Coalesce Research Group

Joint Event

6th International Conference on

ENVIRONMENTAL SUSTAINABILITY AND CLIMATE CHANGE

&

RECYCLING AND WASTE MANAGEMENT

August 21-22, 2023 | Philadelphia, USA

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Scientific Program

Scientific Program

Monday
August 21, 2023

6th International Conference on

Environmental Sustainability and Climate Change & Recycling and Waste Management

Day 1 - August 21, 2023	
Meeting Hall: Salon I, II & III	
08:00 - 08:45	Registrations
08:45 - 09:00	Opening Ceremony and Introduction
Keynote Presentations	
09:00 - 09:40	Title: Role of Standards as an Enabler in a Digital Remanufacturing Industry
	Ramesh Subramoniam, The University of Texas, USA
09:40 - 10:20	Title: SIDS and the Climate|Tourism|Green Energy Nexus: A 'Biotrash' to Cash Sustainable Approach
	Kirk Douglas, The University of the West Indies, Barbados
10:20 - 11:00	Title: Forecasts of Global Renewable Energy Generation and Analysis of Key Factors Affecting the Growth of Renewable Energy Markets
	Abhishek Asthana, Sheffield Hallam University, UK
Group Photo: 11.00 - 11.10	
Networking & Refreshments (11.10 - 11.30) @ Salon IV	
Oral Presentations	
Session Chair:	**M Anowarul Islam**, University of Wyoming, USA
Session Chair:	**Christopher Galarza**, Forward Dining Solutions, USA
Sessions:	Environmental Sustainability and Development | Climate Change Risk, Policy and Law | Biodiversity, Ecology and Ecosystems | Geochemistry and Geoscience | Carbon Cycle and Carbon Footprint | Recycling – Reduce, Reuse and Recovery | Waste to Energy | Green Energy and Economy | Rubber and Plastic Recycling | Hazardous Waste Management | E-Wastes Recycling and Management | Medical Waste Management | Solid Waste Management
11.30 - 12.00	Title: A Multi-Level Characteristic Analysis of Urban Agglomeration Energy-Related Carbon Emission: A Case Study of the Pearl River Delta
	Linyu Xu and Yuqi Dai, Beijing Normal University, China
12.00 - 12.30	Title: Chasing Carbon Zero: Electrifying Commercial Kitchens
	Christopher Galarza, Forward Dining Solutions, USA
12.30 - 13.00	Title: The Current Impact of Asbestos and Asbestos-Containing Waste on the Environment and Human Health
	Enedir Ghisi, Federal University of Santa Catarina, Brazil
Lunch (13.00 - 13.45) @ Salon IV	
13.45 - 14.15	Title: Does the Current Local Green Economy of Ghana have Sustainable Job Creation Potential? The Case of the Agricultural Sector
	Osei-Agyemang Yeboah, North Carolina A&T State University, USA
14:15 - 14:45	Title: Early-Stage Recovery of Lithium from Lithium-Ion Batteries Black Mass in Pilot Scale
	Bastian Hansel, Institute of Chemical Technology, Technische Universität Bergakademie Freiberg, Germany

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14:45 - 15:15	Title: How the Waste Tire Recycling and Management Policy Influenced The Use of Asphalt Rubber in Brazil
	Liseane Padilha Thives, Federal University of Santa Catarina, Brazil
15:15 - 15:45	Title: Diverse Cropping System can Reduce Greenhouse Gas Emission and Improve Soil Health
	M Anowarul Islam, University of Wyoming, USA
15:45 - 16:15	Title: Sand Fixation and Dust Prevention by Biostimulation Method in Kashi Area China
	Qu Jili, Kashi University, China
16:15 - 16:45	Title: Restoring Riparian Ecosystems in East Mediterranean Agricultural Watersheds to Provide Multiple Ecosystem Benefits
	Felicia Orah Rein-Moshe, Soil Erosion Research Station, Ministry of Agriculture, Israel
Networking & Refreshments (16:45 - 17:05) @ Salon IV	
17:05 - 17:35	Title: Delta2Hn-alkane and Delta18Osugar Biomarker Proxies from Leaves and Topsoil of the Bale Mountains, Ethiopia, and Implications for Paleoclimate Reconstructions
	Bruk Lemma, Martin Luther University Halle-Wittenberg, Germany
17:35 - 18:05	Title: Research on Carbon Emission Calculation Method of Steel Pipelines Based on the Coupling of Life Cycle Model and Corrosion Model
	An Yan, Southwest Petroleum University, China
18:05 - 18:35	Title: Methane and Carbon Dioxide Emissions from the Hulene Dump and its Environmental Impact on Neighboring Communities
	Amad Hassam Abdul Gani, Universidade Pedagógica de Maputo, Mozambique
18:35 - 19:05	Title: What are the Conditions for Successful Implementation of Climate International Covenants?
	Erez Z Shoshani, Ruppin Academic Center, Israel
19:05 - 19:35	Title: Management of Covid-19 Vaccination Waste in Ghana
	Senam Tengey, Medical Waste Services Limited and Kwame Nkrumah University of Science and Technology, Kumasi-Ghana
19:35 - 20:05	Title: A Comprehensive Approach to Municipal Solid Waste Management in Kohima City, India
	Nzanthung Ngullie, National Institute of Technology Nagaland, India
20:05 - 20:35	Title: Recycling Used Cooking Oil Waste by Producing Biodiesel in Port Moresby, Papua New Guinea
	Linta Aquillah Qalopui, Pacific Adventist University, Papua New Guinea
Day 1 Concludes followed by Certificate Felicitation	

Scientific Program

Tuesday
August 22, 2023

6th International Conference on

Environmental Sustainability and Climate Change & Recycling and Waste Management

Day 2 - August 22, 2023	
Meeting Hall: Salon I, II & III	
Keynote Presentations	
09:00 - 09:40	Title: Case Study of National Climate Adaptation Policy: The Case of South Korea
	Kihan Lee, Dankook University, South Korea
09:40 - 10:20	Title: Passive Sampling as a Watershed Investigation tool to Identify and Quantify First-Flush Polar Pesticides in an Eastern Mediterranean Agricultural Basin
	Felicia Orah Rein-Moshe, Soil Erosion Research Station, Ministry of Agriculture, Israel
Oral Presentations	
Session Chair:	**Georgi Atanasov,** Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, Bulgaria
Sessions:	Climate Change Risk, Policy and Law | Biodiversity, Ecology and Ecosystems | Recycling – Reduce, Reuse and Recovery | Metal Recycling | Industrial and Chemical Waste Recycling | Waste to Energy | Environmental Sustainability and Development | Oceanography, Fisheries and Aquaculture | Biomass Valorization | Biofuels | Environmental Impact Assessment | Space Monitoring of Climate Variable
10:20 - 10:50	Title: Leaching of Cu/Ag/Au Group Ores by DES to Recover by-product Elements of the CRM Category
	Ben Ebersbach, TU Bergakademie Freiberg, Germany
Networking & Refreshments (10.50 - 11.15) @ Salon IV	
11.15 - 11.45	Title: The COOL Process – Leaching Lithium Selectively from Spent Lithium-Ion Batteries
	Robert Mende, Institute of Chemical Technology, TU Bergakademie Freiberg, Germany
11.45 - 12.15	Title: The use of Recycled Waste from Photovoltaic Panels in Geopolymer Concretes
	Patrycja Bazan, Cracow University of Technology, Poland
12.15 - 12.45	Title: Development of a Climate Resilient Artificial Intelligence Trade (CReAIT) Platform for Sustainability
	Kirk Douglas, The University of the West Indies, Barbados
12.45 - 13.15	Title: Disentangling Antecedents, Behaviour and Entrepreneurial Traits of Key Actors of Sustainable Agritourism Ecosystem: A Tale of Emerging Market
	Navjot Sandhu, Birmingham City University, UK
Lunch (13:15 - 14:00) @ Salon IV	
14.00 - 14.30	Special Session on SAVVYECO
	Surya Kotha and Anil, M/s Savvy Eco Private Limited, India
Session Chair:	**Felicia Orah Rein-Moshe,** Soil Erosion Research Station, Ministry of Agriculture, Israel

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Sessions:	Climate Change Risk, Policy and Law | Biodiversity, Ecology and Ecosystems | Environmental Sustainability and Development | Oceanography, Fisheries and Aquaculture | Environmental Impact Assessment | Space Monitoring of Climate Variable
14.30 - 15.00	Title: Advancing Strategic Environmental Assessment for Oil and Gas Development Transition into new Frontier Basin Regions: A Framework for the Petroleum Industry
	Mustapha Kyari Manga, Newcastle University, UK
15.00 - 15.30	Title: Smallholder Farmers' Willingness to Adopt Climate-Smart Agriculture in the Upper East Region, Ghana
	Yakubu Abdulai, University of Tsukuba, Japan
15.30 - 16.00	Title: Aquaculture Health and Performance: The Probiotic Boosting Effect
	Georgi Atanasov, Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, Bulgaria
	Networking & Refreshments (16.00 - 16.30) @ Salon IV
16.30 - 17.00	Title: Adverse Impacts of Oil Spills on Marine, Lowland and Upland Ecosystems of Niger Delta and the Control Measures
	Etuk Etiese Akpan, Clean Nigeria Associates Limited/Gte, Nigeria
17.00 - 17.30	Title: Promoting and Fostering First Generation Entrepreneurs towards Sustainability for Green Ecosystem
	Priya Kothari, YouthAid Foundation, India
	Poster Presentations
PP-01	Title: Canine Faeces: The Microblog of an Environmental Health Problem
	Salah Jaber, University of Derna, Libya
PP-02	Title: Evaluation of Bacillus Strains Isolated from Corn Washing Liquors as Sustainable Source of Gramicidin
	Ana Belen Moldes, University of Vigo, Spain
PP-03	Title: Sequential Separation Model of Biosurfactants and Potential Antibiotics from Agri- Food Sludges
	Jose M Cruz, University of Vigo, Spain
PP-04	Title: Biomethane Production through the Integration of Renewable Energy Surpluses in WWTP
	Raquel Iglesias Esteban, Department of Energy_ Bioenergy_ CIEMAT, Spain
PP-05	Title: Spatial and Temporal ^{2}H and ^{18}O Isotope Variation of Contemporary Precipitation in the Bale Mountains, Ethiopia
	Bruk Lemma, Martin Luther University Halle-Wittenberg, Germany
PP-06	Title: Bottom Liner Sorption Material from Waste Tires Against the Leaking of the Industrial Contaminants
	Junboum Park, Seoul National University, South Korea

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Offline E-Posters	
EPP-01	Title: Microalgae Conversion into Green Transportation Fuels *via* Hydroprocessing
	Vasiliki Ntagkonikou, Centre for Research & Technology Hellas (CERTH), Chemical Process and Energy Resources Institute (CPERI), Greece
EPP-02	Title: Environmental Assessment of a Microalgae Biorefinery Towards Renewable Fuels
	Loukia P Chrysikou, Chemical Process & Energy Resources Institute (CPERI), Centre for Research and Technology Hellas (CERTH), Greece
Video Presentations	
VP-001	Title: Permanent Debate Forum (fopede) between Portugal, Brazil and Portuguese-Speaking African Countries (PALOP[1]-CPLP[2]) to Identify the "State of the Art" in Solid Waste Management and Resilient Cities
	Maria Madalena Ferreira, University of Coimbra, Portugal
VP-002	Title: Impacts of Climate Changes on Human Health
	Elizabeth Ferreira Rangel, Oswaldo Cruz Institute, FIOCRUZ and Climate Change National Institute of Science and Technology, Brazil

Day 2 Concludes followed by Certificate Felicitation and Closing Ceremony

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Monday
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Virtual Presentations

Day 01 - August 21, 2023 - Starts at 11:00 AM British Summer Time

Keynote Presentation

11:00 - 11:30	Title: Industrial Defossilization for the Energy Transition
	Talieh Rajabloo, Hasselt University, Belgium

Oral Presentations

Session Chair:	**Tumma Anuradha,** University College of Science, Osmania University, India
11:30 - 11:55	Title: TPEF: A Novel Fluorophore for Nanoplastic Detection in Biological Systems
	Jerry Gao, Beijing Normal University, China
11:55 - 12:20	Title: Biodegradable Composite Film of Brewer's Spent Grain with poly(vinyl alcohol) Binder
	Lilian Lin and Heon E Park, University of Canterbury, New Zealand
12:20 - 12:45	Title: An Analysis of Solid Waste Management Policies Implementation Challenges in Cameroon
	Nchia Shella Ndum, University of Tsukuba, Japan
12:45 - 13:10	Title: Extreme Climatic Events: An Analysis of Socio-Economic Vulnerability and Cropping Mechanism in Selected Hotspots in India
	Tumma Anuradha, University College of Science, Osmania University, India
13:10 - 13:35	Title: Hydrogeological and Geophysical Investigations in Kodakandla Mandal, Warangal District, Telangana, India
	Ravi Ande, University College of Science, Osmania University, India
13:35 - 14:00	Title: Lake Chad Vegetation Cover and Surface Water Variations in Response to Rainfall Fluctuations under recent Climate Conditions (2000–2020)
	Paul Gerard Gbetkom, LEGOS, Université de Toulouse, France
14:00 - 14:25	Title: Aminolysis of Polyesters with Anilines over Lactate-Based Ionic Liquids
	Zhimin Liu, Institute of Chemistry, Chinese Academy of Sciences, China
14:25 - 14:50	Title: Eco-Efficiency: Methodological Framework and Assessment
	Alexandra Gkoulgkoutsika, Aristotle University of Thessaloniki, Greece
14:50 - 15:15	Title: A Fuzzy Weighted Moving Average Applied to Annual Temperature in the World
	Jianmin Jiang, Chinese Academy of Sciences and China Meteorological Administration Training Center, China
15:15 - 15:40	Title: Water Resources - The Israeli Experience
	Raphael Semiat, President of the Israel Desalination Society, The Wolfson Department of Chemical Engineering, Technion IIT, Haifa, Israel
15:40 - 16:05	Title: Nurses' Education and Perceptions on Climate Change: A Scoping Review
	Thierno Amadou Diallo, Laval University, Canada
16.05 - 16.30	Title: Smallholder Farmers' Willingness to Adopt Climate-Smart Agriculture in the Upper East Region, Ghana
	Yakubu Abdulai, University of Tsukuba, Japan

