract

The increase of population and purchasing power, supported by the development of technology, give consequence to the generation of E-waste with impacts. The result from 63 shops in Toul Kork showed that the management and behavior is still limited, both in terms of storage and disposal. Protective equipment during the disassembly and repair of EEE, most of the repairers or dismantlers are still unaware of the impact. The amount of waste of electrical and electronic equipment is worrying due to its increase from year to year. According to the results obtained from the study, the electronic waste (phone-85% and computer-15%) generated 0.36 kg/day/shop on working day and 0.9 kg/day/shop on holiday or weekend, while amount waste generated from electrical shop is lower (0.2 kg/day/shop) and there is no any differentiation between working day and holiday. However, in this study indicated that waste from electrical is mainly AC and refrigerator accounted for 35.7% and 42.9%, respectively, while electronic generated phone waste and computer waste accounted for 74.3% and 25.7%, respectively. Regarding to waste storage, both electronic and electrical shops keep the waste by mixing up to 80%, while electronic waste was disposed with other waste (46%), keeping (22%) and selling (32%) and electrical waste was disposed with other waste (32%), keeping (43%) and selling (25%).

Biography

Yim Mongtoeun has his expertise in the field of Solid Waste Management in improving the environmental health and wellbeing. Currently, he is the deputy head of department and started working in department of environmental science, royal university of Phnom Penh (RUPP) and this field for a long period of time in which he contributed a lot on human resources development for improving environment and public health. He has built in this major after years of experience in research, evaluation, teaching and administration both in consulting firms and education institutions. He has participated in many activities related to these issues both locally and international. Research interest is on environmental issues.

TRANSBOUNDARY GOVERNANCE ISSUES OF COASTAL HABITAT IN CAMBODIA – VIETNAM COASTAL ZONE

Hoy Sereivathanak Reasey, Yim Mongtoeun and Chansoriya MINH

Royal University of Phnom Penh, Cambodia

Abstract

Cambodia and Vietnam make up 30.6% of the total area of the Gulf of Thailand Large Marine Ecosystem (LME). Mangroves, seagrass, and coral reefs interact to create a transboundary habitat for migratory species in the area. With its potential for ecosystem services in the zone, transboundary governance is a framework that needs to be considered. The study aims to review current transboundary issues, existing governance indicators of engagement, integration, and completeness using a qualitative research approach for systematic review, key informant interviews, focus group discussion, and conducts risk ranking from very low, low, medium, high, very high. Based on the systematic review and analysis, the coastal zone of both countries is at the level of risk ranking for coastal habitat transboundary governance: at medium risk (40%) for the average level of engagement for each of the agreements in place; At high risk (0.4) for the level of integration across different arrangements; and at high risk (20%) for the average level of completeness of all formal arrangements in places. The zone was identified at very high risk of biodiversity, pollution, ecosystem health, and climate change as well as the lack of concrete binding bilateral collaboration agreements, integration frameworks and political will to split out the ecosystem from the sensitive administration boundary of sovereign rights, the coastal habitat leads to be risk without transboundary governance.

Biography

Hoy Sereivathanak Reasey, is a head of Department of Natural Resource Management and Development, Royal University of Phnom Penh (RUPP - Cambodia), he has been involved in academic career since 2007 until now with his post-graduated background in Natural Resource Preservation and Rational Exploitation, VNU-HCM, Vietnam; Environmental Governance, ANU, Australia; and Integrated Coastal Management (ICM), AIT, Thailand. The focus of research and teaching is on Environmental Law and Policy. He has worked with several ministries and the World Bank to prepare appraisal documents for national development projects with his expertise in environmental and social safeguard consulting. In addition to his primary role, he is also instrumental in the coordination of the PEMSEA Regional Network of Learning Centers (PNLC) in Cambodia, which serves as a national hub for sharing ICM knowledge and experience. Research Interest: Environmental governance, and policy analysis.

SYSTEMS BASED ASSESSMENT OF LIVELIHOOD VULNERABILITY AND ADAPTATION STRATEGIES TO CLIMATE CHANGE: RAJANPUR DISTRICT PAKISTAN

Muhammad Afzal, Shahbaz Mushtaq, Thanh Mai, Kathryn Reardon-Smith and Duc-Anh An-Vo

University of Southern Queensland, Australia

Abstract

Background: Climate change has become one of the most challenging environmental issues in the 21st century. Climate change-induced natural disasters, especially floods, are the major factors of livelihood vulnerability, impacting millions of individuals worldwide.

Objective: To evaluate and mitigate the effects of floods requires an in-depth understanding of the relationship between vulnerability and livelihood capital assets.

Methods: Using integrated approach; sustainable livelihood framework and system thinking approach, study developed a conceptual model of generalized livelihood system in District Rajanpur, Pakistan. The model visualizes the livelihood vulnerability system as a whole and identifies the key feedback loops likely to influence the livelihood vulnerability.

Results: The key finding of the study reveals that household income, health and education are the major factors behind the livelihood vulnerability of the rural poor of District Rajanpur.

Conclusion: The study suggests that such conceptual models provide effective communication and understanding tools to stakeholders and decision-makers to anticipate the problem and design appropriate policies. It can also serve as an evaluation technique for rural livelihood policy and identify key systematic interventions. The Pakistani government tried to reduce livelihood vulnerability of the region through different income, health, and education programs but still many changings are required to make these programs more effective especially during the flood times. The government provided only cash to vulnerable and marginalized families through income support programs, but this study suggests that along with the cash government must provide seed storage facilities and access to crop insurance to the farmers. Similarly, the government should establish basic health units in villages and frequent visits of medical mobile vans should be arranged with advanced medical lab facilities during and after the flood.

Biography

Muhammad Afzal has his expertise in climate change adaptation and mitigation strategies and resilience development to climate change and natural disasters to improve rural communities' socio-economic wellbeing. His conceptual and contextual evaluation model based on system thinking creates new pathways for improving adaptive capacity to climate change disasters and reducing vulnerability to disturbance. He has built this model after years of experience in research, evaluation, teaching, and administration both industry and academia. The foundation is based on System Dynamics (SD) which is a theory of problem solving based on the feedback control theory (J.W. Forrester, 1956) this is a computer aided methodology that utilizes strategy and policy design. This approach is responsive to all stakeholders and has a different way of focusing. Research interests are climate change, agriculture and sustainable development.

AN ASSESSMENT OF GEOTEXTILES' EFFECTIVENESS AS AN EARTHEN REINFORCEMENT IN SOIL STRUCTURES

Ravi Ande and Priyanka Pawar

Lady Irwin College, University of Delhi, India

Abstract

Background/History: There are three main properties which are required and specified for a geotextile are its mechanical responses, filtration ability and chemical resistance. These are the properties that produce the required working effect. They are all developed from the combination of the physical form of the polymer fibers, their textile construction and the polymer chemical characteristics.

Objectives: To Reinforced soil is defined as a soil which is strengthened by a material able to resist tensile stresses and which interacts with the soil through friction and/or adhesion. Geotextiles are permeable fabrics which are used for the reinforcement of soil. When used in soil, it has the ability to separate filters, reinforce, protect or drain. The Geotextiles method of reinforcement is not a new concept.

Methodology: The direct shear test apparatus consisted of 60 mm x 60 mm x 40 mm deep box which can be split horizontally at mid height with displacement-controlled loading system. The constant normal stress was applied by dead load. In order to determine the interfacial friction, several modifications have been made by different Methods and Sampling.

Results: It frequently becomes crucial to accurately estimate the frictional resistance between these two materials in soil-geotextile interaction situations. Friction's core concept may seem straightforward, but it has been a concern for many years. Friction is a problem in every branch of engineering, but as of yet, no theory exists in relation to soils and geotextiles. There has been some development in the theory of skin friction between solid materials, and some of the findings may be extended to the friction between soils and solids. By using a direct shear test, the interface friction angle between geotextile-wrapped cement mortar specimens and four different types of soil (sand, gravel, fine sand, and clayey sand) was found.

Conclusion: For fibers oriented perpendicularly (90 degrees), the highest shear resistance against shear loading was achieved. On the other hand, compared to rough surface cement mortar with sandy soil, the interface frictional resistance between geotextile-wrapped cement mortar specimens with sandy soils was between 6% and 20% lower.

Biography

Ravi Ande is currently working as Assistant Professor in the Department of Fabric and Apparel Science, Lady Irwin College, University of Delhi. He has done his PhD from the Department of Geology, University College of Science, Osmania University, Hyderabad in the area of "Hydrogeological and Geophysical Investigations in Kodakandla Mandal, Warangal District, Telangana, India" and has Participated in 78th United Nations General Assembly, UN Science Summit, international Conferences at New York, USA. Has worked with National Geophysical Research Institute, Hyderabad in the area of "Geophysical Instrumentation Techniques and Geophysical Field Survey". Has Worked with National Mineral Development Corporation Limited, in the area of "Geo-statistical Estimations of the Kriging Methods by Using the Isatis Software". He has worked with the National Remote sensing Center, Hyderabad in the area of "Remote sensing and Geographical Information System" by Using the Arc GIS Software. Has worked with Atomic Mineral Development, Hyderabad in the area of "Uranium Deposits in Northern Delhi Fold Belt, Sikkar District of Rajasthan" and found out the Large Uranium deposits between the Gumansingke Dhani to Narsingpuri Dhani area. Research interests are Geo-Textile, sustainability in textile and apparel industry.

HYDROLOGIC MODELING AND RISK ASSESSMENT FOR URBANIZED FLOODS OF HYDERABAD CITY

Ravi Ande and Madhuri Nigham

Lady Irwin College, University of Delhi, India

Abstract

Background: The urban flood 1D-2D model is developed by integrating GIS with rainfall-runoff model HEC-HMS and hydraulic model HEC-RAS for an urban catchment of Hyderabad, India. The idea is to identify the most flood susceptible areas using past critical rainfall events and to explore the possible upswing in flood risk and hazard owing to climate change.

Objectives:

1. Examine whether the current software is appropriate for simulating urban floods in the Indian environment.
2. Create a specialized model for predicting floods in metropolitan areas.
3. A statistical breakdown of projected rainfall in the context of climate change.
4. Create maps of flood danger and inundation for various rainfall scenarios.
5. To evaluate and create risk maps for flood hazards based on various rainfall scenarios.

Methodology: Methodology to develop an integrated 1D-2D urban flood model is presented in this Research Paper. The first part describes the study area's topography and collection and processing of raw data. The second part is inclined towards the statistical rainfall disaggregation based on scale invariance theory and the last part presents a framework developed for 1D-2D modeling of urban flood on a regional scale combining GIS with a hydrological rainfall-runoff model (HEC-HMS) and hydraulic model (HEC-RAS).