Day 1 Concludes

Scientific Program

Tuesday
August 22, 2023

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Day 02 - August 22, 2023 - Starts at 11:00 AM British Summer Time	
Oral Presentations	
11:00 - 11:25	Title: Enhanced Degradability and Mechanical Properties of Biodegradable Plastic Composites with New Zealand Jade Waste
	Lilian Lin and Heon E Park, University of Canterbury, New Zealand
11:25 - 11:50	Title: Soil Organic Carbon Mineralization and Storage Under Varying Fire Regimes in a Guinean Savanna (Côte d'Ivoire, West Africa)
	Armand W. Koné, Nangui Abrogoua University, Côte d'Ivoire
11:50 - 12:15	Title: Toxicity of Fine Particulate Matter during Firework event in Delhi, India
	Khushbu Dahiya, Indira Gandhi Delhi Technical University for Women, India
12:15 - 12:40	Title: Design of Objective Function Based Segmentation Technique and Supervised Classification Scheme for Remote Sensing Images
	Ravi Ande, University College of Science, Osmania University, India
12:40 - 13:05	Title: Theoretical Model and Simulation of the Power Utility Matrix in Order to Achieve Carbon Peak and Carbon Neutrality
	AJ Jin, Ningbo University, China
13:05 - 13:30	Title: Impacts of Climate Change to African Indigenous Communities and Examples of Adaptation Responses: Case of the Bakas and Bantous People Living at the Periphery of the Dja Biosphere Reserve
	Nwafi Ngeayi Adi, ACOBIDER, Cameroon
Poster Presentations	
13:30 - 13:45	Title: Impacts of Aggregate Quarries on the Environment, in Particular the Atmosphere (Dust Impacts) "Case of Heliopolis Guelma Aggregate Quarry"
	Djedid Faten, University of Badji Mokhtar Annaba, Algeria
13:45 - 14:00	Title: Metal Biosorption by Exopolysaccharides Produced by Bacterial Strains Isolated from Marine Hydrothermal Vents
	Johnthini Munir Ahamed, Kaohsiung Medical University, Taiwan
14:00 - 14:15	Title: Use of Mixed Recycled Aggregates in Concrete: Influence of Water Compensation Method on Physical and Mechanical Properties, Freeze-thaw Performance of Concrete Respectively
	Haoyu Hao, RecyCon, KU Leuven Campus Brugge, Belgium
14:15 - 14:30	Title: Spatial Distribution of Anthropogenic Radionuclides in the Soil-Freshwater Ecosystem of the Arctic of Central Siberian (Russian Federation)
	Lydia Bondareva, Erismann' Federal Scientific Centre Hygiene, Russian Federation
Oral Presentations	
14:30 - 14:55	Title: Modification and Surface Functionalization of Fly ash for Various Applications
	Sangeeta Tiwari, Amity University, India
14:55 - 15:20	Title: Use of Ionic Liquid Pretreated and Fermented Sugarcane Bagasse as an Adsorbent for Congo Red Removal
	Uroosa Ejaz, Shaheed Zulfikar Ali Bhutto Institute of Science and Technology - Karachi Campus, Pakistan
Day 2 Concludes followed by Vote of Thanks	

Day-1
Keynote Presentations

ROLE OF STANDARDS AS AN ENABLER IN A DIGITAL REMANUFACTURING INDUSTRY

Ramesh Subramoniam
The University of Texas, USA

Abstract

Remanufacturing, or Reman, is an industrial process whereby used products referred to as cores are restored to useful life. There is plenty of research describing remanufacturing (reman) as the ultimate form of recycling. However, there have been few studies to show how standards that provide universally accepted definitions and practices can be used to bring about a shift towards digitization and how Digital Technology (DT) can act as a catalyst for digital reman. No clear direction lies in why and how standards and DT should work together in reman and only very little (1 research article from the SCOPUS database) research has explored the intersection of these three areas: reman challenges, standards, and DT. The reman industry challenges that prevent them from successfully transitioning to sustainable production methods include high cost of resources, complex parts design, limited core availability, lack of internationally accepted definitions and protocols, poor design of reverse logistics networks, and poor consumer perceptions. DT can act as an enabler fueling environmental resilience through innovation. This presentation will discuss the ways standards can play a role in helping DT solve reman challenges, thereby achieving the United Nations Sustainable Development Goal (UNSDG) and provide significant opportunities for innovation for both small and large enterprises transitioning towards digital reman.

Biography

Ramesh Subramoniam, PhD is a Clinical Associate Professor of Operations Management and faculty advisor for ASCM (Association for Supply Chain Management) Student Forum at the University of Texas, Dallas. He worked in the Supply Chain industry and consulting for 27 years. He led supply chain teams for GM, Amazon, Verizon and most recently as the Managing Director for the Performance Improvement Practice at FTI Consulting before he joined UT Dallas as a full time faculty in 2018. Dr. Subramoniam had the opportunity to work with all phases of the product life cycle such as design, prototype, manufacturing, aftermarket and returns operations. He also got certified as a APICS Certified Fellow in Production and Inventory Management (CFPIM), six sigma black belt and a project management professional.

SIDS AND THE CLIMATE|TOURISM|GREEN ENERGY NEXUS: A 'BIOTRASH' TO CASH SUSTAINABLE APPROACH

Kirk Douglas, Ayanna Young-Marshall, Dion Greenidge, Gavin Bovell, Winston Moore and Troy Lorde

The University of the West Indies, Barbados

Abstract

For small island developing states (SIDS) in the Caribbean, tourism is a major contributor to national gross domestic products (GDP) and economic growth. As climate change impact risks increase and the vulnerabilities of trade and tourism all threaten to impair sustainable economic growth in the Caribbean, new ways of thinking and a shift in trade and tourism economic policies are required. Tourism generates copious amounts of waste globally with some estimates indicating tourists generate twice as much waste as residents. The climate |green energy| sustainable tourism nexus is intriguing, offering new and exciting opportunities. We advance a potential sustainable solution as a remedy, employing the conversion of multiple biomass waste ('biotrash') streams to primarily biomethane (renewable fuel) (15 M m^3/y), using anaerobic co-digestion on a national scale in Barbados, utilising a sharing economy, circularity, sustainability, and technology approach to leverage by-products such as organic digestate, reclamation and reuse of rectified wastewater, and innovative CO_2 and H_2S utilisation strategy (multiple formats in multiple sectors) as additional revenue streams. As tourism sectors expand waste conversion will expand thus driving more revenue generation ensuring circularity. This model significantly changes the current paradigm of the 'polluter pays' to a 'Biotrash to Cash' approach transforming biowaste generation from a liability into an asset and from a punitive approach to a rewarding one. This approach is a better green energy and sustainable tourism model for SIDS with polycrisis challenges (lack of jobs, high debt, pollution, health, waste management, etc.), limited government expenditure, aged and inadequate infrastructure, heavy dependency on tourism, threatened maritime ecosystems, limited land space, and limited food production. Data systems to monitor waste volumes and relevant conversion efficiencies to economically viable products are needed urgently in SIDS to facilitate adaptation to climate change, achievement of carbon neutrality and maintenance of a clean, healthy, and sustainable environment.

Biography

Kirk Douglas is the Director of the Centre for Biosecurity Studies at the University of the West Indies, Cave Hill campus. He is a professional senior scientist recognized both regionally and internationally for impactful scientific research in the fields of virology, zoonoses, biosecurity, climate change and infectious diseases. He has authored multiple peer-reviewed scientific papers in the fields of microbiology, virology, biosecurity, climate change and zoonoses which have received over 100 citations. His current research interests include zoonoses, infectious diseases, air pollution, wildfires, climate change, bioeconomy, sustainability, illegal wildlife trade, The Blue Economy, environmental pollution, and ecosystem health.

FORECASTS OF GLOBAL RENEWABLE ENERGY GENERATION AND ANALYSIS OF KEY FACTORS AFFECTING THE GROWTH OF RENEWABLE ENERGY MARKETS

Abhishek Asthana
Sheffield Hallam University, UK

Abstract

Just as the world started taking serious steps towards keeping the global temperature rise to under 1.5°C through sustainable energy use, events around the world have created the first truly global energy crisis. The disruption of energy supply chains from Russia has led to steep rise in the price of fossil fuels with severe implications for cost of living, raw materials availability and food security, affecting almost every country in the world. At the same time, energy companies are registering their biggest profits ever which has prompted various European countries to impose windfall taxes on them in political decisions which, in turn, has dampened investor confidence in the sector. In order to ensure energy security, some countries have taken desperate steps by reversing their energy policies and issued fresh licenses for coal, oil and gas extraction including frocking after banning them earlier, which is a short-term backward step towards their carbon reduction targets. This crisis has sparked an unprecedented drive for renewables with governments taking tangible steps to accelerate renewables capacity in order to reduce reliance on imported fuels while maintaining progress towards clean energy goals. This talk will present an analysis on the renewables sector, based on current policies and market developments in various geographical regions around the world. It will frame current policy and market dynamics while placing the recent rise in energy prices and energy security challenges in context. It forecasts the scenarios of deployment of energy technologies in renewable electricity generation, renewable transport fuels and renewable heat to 2027 while also exploring key challenges to the industry and identifying barriers to faster growth.

Biography

Abhishek Asthana - Since joining the university in 2009, Abhishek has delivered 45 industrial projects of energy research, knowledge transfer and consultancy, winning external funding of £2 Million. He has developed 5 commercial software packages and is the inventor of 4 patents.
Abhishek leads 3 courses - BEng Energy Engineering, BEng Chemical Engineering and MEng Chemical Engineering.
He is also the Deputy Director of the Doctoral Training Alliance in Energy formed by 19 British Universities in the University Alliance.
Abhishek is also the Director of Hallam Energy. He is part of a multidisciplinary team with a wide range of engineering knowledge supporting industry through initiatives such the Energy Saving Opportunity Scheme and the Industrial Heat Recovery Scheme.

Day-1
Oral Presentations

A MULTI-LEVEL CHARACTERISTIC ANALYSIS OF URBAN AGGLOMERATION ENERGY-RELATED CARBON EMISSION: A CASE STUDY OF THE PEARL RIVER DELTA

Linyu Xu[1], Ying Yu[1], Yuqi Dai[1], Hanzhong Zheng[1], Wenhao Wu[1] and Lei Chen[2]

[1]*Beijing Normal University, China*
[2]*Guangzhou Institute of Energy Conversion, Chinese Academy of Sciences, China*

Abstract

Urban agglomeration is identified as the important geographic units of country development while contributing immensely to carbon emission. This paper explored energy- related carbon emission characteristics of the Pearl River Delta (PRD) - the typical urban agglomeration in China, from cities and sectors perspectives. By conducting LMDI model, this paper decomposed carbon emission by sector and by cities to illustrate the key impact factors in the PRD, explored the reasons for the change of driving effects in urban agglomeration in view of regional difference. It concludes that, most cities carbon emission rebound around 2017, while carbon emission sharply decreased. There are differences in key reduction industries in different cities, while production and supply of electric power and transport sector had negative impact on reduction processes in most cities. The significant inhibition effect of energy intensity is mainly attributed to the great decrease of energy intensity in main industries reduction cities, such as Shenzhen, Guangzhou, Dongguan and Foshan. Based on the characteristics of carbon emission and social and economic development of the PRD, this paper puts forward specific suggestions and measures for differentiated emission reduction in urban agglomeration, and provides a new idea for the governance of carbon emission in urban agglomeration.

Acknowledgements: This study was funded by the National Key Research and Development Program of China (No.2022YFF1301202), the Guangdong Provincial Key Laboratory of Water Quality Improvement and Ecological Restoration for Watersheds (2021–02). And the authors would like to thank the suggestions on results and discussion section proposed by Jiangjie Yuan, Xiaorong Zhang, Bowen Sun, and Wenfeng Fan.

CHASING CARBON ZERO: ELECTRIFYING COMMERCIAL KITCHENS

Christopher Galarza[1] and Heidi E Kunsch[2]

[1]Forward Dining Solutions, USA
[2]LEED AP BD+C (PA DEP), USA

Abstract

The United States has set the goal of achieving carbon neutrality by 2050. By all credible estimates we are behind in this goal and one of the biggest challenges in achieving that goal is our built environment. In cities across America our built environment contributes to 70% of all carbon emissions. Furthermore, one of the biggest obstacles to do this is the hospitality industry. The average EUI of an office building is 30 and the average EUI of a commercial kitchen is 325 meaning that commercial kitchens use over 10x more energy and emit more pollution than any other building program. Understanding the unique properties of a commercial kitchen operation and the solutions that exist are essential ingredients to reducing our emissions, decarbonizing our cities, and making lasting sustainable changes for our chefs, our citizens, and our planet.

Are you interested in decarbonizing your building but aren't sure how to tackle the commercial kitchen? Join renowned professional chef and kitchen electrification expert Chef Chris Galarza of Forward Dining Solutions as he discusses the unique problems facing the commercial chef and the solutions that exist. This presentation will cover the topic of sustainable food service, looking particularly at how all-electric kitchens, specifically induction cooking equipment, can transform commercial food service. High performance electric kitchens save a considerable amount of energy, compared to traditional gas kitchens. Eliminating combustion from the commercial kitchen also dramatically improves thermal comfort, indoor air quality, and production. This presentation will delve into these topics and provide the audience with solutions to offset costs such as the CHECK program as well as a Case Study.

Biography

Christopher Galarza - Entrepreneur, author, public speaker, and podcaster Chef Chris Galarza is renowned for his work in kitchen electrification and has been featured in Time Magazine, CNN, & Bloomberg for his work. Chef Chris Galarza is the Founder and Culinary Sustainability Consultant for Forward Dining Solutions LLC, the first and only firm dedicated exclusively to creating sustainable and efficient commercial kitchens. As the country's foremost expert in commercial electric-kitchens chef works with clients to sustainably create kitchens that promote healthy, efficient, and equitable working conditions. Chef has worked on notable projects such as Chatham University's Eden Hall Campus (the world's first fully self-sustained university campus), Microsoft Redmond, and Castilleja All-Girls School. Chef worked side by side with several Certified Master Chefs and culinary Olympians and leverages to get projects moving forward and leaves operators prepared to successfully, efficiently, and safely run their kitchen for years to come. Research interests include building decarbonization/ culinary arts/ energy efficiency.

THE CURRENT IMPACT OF ASBESTOS AND ASBESTOS-CONTAINING WASTE ON THE ENVIRONMENT AND HUMAN HEALTH

Enedir Ghisi and Liseane Padilha Thives
Federal University of Santa Catarina, Brazil

Abstract

Background: Asbestos was extensively used in manufactured goods for many years, primarily in building components, automobile parts and coatings. However, the health problems and environmental impacts caused by asbestos were not adequately considered. Many studies confirmed that exposure to asbestos can cause diseases. The environmental departments of many countries classify asbestos as hazardous, and most of them have banned its use. On the other hand, asbestos-containing waste still represents a concern for many countries.

Objective: To present an overview about asbestos-containing waste, its characteristics, relationship to human exposure, and environmental impact.

Methods: The methodology comprises a current and comprehensive literature review on asbestos. The data were surveyed mainly from articles published in international journals (medicine and engineering) to provide an overview of asbestos use effects. Three main topics were assessed: asbestos characteristics and asbestos-containing waste's relationship to human exposure, countries where asbestos use is permitted or banned, and environmental impact due to the disposal of asbestos-containing waste.

Results: Asbestos and asbestos-containing waste exposure represent a risk to public health, which resulted in several types of cancer and respiratory diseases development. In the world, several countries have not banned asbestos use yet. Three main challenges the world has to face regarding asbestos were identified: asbestos is still present in the existing buildings constructed or renovated before asbestos bans, and the people are exposed to this hazardous material; the need to develop methods to recover soil contaminated by asbestos-containing products; the asbestos proper disposal and the impact on the environment must be constantly assessed.