Results: Validation for urban flood modeling is difficult due to a lack of flow data. For rivers, flow gauging systems are available but for urban flooding, no such gauging system exists, and Hyderabad is no exception to it. However, GHMC has reported observed discharge during Aug. 2000 floods as 1092 m^3/s from left-wing Nala and 550 m^3/s from Nala at right-wing, combining both 1642 m^3/s at Zone XIII outlet. The results produced by HEC RAS gives 1583.90 m^3/s maximum discharge at the outlet of Zone XIII.

Conclusion: The risk is categorized into three groups: high risk (depth > 1m), medium risk (depth in between 0.5 to 1m) and low risk (depth < 0.5m). The model results identify 15.76 % area of Zone XII is prone to flooding out of which 9%, 24%, and 67% area shows high, medium and low risk of flooding respectively and 17% of total area of Zone XIII is prone to flooding out of which 9%, 52%, and 35% area falls under high, medium and low risk of flooding respectively.

Biography

Ravi Ande is currently working as Assistant Professor in the Department of Fabric and Apparel Science, Lady Irwin College, University of Delhi. He has done his PhD from the Department of Geology, University College of Science, Osmania University, Hyderabad in the area of "Hydrogeological and Geophysical Investigations in Kodakandla Mandal, Warangal District, Telangana, India" and has Participated in 78th United Nations General Assembly, UN Science Summit, international Conferences at New York, USA. Has worked with National Geophysical Research Institute, Hyderabad in the area of "Geophysical Instrumentation Techniques and Geophysical Field Survey". Has Worked with National Mineral Development Corporation Limited, in the area of "Geo-statistical Estimations of the Kriging Methods by Using the

Isatis Software". He has worked with the National Remote sensing Center, Hyderabad in the area of "Remote sensing and Geographical Information System" by Using the Arc GIS Software. Has worked with Atomic Mineral Development, Hyderabad in the area of "Uranium Deposits in Northern Delhi Fold Belt, Sikkar District of Rajasthan" and found out the Large Uranium deposits between the Gumansingke Dhani to Narsingpuri Dhani area. Research interests are hydrological modeling, hydrogeology and geophysical investigations.

LINKAGE BETWEEN BIODIVERSITY CONSERVATION OF OUTSIDE PROTECTED AREA AND HUMAN WELFARE THROUGH AGRICULTURE IN MARABA-HUYE DISTRICT, RWANDA

Nshimiyimana Frank

University of Rwanda Huye Campus, Rwanda

Abstract

Background: The global changes we are receiving in nature are from modification of ecosystems by our activities mainly in outside protected area. Moreover, a dominant force behind many environmental threats is agriculture. In Rwanda about 86% of the people rely on agriculture for basic subsistence. In addition, in Huye district around 85% of citizens depend on agriculture. In contrast, about 12.4% are in extreme poverty, high prevalence of malnutrition is observed mainly among children and women where acute malnutrition currently is at 0.9% (DDP of Huye district of 2018/2019-2022/2023). This might be from the low production from agricultural practice. In fact, biodiversity conservation and poverty reduction is linked.

Objective: The purpose of this study was to assess the linkage between biodiversity conservation in outside protected area and human welfare through agriculture in Maraba sector, Huye district, Rwanda.

Methods: Our methods include interviewing people in the Maraba sector using a questionnaire; we linked by ranking broad question. Rankings were on a scale of one to four, the stronger relationship is four, the greater the degree of linkage and Maraba health center department of nutrition intervened by offering second data on nutrition of people of Maraba sector.

Results: This study found that vegetable agriculture is the main economic activity in the Maraba sector. The results showed that a malnutrition level were decreased from 2018 to 2023 though it is rising highly in first three month of 2023, and biodiversity is being threatened due to agricultural practices where they use different inorganic fertilizers and insecticide on high level. Whereas they do not know that they harm biodiversity, and the high number of people are not aware of what biodiversity conservation is and how it contributes in their agricultural practices.

Conclusion: Agricultural production is decreasing which causes an increase of malnutrition level because they are destroying biological diversity that would help them in sustainable production. In fact, conservation education is needed which will raise their awareness on the importance of biodiversity in entire life.

Acknowledgement: I greatly give thanks to the Secretary Executive of Maraba sector and director of Maraba health center for their great contribution by allowing me to conduct this research and interact with people of Maraba sector.

I really thank Ange IMANISHIMWE PhD a Director of BIOCOOR RWANDA (Biodiversity Conservation Organization in Rwanda) and Dr. Aisha NYIRAMANA Lecture in the University of Rwanda, for the great contribution and tireless effort with commitments to this research.

Special thanks to University of Rwanda, College of Science and Technology, the Faculty of Science and Biology Department lead by Beth Kaplin PhD for their contribution in this study.

Biography

Nshimiyimana Frank has expertise in evaluating the impact and contribution of biodiversity conservation to human welfare. After years of experience in research, evaluation and teaching, working with University and Non-Governmental organization-based Biodiversity conservation, he contributed in developing a suitable strategies of improving and implementing conservation education around Nyungwe National Park for human welfare. As this area has acidic soil farmers need to be trained and supported so they may have enough production from agriculture for food security. Thus, he contributed to developing the model that helps to do agriculture practice by considering biodiversity conservation which contributes more in both climate change mitigation and poverty reduction. Research interest is about biodiversity conservation.

A STUDY EXAMINING THE LOAD-SETTLING BEHAVIOUR OF AN INTERFACE'S GEOTEXTILE AND FLYASH-COVERED CLAY SUBGRADE EMBANKMENT

Ravi Ande and Madhuri Nigham

Lady Irwin College, University of Delhi, India

Abstract

Background: Study to examine the improvement of California bearing ratio and behavior of clay with use of overlaying compacted fly ash and geotextiles at interface. This has been done through CBR tests carried out on clay, clay-fly ash and clay-fly ash-geotextile matrices together with model studies of embankments made of these matrices.

Objectives: The following are the study's objectives:

1. To investigate the improvement of the soft clay sub-grade's California bearing ratio in relation to the original clay's California bearing ratio by covering it with fly ash at varying thickness ratios.

2. To investigate the enhancement of the soft clay sub-grade's California bearing ratio, when it comes to the original clay, by applying a single layer of woven geotextile at the interface and covering it with fly ash at varying thickness ratios.

Methodology:

(i). Data collection and Purchasing supplies for an experimental investigation, such as clay, fly ash, and woven geotextile.

(Ii). Characterizing clay and fly ash by laboratory testing to ascertain its technical qualities.

(iii). Determining the woven geotextile's engineering qualities

Results: According to the results of the Standard Proctor compaction test, OMC was 16%. Similarly, the soil's water content was kept at 12%, 18%, 24%, 30%, and 36% for the various CBR tests. The Modified Proctor compaction test yielded an OMC of 12%.

Conclusion: CBR value increases from 11.64% to 14.29% and then to 17.21% for clay-fly ash matrix with increase of thickness ratio from 1:2 to 1:1 and then further to 2:1. In the case of clay-fly ash geotextile matrix the CBR value increases from 12.00% to 14.50% and then to 18.50% for similar changes in thickness ratio for Standard Proctor compaction energy.

Biography

Ravi Ande is currently working as Assistant Professor in the Department of Fabric and Apparel Science, Lady Irwin College, University of Delhi. He has done his PhD from the Department of Geology, University College of Science, Osmania University, Hyderabad in the area of "Hydrogeological and Geophysical Investigations in Kodakandla Mandal, Warangal District, Telangana, India" and has Participated in 78th United Nations General Assembly, UN Science Summit, international Conferences at New York, USA. Has worked with National Geophysical Research Institute, Hyderabad in the area of "Geophysical Instrumentation Techniques and Geophysical Field Survey". Has Worked with National Mineral Development Corporation Limited, in the area of "Geo-statistical Estimations of the Kriging Methods by Using the Isatis Software". He has worked with the National Remote sensing Center, Hyderabad in the area of "Remote sensing and Geographical Information System" by Using the Arc GIS Software. Has worked with Atomic Mineral Development, Hyderabad in the area of "Uranium Deposits in Northern Delhi Fold Belt, Sikkar District of Rajasthan" and found out the Large Uranium deposits between the Gumansingke Dhani to Narsingpuri Dhani area. Research interests are geo-textile, sustainability in textile and apparel industry.

Day-2
e-Poster Presentation

EVALUATION OF THE USE OF COFFEE HUSK AND COCONUT FIBER IN SOIL CONSERVATION IN AREAS SUSCEPTIBLE TO DESERTIFICATION

Vinicius Pedro de Souza and Aurelio de Azevedo Barreto Neto

Institute Federal of Espirito Santo, USA

Abstract

Background: The growing demand for agricultural production presents a global challenge. The intensive use of land, severe weather, and inappropriate techniques can lead to soil degradation, erosion, and ultimately desertification. Soil degradation is directly linked to the decline in agricultural productivity. In the United States, erosion results in approximately $37.6 billion in productivity losses annually. Globally, this deficit can reach $400 billion each year. In Brazil, soil loss due to erosion can reach up to 100 tons per hectare per year, positioning the country as a global erosion hotspot. The erosive process can lead to desertification when the soil is not properly treated. Which can lead to a level of degradation that is irreparable. Hydrous erosion is a primary cause of siltation and contamination of water bodies, as it transports sediments and nutrients from the soil to the water bodies. Soil protection is a crucial factor in erosion control to prevent desertification.

Objective: Evaluate the use of coffee husk and coconut fiber in soil conservation in areas susceptible to desertification.

Methods: Laboratory experiments were conducted with both coconut fiber and coffee husk in two different soil cover densities, two rainfall intensities, two runoff flows, and two slope angles.

Results: The results demonstrated that applying coffee husk and coconut fiber to the soil significantly reduced sediment loss and runoff, while increasing water infiltration.

Conclusion: Organic materials such as coffee husk and coconut fiber when correct applied into the soil can restore soil properties, restore fertility and avoid the desertification process in degraded soil.

Biography

Vinicius Pedro de Souza - Environmental Engineer, master's degree in Soil and Water conservation, Geology degree in progress. Conservation scientist, specialized in Sustainable Technologies for Soil and Water conservation and sustainability. I have demonstrated solid technical skills throughout my career, excelling in project management, data analysis, and research. In my career I have provided consulting in the agricultural and livestock production field, implementing conservation techniques of the soil and water. The main results that I have accomplished are the increase of agricultural production combined with the maintenance of natural resources. Using sustainable materials to recover degraded soil in areas susceptible to a process of desertification. Research interests are agriculture, soil, water.