Conclusion: Despite many countries still using asbestos, alternatives are available to reduce the environmental impact generated. Asbestos and asbestos-containing waste are still a problem worldwide particularly in developing countries where asbestos bans as coordinated management plans were not implemented.

Biography

Enedir Ghisi obtained his PhD in Civil Engineering from the University of Leeds, in the UK, in 2002. He is currently a professor in the Department of Civil Engineering at the Federal University of Santa Catarina, located in Florianópolis, southern Brazil. So far, he has edited 10 books, published 14 book chapters, 166 conference articles and 157 journal articles. His research topics are thermal performance of buildings, energy efficiency in buildings, lighting, sustainability, building simulation, life cycle assessment, water consumption and rainwater harvesting in buildings. In a study by the Stanford University, United States, published in 2021, he is among the 100,000 most influential scientists worldwide. According to the AD Scientific Index, he is among the 10,000 most influential scientists in Latin America and the BRICS countries. Research interests are energy efficiency in buildings, rainwater harvesting, sustainability and life cycle analysis.

DOES THE CURRENT LOCAL GREEN ECONOMY OF GHANA HAVE SUSTAINABLE JOB CREATION POTENTIAL? THE CASE OF THE AGRICULTURAL SECTOR

Osei-Agyemang Yeboah, Shaibu Fuseini and Nassif Dauda
North Carolina A&T State University, USA

Abstract

Over 230,000 graduates enter the Ghanaian labor market every year with only 4,600 securing jobs from state agencies. In 2022, there were more than 635,000 jobless people in Ghana, most of them being males. Efforts to create more employment opportunities by shifting from the conventional economic development models to greener and more sustainable ones have yielded positive results. Since the 2000s, government policies including the National Climate Change Policy, Environmental Fiscal Reform Policy, and the National Climate Change Adaptation Policy have all been initiated to facilitate this transformation especially in the agricultural sector. This paper employs computable general equilibrium modeling to determine the job creation impacts of the green economy on the agricultural sector. Impacts are determined by the employment of a static specific factors model with competitive production that assumes constant returns, full employment, competitive pricing, and perfect labor mobility across industries. Substitution matrix made up of factor shares and industry shares are constructed. Factor shares are payments going to productive factors, and industry shares are the portions of factors employed by industry. The model uses 2020 Census labor data for four skilled groups (managers, professionals, service, production) across the manufacturing, services, rest of agriculture, and the green economy. Capital receives the residual of value added after the Labor and Energy Bill. The model can be readily simulated with various vectors of price changes in the green economy sector. Preliminary results indicate green energy policies especially in the agricultural sector have led to increased job creation.

Biography

Osei-Agyemang Yeboah is a professor of international trade and serves as the Director of the L.C. Cooper Jr. International Trade Center at North Carolina Agricultural and Technical State University. The Center through its international projects especially has developed trade and economic development models addressing food security, poverty, trade and climate change adaptation and mitigation with special focus on youth and gender in countries including Cambodia and Philippines in 2009 -2014; and in Ghana from 2012 -up to date. Yeboah and partners from the Savannah Agricultural Research Institute (SARI) of the Council for Scientific and Industrial Research (CSIR), Ghana have been working on USDA-FAS funded Food Security Projects on Peanut, Soybean, Maize, Cowpeas and other horticultural crops value chains using Climate-smart agricultural innovations. Yeboah holds a PhD in Agricultural Trade/Environmental Economics from University of Nebraska-Lincoln in 1998. Research interests are international trade, international marketing, environmental economics and policy, production economics, agricultural cooperatives and economic development.

EARLY-STAGE RECOVERY OF LITHIUM FROM LITHIUM-ION BATTERIES BLACK MASS IN PILOT SCALE

Bastian Hansel, D Kaiser, C Pätzold and M Bertau

Institute of Chemical TEchnology, Technische Universität Bergakademie Freiberg, Germany

Abstract

Background: Lithium-ion batteries (LIBs) have become indispensable in electric mobility sector in recent years. However, already established industrial recycling processes (e.g. Umicore, Sony- Sumitomo, Toxco or Recuply process) are focused on the recovery of metals such as Co or Ni from the LIB black mass instead of Li. Due to the increasing demand and political competition for global Li deposits, a change in this trend is expected.

Objective: Optimization of the leaching of LIB black mass with supercritical CO_2 on a pilot scale.

Methods: The COOL process uses supercritical CO_2 to mobilize Li from complex LIB black mass in early-stage. On a laboratory scale (0.5 L autoclaves), the success is demonstrated by Li leaching yields >98 %. The great advantage of this method compared to other hydrometallurgical recycling processes, like the Duesenfeld or Accurec process, is the low chemical consumption for the recovery of the Li trade form Li_2CO_3. For the upscaling of the process, a 200 L autoclave is used in which industrial LIB black mass from Duesenfeld, Wendeburg, Germany, is leached. The generated $LiHCO_3$-solution is enriched by electrodialysis and then Li_2CO_3 is precipitated after evaporation.

Results: Using the 200 L autoclave pilot plant, Li was selectively leached from up to 5 lbs of LIB black mass. Li yields of 82-95% (depending on the solid:liquid ratio) and Li_2CO_3 purities of 99.97% have been obtained.

Conclusion: The resource-efficient COOL process was successfully applied to the pilot plant scale for the purpose of recycling LIB black masses. Since Li is removed from the complex black mass system in early-stage, the processing and separation of the material streams Mn, Fe, Co, Ni, Cu is simplified. According to the Li_2CO_3 purities, the battery quality required for reuse in LIB production was achieved.

Biography

Bastian Hansel is a PhD student and lecturer for industrial extraction and precipitation processes at the Technische Universität Bergakademie Freiberg in Germany. His research focuses on resource chemistry. In detail, the work deals with the resource-saving recycling of LIB with regard to lithium recovery. The aim is to continuously improve the patented COOL process and implement it on industrial scale. In addition to LIB recycling, other fields of activity include fluorine chemistry and participation in the development of hydrogen storage systems. This is due to his knowledge in chemical elemental analysis, which has already resulted in many collaborations with other institutions. Research interests include resource chemistry, lithium recycling.

HOW THE WASTE TIRE RECYCLING AND MANAGEMENT POLICY INFLUENCED THE USE OF ASPHALT RUBBER IN BRAZIL

Liseane Padilha Thives, Enedir Ghisi and Juarez J Thives Júnior
Federal University of Santa Catarina, Brazil

Abstract

Background: Since 2010, Brazil has implemented public policies to increase the recycling and management of waste tires effectively. The policy instituted goals for tire manufacturers, importers, distributors, and dealers through laws. Annually, such companies must inform the quantity of waste tire collected, the local and the destination form. The information is used to verify compliance with the annual goal for the collection and disposal of waste tires. The country's high amount of waste tires fostered research on asphalt modification by crumb rubber, called asphalt rubber, which in Brazil is produced through a terminal blend system. The main advantages are long-term storage, high crumb rubber contents addition, and longer pavement life. After implementing the waste tires policy, it is important to assess the management of such waste and the contribution to asphalt rubber application growth in Brazil.

Objective: To assess the waste tire goal compliance by the companies, as well as the number of waste tires collected and leading destinations, and evaluate how policy actions contributed to asphalt rubber use in Brazil.

Methods: Data were surveyed in reports from 2010 to 2022 of Brazilian agencies (National Council for the Environment, Environment and Renewable Natural Resources) related to the manufacturers' and importer companies' waste tires goal, destinations and quantity. Asphalt rubber use evaluation was performed through journal papers, highway agency reports and asphalt production companies' bulletins.

Results: From 2010 to 2022, the established goals were met by new tire manufacturers rather than by importers. The leading waste tire destination was co-processing (62%), granulation (22.9%) and lamination (13.9%). Still, a tiny road network extension is paved using asphalt rubber (3.5%).

Conclusion: Managing waste tires remains challenging for Brazilian environmental authorities. Other alternatives must be implemented to minimize the environmental impacts, and more incentives must be given to asphalt rubber application in the country.

Biography

Liseane Padilha Thives has experience in Civil Engineering, focusing on roads, design, construction and transportation. She holds a Doctor degree in Civil Engineering from the University of Minho (Portugal). Her research topics are: transport, road pavements, storm water harvesting, and waste management. She worked for 18 years on pavement sites. Since 2010 she is an Associate Professor at the Federal University of Santa Catarina (Brazil), Department of Civil Engineering. She supervises students at the master's and doctoral level, has more than 40 articles published in international journals and more than 100 articles published in conferences. Research interests are transport, road pavements and waste management.

DIVERSE CROPPING SYSTEM CAN REDUCE GREENHOUSE GAS EMISSION AND IMPROVE SOIL HEALTH

M Anowarul Islam[1] and Dennis Ashilenje[1,2]

[1]*University of Wyoming, USA*
[2]*Mohammed VI Polytechnic University, Morocco*

Abstract

Background: Diverse mixtures of crops can reduce greenhouse gas emissions from soil compared to nitrogen fertilizers. An experiment was conducted for two years at the University of Wyoming Sheridan Research and Extension Center in Wyoming, USA.

Objective: To compare nitrous oxide and carbon dioxide gas emissions, soil microbial biomass, and mineral-nitrogen for diverse cropping systems.

Methods: Diverse cropping systems included meadow bromegrass (*Bromus riparius* Rehm.) receiving three nitrogen rates (0, 56, and 112 kg ha^{-1}), alfalfa (*Medicago sativa* L.) monoculture, and 50-50% and 70-30% meadow bromegrass-alfalfa mixtures. Measurements were conducted in May, August, and October each year for two years.

Results: Treatments significantly affected ($P = 0.012$) nitrous oxide fluxes. In the first year, nitrous oxide fluxes from alfalfa monocrop (150 µg nitrogen $m^{-2}h^{-1}$) and 50-50% mixture of meadow bromegrass with alfalfa (125 µg nitrogen $m^{-2}h^{-1}$) were highest. Meadow bromegrass significantly ($P<0.05$) suppressed nitrous oxide fluxes in monocultures differentially fertilized with nitrogen (59 and 80 µg nitrogen $m^{-2}h^{-1}$) and in 70-30% mixtures with alfalfa (92 µg nitrogen $m^{-2}h^{-1}$). Similarly, in the second year, the 50-50% mixture of meadow bromegrass with alfalfa (162 µg nitrogen $m^{-2}h^{-1}$) and alfalfa monoculture (139 µg N $m^{-2}h^{-1}$) had highest nitrous oxide fluxes. Lower ($P<0.05$) fluxes were recorded in the 70-30% mixture of meadow bromegrass with alfalfa (92 µg nitrogen $m^{-2}h^{-1}$) and grass monocultures (59 to 80 µg nitrogen m^{-2} h^{-1}). There were poor correlations between soil mineral-nitrogen and nitrous oxide flux ($R^2 = 0.3$, $P<0.05$) in both years. Although there was no significant treatment effect, the range of carbon dioxide flux (15 to 67 mg carbon $m^{-2}h^{-1}$) was 10 times lower than those found in undisturbed forage cropping systems. Treatments had similar soil microbial biomass in August and October of both years.

Conclusion: Mineral-nitrogen demand by plant underpins the suitability of meadow bromegrass-alfalfa mixtures in reducing greenhouse gas emissions and sustaining soil microbes.

Biography

M Anowarul Islam is a Professor at the Department of Plant Sciences of University of Wyoming. He received his Ph.D. in Forage Agronomy from University of Sydney, Australia; M.S. from Institute of Postgraduate Studies in Agriculture, Bangladesh; and B.S. from Bangladesh Agricultural University. Islam received extensive postdoctoral trainings as a forage agronomist at the Noble Foundation, Oklahoma; Miyazaki University, Japan; and Sydney University, Australia. His research and outreach activities aim to develop modern and innovative research and outreach programs on Forage Agronomy that includes: germplasm search and evaluation for selection/cultivar development; establishment and best management practices for profitable and sustainable forage.

SAND FIXATION AND DUST PREVENTION BY BIOSTIMULATION METHOD IN KASHI AREA CHINA

Qu Jili, Wang Li and Zhang Mengqing
Kashi University, China

Abstract

Background: Nearly one-third of the weather in Kashgar in China is shrouded in sandstorms and dust every year, posing a great threat to local people's lives, economic activities and the implementation of China's One Belt, One Road Initiative.

Objective: To reduce or even completely eliminate the threat of sandstorms in Kashgar in China.

Methods: Data were drawn from site and laboratory tests by microbial induced calcite precipitation, of which the bioaugmentation and biostimulation methods were used separately to evaluate the effects of two them. DNA sequencing test, wind erosion test, micro-penetration test, SEM and RXD test and other advanced testing method were also applied to investigate the basic characteristics of the local sand, which is considered to be the main material source of sandstorm and dust.

Results: The reinforcement of the sand surface was increased by 300 and 400% with biostimulation and bioaugmentation method separately, with 1:1 of $CaCI_2$ and urea concentration and corresponding chemical additives.

Conclusion: It is feasible for biostimulation and bioaugmentation methods to reinforce the sand surface and has wide application perspective.

Biography

Qu Jili has his expertise in modification of soil strength and passion in improving the sand surface strength and in modifying the feature of soil. His sand fixation and dust prevention method based on MICP create new pathways for improving soil resistance against wind. She has built this soil improvement technique after years of experience in research, practice, teaching and administration both in engineering and education institutions. Research interests include natural hazard and disaster management.

RESTORING RIPARIAN ECOSYSTEMS IN EAST MEDITERRANEAN AGRICULTURAL WATERSHEDS TO PROVIDE MULTIPLE ECOSYSTEM BENEFITS

Felicia Orah Rein-Moshe
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Abstract

Riparian areas, especially in the Mediterranean, offer many ecosystem services that protect and support the environment and benefit society. Despite this, these areas have become highly degraded and lack sustainable management. Strong pressure exists on aquatic ecosystems and water resources, deriving from agricultural production, climate change, population growth, and more, which continues to threaten natural resources. Agricultural pressure and hydrologic alterations are common; with the result that native riparian vegetation is often completely eradicated and replaced with crops or ruderal vegetation. The Mediterranean Basin is considered one of the most sensitive regions to climate change impacts, with riparian ecosystems one of the most threatened. Meanwhile, more intense winter storms will drive increased soil erosion, resulting in ongoing loss of soil and decreasing soil productivity, especially on sloped lands. Sediment-bound agricultural non-point source chemicals (i.e., fertilizers and pesticides) are transported with eroded sediment, entering streams and degrading water quality. Restoring riparian ecosystems in agricultural watersheds can provide multiple ecosystem benefits to mitigate these problems. This research aims to develop guidelines for selecting the optimal composition of native plant species for restoring nonwoody riparian vegetation by measuring ecosystem services provided by 25 specific plant species, through field and laboratory measurements. Our results show that restoring riparian ecosystems provides many regulating ecosystem services, including filtering agricultural runoff, capturing eroded sediments, increasing biodiversity, and improving hydrologic resilience to climate change. Results from this study will support the development of strategies to optimize management objectives and will facilitate the implementation of appropriate native riparian vegetation by farmers, drainage authorities, municipalities, and other stakeholders interested in restoring riparian ecosystems.