Virtual - Day 1
Keynote Presentation

REFORMING OF LIGNOCELLULOSIC BIOMASS WASTE FOR COGENERATION OF GREEN CHEMICALS AND GREEN HYDROGEN

Hong Li

Nanyang Technological University, Singapore

Abstract

Climate change and fossil fuel depletion are intertwined global challenges that necessitate urgent action and lead to the sustainability shift towards low-carbon biofuels, renewable energy, and clean hydrogen fuel, as well as green chemicals. High purity hydrogen can be generated from water electrolysis but is hindered by inefficient oxygen evolution reaction (OER) and the possible explosive mixture of oxygen and hydrogen under the condition of partial loading and membrane degradation. There is a widespread effort to replace OER with the more favorable electrooxidation of small organic molecules. Although value-added products can be generated, the production of these organics is process-intensive and costly. Most importantly, they lack the abundance necessary to meet the requirements of a hydrogen economy.

Abundant raw biomass with annual production of billions of tons in nature are promising alternatives to these small organics. Significantly, biomass reforming via electrooxidation (to replace OER) could close the carbon cycle and promote a circular economy. However, the complex structure of raw biomass poses challenges, limiting processability. Consequently, these biomass materials are conventionally used as fuel for electricity generation, leading to CO_2 emission and underutilization of biomass. Therefore, from both resources recovery and carbon abatement perspectives, it is critical to develop advanced electro-refinery system for biomass valorization. To overcome the low processability of raw biomass, highly efficient pretreatment methods were developed and thoroughly investigated.

Herein, fast-growing plant species were featured as promising biomass for reforming due to their rapid carbon fixation within a short timeframe. Their fast growth rate also accompanies a shorter lifespan; hence they release carbon back into the atmosphere only after a short period of storage, rendering advanced carbon storage and utilization crucial. Reforming biomass from fast-growing plant species not only produces green commodity chemicals and hydrogen fuels but also holds promising potential for climate change mitigation.

Biography

Hong Li is currently an Associate Professor in Nanyang Technological University (NTU) Singapore. Before he joined NTU in 2016, he was a postdoc in Stanford University in United States. Dr. Hong Li received a few awards including the prestigious Singapore Millennium Foundation postdoc fellowship and Nanyang Assistant Professorship. Dr. Li's current research focus on renewable energy and sustainability including waste-to-value, green hydrogen generation, passive cooling, etc. Dr. Li has published more than 90 peer-reviewed papers in international journals that have received more than 17, 000 citations. Research interests is about advanced waste upcycling.

Virtual - Day 1
Oral Presentations

ECOTOXICITY ASSESSMENT OF CONSUMER PRODUCT-DRIVEN CONTAMINANT PARTICLES IN A MARINE ENVIRONMENT

Sung Hee Joo

Metropolitan State University of Denver, USA

Abstract

Daily consumption of consumer products, including plastic products, lotions, food, and toothpaste, releases particles to environmental media (e.g. air, water, and soil) and may have various cumulative environmental effects over time. The environment's heterogeneous nature and numerous co-existing contaminants present challenging and complicated issues regarding assessing potential risks, particularly toxicity effects on marine environments. The ocean is a major carbon sink crucial for mitigating global warming potential. However, scant information exists concerning the harm of contaminant particles in oceans. In this paper, a case study on nanomaterials in consumer products is explored for their ecotoxicological effects on marine environments, particularly the synergistic toxicity effects of contaminant particles on marine diatom algae, along with detailed toxicity mechanisms. Further, the changes in the physicochemical properties of marine diatom algae due to exposure to contaminant particles, as an indicator of marine pollution, are discussed.

SCOPE 3 DECARBONATION, ROLE OF MICROALGAE, CONSTRAINTS AND SOLUTIONS

Jean-Louis Roux Dit Buisson

NeoCarbons sa, ZHAW, Switzerland

Abstract

Background: Microalgae can play an important role in decarbonating Scope 3 entrants with bio-green chemicals from recycled Scope 1 & 2 CO_2. Current photosynthetic technologies are not suited for industrial competitive production due to their inherent low productivity and high costs linked to the poor efficiency in transfer of photonic energy (less than 30% yield on power). Energy is 85% of the opex in industrial photosynthesis.

Objective: NeoCarbons has patented and successfully tested a disruptive equipment that has a high power to photon efficiency (85%), and a close to theoretical optimum efficiency in photon usage (90%). Under proper operating conditions a reactor equipped with NeoCarbons' equipment can operate in continuous mode at the optimal productivity point, thus delivering low production costs on a significantly reduced footprint, with no water waste.

Methods: NeoCarbons' equipment was tested at ZHAW in both a 2.5L prototype (to determine versatility with respect to 5 major microalgae strains), and 50L pilot equipment (to determine industrial potential).

Results: 5 x 600 hours runs were successfully performed with Chlorella Vulgaris (2) and Galdieria Sulphuralis (3 runs, pH2, 42°C). The industrialization readiness of NeoCarbons' equipment was demonstrated: CPU controlled growth of the microalgae, continuous operations at optimal productivity point, versatility in controlling for biomass optimization and/or metabolites optimization. The runs also witnessed no fouling in the reactor, a significant improvement leading to less downtime and lower production costs. The equipment is compatible with sterilization processes (Tandalization at 120 degrees). Samples analyses were performed by a 3D party, ETH-Z. On chlorella vulgaris we obtained 3x the amount of protein compared to other technologies, on Galdieria Sulphuralis the quality and content of pigment phycocyanin was qualified as exceptional.

Conclusion: NeoCarbons' equipment is well suited for an industrial remediation of Scope 1 and 2 CO_2 emissions, and the supply of substitutes of fossil-based chemicals as Scope-3 entrants in the foods, feeds, fine chemicals and chemicals (biofuels, -pesticides, - fertilizers etc) industries.

Biography

Jean-Louis Roux Dit Buisson has 25 years of experience in developing and growing technology-based companies. His business developer experience covers materials and processes industries (Hexis Fuel Cells, SmartMonitor preventative maintenance, SuPrem advanced carbon fibers, Sulzer Metco, Sulzer Innotec) and health care industries (Medical devices, pharmaceuticals, biopharmaceuticals diagnostics).
Jean-Louis started his career as a process engineer at Badger USA, and later as a production engineer Advanced Resins at Exxon Chemicals. His management experience includes management and coaching in private and corporate technology-based growth businesses and Health care industries. Jean-Louis has held responsibilities as CEO, M&A, Finance, Marketing, Sales, R&D management and Production responsibilities in large groups, start-ups and SMEs. He has counseled boards on M&As, technology licensing, including strategic integration plans and pricing for value decisions. Jean-Louis holds an MBA from Insead, an MSc in Chemical Engineering from MIT and an Engineering degree from ENSCP Paris-Tech. Research interests are Photosynthesis and light distribution.

WATER QUALITY INDEX (WQI) OF THE ENGENHEIRO ÁVIDOS DAM, LOCATED IN THE PIRANHAS RIVER BASIN, BRAZILIAN SEMIARID

Érika Alves Tavares Marques, Anthony Epifânio Alves, Jonathas Santos de Araújo and Maria do Carmo Sobral

Universidade Federal de Pernambuco, Brazil

Abstract

Background: The Engenheiro Ávidos dam is located in Northeast Brazil in a semi-arid climate. The construction of this dam aims to regularize the water supply problem in the region due to the low levels of rainfall for consecutive years, which compromised the supply of this source. To alleviate water supply problems in the State, the reservoir storage system continues to be the most used option to address water shortages, despite its efficiency being questionable, as water supply becomes compromised during periods of prolonged drought.

Objective: Assess the water quality of the Engenheiro Ávidos Reservoir.

Methods: Data were drawn from the 2009 to 2022 provided by the Ministry of the National Integration. The Engenheiro Ávidos Dam was monitored during 26 campaigns. The sampling points are located upstream of the dam (P1), in the reservoir (P2) and downstream of the dam (P3). To assess water quality, WQI was used.

Results: The WQI of the water of the dam ranged from Bad (27) to Excellent (80) during the study period. Point P2 during the dry period presented the WQI with the best value in the group. Regarding thermotolerant Coliforms and total phosphorus, there was no normal distribution according to the Shapiro-Wilk test (p-value<0.05). Although the quality results were satisfactory, concentrations of pH, BOD, total phosphorus and thermotolerant coliforms were found to be outside the standards established in CONAMA Resolution nº 357/2005 and in Ordinance 518/2004 of the Ministry of Health. According to the literature, in the Piranhas River Basin, sand removal, deforestation, soil salinization, release of effluents, garbage disposal on the banks, inadequate irrigation management, indiscriminate use of pesticides and insufficient sanitation were found.

Conclusion: Given this scenario of water scarcity and environmental impacts in the basin, it is necessary to promote efficient management in order to guarantee water supply to the population.

Biography

Érika Alves Tavares Marques is a PhD in Development and Environment, Master in Environmental Technology, Specialist in Environmental Management and Control, Environmental Management Technologist and Biologist. Her expertise is in water quality and pollution control, having published several articles on the topic. Research interests are water quality and pollution control.

PHILOSOPHICAL CONSIDERATIONS OF SUSTAINABILITY

Paul Comet

Comet Environmental Consulting, USA

Abstract

Minimizing waste generation by use of waste management companies or by using the manufacturer to take extended product responsibility (EPR) to recycle discarded objects are two different directions that can be followed to "complete the recycling circle". Ludwig, 2023, in Germany, uses the example of unwanted washing machines that can be taken back to a specialized washing machine recycling plant or discarded as unsorted scrap by a waste management company.

To fulfil complete "circularity" for every discarded object is probably not realistic. However, the USA automobile industry has largely achieved this. Damaged or obsolete cars are auctioned off, refurbished or cannibalized for spare parts, their organic components stripped away & the chassis shredded or cubed ready for melting at the local steel works. A similar model could be envisaged for other "big ticket" items such as fridges and stoves.

Ludwig 2023 proposes Circular Economy Recirculation Twigs (CER Twigs) as an analytical tool for the description of the many different circles that start at different points in a product's life cycle. These in order to close – the -loop of each cycle. In my view, while the use of CER Twigs may be important in studying the recycling of big-ticket items, they would be impractical for the recycling of small items such as in electronics, where a "mining "metal reclamation model may be more useful.

The largely organic nature of municipal waste may be more practically dealt with by considering it as fuel, for syngas or hydrogen source using gasification or steam reforming methods.

Reference

System Change to Circular Economy and its Impact on the Waste Management Sector | WMW (waste-management-world.com)

REVERSING GLOBAL HEAT ACCUMULATION BY RESEARCHING RECENT PALEOCLIMATOLOGY

Thomas F Valone

Integrity Research Institute, USA

Abstract

Background: Research into 420,000 years of paleoclimatology has uncovered a detailed past of temperature, carbon dioxide (CO_2) levels, and sea levels. This has produced a rich data set of those variables but also a predictive future global hothouse environment and suggestions of a sound method for its reversal. The world's population has tripled (3x) since 1950, with another 50% increase expected by 2100, global annual CO_2 emissions growth rate has quadrupled (4x) since 1950 and global energy demand has quintupled (5x), all in the same time period. This discontinuous combination can be called a "3-4-5 Triad" and the sudden acceleration in all three arenas is too stressful for the environment and the damaging effects will be felt globally for centuries to come unless drastic action is taken.

Objective: To demonstrate that the past 420,000 years of paleoclimatology yield a predictive future global environment roadmap.

Methods: Data was supplied from the Vostok Ice Core and calculations were made to determine temperature, carbon dioxide concentration, and approximate sea level. Extrapolations are made from the Hansen graphic summary for the near (this century) future.

Results: The Hansen graphs also yield an equation from the multilevel data analysis which fits the historical variables of global temperature, carbon dioxide concentration, and sea levels. Furthermore, the equation reasonably condenses 420,000 years of global climate record and reveals a tight correlation between the three variables that can be advantageously manipulated through geoengineering. Comparisons with contemporary published climate predictions yield conclusive validity to the data and method.

Conclusion: By the close examination of paleoclimatology for the past 420,000 years, it is found to be demonstrable that reducing the concentration of this single most prolific heat-trapping gas by geoengineering at the gigaton level, back to pre-industrial levels of less than 300 ppm, can actually give humankind a collective control over the world's rapidly rising average global temperature and once more, a temperate climate to live in and prosper.

Biography

Thomas F Valone - Physicist and licensed professional engineer, Dr. Thomas F. Valone is also an author and editor of several books including most recently, ***The Future of Energy*** (Nova Science Pub. 2020), as well as over 100 articles. Dr. Valone has lectured widely at government and organizational venues. He is President of Integrity Research Institute and formerly a physics teacher at Erie Community College, a USPTO patent examiner, and a Research Scientist for Scott Aviation. He has appeared on CNN, A&E, History and Discovery Channels, besides a few commercial energy videos. Dr. Valone has been a speaker for the Earth Transformation Conference, Whole Person Healing Conference, Joint Propulsion Conference (AIAA).

DISTRIBUTION OF VECTORS OF AMERICAN VISCERAL LEISHMANIASIS IN THE STATE OF RIO DE JANEIRO/ BRAZIL: MUNICIPAL VULNERABILITY FOR TRANSMISSION, ECOLOGICAL NICHE MODELLING AND PREDICTED GEOGRAPHIC DISTRIBUTION

Elizabeth Ferreira Rangel[1,2], Margarete Martins dos Santos Afonso[1,2], Bruno Moreira de Carvalho[3], Artur Augusto Velho Mendes Júnior[4], Cristina Maria Giordano Dias[5], Lucas Keidel[5], Patrícia Soares Meneguete[5] and Sandro Antônio Pereira[4]

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[5]Secretaria de Estado de Saúde do Rio de Janeiro, Brazil

Abstract

Background: Leishmaniasis is sensitive to climate and environmental changes, vectors species are dependent on climate.

Objective: This study aims to identify vulnerable municipalities, mapping the spatial distribution of disease, vectors (*Lutzomyia longipalpis* and *Migonemyia migonei*), predict spatial distributions using ecological niche modelling based on climate and environmental variables.

Methods: The occurrence of vectors, human and canine cases of AVL were obtained by the National Information System on Notifiable Diseases of RJ and literature; association with non-correlated bioclimatic variables: temperature, precipitation, altitude. Enhanced Vegetation Index Models were based on algorithms: bioclim, logistic regression, random forest, maximum entropy, and support vector machines; were run in R and the final maps were designed in QGIS.

Results: The database included 42 records of *Lu. longipalpis* and 88 of *Mg. migonei*, present in 19 and 31 municipalities, respectively from RJ. Model outputs had TSS scores between 0.5 and 1, and the ones with TSS<0.7 were excluded from the final predictions. Both vectors are predicted to occur sympatric in the metropolitan region, coastal lowland, parts of the green coast and South of the Northern region. *Migonemyia migonei* is predicted to occur additionally in the middle Paraíba, Center-South, Northwest and Southern green coast. In the last three years in RJ, 48% municipalities registered human transmission, 52% were vulnerable and 29% of which were receptive (with vectors); having only 37% municipalities with vectors.

Conclusion: Although the impacts of climate change must be noted, these results contribute to knowledge of ecology and distribution of AVL vectors in Rio de Janeiro. Recently, has been observed increasing transmission in urban areas. These studies provide future scenarios for surveillance and prevention planning, and also contribute to the knowledge of ecology and distribution vectors in RJ.

Acknowledgement for Financial Support: Climate Change National Institute of Science and Technology/ INCT (Climate Changes) Brazil; National Council for Scientific and Technological Development/

CNPq; Research Support Foundation of the State of Rio de Janeiro/ FAPERJ; Oswaldo Cruz Institute, FIOCRUZ/ Rio de Janeiro, Brazil.

Biography

Elizabeth Ferreira Rangel - Public Health Researcher at the Oswaldo Cruz Institute, Oswaldo Cruz Foundation. She is coordinator of the National and International/Regional Reference Laboratory (PAHO/WHO) in Entomological Surveillance, Taxonomy and Ecology of Leishmaniasis Vectors, at the Oswaldo Cruz Institute, since 2004. Consultant to the Health and Environment Surveillance Secretariat, Ministry of Health, for the National Leishmaniasis Program. He is a member of the Expert Committee of the Leishmaniasis Control Program of the Pan American Health Organization. He is a member of the WHO Expert Advisory Panel on Parasitic Diseases (Leishmaniasis). She is Coordinator of the Fiocruz Reference Network for Leishmaniasis. Deputy Director of Reference Laboratory and Biological Collections, at the Oswaldo Cruz Institute. Coordination of the Health Sub-component of the National Institute of Science and Technology in Climate Change. Research interests are entomological surveillance, taxonomy and ecology of Leishmaniasis vectors, climate and environmental changes.

THE EFFECTS OF CLIMATE CHANGE ON HEALTH IN KENYA: CHALLENGES AND PROSPECTS

Peter Imatari Emoit

Dublin City University, Ireland

Abstract

The health sector of many countries in Sub-Saharan Africa (SSA) has deteriorated due to extreme events associated with climate change. This paper explores how extreme climate change events are worsening and affecting the health of many poor people in Kenya. The public's exposure to extreme weather events affects production and the economy's growth. The greatest challenge faced in SSA is the early detection, treatment, and control of emerging and spreading diseases linked to climate change. Climate change has also accelerated the emergence of air and waterborne diseases that have challenged the survival of many species. Moreover, the unclean air has also threatened human health due to pollution, exponentially increasing the spread of pathogenic diseases. This paper will, therefore, use secondary data to demonstrate how extreme climatic events such as floods and drought contribute to the increase of respiratory, vector-borne and waterborne diseases. A systematic literature review of studies on climate change and health in Kenya will be conducted by searching PubMed and Web of Science. The articles that will be reviewed will describe the effects of climate change on health in Kenya. To ensure eligibility, the full text of the articles selected will be screened.

This study will contribute to a better understanding of the dynamic effects of climate change on health, explore a way forward in reducing disease strategies, and benefit communities and households vulnerable to extreme events.

THE REGIONALLY OPTIMIZED DEMAND AND SUPPLY OF THE KEY RESOURCES WITH ECONOMIC AND ENVIRONMENTAL SUSTAINABILITY INDICATION

Fardin Farahnak

Iranian Ministry of Energy, Iran

Abstract

1. Introduction

The world's primary environmental challenge is achieving maximum environmental sustainability. This ambitious goal requires a shift towards comprehensive global integration, characterized by strong adherence to sustainability principles under an efficient enforcement system. Contrary to the linear economic system, this transition aligns well with the fundamentals of the circular economy. Below, we review trends in natural resource consumption, related challenges and risks, and strategies for sustainable resource use. The innovation of this research is presented as a hypothetical model targeting maximum global integration to achieve environmental sustainability. We then discuss how this approach contributes to economic sustainability.

2. Global Resource Consumption Trends

- According to the United Nations Environment Programmes Global Resources Outlook, natural resource consumption is expected to increase by 60% by 2060 compared to 2020 levels. This growth is driven by urbanization, industrialization, and population expansion.
- Key resources include food crops, wood for energy, fossil fuels (petroleum, coal, and natural gas), metals (iron, aluminum, copper), non-metallic minerals, land, and water.

3. Challenges and Risks

- Rising resource demand leads to severe consequences such as biodiversity loss, water stress, climate change, and air pollution.
- Disrupted supply chains for critical goods and resources are among the top risks identified in the World Economic Forum's Global Risks Report 2024.

4. Strategies for Sustainable Resource Use

- **Decoupling:** Balancing resource use to decrease environmental impact while increasing well-being, through more efficient and effective resource use.
- **Policy Instruments:** Implementing policies that promote sustainable consumption and production patterns, particularly in resource-intensive sectors such as agriculture, forestry, construction, and energy production.
- **Renewable Energy Transition:** Shifting from fossil fuels to renewable energy sources (solar, wind, hydro, biomass) can significantly reduce carbon emissions.
- **Resource Efficiency:** Promoting efficient resource use in cities and countries contributes to achieving the UN Sustainable Development Goals (SDGs).
- **Incorporating Environmental Impacts:** Converging the in-practice optimized combination of the resources to the so-called socially optimized combination of them.

5. Optimizing the Supply and Demand of Energy Resources

The first step in this initiative is to clearly define the goal: an optimal economic combination of energy production and consumption with minimal environmental impact, assuming maximum global integration. This involves a hypothetical combination of optimal production and consumption levels of energy resources in different regions, continuously updated. This model serves as a benchmark for national and international programs, enhancing accountability for environmental outcomes.

- **Consideration of Costs and Environmental Impact:** Evaluate the usage costs and environmental impacts.
- **Removal of Political Barriers:** Envisioning a utopia where resources can freely cross borders.
- **Regional Optimization:** Account for variations in resource availability, infrastructure, capacities, and potentials.
- **Separate Analysis by Region:** Analyze geographical regions individually for different resources.
- **Sustainability Criteria:** Ensure no decrease in national production and welfare, include transportation and utilization costs, and consider current and feasible extraction, transmission, and consumption capacities.