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DELTA$^{2}H_{n\text{-}alkane}$ AND DELTA$^{18}O_{sugar}$ BIOMARKER PROXIES FROM LEAVES AND TOPSOIL OF THE BALE MOUNTAINS, ETHIOPIA, AND IMPLICATIONS FOR PALEOCLIMATE RECONSTRUCTIONS

Bruk Lemma[1,2], Lucas Bittner[3], Bruno Glaser[1], Seifu Kebede[4], Sileshi Nemomissa[5], Wolfgang Zech[6] and Michael Zech[1,3]

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[2]Ethiopian Biodiversity Institute, Ethiopia
[3]Technische Universität Dresden, Germany
[4]University of KwaZulu-Natal, South Africa
[5]Addis Ababa University, Ethiopia
[6]University of Bayreuth, Germany

Abstract

The hydrogen isotopic composition of leaf wax-derived n-alkane (delta$^{2}H_{n\text{-}alkane}$) and oxygen isotopic composition of hemicellulose-derived sugar (delta$^{18}O_{sugar}$) biomarkers are valuable proxies for paleoclimate reconstructions. Here, we present a calibration study along the Bale Mountains in Ethiopia to evaluate how accurately and precisely the isotopic composition of precipitation is imprinted in these biomarkers. *n*-Alkanes and sugars were extracted from the leaf and topsoil samples and compound–specific delta$^{2}H_{n\text{-}alkane}$ and delta$^{18}O_{sugar}$ values were measured using a gas chromatograph-thermal conversion-isotope ratio mass spectrometer (GC-TC-IRMS). The weighted mean delta$^{2}H_{n\text{-}alkane}$ and delta$^{18}O_{sugar}$ values range from −186 to −89 per mile and from +27 to +46 per mile, respectively. Degradation and root inputs did not appear to alter the isotopic composition of the biomarkers in the soil samples analyzed. Yet, the delta$^{2}H_{n\text{-}alkane}$ values show a statistically significant species dependence and delta18Osugar yielded the same species-dependent trends. The reconstructed leaf water of *Erica arborea* and *Erica trimera* is ^{2}H– and ^{18}O–enriched by +55 ± 5, and +9 ± 1 per mille, respectively, compared to precipitation. By contrast, *Festuca abyssinica* reveals the most negative delta$^{2}H_{n\text{-}alkane}$ and least positive delta$^{18}O_{sugar}$ values. This can be attributed to "signal-dampening" caused by basal grass leaf growth. The intermediate values for *Alchemilla haumannii* and *Helichrysum splendidum* can be likely explained with plant physiological differences or microclimatic conditions affecting relative humidity (RH) and thus RH-dependent leaf water isotope enrichment. While the actual RH values range from 69 to 82 percent (Mean = 80 ± 3.4 percent), the reconstructed RH values based on a recently suggested coupled delta$^{2}H_{n\text{-}alkane}$ – delta$^{18}O_{sugar}$ (paleo-) hygrometer approach yielded a mean of 78 ± 21%. Our findings corroborate (i) that vegetation changes, particularly in terms of grass versus non-grassy vegetation, need to be considered in paleoclimate studies based on delta$^{2}H_{n\text{-}alkane}$ and delta$^{18}O_{sugar}$ records and (ii) that the coupled delta$^{2}H_{n\text{-}alkane}$ – delta$^{18}O_{sugar}$ (paleo-) hygrometer approach holds great potential for deriving additional paleoclimatic information compared to single isotope approaches.

RESEARCH ON CARBON EMISSION CALCULATION METHOD OF STEEL PIPELINES BASED ON THE COUPLING OF LIFE CYCLE MODEL AND CORROSION MODEL

An Yan, Junlei Tang, Bing Lin, Hongpeng Zheng and Yingying Wang
Southwest Petroleum University, China

Abstract

Background: Steel materials are the basis of human industrial civilization, but the carbon emissions from the production process of steel materials are huge, so it is imperative to control the carbon emissions of steel and related industries. Steel materials not only have carbon emissions in the manufacturing, transportation, installation, service and recycling stages, but also determine the consumption of steel materials per unit time by the life of steel materials, thus affecting the overall carbon emissions.

Objective: To examine the association between corrosion and the carbon emissions of steel materials throughout the life cycle.

Methods: A carbon emission calculation model of steel materials was established. Carbon emissions throughout the life cycle of steel pipelines in typical environments were calculated, and the impact of corrosion protection technology on the service life of steel pipelines and the average annual carbon emissions throughout the life cycle were analyzed. Then, taking the steel pipeline in a gradual corrosion environment as an example, the total carbon emissions, the average annual carbon emissions and the carbon emission contribution value due to corrosion of the steel pipelines were calculated. The carbon emission differences of different metal materials and the whole gas and oil field development cycle under this environment were analyzed.

Results: By improving the corrosion protection level, extending the service life of steel materials, reducing the average annual carbon emissions throughout the life cycle, the maximum emission reduction potential can reach about 80%. The annual carbon emission can be further reduced by 8%~57% from the original level by improving the performance on the basis of the existing anti-corrosion projects to extend the life of steel materials.

Conclusion: Although the use of appropriate corrosion protection in the service stage of steel materials will bring additional carbon emissions, it can significantly prolong the service life of steel materials, and then effectively reduce the average annual carbon emissions throughout the life cycle of steel materials.

Biography

An Yan has expertise in the field of carbon emission assessment and calculation. He established a life cycle carbon emissions calculation model for steel materials from cradle to grave based on existing life cycle assessment methods, focusing on studying the impact of corrosion on carbon emissions of steel materials, and quantifying the carbon emissions generated by corrosion every year This method can compare the service life and carbon emissions of various types of steel materials after applying different types of anti-corrosion measures in different service environments, which has great significance for reducing carbon and increasing service life of steel materials. The research interests are LCA, carbon neutrality.

METHANE AND CARBON DIOXIDE EMISSIONS FROM THE HULENE DUMP AND ITS ENVIRONMENTAL IMPACT ON NEIGHBORING COMMUNITIES

Amad Hassam Abdul Gani
Universidade Pedagógica de Maputo, Mozambique

Abstract

Anaerobic digestion is a biological process, which occurs in organic waste deposited in a dump and can generate methane, carbon dioxide and other gases in an oxygen-free environment. Municipal Solid Waste (MSW) in Maputo city, is generally deposited in the Municipal Dump of Hulene. The characteristics of this dump and the type of waste deposited daily generate biogas, leachate and other pollutants that contaminate soil and groundwater. This research work was carried out at this dump, which has been operating for over 35 years. The objective of this research was to evaluate the emission of methane and carbon dioxide on the surface of the dump. This work was carried out in May of 2022, using a portable multigasimeter S318 capable of measuring six gases simultaneously. In this work, methane and carbon dioxide emitted into the atmosphere will be addressed, contributing to the worsening of the greenhouse effect phenomenon and, on the other hand, these emissions have a significant impact on the environment. Methane concentrations in the surface atmosphere of the Hulene Municipal Dump range from 5 to 6% LEL. Carbon dioxide concentrations mostly range from 437 ppm to 647 ppm, with a point where the peak reached 1035 ppm due to on-site waste removal and when measurements were taking place. The results show a methane concentration, relative to the oxygen present in that atmosphere, which can be explosive, at least for the month of measurement. Methane has an LEL greater than 5% and is in an explosive proportion. Thus, it is observed that there is greater methane emission in the central, north, northeast and a small strip of the west zone of the dump. For carbon dioxide, the greatest dispersion occurs in the north, center and southeast region of the Lixeira. These regions coincide with the places where waste is most recently deposited. It is assumed that these places produce more methane and carbon dioxide which, when in contact with the oxygen in the air, can be highly explosive.

WHAT ARE THE CONDITIONS FOR SUCCESSFUL IMPLEMENTATION OF CLIMATE INTERNATIONAL COVENANTS?

Erez Z Shoshani

Ruppin Academic Center, Israel

Abstract

Since the Rio earth summit in 1992 the international community has sought to promote legally binding covenants as a mechanism to cope with various environmental challenges, especially climate change. However, those endeavors did not succeed in fully achieving their goals, as was apparent in both the Kyoto protocol (1997) and the Paris agreement (2016) cases. Indeed all the conferences of the parties to the UN framework convention on climate change since the signing of the Kyoto protocol were largely dedicated to assessing ways by which international cooperation on the issue could be more effective.

This paper will deal with factors that may explain the failure of past covenants while comparing them to covenants that were more successful. Thus, the paper will address such covenants as the Barcelona convention, Montreal protocol and UNCLOS.

Among others, the paper will discuss factors such as superpowers leadership, the roll of the industry and the importance of scientific consensus.

Biography

Erez Z Shoshani (PhD from Haifa University in International Relations), tenured faculty member in the department of Business Administration in the Ruppin academic center in Israel. I teach courses on International Relations, Globalization, Immigration, Business ethics and more. Among other roles in academia, I served as my college academic development officer and as the head of the Business Administration department in the faculty of Economics and Business Administration.

MANAGEMENT OF COVID-19 VACCINATION WASTE IN GHANA

Senam Tengey and Boachie-Yiadom Johannes

Medical Waste Services Limited and Kwame Nkrumah University of Science and Technology, Kumasi-Ghana

Abstract

Background: Ghana detected the first two cases of Covid-19 on 12th March 2020. The cases increased as different waves of the disease struck. The Ministry of Health (MOH) and Ghana Health Service (GHS) procured vaccines into the country to vaccinate the populace against Covid-19. The vaccination commenced on 2nd March 2021 and as result of those huge quantities of potentially infectious waste such as used syringes, blood stained cotton etc. were generated nationwide and had to be properly managed to avoid the potential spread of infections.

Objective: To assess the management of Covid-19 vaccination waste in Ghana.

Methods: Primary data were obtained from observational surveys of 160 selected Covid-19 vaccination centers across the 16 regions of Ghana. The quantities of waste generated and collected were obtained from a private medical waste company contracted to manage the waste nationwide. The quantities of vaccines procured and administered to the populace were obtained from the Public Health Department of the Ministry of Health and Ghana Health Service online dashboard. All data obtained were analyzed with Microsoft Excel.

Results: Ghana procured a total of 34 million doses of vaccines including Astra Zeneca, Sputnik-V, Moderna, Pfizer and Janssen. 24,435,259 doses of vaccines had been administered to the public as of 12th April 2023. Zoomlion Ghana Limited was contracted to manage the Covid-19 vaccination waste across the country. 600,000 color coded bin liners and bins were distributed to the various vaccination centers to aid with waste segregation and storage. Specialized medical waste trucks with trained personnel were dispatched to collect and transport the vaccination waste from the various regions to a centralized medical waste treatment facility which utilized autoclave, shredders and microwave systems. A total was 214 tons of waste were collected, treated and disposed of as at the end of March 2023.

Conclusion: The Covid-19 vaccination waste was generally properly managed considering the collection, storage, transportation, treatment and disposal systems implemented by Ghana.

Biography

Senam Tengey is a professional Biomedical Engineer and Researcher. His research interest lies in hazardous waste management, Healthcare Waste Management (HCWM) and Infection Prevention and Control (IPC). He has worked in the waste management sector of Ghana for over eight years and contributed enormously to the formulation of policies and guidelines in healthcare waste management and Water Sanitation and Hygiene (WASH). He has also published several journals in HCWM and IPC. He has trained over 4,500 healthcare workers since 2015 to date. He is a prolific conference speaker. He is currently the General Manager of Medical Waste Service Limited and is spearheading the establishment of Centralized Medical Waste Treatment Facilities across Ghana. Research interests are Medical Waste Management and Hazardous Waste Management.

A COMPREHENSIVE APPROACH TO MUNICIPAL SOLID WASTE MANAGEMENT IN KOHIMA CITY, INDIA

Nzanthung Ngullie and Moanaro Ao
National Institute of Technology Nagaland, India

Abstract

Background: Hilly urban areas face unique challenges in terms of Municipal Solid Waste Management (MSWM). Kohima is one such hill station city in the North Eastern Region of India which is facing numerous issues due to the mismanagement of the Municipal Solid Waste (MSW) generated in the city. The MSWM system in Kohima at the moment consists solely of collection, transportation and disposal of waste at an identified dumpsite. Several efforts and experimental projects on waste management have been implemented without any success. The management of waste in Kohima is greatly hampered by the city's remoteness, challenging topography, scattered settlements, etc.

Objective: The aim of the study is to examine the current condition of waste creation, assess the efficacy of the current MSW management system and to develop a strategic plan to achieve resilient and sustainable MSWM system.

Methods: Data for the study was selected by conducting field survey and from secondary sources. Waste generation and its characteristics were studied. Geographical Information System (GIS) application was used to locate suitable small waste stations for waste recovery and recycling. A waste management strategy was developed for micro-level implementation such as household composting for biodegradable waste and community scale incinerators for non-biodegradable waste.

Results: The findings from the study indicate that in order to improve the MSWM, a holistic approach is required that takes into account social, technological, environmental and economic factors.

Conclusion: The waste is characterized to have high biodegradable content which requires a stringent adherence to segregate waste at source. This will enable recovery of biodegradable waste and greatly reduce the burden on landfills/dumpsite. Introducing incentive-based solutions at the ward level and initiatives such as 'polluters pay principle' were explored to instill a sense of responsibility in every waste generator and to achieve self-sustaining model of MSWM in the city.

Biography

Nzanthung Ngullie is an Assistant Professor in the Department of Civil Engineering, and Associate Dean (Planning & Development) in the National Institute of Technology Nagaland, India. He did his Bachelors in Civil Engineering and completed his Masters and Ph.D. in Environmental Engineering from the Indian Institute of Technology Guwahati, India. He is currently taking up various Research and Consultancy projects in the field of Solid Waste Management. Research interests include Public Private Partnerships (PPP) in Solid Waste Management, Applications of Geographical Information Systems, Life Cycle Assessment (LCA) studies, Recycling solid waste into alternative building materials, and Environmental Impact Assessment.

RECYCLING USED COOKING OIL WASTE BY PRODUCING BIODIESEL IN PORT MORESBY, PAPUA NEW GUINEA

Linta Aquillah Qalopui
Pacific Adventist University, Papua New Guinea

Abstract

One of the many environmental problems encountered in Papua New Guinea (PNG) today is the massive output of Used Cooking Oil (UCO) wastes from the catering facilities and households in PNG. These massive output of UCO wastes from catering facilities and households have contributed to sewer blockages, environmental pollution and health risks, therefore, by converting the UCO to biodiesel, it has the potential to reduce the sewer blockages, environmental pollutions and emissions for FDF engines, and as well as reducing the risks of coronary diseases that people may have by reusing these UCO wastes in their cooking.