6. Conclusion

Urgent action is needed to transform global resources' supply and demand patterns. By aligning policies, technology, and international cooperation, we can advance toward a more sustainable and resilient future. Identifying regional economic potentials for supplying global resource needs and optimize resource supply with economic justification, while considering transmission, transformation, and adaptation costs, supports the principles of the circular economy—reducing production and consumption, and promoting reuse and recycling. Therefore, let's go toward establishing a dynamic comprehensive map of the sustainable supply potentials of the resources by the regions.

7. References

- United Nations Sustainable Development Goals
- Global Resources Outlook
- World Economic Forum Global Risks Report 2024

SCALER THEORETICAL AND PRACTICAL IMPLICATIONS OF PLASTIC WASTE SEGREGATION AND DISPOSAL PRACTICES AT THE UNIVERSITY OF GHANA CAMPUS

Victoria Nyebe Sika

University of Ghana, Ghana

Abstract

I report on research conducted on plastic waste (mainly bottled and sachet water) segregation and discard behavior practices at the University of Ghana campus, Jones-Quartey Building (JQB). The study aims to document students and faculty's behaviors toward plastic waste segregation (mainly bottles and sachets) at one of the largest lecture hall complexes on campus. I used interviews, observations (including participant observations), and focus group discussions to gather data for this study. Three core objectives underpin the study. The first objective is to identify the extent to which students and faculty patronize the segregation bins. Secondly, I documented the motivational drive for plastic waste segregation. Finally, I explore the variable scales by which the discard behavior at this little enclave in Ghana could have broader implications for archaeological practice, environmental sustainability, and climate change devoid of international boundaries. The study revealed that socioeconomic status and safety are key factors that determine the use of bottled or sachet plastic water containers. Regarding the patronage of plastic segregation, the frequency of emptying the bins was a key consideration. This indication suggests that if the segregation bins are regularly emptied, users will patronize them. The study has implications for environmental sustainability and the archaeology of plastics in the future.

EVALUATION OF ENVIRONMENTAL BURDENS AND POTENTIAL DECARBONIZING OPPORTUNITIES FOR STEEL MANUFACTURING IN PAKISTAN

Shamraiz Ahmad, Hania Rubab, Tiberio Daddi, Shahid Ikramullah Butt and Riaz Ahmad

Sant'Anna School of Advanced Studies, Italy

Abstract

Background: In Pakistan, the iron and steel industry is a leading manufacturing sector that plays a significant role in the national economy. However, it consumes a significant amount of energy, produces various emissions and generates wastages. An assessment of environmental burdens may enable to review and improve the environmental outlook of this sector.

Objective: As there is limited research on this topic, the objective of this study is to evaluate the environmental impacts of a mini steel mill (manufacturing plant), located in Pakistan.

Methods: For this study, the system boundary includes scrap melting, continuous casting, and rolling processes, representing the gate-to-gate steel production. Primary data were collected from a steel production plant, located in Islamabad. The study utilizes SimaPro V9.4 software as the modeling tool and the Recipe method to map various impact categories. A comprehensive cost analysis is conducted to assess the financial implications for renewable energy transition.

Results: The scrap melting process was found with higher environmental impacts in most of midpoint impact categories, including global warming, acidification, ozone depletion, etc. This was mainly because of the energy intensive nature of melting process and coal-based energy generation at the plant. After melting, it was the continuous casting process that generated more impacts and it was followed by the rolling process. At the endpoint (damages) level, the scrap melting caused more damages to all three areas of protection. Cost analysis showed that while transitioning to a solar energy system, the payback period for the case study plant was estimated to be six years.

Conclusion: The results of alternative scenarios were compared with the baseline scenario to show the reduced environmental impacts and discuss potential decarbonizing opportunities and costs implications. Overall, this study offers valuable insights for the policymakers, practitioners and related researchers who are seeking to promote sustainable and cleaner steel production, especially in developing world.

Biography

Shamraiz Ahmad's research interests include sustainability performance evaluation and life cycle assessment of products, systems and innovative technologies, circular economy, open innovation, and sustainable business practices. He has written many articles for various high quality international journals, in the areas of industrial food production, metal and glass manufacturing, leather manufacturing, wastewater and sludge treatment, electronic waste management, etc.

BEYOND THE HUE: NAVIGATING THE IMPACTS OF SYNTHETIC DYES AND PATHWAYS TO SUSTAINABLE SOLUTIONS

Madhuri Nigam and Niharika Jain

Lady Irwin College, University of Delhi, India

Abstract

Background: While the story of synthetic dyes is often celebrated for its technological breakthroughs and industrial achievements, it also harbors a darker tale of multifaceted challenges. As synthetic dyes have become increasingly prevalent and diverse over time, their pervasive presence in our surroundings has catalyzed a range of environmental consequences. From the pollution of water bodies due to the discharge of dye effluents to the contamination of soil and groundwater from dye manufacturing processes, the environmental footprint of synthetic dyes is undeniable. These pollutants also have far-reaching implications for human health and well-being.

Objective: This review aims to delve deeply into the intricate ramifications of synthetic dye usage on both environmental ecosystems and human health, offering a comprehensive analysis of existing mitigation strategies and regulatory frameworks. By scrutinizing the efficacy of current approaches, it aims to pinpoint gaps and limitations while proposing forward-thinking, sustainable alternatives to address the persistent challenges posed by synthetic dye pollution.

Methods: Academic databases and relevant sources were systematically searched for the review, applying the inclusion criteria. Data were extracted from selected studies, and the findings were synthesized to address the objectives.

Results: Synthetic dye pollution persists as a pervasive threat, despite mitigation and regulatory efforts, with adverse effects felt across ecosystems and human populations. Gaps in current approaches, such as inadequate enforcement and a dearth of sustainable alternatives, are identified in the review, highlighting the pressing need for holistic solutions.

Conclusion: This review underscores the pressing imperative for strategies to combat synthetic dye pollution. Recommendations advocate strengthening regulatory enforcement, fostering innovation in sustainable dye production such as dye extraction from waste sources, adopting innovative technologies, and promoting international cooperation to mitigate the global impact of synthetic dye pollution. By embracing sustainable practices and collaborative strategies, stakeholders can safeguard the environment and public health for future generations.

Biography

Madhuri Nigam, Associate Professor – Department of Fabric & Apparel Science, Lady Irwin College (University of Delhi). Department in Charge from January 2020. Madhuri Nigam has been in academics for 21 years. Her area of specialization is Textiles and apparel. She has been working on life cycle assessment for several years. She has developed 52 Life Cycle Inventory (LCI) datasets for the SRI project for Eco invent. Additionally, she has reviewed around 206 EF 3.00 compliant LCI data sets for EU funded PEF project of Eco invent.

LOW-COST ACTIVATED CARBON FROM NITRILE BUTADIENE RUBBER GLOVES WASTE AND ITS APPLICATION FOR THE REMOVAL OF PHENOL IN WASTEWATER

KC Nedzivhe-Mqehe and BO Ojo and N Mabuba

University of Johannesburg, South Africa

Abstract

Background: The global usage of nitrile butadiene rubber (NBR) gloves has increased over the past few years. This was influenced by the Covid-19 pandemic which has raised high health risks across the world. The biggest problem with this kind of glove is that they are designed for a single use and discarded leading to the generation of high volume of waste. Currently waste gloves are disposed through incineration and landfill. These kinds of methods offer a quick reduction of waste. However, the biggest challenge with these methods is that CO_2 is produced into the atmosphere, land deposition results in accidental fires posing a high risk to living organisms.

In attempting to resolve this issue, several countries are forced to stipulate more stringent requirements for waste management. One of the requirements is to generate the need for innovative technologies to eliminate waste.

Objective: This study aims to recycle waste NBR gloves by using it as the precursor for synthesis of activated carbon. The activated carbon will be used to remove toxic phenol in wastewater.

Methods: Waste NBR gloves was washed, and pyrolyzed at 500°C for 1 hour. H_3PO_4, $ZnCl_2$, KOH and H_2O_2 were used to activate char. The mixture was kept at room temperature for 24 hours. The pretreated samples were washed with deionized water and oven dried at 110°C for 24 hours. Batch adsorption method was used for adsorption of phenol in wastewater.

Results: Activated carbon was characterized using Zeta potential, Elemental analyzer, FTIR, TGA, SEM, XRD and BET. The optimum removal of phenol achieved was 78, 55, 62 and 73 % for AC-H_3PO_4, H_2O_2, KOH and $ZnCl_2$ respectively.

Conclusion: The significance of this research is to develop a new way of recycling waste NBR gloves which is generated in large quantities in academic institutions, hospitals and pharmaceutical industries.

Biography

K C Nedzivhe-Mqehe is vastly experienced in managing various laboratory activities and waste recycling. Her passion and expertise have been instrumental in the structuring of research laboratories at the University of Johannesburg. Recycling used gloves has been a continuous challenge that her research aims to address. Research interest is about waste management.

Virtual - Day 2
Oral Presentations

A COMPARATIVE NATIONAL-LEVEL ANALYSIS OF GOVERNMENT FOOD SYSTEM RESILIENCE ACTIVITIES ACROSS FOUR DEVELOPED COUNTRIES AT VARYING STAGES OF PLANNING

Jane Lloyd, E R H Moore, Lyndsey Dowell and Roni Neff

Springhouse Consulting, New Zealand

Abstract

Background: The COVID-19 pandemic, extreme weather events, and the Russian invasion of Ukraine have highlighted global food system vulnerabilities and a lack of preparedness and prospective planning for increasingly complex disruptions. This has spurred an interest in food system resilience. Despite the elevated interest in food system resilience, there is a lack of comparative analyses of national-level food system resilience efforts. An improved understanding of the food system resilience landscape can support and inform future policies, programs, and planning.

Methods: We conducted a cross-country comparison of national-level food system resilience activities from Australia, Aotearoa New Zealand, Sweden, and the United States. We developed upon and adapted the resilience framework proposed by Harris and Spiegel to compare actions derived from thirteen national food system resilience documents. We coded the documents based on the actions taken by the governments including: the food system resilience attributes utilized, the part of the food supply chain, the specific shocks or stressors, the implementation level, the temporal focus of action, and the expected impact on food security. We analyzed and compared countries' coded categories and subcategories, and category combinations.

Results: The results showed that these countries are addressing some of the same issues, are using multi-pronged policy actions to address food system resilience issues and are focused on both retrospective reviews and prospective models of disruptive events to inform their decisions. Some work has been done towards preparing for climate change and other natural disasters, and less preparing has been done for other shocks or stressors.

Conclusion: This paper develops and applies a framework rooted in literature to understand the content of national level food system resilience documents. The analysis identified potential gaps, concentrations, and themes in national food systems resilience. The framework can be applied to augment existing policy, create new policy, as well as to supplement and complement other existing frameworks.

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AN ASSESSMENT OF ALTERNATE FERTILIZER POTENTIAL OF GLAUCONITE DEPOSITS IN INDIA USING SIMPLE BENEFICIATION METHODS

Tehreen Shaikh[1], Tathagata Roy Choudhury[1], Santanu Banerjee[1] and P V Sunder Raju[2]

[1]Indian Institute of Technology Bombay, India
[2]CSIR-National Geophysical Research Institute, India

Abstract

Background: India meets its needs for agricultural potassium fertilizers through imports from countries like Canada, Russia, and Belarus largely. The necessity for an indigenous source is due to the depleting reserves of potash fertilizer and the ever-increasing demand in the market. Glauconitic soils help to avoid the problem of early salinization in agricultural fields, releases nutrients slowly, and enhances soil fertility The glauconitic content rarely increases by 20% and hence the need for enhancing its concentration before direct application to soil is researched.

Objective: To assess the fertilizer potential of glauconite mineral as an alternate source of potash fertilizer

Methods: Data were drawn by analyzing physical, chemical, and mineralogical characteristics of glauconite mineral through various geochemical techniques (XRF, XRD, ICP-AES, Magnetic separator). Samples of the glauconite mineral was collected from all the deposits across India. A series of simple beneficiation techniques was utilised to extract the maximum composition of that mineral. The characteristic of glauconite mineral is its magnetic nature, which was the basis of the study.

Results: Mineralogy of bulk samples from Phanerozoic sediments yielded 15% to 20% glauconite. The sieving process led to further enhancement of glauconite in the resultant fraction. A moderate to high content of glauconite is fractionated, in comparison to the bulk counterparts. The magnetic concentrate of glauconite, derived from the magnetometer at an optimum current shows a significant increase ranging from 35% to 57% across magnetic, sub-magnetic concentrates of different rock fractions.

Conclusion: Glauconite can be a good alternative of potassium fertilizers because of its readily exchangeable potassium ion. Precambrian glauconites, instead of having larger concentrations of glauconite occur in partially cemented sandstones and is difficult to process. However, the Phanerozoic glauconites are weakly consolidated and can be processed easily. Fractionation and reworking on these finer fractions can be easily utilized for further extraction processes.

Biography

Tehreen Shaikh has her expertise in Geosciences, with an inclination towards sedimentology, sustainability, and hydrogeology. She is passionate about nature and practices greener alternatives in her routine life. She is currently working for a consultancy exploring solutions for sustainable design and engineering. Her implication of the techniques that can be beneficial for the enhancement of fertiliser is a pathway to a global scale issue of potassium import, for countries dependent largely on import. She has derived this hypothesis based on her strong academic knowledge and her background of teaching, research, and evaluation. These techniques have been used in India for the first time and globally, only second to Russia. The foundation is based on Rudmin et al 2017, which studies economical techniques for concentration of glauconitic mineral as an alternate fertilizer for potash source. The techniques have been used, enhanced and newer methods have also been diagnosed for the same outcome. Research interests are sedimentology and sustainability.

CLIMATE SOLUTIONS AND SUSTAINABLE ENTREPRENEURSHIP: A BIBLIOMETRIC REVIEW OF PUBLISHED ARTICLES IN 2023

Ebenezer Takyi, Isaac Atta Senior Ampofo, Kwame Nkrumah Hope and Collins Kuffour

University of Liverpool, UK

Abstract

Background: The Sustainable Development Goals (SDGs) indexing shows how fiercely the world is competing to accomplish the SDGs in the next ten years and provide sustainable well-being for all. By the end of the twenty-first century, the World Economic Forum predicts that 200 species would go extinct each year and that climate-related calamities will cost the US economy 10% of its GDP. There is no denying the truth of climate change and attempts to adapt to it have been the subject of in-depth research worldwide.

Objective: The goal of the study was to fill up knowledge gaps in sustainable entrepreneurship and climate solutions.

Methods: The study used VOS viewer analysis and bibliometric evaluation to methodically examine and visualize the body of existing literature. These methods improved the research's capacity to offer significant new information and suggest important avenues for further investigation at this crucial nexus between entrepreneurship and climate change.

Results: For research areas, Environmental Sciences Ecology recorded the highest of 2869 articles, amounting to 58.3%. This is followed by Science, Technology and other topics which recorded 2033 articles, amounting to 41.3%. Development studies and psychology recorded the lowest published articles of 45 representing 0.914%. Sustainability as a source had the highest of 1202 articles with 940 citations and 75 total link strength. The research sheds light on the detrimental consequences of extreme weather events and environmental regulations, but it is unclear how business owners may increase their resilience and modify their approaches to prosper in a changing climate.

Conclusion: Climate innovation-fostering entrepreneurial ecosystems should be actively supported and encouraged by policymakers. This entails setting up finance channels, incubators, and accelerators especially for companies creating resilience, adaptation, and mitigation strategies for the climate.

Biography

Ebenezer Takyi, Data Scientist, Researcher and Entrepreneur is currently studying with much interest in the application of data science skills in many fields especially in climate data analysis. He studied MPhil Computer Science at the University of Energy and Natural Resources, Sunyani, Ghana and currently undertaking an MSc in Data Science at Oslomet – Oslo Metropolitan University, Oslo, Norway. Team member of DHEFEUS through the collaboration of Oslomet and the University of Lisbon (Instituto Dom Luiz). Working on a research project to enhance the knowledge of compound weather/climate events, namely drought and heatwaves with the application of data science skills. Research interests are machine learning and climate change.

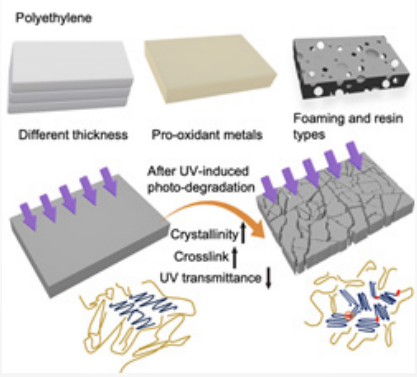
STUDY OF DEGRADABILITY AND GREEN WASTE MANAGEMENT OF POLYETHYLENE

Bochu Du and Ying Ji

Hong Kong Polytechnic University, Hong Kong

Abstract

Like most commodity plastics, polyethylene presents a significant challenge due to its low biodegradability and large quantities. Most conventional studies have focused on the biodegradation of polyethylene and waste mitigation. This study investigates the photo-degradability of polyethylene sheets under UV weathering conditions as defined by ASTM D5208. The impact of multiple factors such as metal stearates, thickness, foaming, and polyethylene resin types are explored through the characterization of the carbonyl index, molecular weight, tensile properties, and crystallinity. The results show that thickness, foaming, and resin types significantly impact the rate of photo-oxidation, especially when there is only one factor a single iron demonstrating a single increasing trend to accelerate the photo-degradation of polyethylene sheets. Thick polyethylene sheets (1.2 mm) exhibited heterogeneous oxidative progress between the face and back sides, resulting in the unsynchronized development of carbonyl groups and a delayed rate of molecular weight decrease. Additionally, foaming and resin types could significantly influence the photo-degradation rate by impacting UV transmittance and crystallinity, thereby hindering photo-degradation. Furthermore, the use of UV radiation, in combination with these optimized factors, could be a promising method for accelerating the degradation of polyethylene, thereby reducing its environmental impact. As the degradation of polyethylene progressed, the increase in crystallinity and the formation of crosslinks prevented further oxidative cleavage of the polyethylene chain. These findings provide valuable insights into the factors affecting the photo-degradability of polyethylene sheets, offering potential strategies for the formulation design of photo-degradation and mitigating the environmental impact of polyethylene wastes.



Biography

Bochu Du is a research graduate student from The Hong Kong Polytechnic University. She is a female scholar who has made significant strides in her field, demonstrating a commitment to academic excellence and a passion for knowledge. In this capacity, she has been able to apply her academic knowledge to practical research, contributing to her field and further developing her skills. Her academic and research training has not only allowed her to delve deeper into her area of interest but has also provided her with the opportunity to contribute to the broader community. Ms. Bochu Du has been working with biodegradable and bio-sourced materials, enhancing the degradability of commodity plastics, sustainable manufacturing, processing and green applications. Research interest is about degradation.

RECYCLING TRENDS AND CHALLENGES IN THE BALTIC STATES

Natalija Cudecka-Purina

BA School of Business and Finance, Latvia

Abstract

Background: Waste recycling is a niche that has huge potential for the successful implementation of the circular economy as well as for fostering transition from waste to resource management. Latvia along with Estonia and Lithuania have made major improvements in the field of waste management for the last 25 years – shifting from uncontrolled and illegal waste dumping to development of sophisticated and state of the art waste management system with sanitary landfills, waste sorting system, deposit refund system, waste recycling facilities and waste-to-energy plants. Although, being members of European Union for all three Baltic states means the obligation to fulfill the mandatory targets, set in the Waste Framework Directive.

Objective: To examine the current achievements and main challenges of waste recycling in the Baltic States.

Methods: Data on waste recycling has been obtained as a secondary data from Early warning reports published by the EU, as well as local statistical data. The data analysis will also engage a multilevel-model approach as well as systems dynamics.

Results: The recycling rate for household waste in Lithuania in 2021 accounted for 45.2%, in Latvia – 44%, and in Estonia – 30.6%. The target set in the EU WFD for 2020 was 50% and for 2025 is 55%. It is also essential to mention that unfulfillment of the targets can be followed by financial liabilities and/or infringement.

Conclusion: Although there is still a strong perception that circular economy is mostly about waste management, which is undoubtedly wrong, it does play a significant role in CE by possessing thousands of tons of potential valuable resources. This is why it is of crucial importance to understand i) how to divert these resources from the waste flow and ii) if they do enter the waste flow, how can we benefit from them in the most effective way by upcycling.

Biography

Natalija Cudecka-Purina, Assoc. Prof., Phd in Business Administration with a focus on circular economy and Sustainability for waste landfills. Natālija has over 15 years' experience in Sustainability, being involved in development of Latvian waste management system – implementation of infrastructural projects on dumpsite closure and recultivation, construction of sanitary landfills and waste sorting infrastructure. Followed by almost 10 years' experience in public sector in policy planning and strategy development. In the role of Associate Professor, Natalija has developed a range of study courses and continues scientific research in the field of sustainability, waste management, circular economy (LIFE, Erasmus +, Horizon, COST actions, etc.). Current research interest is on circular economy and industrial symbiosis, how to keep the resources in the economic cycle as well as to foster inter-sectoral and cross-sectoral cooperation. Research interests are circular economy, industrial symbiosis, resource efficiency and waste management.