This study aimed to produce biodiesel from used cooking oil collected from the catering facilities in Port Moresby (POM), in PNG. Specifically, the quality of the biodiesel produced from UCO in POM was compared to the American Society for Testing Materials (ASTM) D6751 standards to identify optimal conditions. Two experiments were conducted in this study where the first experiment was a laboratory scale experiment that involved three tests against the climatic conditions of Port Moresby (POM) in PNG namely, potassium hydroxide (KOH) test, water in biodiesel test, and UCO and glycerine separation test, and the second experiment was a larger scale experiment in authentic settings that included the production of biodiesel from UCO collected in POM. The results obtained from these experiments were that despite of the humid climate of POM that affects the water content reading of the biodiesel produced from UCO, to be higher, it was proven to be feasible to produce biodiesel from UCO in POM that was tested in few diesel vehicles without any modification. This is indeed a way forward to support and promote the environmental pollution reduction program in PNG in recycling UCO waters into energy that also can be regarded as an alternative energy for PNG.

Day-2
Keynote Presentations

CASE STUDY OF NATIONAL CLIMATE ADAPTATION POLICY: THE CASE OF SOUTH KOREA

Kihan Lee
Dankook University, South Korea

Abstract

As climate change adaptation has become essential for the sustainable development of nations, national adaptation policies have increasingly been adopted and implemented over the past decade. However, an adaptation gap is observable and getting wider. I investigate the barriers to national adaptation policy and their origins, influence as well as relationships between them in South Korea. I analyse used and suggested solutions to overcome the barriers. Based on interviews with core stakeholders, we find 49 factors (16 barriers, 14 origins, 19 influences) related to barriers to national adaptation policy and draw a barrier map that shows all factors and relationships between them.

I also explain how the barriers occur and how they affect national adaptation policy by mapping the relationships between barriers, origins, and influences. Key barriers to Korea's national adaptation policy are related to institutions, fragmentation, and resources. With an analysis of used/suggested solutions, I conclude by suggesting a procedure for diagnosing problems of national adaptation policy, understanding related barriers and origins, and devising practical solutions for national policymakers and stakeholders.

My research seeks to advance research by providing a deeper understanding of barriers to adaptation through analysing barriers to national adaptation policy, including their origins, influences, and relationships between them. It suggests a potential approach for policymakers and policy practitioners to address the barriers. The questions guiding this research are (1) what are the barriers to national adaptation policy and their origins and influences? (2) how do the barriers, origins, and influences interact? and (3) what can policymakers and stakeholders do to address the barriers?

My research examines the national adaptation policy in the Republic of Korea (Korea). Most research to date on national adaptation policy has focused on western developed countries, particularly in the EU. Therefore, an examination of the Korea case can contribute to a better understanding of barriers to national adaptation policy as well as to providing new insights into adaptation policy in Asia.

PASSIVE SAMPLING AS A WATERSHED INVESTIGATION TOOL TO IDENTIFY AND QUANTIFY FIRST-FLUSH POLAR PESTICIDES IN AN EASTERN MEDITERRANEAN AGRICULTURAL BASIN

Felicia Orah Rein Moshe[1], Gary Fones[2], Graham A Mills[2], Adam Borik[3], Roman Grabic[3] and Noa Hillel[4]

[1]Soil Erosion Research Station, Ministry of Agriculture, Israel
[2]University of Portsmouth, UK
[3]University of South Bohemia in České Budějovice, Czech Republic
[4]Kishon Basin Drainage Authority, Israel

Abstract

In watersheds dominated by agricultural lands, a range of agrochemical pollutants is transported into streams via various pathways. Among these pollutants are plant protection products, including fungicides, herbicides, and insecticides, which are applied to the fields throughout the growth cycle. In addition, treated wastewater used for irrigation contains residual pharmaceuticals that are also transported in surface runoff and subsurface paths into streams. The resulting chemical mixture harmfully affects living organisms and degrades water quality. Identifying sources of these different pollutants is essential to reducing water pollution, treating the problem at the source, and restoring the stream's ability to support its natural habitat and ecological state. Monitoring is essential for interpreting the presence and fate of these pesticides. Discrete, low-volume (1 L) grab samples and targeted analytical methods are currently used within routine stream monitoring programs. In Israel, national stream monitoring is conducted only in the spring and fall, missing winter storm flows. Further, this method of sampling provides only a 'snapshot' at the moment of sampling, neglecting variation in hydrochemistry dynamics that occur during the storm event. In addition, targeted analytical methods miss detecting compounds outside of the measurement suite. Passive sampling coupled with non-targeted analysis and suspect screening can overcome these limitations.

We used the Chemcatcher passive sampler receiving membranes to investigate water quality in an agricultural coastal watershed in northern Israel. Duplicate samplers were deployed (November 2020) at 25 sites for two weeks in the main Kishon stream and 19 of its tributaries. The aim of this work was to (1) characterize the range of polar pesticides during winter first- flush storms (2) compare the pollutant contribution from each tributary (3) identify priority pollutant sources (4) advance watershed-based monitoring, by comparing results between conventional spot sampling and passive sampling and (5) evaluate the impact of agricultural land use on water quality.

The HLB-L receiving phase disks from the deployed samplers were extracted (methanol) and analyzed by liquid chromatography coupled with high-resolution mass spectrometry (LC- HRMS) using a non-targeted method. The LC-HRMS system used consisted of an HPLC pump Vanquish™ (Thermo Fisher Scientific), autosampler CTC PAL RST (PAL Systems), and a hybrid quadrupole-orbital trap mass spectrometer QExactive HF (Thermo Fisher Scientific). The data acquisition method was based on combining a full scan within 100-1000 m/z with data-independent analysis (DIA), providing MS2 spectra for a selected range of precursor masses. The obtained dataset containing MS1 and MS2 data were evaluated using

two different approaches (Compound Discoverer 3.1 and Trace Finder 4.1) giving data at Schymanski confidence levels 2 and 4.

Results identified a total of 169 pesticides based on the suspect screening and quantified 98. The availability of standards to enable accurate quantification of pesticide concentrations is a limiting factor for both methods of grab and passive sampling. We identified 59 pesticides using the grab sampling method, with 25 pesticides that were identified and quantified in both methods. Data were normalized to enable comparison between the 19 tributaries, constructing a spatial risk map of the basin. Agricultural land use categories were found to be correlated with water quality. We conclude that passive sampling offers important advantages to the current monitoring system and recommend including this method as a complementary approach to the existing program.

Day-2
Oral Presentations

LEACHING OF Cu/Ag/Au GROUP ORES BY DES TO RECOVER BY-PRODUCT ELEMENTS OF THE CRM CATEGORY

Ben Ebersbach

TU Bergakademie Freiberg, Germany

Abstract

Background: The European Union defined several elements as critical raw materials (CRM) that are essential for maintaining the current modern standard of living because they are important in all high-tech sectors of the society and not yet replaceable. Some of these CRMs like Co, Se, In or Sb are present as by-products of typical Cu/Ag/Au group ores and are not recovered by conventional metallurgical processes.

Objective: Use of deep eutectic solvents (DES) as novel lixiviant for the recovery of CRM type elements from Cu/Ag/Au group ores.

Methods: Leaching experiments were carried out in different scales to confirm effective recovery rates of CRM type elements and main metal ores as well. By the use of differing amounts of additives and oxidising agents and variation of leaching parameters like temperature, time or stirring investigation of an optimised leaching process was aimed at. Analysis of the metal content of each leachate was done by ICP-MS. The stability of the DES throughout the leaching process was analysed by HPLC.

Results: Satisfying recovery rates for CRM type elements were achieved by using DES as lixiviant and the utilisation of additives and oxidising agents. The main metal ores a leached much less effective than the by-product ones. The DES shows minor signs of decomposition throughout the leaching process resulting in some adjustments after the process to achieve recycling of the DES and application in additional extractions.

Conclusion: The use of DES as novel environmentally friendly lixiviants for the recovery of CRM type elements from Cu/Ag/Au group ores was shown. By further investigating of the used additives and oxidising agents and their applied amounts an optimised process could be achieved.

Biography

Ben Ebersbach is working at the ION4RAW project (ionometallurgy of primary sources for an enhanced raw materials recovery) of the European Union´s Horizon 2020 research and innovation program in the field of optimising and up-scaling the leaching process form the lab scale to a kilogram scale and validation of the metal recovery rates. By utilising the lab scale results and optimising parameters of the process he was able to transfer the results into larger scale. His results will be used by other partners of the ION4RAW project to operate a pilot plant to show proof of concept of the novel leaching process. Research interests include novel leaching processes, photovoltaic recycling, recycling of high power electronics.

THE COOL PROCESS – LEACHING LITHIUM SELECTIVELY FROM SPENT LITHIUM-ION BATTERIES

Robert Mende, Doreen Kaiser and Martin Bertau
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Abstract

Background: Lithium-ion batteries are the key cornerstones towards an electrified mobility of the future. However, these batteries degrade over lifetime, ultimately necessitating their recycling. Industrially implemented, pyrometallurgical recycling processes primarily aim at the recovery of the valuable metals cobalt and nickel from these spent batteries, whereas lithium remains unused in the slag and is therefore not recovered.

Objective: In the light of a holistic approach, lithium has to be recovered from the batteries as well. It is meant to be recovered by a selective leaching, followed by the precipitation of lithium carbonate. The leaching residue, containing the residual transition metals, should then be processed in a conventional fashion.

Methods: The following experiments were carried out on preprocessed lithium-ion battery residues, so called "black mass". The black mass was suspended in water in an autoclave reactor. The reactor was then sealed, heated to the desired temperature and CO_2 was added until a pressure of 100 bar was reached. The actual experimental parameters were systematically defined by an experimental design plan. It employed the variation of the reaction temperature (150°C-230°C), the residence time (2 h-4 h) and the liquid-solid-ratio (30 ml/g-90 ml/g).

Results: The best results considering the lithium mobilization were achieved at 230°C, 4 h residence time and a liquid-solid-ratio of 90 ml/g. 95% of the lithium were mobilized. Only aluminium was significantly co-mobilized (49%), while the mobilization of the transition metals was lower than 1% each, meaning they remained in the residue. These transition metals were shown to be recoverable in a following conventional hydrometallurgical approach consisting of acid digestion and extraction. Lithium carbonate was successfully precipitated from the solution at a purity of 99.8%, purer than the 99.5% lithium carbonate used in battery manufacturing.

Conclusion: The COOL process allows for easy selective leaching of lithium from spent lithium-ion batteries. The leaching step was selective for lithium, while the transition metals remained in the residue. In the end, lithium carbonate was obtained in battery grade quality.

Biography

Robert Mende is a PhD student in the field of lithium recovery and production from both primary and secondary resources. His interests cover resource efficient lithium recovery, solid state reactions involving lithium minerals and laboratory automation in various dimensions. The publications he has (co-)authored have dealt with the recovery of lithium from spent lithium-ion batteries and lithium recovery from various lithium containing ores. Apart from that, he has also authored a publication about the automation of a laboratory plant, its remote control and the implications for future remote teaching in chemistry education. For the future, Robert plans to implement an improved process for the processing of the most important lithium containing minerals in the context of his doctorate. Research interests include lithium recovery from primary and secondary resources, laboratory automation.

THE USE OF RECYCLED WASTE FROM PHOTOVOLTAIC PANELS IN GEOPOLYMER CONCRETES

Patrycja Bazan, Kinga Pławecka and Michał Łach
Cracow University of Technology, Poland

Abstract

Background: Photovoltaic panels are the basis of any installation that uses solar energy to generate electricity. Photovoltaic cells, which they are made of, convert energy from the sun into electricity, which can then power household appliances. Due to the growing demand for this type of solution, there are also more and more problems with recycling and waste management.

Objective: To examine the possibility of using waste from photovoltaic panels, such as glass and plastics, in the geopolymerization process.

Methods: As part of the research, short and long fibers obtained from used photovoltaic panels were used. Geopolymer concretes based on fly ash and sand were produced. The addition of fibers was 1% by weight. Then, basic tests of the physical and mechanical properties of the produced geopolymers were carried out to determine the effect of adding fibers on the tested properties.

Results: Geopolymers were made in beams with dimensions of 160 x 40 x 40 mm, fibers with a length of 150 x 1 mm were embedded in the geopolymer mass in three layers, 8 pieces in each beam. Compressive strength and bending strength tests were carried out. The test results showed that introducing long fibers into the material does not change the compressive strength value but increases the bending strength by about 10%.

Conclusion: Geopolymers are found mainly in the construction industry. The obtained test results indicated a great potential for using waste from photovoltaic panels in geopolymers, improving the strength properties of the produced geopolymer composites. This type of research is the basis and can be a potential solution to emerging problems with waste and benefit the protection of the natural environment.

Biography

Patrycja Bazan Ph.D is a specialist in polymer materials and composites based on thermoplastics. In her work, she deals with the issues of mechanical and thermal properties as well as aging processes occurring in composite materials. She broadens her interests in geopolymer materials and conducts research on the possibility of using geopolymer materials as an alternative to cement, as well as research the immobilization of hazardous materials and recycling of waste materials. Research interests include material science, polymer composites, geopolymers and recycling.

DEVELOPMENT OF A CLIMATE RESILIENT ARTIFICIAL INTELLIGENCE TRADE (CREAIT) PLATFORM FOR SUSTAINABILITY

Kirk Douglas, Ayanna Young-Marshall, Dion Greenidge, Gavin Bovell, Winston Moore and Troy Lorde

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Abstract

Trade remains a significant contributor to national gross domestic products (GDP) and economic growth globally. As climate change impacts increase in severity and frequency, they can negatively impact upon supply chain management and procurement. Caribbean countries like most SIDS are heavily dependent on imports for economic growth and food security thus climate change increases their vulnerabilities. Using national trade volume, product barcode and meteorological data we advance a climate resilient artificial intelligence trade (CReAIT) data ecosystem to generate trade intelligence insights to lend climate resilience to national business supply chains. A pilot was conducted using a major FMCG company with a regional footprint in the Caribbean and we illustrate the utility of this model for improvement of business efficiency and cost reduction regarding supply chain management. It allows accurate waste characterization and waste volume estimation of imported goods into SIDS permitting streamlined national waste management and the rapid, efficient, and accurate tracing of contaminated goods from source to customer to ensure public health and potential infectious disease outbreak containment. This should enhance business performance, climate resilience and strengthen national biosecurity and sustainability for vulnerable SIDS such as those found in the Caribbean.

Biography

Kirk Douglas is the Director of the Centre for Biosecurity Studies at the University of the West Indies, Cave Hill campus. He is a professional senior scientist recognized both regionally and internationally for impactful scientific research in the fields of virology, zoonoses, biosecurity, climate change and infectious diseases. He has authored multiple peer-reviewed scientific papers in the fields of microbiology, virology, biosecurity, climate change and zoonoses which have received over 100 citations. His current research interests include zoonoses, infectious diseases, air pollution, wildfires, climate change, bioeconomy, sustainability, illegal wildlife trade, The Blue Economy, environmental pollution, and ecosystem health.