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TREATMENT OF SUBSTANDARD ROCKET FUEL 1,1-DIMETHYLHYDRAZINE VIA ITS METHYLENE DERIVATIVE INTO HETEROCYCLES BASED ON PYRROLO-[3,4C] QUINOLINES, CYCLODODECA[B]PIRAN AND PYRROLE

Elizaveta Sergeevna Ivanova, Oleg Evgenievich Nasakin and Yhtiar Kadyrow

Ulyanov Chuvash State University, Russia

Abstract

Background: 1,1-Dimethylhydrazine (Heptyl, rocket fuel (UDMH)) is characterized by extremely high toxicity, teratogenicity and the ability to constantly absorb water from the atmosphere, losing its energy characteristics. To utilize UDMH in huge amounts, it is involved into immediate reaction with a formalin solution to form significantly less toxic 1,1–dimethyl-2-methylene hydrazone (MDH). MDH is polymerized under acidic conditions followed by its incineration, yielding a substantial amount of nitrogen oxides.

Objective: This study aims to develop environmentally friendly laboratory method of UDMH recycling via MDH.

Methods: MDH was obtained by careful addition of UDMH to formalin solution (40%) stirring the reaction mixture at 0-5°C for an hour. NaOH was added until two layers were formed. The water layer was separated from the organic layer. The organic layer was distilled with the provision of a rectification column at 64°C. Tetracyano ketones (TCEKs) were obtained by the general procedure: appropriative ketones were mixed with tetracyanoethylene (TCNE) in dioxane along with a catalytic amount of hydrochloric acid. The progress of the process was determined via a test for hydroquinone (blue TCNE complex). After the blue color ceased to appear, the dioxane solution was maintained at 0–5°C in the freezer for 10 min. Then, cold distilled water was added to the frozen reaction mixture in a volume equal to the dioxane solution to cause precipitation. The desired product was filtered off and washed with water. Each TCEK was mixed with MDH in equal amount in EtOAc. The reaction mixture was stirred at room temperature till the precipitation. The target products were filtered off and recrystallized from isopropanol. The structures were confirmed by IR, ^{1}H, ^{13}C NMR and mass spectroscopy methods.

Results: These MDH-based syntheses in one stage yield bi- and tricyclic compounds that exhibit structural similarities with well-known drugs. These structures are presented in **figures 1 and 2.**

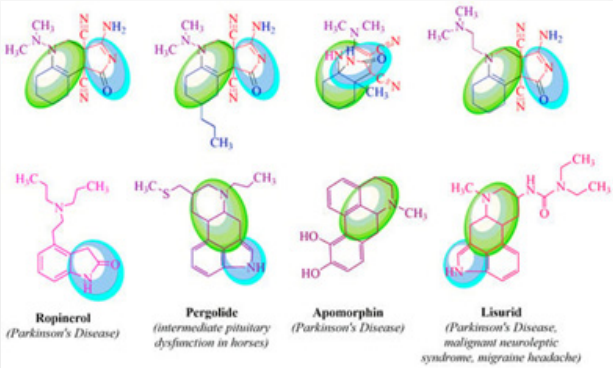

Figure 1. Adducts of MDH and TCEKs and neuroprotective drugs.

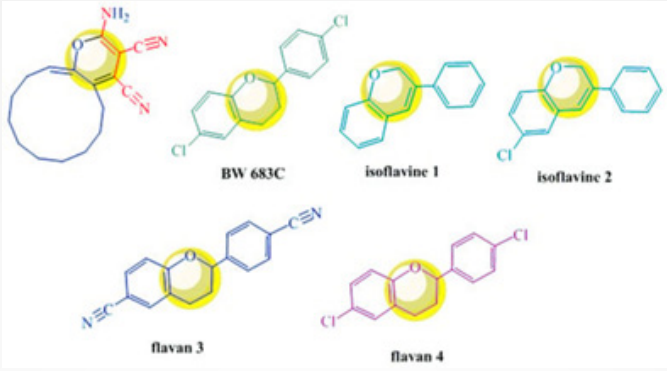

Figure 2. Adduct of cyclododecanone and MDH and antiviral compounds.

Conclusion: The obtained compounds have interesting structural scaffolds that are promising for molecular design and pharmaceutical chemistry.

«This research was funded by the Russian Science Foundation, grant number 23-23-00656»

Biography

Elizaveta Sergeevna Ivanova is the aspirant of Ulyanov Chuvash State University, Russia. She has 4 publications in national and international journals. She presented papers in more than 50 national conferences. Research interests are about syntheses based on dimethylhydrazine, its derivatives and tetracyanoethylene.

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EXAMINING LONG TERM ENVIRONMENTAL AND FINANCIAL IMPACTS OF MISSING HIGHWAY CONNECTORS

Orianne K Wang[1,2] and Deli Wang,[3]

[1]Westview High School, USA
[2]Shanghai American School, China
[3]Reshine Renewables Inc, USA

Abstract

Background: California State Route 56 (SR-56) connects Interstate 5 (I-5) and Interstate 15 (I-15) for San Diego's North County region. However, there are no connectors from westbound SR-56 to northbound I-5 and from southbound I-5 to eastbound SR-56. Vehicles connecting the highways must take circuitous routes through multiple traffic lights and ramp meters.

Objective: To examine the long-term environmental and financial impacts of the lack of ramps connecting W-56 and N-5, and to understand the engineering design's impacts on sustainability.

Methods: By defining start/end points or landmarks for vehicles to exit/enter westbound SR-56/northbound I-5 or southbound I-5/eastbound SR-56, respectively,

- We measured trip times for vehicle to exchange highways, frequencies, and average vehicle occupancies at different times of the day and days of the week.
- Using trip times on connectors of the other direction as references, we studied the average delay time due to the missing highway connectors, estimated daily and annual additional CO_2 emissions due to the slow-down and equivalent monetary losses owing to time wasted.
- Google's Vision AI was employed to facilitate data analysis.

Results: The average delay time for vehicles connecting westbound SR-56/northbound I-5 and southbound I-5/eastbound SR-56 ranges from 1 to 3 minutes, resulting in a cumulative annual waste of half a million hours. Environmentally, it results in over 3,000 metric tons of additional CO_2 emissions and an equivalent monetary loss exceeding $10 million each year. These numbers are underestimated because data were collected between 4am to 10pm in a day.

Conclusion: Engineering decisions significantly impact the environment and sustainability. Long-term sustainability considerations should guide design, leveraging new technologies such as big data and AI to successfully meet traffic needs and keep pace with urban development. Although this study is conducted on a local case in San Diego, California, we believe the conclusion is universally true!

Acknowledgement: The authors are grateful to Dr. Ricardo Basurto-Dávila, Chief Evaluation Officer of the County of San Diego, for his generous support to this project by providing constructive advice and insightful guidance on designing the experiments.

Biography

Orianne K Wang is passionate about the environment, having started to eat vegan foods at 10 years old after learning about the pollution caused by cow farming in 4th grade. She began working on this project in 2022 during her spring, summer, and winter breaks while attending Westview High School in San Diego, California. She is currently a senior at Shanghai American School (SAS) in China.

Deli Wang received his B.S. degree in Polymer Chemistry from the University of Science and Technology of China and his Ph.D. degree in Materials Science from the University of California, Santa Barbara (UCSB). After his postdoctoral research at Harvard University, Deli worked at the University of California - San Diego (UCSD), from 2004 to 2014, as a professor in the Department of Electrical and Computer Engineering. He currently works on renewable energies and smart microgrids at Reshine Renewables Inc. Research interests are sustainability, environment sensing and monitoring, renewable energy, waste to energy and water.

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INCREASED ATMOSPHERIC CO_2 TRANSFER TO SOIL THROUGH MIXING OF FUNCTIONALLY DIVERSE PLANTS DURING REFORESTATION AND FALLOW (IVORY COAST AND CONGO)

Armand W Kone, Michel K Yao and Lydie-Stella Koutika
UFR Sciences de la Nature, Université NANGUI ABROGOUA, Ivory Coast

Abstract

Background: The agricultural sector generates about 30% of the global CO2 emissions, making it a major contributor to climate change (CC). Conversely, agricultural soils can play a key role in CC mitigation by sequestering atmospheric carbon, provided that effective agroecological practices are implemented.

Objective: This study draws on case studies conducted in West and Central Africa to show how the mixture of plant species shedding litter with contrasting characteristics can promote soil organic carbon (SOC) storage during reforestation and fallow.

Methods: In the semi-deciduous forest zone of Côte d'Ivoire (Oumé), monocultures of teak (*Tectona grandis*) and cocoa (*Theobroma cacao L.*) that shed recalcitrant and moderately recalcitrant leaf litters, respectively, were investigated alongside a mixture of *T. grandis, Gmelina arborea, Terminalia ivorien-sis* and *Terminalia superba*, shedding soft and recalcitrant leaf litters. In the forest-savanna transition zone (Taabo), the mixed fallow of the herbaceous *Chromolaena odorata* with the shrub legume *Cajanus cajan* was compared to the respective pure fallows. In Congo, the mixed tree stands of *Acacia mangium* (high-quality leaf litter) with *Eucalypt urophilla* (low-quality leaf litter) was compared to the respective pure stands.

Results: In Oumé, the SOC mineralization rate (C_{min}) and stock (0-10 cm depth) in the mixed tree stand were found to be higher than in the pure stands of teak (+9% and +16%, respectively) and cocoa (+27% and +26%). In Taabo, the mixed fallow exhibited higher SOC stock (0-10 cm depth) relative to *C. cajan* (+38%) and *C. odorata* (+13%). In Congo, the stock of SOC in the mixed tree stand was higher than in the pure stands of *A. mangium* (+35%) and *E. urophilla* (+30%).

Conclusion: Mixing functionally diverse plant species provides an effective natural solution to mitigate climate change, which should be promoted in sub-Saharan Africa.

Biography

Armand W Kone graduated in 2009 with a PhD in Soil Ecology/Agroecology. He is an Associate Professor at Nangui Abrogoua University, Abidjan, Côte d'Ivoire. His research work relates to sustainable soil management in natural ecosystems (forest and savanna), forest plantations, and agro-ecosystems. He has sharpened his expertise in getting actively involved in national, regional and international projects as principal investigator, head of work team or participant. He attended and presented scientific works at about 20 conferences nationally and internationally. He has a proven track-record in publishing scientific articles in high rank international journals on topics relating to soil ecology, agroecology, soil fertility, carbon and nutrient cycling and crop production. He currently acts as a reviewer for international journals and is an active member of 4 international research networks.
Research interests are soil ecology, agroecology, agroforestry, soil organic carbon, soil biology, soil microbial activity and crop production.

PEOPLE'S PERCEPTION ON DEPLETION AND DEGRADATION ON WATER RESOURCE IN PATNA AND KENDUJHARGARH BLOCK OF KENDUJHAR DISTRICT, ODISHA, INDIA - CLIMATE CHANGE PERSPECTIVE

Ranjan K Mallick and Sibabrata Das

Ravenshaw University, India

Abstract

Climate change poses a significant threat to water resources globally, with potential impacts on water availability, quality, and accessibility. Kendujhar, located in the eastern part of India, plays a crucial role in Odisha's economy due to its rich mineral resources and diverse ecosystem. The present study is based on the data and information collection from various secondary as well as primary sources. Precisely four data collection methodologies were applied: (a) Interviewing key informants based on designed questionnaire or check list (b) documentary research (c) organizational mapping (d) Focused Group Discussions. Both quantitative and qualitative data analysis methods have been employed in carrying out the analysis of data collected from primary and secondary sources. The analysis has been done with the help of spread-sheet application. The field survey for this study has been carried out and around the villages of the mining and industrial areas which are major contributor of water consuming related activities. The data for the present study has been collected using structured questionnaire structured questionnaire from 23 villages (13 from Kendujhar Sadar and 10 from Patna) comprising 178 households (121 from Kendujhar Sadar and 58 from Patna) and collected from various NGOs, Government Officials and Organizations involved in mining activities in both these blocks. However, the region faces challenges related to water scarcity, making it particularly vulnerable to climate change impacts.

Based on the survey data, a minority of villagers in Patna Block are satisfied with the quality of water. Overall, only 43% of villagers reported being satisfied, whereas 57% reported being unsatisfied. Erendei village has the lowest satisfaction rate at 0%, while Ghatbalijadi village has the highest satisfaction rate at 100%. The dissatisfaction level is 87.5% in, 71.4% in Kothanghar, and 62.5% in Dumuria. The average satisfaction level across all villages is 64%. This suggests that most people are at least somewhat satisfied with the water quality. However, there is a wide range of satisfaction levels between villages, from a low of 10% in Badapalasa to a high of 96% in Tikaragumura. This suggests that there are significant variations in water quality and access between different communities.

Coalesce Research Group

7th International Conference on

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UNDERSTANDING THE IMPACTS OF CLIMATE CHANGE ON AFRICAN INDIGENOUS COMMUNITIES AND EXAMPLES OF MITIGATION/ ADAPTATION RESPONSES: CASE OF THE BAKA AND BANTOUS LOCAL PEOPLE LIVING AT THE PERIPHERY OF THE DJA BIOSPHERE RESERVE

Nwafi Ngeayi Adi

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Abstract

Background: Mitigating climate change, addressing waste and pollution, and ensuring environmental sustainability are among the world's most pressing issues. Increasing temperatures and sea levels, changing precipitation patterns and more extreme weather are threatening human health and safety, food and water security and socio-economic development in Africa and the global planet in general. According to a new report devoted exclusively to the continent. The State of the Climate in Africa 2019 report, a multi-agency publication coordinated by the World Meteorological Organization (WMO), provides a snapshot of current and future climate trends and associated impacts on the economy and sensitive sectors like agriculture. It highlights lessons for climate action in Africa and identifies pathways for addressing critical gaps and challenges.

Globally, there are an estimated 370 million indigenous people whose livelihoods are being negatively affected by climate change by means of an increased frequency and intensity of extreme weather events such as droughts, floods, storms, cyclones, as well as heatwaves, among others. While climate change is an environmental challenge that developed countries have largely contributed toward from anthropogenic activities, the negative impacts are being felt among poorer countries, particularly vulnerable indigenous communities who ordinarily live low carbon lifestyles. Additionally, many indigenous communities have been confined to the least productive and most delicate lands because of historical, social, political, and economic exclusion. Furthermore, less consideration has been given to indigenous groups during formulation of climate-change mitigation strategies, making them vulnerable to its effects. Notwithstanding, many indigenous communities have enduringly used various indigenous and local knowledge (ILK)-derived coping mechanisms passed from generation to generation. and promoting local technologies that help reduce carbon emissions and energy consumption. Also important is to develop and put in practice adequate governance frameworks that enable the sharing and re-use of environmental waste. At the same time, more focus needs to be placed on promoting environmental education and building awareness on environmental sustainability within the protected areas and local communities.

Objective: To understand the strategies derived from Indigenous Local Knowledge that indigenous groups have used to deal with ecological uncertainty (a.k.a. environmental risk) such as droughts, food insecurity, and loss of, or displacement from land, and how they build resilience against climate-related stresses and shocks.

Methods: Data were collected from the field Survey through focus group discussions with local communities living at the borders of protected areas around the Dja Biosphere Reserve in Eastern Cameroon. A sample of 350 households was selected. Data were collected from 200 women actively involved in agriculture and Non-Timber Forest Products Collection and 150Men who are mainly cocoa farmers. Data

were analysed using a regression analysis approach.

Results: Indigenous communities have been constantly adapting to the effects of environmental stresses over a very long period with numerous climate-change adaptation mechanisms being adopted in recent decades. However, more recent impacts of climate change have placed significant strain on these communities as indigenous people are impacted in idiosyncratic ways by climate change (e.g., reduction in crop yields, water scarcity, and exposure to malnutrition) and also Apart from the matters described in the background of study , there are further barriers to climate change adaptation that are often seen across the continent in general and the northern and eastern regions of Cameroon in particular, namely the unequal global vulnerability of populations, differential responsibility, and unequal power in decision-making concerning policymaking, thus undermining the resilience capability of indigenous communities. As seen in the studied communities are making their best efforts to address these barriers. There are examples that show that indigenous people's knowledge is one important component to the success of policies that aim to increase adaptation. For instance, the Afar communities have extensive experience in adapting to the impacts of climate change using their ILK via understanding the biophysical observations, and the community's perception was matched with the temperature trends using conventional weather-forecasting systems. Similarly, the Borana people have been using indigenous collective resource-governance systems, traditional social insurance and safety-net systems, and weather-forecasting systems based on changes in animal behaviors, as well as the movement and alignment of stars and divining animal entrails, which have proven to be reliable for centuries despite the challenges posed by an increasingly variable climate, thus allowing acclimatization to drought challenges.

Conclusion: Africa and the small island developing States are the regions facing the largest capacity gaps regarding climate services. Africa also has the least developed land-based observation network of all continents. Africa has made great efforts in driving the global climate agenda. This is demonstrated by the very high levels of ratification of the Paris Agreement – over 90%. Many African nations have committed to transitioning to green energy within a relatively short time frame. Clean energy and agriculture are, for example, prioritized in over 70% of African NDCs. This ambition needs to be an integral part of setting the economic development priorities of the continent.

One promising approach throughout the continent to reducing climate related risks and extreme event impacts has been to reduce poverty by promoting socioeconomic growth, in the agricultural sector. In this sector, which employs 60% of Africa's population, value-addition techniques using efficient and clean energy sources are reported to be capable of reducing poverty two to four times faster than growth in any other sector.

Biography

Nwafi Ngeayi Adi is an expert in leading Civil Society organizations and other NGO like the GIZ (German International Cooperation for Development) in designing, conceiving, and implementing Community development projects with approach focusing on Community driven Conservation of biodiversity and rural development in tropical landscapes and Savana zones. His long-term experience (12years) and research work in the areas of developing strategies to adaptations to climate change has greatly contributed in building the capacities of 200local communities towards resilience to climate change. Empowering over 2000 women actively involved in Agriculture and Non-Timber Forest Product valorization has helped to Improve the sustainable management of natural resources around the Dja Biosphere Reserve. He is currently the CEO and President Founder of the CSO named ACOBIDER (Association for the Conservation of Biodiversity and Rural Development) with headquarters based in Bertoua Eastern region Cameroon. Research interests are biodiversity conservation, environmental sustainability and local development.

SWOT ANALYSIS AND STRATEGIES TO DEVELOP PROJECTS SUSTAINABILITY IN JORDAN

Reham M Alreqeb

Aljiza Municipality, Jordan

Abstract

Many developed countries in Europe, Asia, and North America have turned to the Smart City system. This has been attempted by either retrofitting the established cities or creating new cities to provide their services instantly to citizens. Success stories of smart city projects have spread recently in various regions of the Middle East, and Amman is not among those successes.

This study explores the implementation of the global Smart Municipality concepts at the local level, Specifically, Greater Amman Municipality (GAM). This research went through two stages, namely a qualitative technique that included interviews with experts. Secondly, a case study in which four constructed projects in terms of smart city concepts were chosen in GAM to check the Smart Municipality Project Assessment Matrix (SMPAM) to show relationships between the challenges and the project areas.

The research results showed that GAM approaches the implementation of the global concept of a Smart City in Amman. The executive committee for innovative solutions stated that the main dimensions that had been applied in GAM are city Mobility and Environment projects area. On the contrary, marginal regions in the adoption of smart projects are limited to living and social services.

According to the study results, Amman could become a smart city by 2030, so this research suggested a roadmap to implement the smart city concepts as a smart solution for local municipalities in Jordan.

INDEX

Adrienn Kakuszi-Széles	16
Armand W Koné	74
Bing Yan	21
Bochu Du	68
Christian Toochukwu Ogbonna	22
Ebenezer Takyi	67
Elizabeth Ferreira Rangel	55
Elizaveta Sergeevna Ivanova	70
Érika Alves Tavares Marques	52
Éva Horváth	16
Fardin Farahnak	57
Funda Yoldas	34
Hong Li	48
Hoy Sereivathanak Reasey	36
Jalal Rastegary	18
Jane Lloyd	65
Jean-Louis Roux Dit Buisson	51
John Kraemer	17
Junye Wang	12
K C Nedzivhe-Mqehe	63
Kwadwo Antwi-Wiafe	19
Laima Cesoniene	20
Madhuri Nigam	62
Madjid Fathi	30
Michael Aide	13
Muhammad Afzal	37
Naa Dedei Tagoe	32
Natalija Cudecka-Purina	69
Nshimiyimana Frank	41
Nwafi Ngeayi Adi	76
Obroma Agumagu	33
Orianne K Wang	72
Osei Agyeman Yeboah	19
Paul Comet	53
Peter Imatari Emoit	57
Ranjan K Mallick	75
Ravi Ande	38
Ravi Ande	39
Ravi Ande	43
Reham M Alreqeb	78
Shamraiz Ahmad	61
Simeng Li	25
Sung Hee Joo	50
Tanja Trakic	28
Tehreen Shaikh	66
Thomas F Valone	54
Vibha Yadav	23
Vibha Yadav	24
Victoria Nyebe Sika	60
Vinicius Pedro de Souza	46
Yim Mongtoeun	35
Ying Ji	68

Note

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