DISENTANGLING ANTECEDENTS, BEHAVIOUR AND ENTREPRENEURIAL TRAITS OF KEY ACTORS OF SUSTAINABLE AGRITOURISM ECOSYSTEM: A TALE OF EMERGING MARKET

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Abstract

Drawing from actor network theory, contingency theory and the concept of entrepreneurship, this study investigates the viability of agritourism in Indian Punjab. This research disentangled the key players of agritourism ecosystem and role of each player to make agritourism a success. This research identifies the external and internal factors and financial and non-financial benefits of managerial behaviours that exist when operating agritourism firms. The study uses a survey approach, involving in-depth face to interviews based on a semi-structured questionnaire undertaken with 110 farmers, selected from three districts of Indian Punjab. Out of the 110 farmers, five are engaged with agri-tourism and 105 randomly selected to investigate awareness of agri-tourism and likelihood of take up. The findings suggests that like western countries there is significant scope to apply the concept of agri-tourism in agrarian economy of Indian Punjab. In response to falling agricultural productivity, there is a need to replace income lost from farming through sustainable agri-tourism income generating activities. The study identified the impact of managerial behaviour on different types of businesses performances. It highlighted the substantial role of catalytic convertors to enhance agritourism growth and productivity. In addition, this study provides theoretical implications of agritourism studies as well as managerial implications for owners, consultants and policymakers related to the small tourism business in Indian Punjab.

ADVANCING STRATEGIC ENVIRONMENTAL ASSESSMENT FOR OIL AND GAS DEVELOPMENT TRANSITION INTO NEW FRONTIER BASIN REGIONS: A FRAMEWORK FOR THE PETROLEUM INDUSTRY

Mustapha Kyari Manga, Paola Gazzola and Neil Adrian Powe
Newcastle University, UK

Abstract

The Nigerian government recently unveiled an ambitious Petroleum Industry Act (PIA) 2021, which aims to expand oil and gas development into the new frontier basins. While the renewed interest to opening new frontier basins to potential hydrocarbon drilling activities has triggered accelerated government attention; however, it also sparked long-standing concerns regarding the country's strategic preparedness to plan for energy expansion, considering the existing project-based environmental impact assessment is inadequate in addressing a complex web of cumulative effects, uncertainties and broader policy issues associated with the oil and gas development. The lack of upstream strategic planning and impact assessment for oil and gas policies, plans and programmes (PPPs) often leads to narrow and reactive project development decisions with far-reaching detrimental impacts on the marine ecosystem, wildlife species and the socio-economic fabric of the local inhabitants. To address these broad regional and long-term cumulative impacts of the hydrocarbon expansion plan, this paper proposes a strategy-based SEA framework that integrates environmental, social and economic dimensions to facilitate a strategic focus, analyses the current sustainability indicators in the old frontier basins and explores the potential sustainability outcome in the new frontier regions based on critical decision factors, trend analysis of distributional opportunities and risks to appropriately plan for oil and gas development transition in Nigeria.

Background: The oil and gas exploration and production in Nigeria's old frontier basin in the Niger Delta region have exposed the fragility of the ecological ecosystem to an inestimable range of degradation, greenhouse gas emissions, biodiversity loss, displacement of human population and their socio-economic livelihood. Addressing these challenges is far greater in scope and complexity than the current disposition to the project-based EIA approach which has been criticised for its focus on stanealone project actions, reactive nature and inability to address cumulative impacts. SEA is a flexible and future-oriented process that can help inform environmental and social issues right at the strategic level of PPP-making to ensure sustainability priorities and criteria drive planning and assessment for a new oil and gas frontier region to achieve a more desired outcome.

Objective: To develop a strategy-based SEA framework to shape PPPs formulation above the traditional project-based approach to influence the oil and gas development programs and project-specific decisions and choices for the new frontier basin regions in Nigeria. The goal is mainstream strategically relevant issues of sustainability in transition planning and decision- making.

Methods: A range of qualitative instruments were used in this study to generate detailed and well-grounded information. Firstly, event ethnography was used to capture the short-term and temporarily bound events involving documents and visual presentations by community members and a panel of experts to document the effects of oil and gas development in the old frontier basins region and the same time to understand the local inhabitant's expectations and concerns about the potential hydrocarbon devel-

opment in the new frontier basins. Secondly, data were collected from secondary sources, specifically evidential material reports related to oil and gas development impacts on the environment, socio-economic and health status in the Niger Delta region in Nigeria. In order to supplement the aforementioned methods, an interview was conducted with 26 key government decision-makers, ENGOs, academics and international development consultants. NVivo software was used to thematically classify, organise and analyse insights obtained from qualitative data.

Results: Inspired by the emerging concept of the strategic thinking model, the strategy-based SEA framework envisioned in this study offers innovative and iterative stages of strategic planning and assessment pathways beyond the traditional EIA approach in order to help facilitate consideration of broad environmental and sustainability objectives in shaping the hydrocarbon development transition into new frontier basin regions in Nigeria.

Conclusion: This paper further reinforces the growing recognition that in order to improve the shortcomings of project-based assessment in the oil and gas sector, strategy-based SEA thinking can be complemented to ensure proactive, multi-sectoral strategic planning for the oil and gas development expansion to explore the best pathways to sustainability transition.

Biography

Mustapha Kyari Manga has expertise in environmental planning and sustainability. He has over 10 years of experience – covering the academia and private sector, possessing a solid teaching background and research experience in the field of environmental and sustainability issues in the 21st century. Over the years, I have had the opportunity to speak at the top international conferences on topics that impact energy, sustainability and broader societal issues. Manga is currently undertaking his PhD in the School of Architecture, Planning and Landscape at Newcastle University, United Kingdom. His research is focused on Strategic Environmental Assessment as a tool to facilitate strategic transition in energy policy governance, with a particular focus on the environmental sustainability of oil and gas development. Research interests include strategic environmental assessment and sustainability.

SMALLHOLDER FARMERS' WILLINGNESS TO ADOPT CLIMATE-SMART AGRICULTURE IN THE UPPER EAST REGION, GHANA

Yakubu Abdulai and Kenichi Matsui
University of Tsukuba, Japan

Abstract

Background: Climate-Smart Agriculture (CSA) adoption is gaining considerable attention at international and national levels to address climate change impacts on agricultural productivity. However, the way farmers adopted CSA varies by location, socio-economic conditions/constraints, farmer's willingness, and income levels. Whether or not CSA can be hugely beneficial to smallholder farmers in the world has to be investigated more regionally, especially where not much local information is available and climate change is expected to affect dramatically. The Upper Africa region in Ghana, one of the most climate vulnerable regions of western Africa, is one of the critical areas to better understand for the possibilities of CSA adoption for smallholders.

Objective: This paper examines factors that lead to smallholders' CSA adoption and practices in the Upper East Region of Ghana. It tries to find households' willingness to adopt CSA and how this willingness is interconnected to income, local needs, and other factors.

Methods: This research conducted a questionnaire survey among 360 farming households in six districts in the Region. The survey tried to clarify their willingness to adopt CSA and their incentives in connection with income and needs. The collected data were analyzed by using SPSS version 24 and presented in tables and figures.

Results: The results show 82% of the households had a high willingness to adopt CSA. About 54% had received CSA training. However, only 32% said that they had enough income to adopt CSA practices. Livestock manure application was identified as the most possible CSA practice among the respondents.

Conclusion: Smallholder farmers are generally willing to adopt CSA practices. However, their training for CSA did not sufficiently consider such socio-economic constraints as low household farm income. As a result, the farmers' CSA adoption was limited. Other available CSA options appear to require additional cash income that appears to be impossible for smallholders without taking income diversification options by moving away from their farms.

Biography

Yakubu Abdulai - The lead author is a Ph.D. student at the University of Tsukuba, Japan. His research interests include but are not limited to gender, rural studies, and smallholder farmers' autonomous adaptation to climate change. He has worked with the Ministry of Food and Agriculture, Ghana for over a decade. There, he interacted, discussed, and promoted with farmers on extension and agricultural productivity issues. He has collaborated with stakeholders (JICA, USAID, and World Food Program) on agricultural policies to help farmers and buyers, especially women farmers. Also, collaborated with other local NGOs to deal with socio-cultural factors affecting women farmers in agriculture in selected study areas in the country. Research interests are rural studies, gender, and smallholder farmers' autonomous adaptation to climate change.

AQUACULTURE HEALTH AND PERFORMANCE: THE PROBIOTIC BOOSTING EFFECT

Georgi Atanasov[1], Kapka Mancheva[2], Svetla Danova[3], Neli Vilhelmova-Ilieva[3], Lora Simeonova[3], Lili Dobreva[3] and Petya Orozova[4]

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[3]The Stephan Angeloff Institute of Microbiology, Bulgarian Academy of Sciences, Bulgaria
[4]National Diagnostic Research Veterinary Institute, NDRVI, Bulgaria

Abstract

Background: Bulgaria is world-renowned as a region with a specific microclimate suitable for the development of authentic strains of lactic acid bacteria. Recently, probiotics and their postmetabolites have been widely used to further aid in the treatment of various animal and human pathogens.

Objective: Our objective was to establish the effect of selected strains lactic acid bacteria on various pathogens isolated from aquaculture.

Methods: We analyzed fish and shellfish from different aquacultures in Bulgaria with external signs of diseases. We found and isolated pathogens: *Yersinia ruckeri, Lactococcus garvieae, Aeromonas veronii, Aeromonas bestiarum, Shewanella putrefaciens*, *Chryseobacterium joostei*.

We investigated the effect of selected strains lactic acid bacteria on the isolated pathogens. The activity of the strains Lb ZK 1, Lb13, Lb7H, LbVe, Lbb from acidophilus group *Lactiplantibacilus, Lactobacillus delbrueckii* subsp. *bulgaricus* from Bulgarian yogurt and strains of *Lactiplantibacillus plantarum*.

Results: In Yersinia ruckeri, we obtained a strong inhibitory effect of the Lb7H strain. It is noteworthy that the action of the probiotic culture failed to destroy the pathogen but kept it at levels below 30% compared to the control. Another strain with a growth-inhibitory effect of *Yersinia ruckeri* is Lb ZK 1.

For *Lactococcus garvieae*, we again observed the strongest effect of strain Lb7H, followed by Lb13 and LbVe strains.

Aeromonas veronii and *Aeromonas bestiarum* were most suppressed again by the Lb7H strain.

The Gram-negative pathogen *Shewanella putrefaciens* isolated from the black mussel *Mytilus galloprovincialis* Lamarck, 1819 was best affected by Lb7H with more than 50% growth inhibitory effect.

For the pathogen *Chryseobacterium joostei*, again the Lb7H strain gave the best results. After 24 hours in this pathogen, we have a beneficial effect on both LbVe and Lb ZK 1 strains.

Conclusion: The strains of lactic acid bacteria from the acidophilic group show a very good inhibitory effect on the studied dangerous fish pathogens. In almost all pathogens tested, the strain showed more than 30% inhibitory effect. These results provide a clear picture of the possibility using probiotics as nutritional supplements inhibiting various pathogens in aquaculture.

Biography

Georgi Atanasov has expertise in aquaculture health and welfare. He has over 20 years of experience in disease risk assessment and critical points and vectors of infection in aquaculture. In recent years, he has worked in non-medicinal areas to limit and suppress diseases in aquaculture. Research interests include aquaculture technology and innovations.

ADVERSE IMPACTS OF OIL SPILLS ON MARINE, LOWLAND AND UPLAND ECOSYSTEMS OF NIGER DELTA AND THE CONTROL MEASURES

Etuk Etiese Akpan
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Abstract

The Niger Delta region of Nigeria, being the sole habitat for oil prospecting and production activities, has been subjected to contamination of both the physical and biological components of the ecosystem, in the marine and land environments. Soil fertility and water quality is adversely impacted by oil pollution. Soil fertility in the ecological zone was investigated to establish the consequences of oil pollution on the soil and remedial actions to heal the soil. Also, the effects on the marine environment were investigated to estimate the extent of damage caused by oil pollution. A humanly and environmentally friendly technology to deal with pollution, especially on land environment was developed and implemented through several field trials using the process of Remediation by Enhanced Natural Attenuation. (ENAP) which facilitates the activities of microorganisms to degrade the hydrocarbon Polluted soil. The study compared the physicochemical and biological parameters of the oil spill polluted soil and water with the ecological systems of the unpolluted soil and water as well as their response to treatment interventions using ENAP. The results confirmed that significant decrease in the values of the key indicator parameter, the (TPH) and significant increase in Phosphate concentration occurred for the polluted ecological media with intervention. Whereas the result showed low level of reduction of TPH values and decrease in Phosphate concentration for the polluted media without interventions. A degradation trend was profiled with time leading to significant TPH reductions and improved key soil fertility indices. The result showed that the level of the nutrient status in the media in the region can be improved through natural processes of intervention. However, for the marine environment, efforts were directed on how to swiftly remove the pollution from the environment to reduce further escalations and impacts on the environment.

PROMOTING AND FOSTERING FIRST GENERATION ENTREPRENEURS TOWARDS SUSTAINABILITY FOR GREEN ECOSYSTEM

Priya Kothari
YouthAid Foundation, India

Abstract

The study focuses on promoting and empowering first generation entrepreneurs and existing business to words green entrepreneurship in India and Initiatives taken for first generation entrepreneurs in making and promoting green products. Entrepreneurs are focused on green products and sustainable development with the effort to minimize the level of pollution. This also encourages emerging young entrepreneurs to make their venture ecofriendly by promoting green products India where level of pollution is increasing day by day. entrepreneurship has a huge role in solving environmental degradation and social problems. As today's youth are tomorrow's entrepreneurs, enhancing their green entrepreneurial intention will contribute to the sustainable development of economy in the future.

According to the Confederation of Indian Industry (CII), about 40 per cent of India's workforce is employed by the country's 42.5 million Small and Medium Enterprises (SMEs). Together they contribute around 30 per cent of the country's GDP. In recognition of this and the vast commercial potential for start-ups, India is often described as 'the poster child of emerging markets. The innovation and entrepreneurial capabilities mushrooming from this ecosystem are driving impact and contributing to the achievement of Sustainable Development Goals (SDGs) in India. 'Startup India' and several state government initiatives, also highlight the increased political will to support this culture of entrepreneurship. Importantly, non-complex policies and adequate funding are two crucial factors for start-ups to grow and sustain. Entrepreneurs seeking capital to grow initiatives in the field of sustainable development would endorse this wholeheartedly.

As a major boost to Sustainable Entrepreneurship (SE), globally the quantum of green, social and sustainability instruments in 2020 have steadily risen to US$ 700 billion, which is almost double the amount issued in 2019. In India too, SE investments are gaining steam across a variety of sectors ranging from mobility, renewable energy, waste recycling and others. As a case in point, the World Bank is introducing a $100-million credit guarantee scheme to boost India's rooftop solar programme. This is expected to benefit micro, small, and medium enterprises significantly. Multiple reports have also shown SE gaining momentum in the Indian financial marketplace; the country secured first place in the Emerging Markets Clean Energy Investment index and is ranked as the second-largest emerging market for green bonds. 'Green finance' investments and start-ups have significant potential to contribute to India's Mission 2070 net-zero aspirations.

This pilot project supporting many small to medium has examined the green entrepreneurial intention of first-time entrepreneurs based on self-efficacy, entrepreneurial creativity, entrepreneurship education, financial support, sustainable development values, and other influencing factors. Therefore, this projects education aimed to understand and analyze the influence of the complex relationship between multiple antecedents (entrepreneurial creativity, future self-continuity, green cognition, entrepreneurship culture, entrepreneurship education, and financial support).

Day-2
Poster Presentations

CANINE FAECES: THE MICROBLOG OF AN ENVIRONMENTAL HEALTH PROBLEM

Salah Jaber
University of Derna, Libya

Abstract

The risks of canine waste accumulation in urban environment and agro-ecosystem is an ever-growing issue, pathogenic bacteria such as *Escherichia coli* and *Salmonella Spp*. have been isolated from animals faeces including canine faeces. Invertebrates such as slugs and snails play an important role in the food chain and can act as agricultural pests. Observed that the Great Gray Slug, Limax maximus and the Yellow Slug, *Limax flavus* can carry *E. coli* O157 from animals' manure on their bodies surface and internally as intermediate hosts vectors. Recycling is a sustainable strategy for disposing of animal waste, and composting can be an important part of a recycling programme. The microorganisms involved oxidize carbon as an energy source for growth and ingest nitrogen for protein synthesis. Consequently, the right carbon to nitrogen ratio in composting systems is required for efficient decomposition of wet dog manure contains 0.7% nitrogen (N), and 0.25% phosphate (P_2O_4) (compared to wet cattle manure, dog waste which contains 40% more nitrogen, the same amount of phosphate. Insects such as Black soldier fly larvae have been used in bioremediation to breakdown and recycle animals' faeces which lead to a reduction in bacterial number in animal's faeces in may be used for biodiesel production and animal food-stock. This study aims to investigate the problems resulting from dog faeces accumulation in the environment and to find scientific solutions for utilizing and converting dogs waste to a safer material which should be more compatible with environmental aspects.

EVALUATION OF BACILLUS STRAINS ISOLATED FROM CORN WASHING LIQUORS AS SUSTAINABLE SOURCE OF GRAMICIDIN

Ana Belen Moldes, K Lvova, A López-Prieto, X Vecino, B Pérez-Cid and J M Cruz

University of Vigo, Spain

Abstract

Background: The residues obtained from the agri-food industry constitute a very rich source of nutrients and are generally characterized by presenting a very high biochemical oxygen demand (BOD), synonymous of spontaneous fermentation. In this sense, it is known that corn washing liquors (CSL) are an exceptional source of nutrients in numerous biotechnological processes. However, in recent years CSL have been characterized for presenting sporulated Bacillus, specifically *Aneurinibacillus aneurinilyticus*, which produces the antibiotic Gramicidin.

Objective: The objective of this work was to isolate sporulated Bacillus from different brands of corn washing liquors and study their potential for the sustainable production of Gramicidin.

Methods: Microbial biomass contained in CSL was isolated in Tryptic Soy Agar (TSA) and Tryptic Soy Broth (TSB) media to detect the existence of sporulated Bacillus compatible with the presence of *A. aneurinilyticus*. Following Gramicidin was extracted from the CSL microbial biomass or TSB microbial biomass using phosphate buffer saline (PBS) or ethanol and analyzed by Matrix Assisted Laser Desorption/Ionization-Mass (MALDI TOF) and Fourier Transform Infrared Spectroscopy (FTIR).

Results: In all the corn washing liquors evaluated, was detected the presence of sporulated Bacillus compatible with *A. aneurinilyticus* and after growing the isolated microorganisms in TSB broth was confirmed, in most of them, the production of Gramicidin.

Conclusion: Microbial Biomass from corn washing liquors could be a sustainable source for producing Gramicidin.

Biography

Ana Belen Moldes is Associate Professor in the Chemical Engineering Department of the University of Vigo with more than 20 years of experience in the field of Agri-Food residues valorization. Her main scientific contributions focus on the use of secondary Agri-food streams to produce biosurfactants and bioactive compounds promoting a circular economy. During her research career she has participated in more than 20 research projects, and she has published over130 articles in JCR journals (most of them Q1 and Q2). She has an h-index of 39 (Scopus ID: 6603511495), has co-authored 8 patents, has presented over 160 communications at congresses and has co-supervised 8 PhD Theses. Research interests include circular economy, secondary raw materials, biotechnology process and bioactive compounds.

SEQUENTIAL SEPARATION MODEL OF BIOSURFACTANTS AND POTENTIAL ANTIBIOTICS FROM AGRI- FOOD SLUDGES

Jose M Cruz, N Martínez-Russo, K Lvova, A López-Prieto, X Vecino and A B Moldes

University of Vigo, Spain

Abstract

Background: Different microorganisms (yeast and bacteria) with capacity to produce biosurfactants and antibiotics can growth in residual streams from food industry as these were isolated from various food wastes. Therefore, in the literature *Bacillus subtillis* or *Bacillus aneurinilyticus* were characterized for producing lipopeptides with surfactant capacity as well as antibiotics whereas yeast species like *Candida* sp were characterized as glycolipid producers with surfactant activity.

Objective: The objective of this work was to propose a sequential separation process of biosurfactants and potential antibiotics extracts from Agri-food sludges.

Methods: Agri-food sludge, coming from the starch industry, was centrifuge and biosurfactants were extracted from the liquid phase by liquid-liquid extraction using ethyl acetate. Following the precipitate consisting of microbial biomass was washed with deionized water and subjected to an extraction process with phosphate buffer saline (PBS) to obtain an hydrophilic biosurfactant extract. The surfactant capacity of the extracts was measured using a tensiometer whereas the antimicrobial activity was evaluated by the challenge test (UNE-EN ISO 11930).

Results: The results showed that the sequential separation process proposed allowed to obtain two biosurfactant extracts, with different antimicrobial and surfactant properties observing that the extracts obtained from the liquid phase of Agri-food sludge, at concentration of 1 g/L, present higher antimicrobial and surfactant properties than the biosurfactant extracts obtained by solid -liquid extraction although both extracts were able to reduce the surface tension of water in more than 15 units.

Conclusion: Liquid-liquid extraction with organic solvents combined with sequential solid-liquid extraction can be an interesting strategy to obtain different biosurfactant extracts from Agri-food sludges of starch industry with potential application in the formulation of new antibiotic drugs.

Biography

Jose M Cruz is Associate Professor in the Chemical Engineering Department of the University of Vigo. His main scientific contributions focus on the field of use and valorisation of agro-industrial waste and/or secondary streams to obtain products of industrial interest and high added value. He has developed chemical and biotechnological processes for the valorisation of different types of lignocellulosic materials as well as residual or secondary industrial streams. During his research career he has participated in over 40 research projects, he has published during his research career over140 articles in JCR journals (79 Q1). He has an h-index of 42 (Scopus ID: 7402505903), has co-authored 9 patents, has published 13 book chapters, presented over 200 communications at congresses and has co-supervised 9 PhD Theses. Research interests include chemical engineering, chemical technology, food technology, biotechnology and sustainable development.

BIOMETHANE PRODUCTION THROUGH THE INTEGRATION OF RENEWABLE ENERGY SURPLUSES IN WWTP

Raquel Iglesias Esteban
Department of Energy, Bioenergy, CIEMAT, Spain

Abstract

The paper was published last year (https://www.mdpi.com/1996-1073/14/10/2742 and now we updating it into BIOUP project. The paper reviews the role of biogas as advanced biofuel in the renewable energy system, summarizing the main raw materials used for biogas production and the most common technologies for biogas upgrading and delving into emerging biological methanation processes. In addition, it provides a description of the current European legislative framework, the potential biomethane business models, and the main biogas production issues to be addressed to fully deploy these upgrading technologies. Biomethane could be competitive due to negative or zero waste feedstock prices, and competitive with fossil fuels in the transport sector and power generation if upgrading technologies become cheaper and environmentally sustainable such as biological upgrading of biogas to get biomethane.

BIOUP is a project (2022-2025) coordinated by ACCIONA's Water business with the participation of the University of Valladolid through its Institute for Sustainable Processes (ISP) and CIEMAT, Unit Advanced Biofuels and Biochemicals, a Public Research Organization attached to the Ministry of Science, Innovation and Universities focused on energy and environmental research. The project pursues the development of a power-to-gas solution that will make it possible to obtain a safe and logistically manageable energy vector, such as methane while contributing to solving the problem of surplus renewable energy since it cannot be used in certain time slots.

The BIOUP project will undertake the generation of biomethane through biological upgrading of biogas in one and two stages (*in-situ*, in the digester of the treatment plant itself, *ex-situ*, in trickling biofilters, or through a combination of *in-situ* and *ex-situ* stages) for its integration into the sludge and/or gas line of a WWTP. The ultimate goal is to obtain biomethane to improve the efficiency of the cogeneration groups or to be injected into the natural gas network if the appropriate quality is achieved.

SPATIAL AND TEMPORAL ^{2}H AND ^{18}O ISOTOPE VARIATION OF CONTEMPORARY PRECIPITATION IN THE BALE MOUNTAINS, ETHIOPIA

Bruk Lemma[1,2], Seifu Kebede[3], Sileshi Nemomissa[4], Insa Otte[5], Bruno Glaser[1] and Michael Zech[1,5]

[1]Martin Luther University Halle-Wittenberg, Germany
[2]Ethiopian Biodiversity Institute, Forest and Rangeland Biodiversity Directorate, Ethiopia
[3]Addis Ababa University, Ethiopia
[4]Philipps University of Marburg, Germany
[5]Technical University of Dresden, Germany

Abstract

Stable isotopes of precipitation (^{2}H, ^{17}O, and ^{18}O) help to understand modern-day atmospheric circulation patterns and they are useful proxies for paleoclimate studies. The variation of delta$^{2}H_{prec}$ and delta $^{18}O_{prec}$ results from isotope fractionation occurring during evaporation and/or condensation along the hydrological cycle. Eastern Africa is an underrepresented region in respect of monitoring the stable isotopic composition of precipitation (delta$^{18}O_{prec}$ and delta$^{2}H_{prec}$). In 2017, we collected precipitation samples using a ball-in-funnel collector (BiFC) from ten weather stations located along an altitudinal transect ranging from 1304 to 4375 m a.s.l. The delta$^{18}O_{prec}$ and delta$^{2}H_{prec}$ values varied from -8.7 to +3.7 per mille and -38 to +29 per mille, respectively. The local meteoric water line is characterised by a lower slope, a higher intercept, and more positive *d*-excess values (delta$^{2}H = 5.3 \pm 0.2 * \text{delta}^{18}O + 14.9 \pm 0.9$) compared to the global meteoric water line. Both altitude and amount of precipitation clearly correlate with our isotope data. However, the delta$^{18}O_{prec}$ and delta$^{2}H_{prec}$ values show at the same time a seasonal pattern reflecting the rainy versus dry season. More enriched isotope values prevailed shortly after the end of the dry season; more negative isotope values coincided with high precipitation amounts recorded in May, August, and September. Moreover, HYSPLIT trajectories reveal that during the dry season water vapor originates primarily from the Arabian Sea, whereas during the wet season it originates mainly from the Southern Indian Ocean. These findings challenge the traditional amount effect interpretation of paleoclimate isotope records from Eastern Africa and rather points to a previously underestimated source effect.

BOTTOM LINER SORPTION MATERIAL FROM WASTE TIRES AGAINST THE LEAKING OF THE INDUSTRIAL CONTAMINANTS

Junboum Park and Rahim Shahrokhishahraki
Seoul National University, South Korea

Abstract

Waste tiers were collected and pulverized for the development of sorption material against the leaking of the industrial sectors. Those sorption beads were supposed to be mixed with local soils beneath potential contamination sources like industrial zones. The mixed layers would catch and sorb the leaked contaminants including heavy metals. The mixed bottom layers were investigated for the sorption and reduction of the leaked plume and tested for geotechnical properties as well. The test results showed some promising sorption and engineering properties as bottom liner system beneath the industrial facilities.

Day-2
e-Poster Presentations

MICROALGAE CONVERSION INTO GREEN TRANSPORTATION FUELS VIA HYDROPROCESSING

Vasiliki Dagonikou, Loukia P Chrysikou, Athanasios Dimitriadis and Stella Bezergianni

Centre for Research & Technology Hellas (CERTH), Chemical Process and Energy Resources Institute (CPERI), Greece

Abstract

Background: In recent years, the increasing demand of transportation fuels has led the scientific community and industry to investigate new technologies and alternative feedstocks for biofuels production via sustainable processes. Microalgae, enriched in lipids, have been characterized as an environmentally friendly and sustainable potential feedstock for biodiesel production by overcoming greenhouse gas emissions increase and competition of biofuels with some agricultural resources.

Objective: This study aims to investigate a new technology for the production of green fuels via catalytic hydrotreating technology exploiting microalgae oil cultivated in drainage water of greenhouse.

Methods: In the framework of this study, a series of catalytic hydroprocessing experiments of microalgae were conducted in a TRL 3 hydroprocessing pilot plant evaluating different operating conditions in order the optimum operating window to be selected.

Results: Based on the experimental results, the microalgae oil hydrotreatment leads to a final product in the range of diesel hydrocarbons presenting improved properties such as high cetane index (>78), high heating value (>46 MJ/kg) and low S content (<10 wppm). Moreover, the oxygen removal was achieved via hydrodeoxygenation reactions leading to a diesel product with properties abided by EN590 diesel specs.

Conclusion: According to the results of a current study a high-quality diesel fuel can be produced via microalgae oil hydrotreating.

Biography

Vasiliki Dagonikou is a Chemical Engineer, with a PhD diploma at the School of Chemical Engineering of the National Technical University of Athens (NTUA). Her PhD thesis involves the catalytic hydrotreating of low-graded petroleum fractions and lipids for hybrid fuels production. Since 2012, she is a member of HydPro group of CPERI participating in hydro processing experiments for biofuels production at the CERTH in relevant European and national programs as well as in research services provided by industries in Greece and abroad. Her research activities involve also the simulation of industrial and refinery processes using the Aspen Plus / Hysys V.11 software in order to complete and evaluate techno-economic and environmental studies. Research interests are biofuels, hydrotreating, aspen modelling.

ENVIRONMENTAL ASSESSMENT OF A MICROALGAE BIOREFINERY TOWARDS RENEWABLE FUELS

Loukia P Chrysikou, Vasiliki Dagonikou and Stella Bezergianni

Chemical Process & Energy Resources Institute (CPERI), Centre for Research and Technology Hellas (CERTH), Greece

Abstract

Background: The increasing depletion of fossil fuels and the adverse effects on the environment have attracted research interest in alternative energy resources. In this context, microalgae constitute a potential energy resource, while microalgae-based biorefineries are being extensively investigated in an effort to move toward large-scale biofuels production.

Objective: To conduct a LCA study of a microalgae-based biorefinery (*Chlorella Sorokiniana sp*.) quantifying its environmental impacts for the production of renewable fuels via catalytic hydrotreatment.

Methods: Experimental and literature data, were utilized for the LCA study. Furthermore, a process simulation model for the derived lipids upgrading via catalytic hydrotreatment using Aspen Plus V. 11 was developed. The life-cycle impacts are quantified in terms of NER (Net Energy Ratio) and GWP (Global Warming Potential).

Results: The results show minimum GHG emissions (~-13 g CO_{2eq}/MJ renewable fuel) underlying the sustainability of the examined biorefinery, verified also by the low NER in the hydrotreatment process. The stages of harvesting and lipids extraction emit significant GHG amounts, whereas also the H_2 production contributes noticeably to the environmental impacts of the process.

Conclusion: Microalgae biomass constitutes a potential bioenergy feedstock towards biofuels production. Nonetheless, zerowaste biorefinery approach is at the early developmental stages but yet is promising based on the environmental aspects.

Biography

Loukia P Chrysikou is a Chemist with a Master degree and a Ph.D in Environmental Chemistry from the Aristotle University of Thessaloniki. Since 2011 she is a research assistant in the Center for Research and Technology Hellas (CERTH). Her research activities involve the investigation of fuels and biofuels oxidation stability and aging studies, while her work also fucuses on life cycle assessment (LCA) of variant processes producing high- added value products, fuels and biofuels. Furthermore, she is also working on bio-based feedstocks characterization and analysis prior their upgrading towards renewable fuels. Dr. Chrysikou has participated in several European and national research projects as well as in research activities in collaboration with national and international industrial partners. She has >15 publications in peer-reviewed journals, 2 book chapters and >50 publications in international and national conference proceedings. Research interests are LCA, fuels storage stability and accelerated aging.

Day-2
Video Presentations

PERMANENT DEBATE FORUM (FOPEDE) BETWEEN PORTUGAL, BRAZIL AND PORTUGUESE-SPEAKING AFRICAN COUNTRIES (PALOP[1]-CPLP[2]) TO IDENTIFY THE "STATE OF THE ART" IN SOLID WASTE MANAGEMENT AND RESILIENT CITIES

Maria Madalena Ferreira
University of Coimbra, Portugal

Abstract

Background: Portugal became a member of the European Community in 1985; until 1995 it still had 341 open dumps; and one of the criteria for remaining in the EC would be to define a management program, culminating in PERSU (1997) which defined regional arrangements and formalized the first public-private partnerships; a plan that contributed to the implementation of sanitary landfills; a goal reached in 2000 when it inaugurated in Évora the last landfill planned in PERSU I. These strategic plans are reassessed decennially; PERSU II (2007-2016) was followed by PERSU III (2014-2020) and currently PERSU 2030 (fourth generation) dialogues with other public policies to approach the European indices seeking to achieve the goals of the UN/2030 Agenda and Circular Economy.

Objective: FOPEDEwill contribute to a reflection on the "State of the Art" of MSW among the partners; and may foster tangible solutions to overcome internal difficulties and prevent rich countries from continuing to transfer their waste to them. The big question that is intended to answer is related to: instead of transferring containers of discarded waste there, why not transfer knowledge, technology and professional training, contributing to environmental quality and generation of employment and income.

Methods: The project will be carried out in phases; in this first one using digital platforms, networks and thematic groups, we are disseminating, sensitizing and identifying partners to define a collective work agenda. In the construction of the agenda will be defined the priority and emergency themes to be discussed in the following phases: learning by doing. And as Results or final product will be used the Memory Help for the preparation of a detailed report as a subsidy for decision making in a face-to-face event, to be defined.

The Guisa Conclusion: To date some partnerships have declared interest: CEGOT (General Coordination) UC; UPLBM; UNIR; UNIFOR/IFEE, RIAS, CIAS; REARO; FLC; CATANORTE. STARTUP BE THE DIFFERENCE

Biography

Maria Madalena Ferreira - Geographer- USP-FFLCH (1982); Master in Geography and Teaching Practice-USP-FFLCH (1996); PhD in Regional Development and Environmental Planning-UNESP-Presidente Prudente (2003). In Rondônia I worked from 1983 to 2014, I retired from the Federal University of Rondônia (Western Amazon)-Department of Geography. At the moment I am completing a Post-Doctorate on the Solid Waste Management model in Portugal and linked to (www.cegot.pt) as a collaborating researcher; by proposing FOPEDE it will be possible to continue the theme and to dialogue in the search for solutions between partners on MSW management and compliance with the 2030 Agenda, especially SDG 11. In Brazil I voluntarily participate in a project for the installation of an incubator for the use of Tetrapack packaging for the manufacture of a "thermal insulation blanket" (low cost) aimed at the homes of collectors of recyclable materials and low-income population.

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IMPACTS OF CLIMATE CHANGES ON HUMAN HEALTH

Elizabeth Ferreira Rangel[1,2], Simone Miranda da Costa[1,2], Jéssica Milena[1,2], Marco Aurélio Pereira Horta[1,2], Bruno de Carvalho[3], Ana Maria Bispo de Felippis[1], Kátia Eliane Santos Avelar[1] and Margarete Martins dos Santos Afonso[1,2]

[1]Oswaldo Cruz Institute, FIOCRUZ/Rio de Janeiro, Brazil

[2]Climate Change National Institute of Science and Technology, Brazil

[3]Global Health Resilience, Earth Sciences Department, Barcelona Supercomputing Center, Spain

Abstract

The Intergovernmental Panel on Climate Change and United Nations Organization have discussed the impact of climate change on Economy, Ecosystems and Health. According to World Health Organization, policies for surveillance and control of neglected diseases must be aligned with appointments committed to assessment of climate and environmental changes. Brazil is vulnerable to the increased incidence of vector-borne diseases in the context of global climate change, in this way, increase in the average temperature of the planet contributes to expanding in Brazil the distribution of vector-borne diseases. Infectious diseases transmitted by insects will be affected by global warming implying current risks and impacts on human health, so must be analyzed and discussed in the light of different and new epidemiological scenarios. Control actions for leishmaniasis, Cutaneous and Visceral, have failed and don't achieve results that of well-conducted strategies in a cost-effective context. It is necessary alternative planning proposals, considering future scenarios. About three million cases of dengue per year could be prevented in American Continent compared to a scenario without policies with warming of 3.7°C. Incubation time for Yellow Fever in mosquitos is temperature-dependent, as the same way for transmission of Zika and Chikungunya virus. Global warming is responsible for extreme flood events with impacts on human health. Number of patients and deaths by Leptospirosis has been increased after flood in Brazil. Deforestation has intensified in recent years in Brazil, places human health on a tenuous frontier with the destruction of tropical forests. Fires in the Amazon may have been responsible for the high number of human cases and deaths in the State of Amazonas by COVID-19. Efforts must be driven to understand the relationships among SARS-CoV-2 infection, circulation and climate parameters, as the implications of viral persistence. There is a great challenge facing future scenarios, which are not promising, on the contrary, they are worrying and pessimistic. It is relevant that federal governments can establish laws and ensure that they are complied with, preventing burning, greenhouse gas emissions and illegal exploitation of land.

Financial Support: Oswaldo Cruz Institute, FIOCRUZ/Rio de Janeiro, Brazil; Climate Change National Institute of Science and Technology, Brazil

Biography

Elizabeth Ferreira Rangel - Researcher in Public Health at Oswaldo Cruz Institute, Oswaldo Cruz Foundation, Brazil. Coordinator of the National and International/Regional Reference Laboratory (PAHO/WHO) in Leishmaniasis Vector Surveillance, at Oswaldo Cruz Institute. Consultant of the Secretariat of Surveillance and Health & Environment, Ministry of Health, for the National Program of Leishmaniasis. Member of the Committee of Specialists of the Leishmaniasis Control Program, of the Pan American Health Organization. Member of the WHO Expert Advisory Panel on Parasitic Diseases (Leishmaniasis). Coordinator of the Fiocruz Reference Network on Leishmaniasis. Vice Director of Reference Laboratories, Ambulatory and Biological Collections at Oswaldo Cruz Institute. Acts in the Coordination of the Health Subcomponent of the National Institute of Science and Technology in Climate Change. Research interests are climate changes and the impacts on human health; surveillance and control of leishmaniasis.

Virtual Day-1
Keynote Presentation

INDUSTRIAL DEFOSSILIZATION FOR THE ENERGY TRANSITION

Talieh Rajabloo
Hasselt University, Belgium

Abstract

A considerable part of the fossil CO_2 emissions comes from the industrial sector with a share of 23%, in which the energy-intensive industries, namely metal production, chemicals, petrochemicals, cement, and manufacturing play important roles in the emission severity. Overall, the industrial plants are the second carbon emitter after energy production sector. Transportation and buildings are the other following sectors regarding the emission share. The main objective of this speech will focus on the defossilization potential for energy intensive industries, defossilization of petro-/chemical sectors, and the implementation of renewable energy/resources. Moreover, this talk includes a brief overview of the renewable feedstock's, carbon capture/storage/utilization as well as disruptive technologies for CO_2 reduction in several petro-/chemical production processes. The research results of my current study reveal that although all of the innovative technologies are not industrialized yet, they will play a crucial role in the energy transition in the upcoming decades.

Virtual Day-1
Oral Presentations

TPEF: A NOVEL FLUOROPHORE FOR NANOPLASTIC DETECTION IN BIOLOGICAL SYSTEMS

Jerry Gao, Heng Wang, Yi-chen Liu and Guo-wen Xing
Beijing Normal University, China

Abstract

Background: Microplastics are hazards to both human health and ecosystems due to their minute size and is one of the most intensely researched pollutants currently. Microplastics' (and smaller nanoplastics') size and high entropy complicate efforts of detection and tracking. Existing fluorescent dyes for nanoplastic imaging, such as Nile Red (NR), present limitations in detecting smaller microplastics and nanoparticles,

Objective: Creating an AIE (aggregation-induced emission) fluorescent dye that is better able to stain and shine on microplastics, thus making microscopic imaging of microplastics more sensitive.

Methods: A tetraphenylethene-based AIE fluorescent dye, TPEF, was synthesized via a Suzuki reaction between TPE-CHO and 8-Hydroxyjulolidine. TPEF was characterized via ^{1}H and ^{13}C NMR, as well as HRMS. It was then used to stain various microplastics and compared to NR. Polystyrene (PS) nanoparticles were stained with TPEF and NR and suspended in water and used to cultivate bean sprouts imaged using confocal laser scanning microscopy (CLSM). HeLa cells were also cultured with stained PS particles and analyzed by CLSM.

Results: TPEF exhibited exceptional fluorescence and a remarkable capacity to label nanoplastics. TPEF-stained nanoplastics (PS, 0.1 μm) displayed a brighter fluorescence than those stained with NR, underscoring TPEF's superior performance as a fluorescent dye for nanoplastic detection. Microplastics was revealed to be able to contaminate and cross the hypocotyl epidermis of Mung bean and Soybean sprouts. Consistent with prior research, cell membrane and cytoplasm of HeLa cells were also contaminated.

Conclusion: TPEF is a promising fluorescent probe for nanoplastic imaging in complex biological environments, offering advantages over conventional dyes such as NR. TPEF can facilitate the tracking of nanoplastics across the food chain and within human cells, suggesting its prospective role in nanoplastic detection, with substantial implications for addressing nanoplastic pollution.

Biography

Jerry Gao is a high school student who is passionate about fluorescent probes and microplastic imaging. He was first introduced to fluorescent dyes in school and was quickly fascinated by them. He applied for and later participated in a mentor program that allowed him to work with Prof. Guowen Xing from Beijing Normal University. Jerry Gao was able to synthesize a new fluorescent probe called TPEF. Originally indented for cell imaging, Jerry discovered during purification that TPEF strongly adhered to various plastic containers and gaskets. He successfully explored the application of TPEF on microplastic imaging.

Jerry strives to continue research on microplastic pollution. He hopes to extend his knowledge about detecting and tracking microplastics. Jerry Gao strives to contribute to the world's understanding and resolution of microplastic pollution. Research interests include water-soluble fluorescent probes, AIE molecules, microplastic staining.

BIODEGRADABLE COMPOSITE FILM OF BREWER'S SPENT GRAIN WITH POLY(VINYL ALCOHOL) BINDER

Lilian Lin, Sarah Mirkin and Heon E Park
University of Canterbury, New Zealand

Abstract

Background: Plastic pollution has emerged as a critical global concern and gathered urgent attention and collaborative efforts to mitigate its environmental impact. Biodegradable composites hold promise as potential solutions due to their ability to naturally degrade over time. However, it is crucial that the production processes and properties of these composites are environmentally benign and useful. Simultaneously, food waste has become a pressing global issue, given its substantial carbon footprint when improperly managed. Thus, the need to upcycle food waste into useful, biodegradable applications has become increasingly urgent.

Objective: To develop a biodegradable composite film using brewer's spent grain (BSG) with poly(vinyl alcohol) (PVA) as a binder.

Methods: Composite films were fabricated by incorporating BSG as the primary component, along with PVA and glycerol as binder materials. Hexamethoxymethylmelamine (HMMM) was included to enhance water resistance. The films were produced using a solution-casting method, varying the ratios of these components to investigate their effects. The characterization of the films included assessing moisture uptake, tensile properties (such as Young's modulus, tensile strength, ultimate strain, and toughness), and biodegradability.

Results: Moisture uptake in the films was primarily influenced by the glycerol content while the fraction of the other components did not exhibit a significant effect. The tensile strength, ultimate strain, and toughness of the films did not decrease significantly with BSG content at 20 wt.% or lower. Conversely, ultimate strain and toughness increased while tensile strength and Young's modulus decreased with glycerol content at 6 wt.% or more. All the composite films were found to degrade in compost within three weeks.

Conclusion: This study demonstrates the successful production of biodegradable composite films utilizing brewer's spent grain, PVA resin with glycerol as a binder, and hexamethoxymethylmelamine as a water-repelling agent. The findings highlight the potential for repurposing food waste into sustainable materials, contributing to waste reduction and environmentally friendly practices.

Biography

Lilian Lin is a Ph.D. candidate in Chemical and Process Engineering. She currently holds a Bachelor's Degree with Honors in Chemical and Process Engineering and a Bachelor's Degree with Commerce majored in Accounting and Taxation. She believes, by combining her knowledge in both degrees and her interest in research, that she will be able to produce unique and sustainable solutions that will benefit the global society. She has research background in a wide range of areas such as plastics, and materials for biomedical engineering, supercritical fluids, foams, cultured meat, sterilizing endospores of bacteria, zeolites, food sterilization and waste treatment. The main focuses in those research areas are generating better alternatives to our welfare, material characterization, environment, sustainability, project economics and energy savings. Research interests include biodegradable composites, polymers, sustainability and polymer characterization.

AN ANALYSIS OF SOLID WASTE MANAGEMENT POLICIES IMPLEMENTATION CHALLENGES IN CAMEROON

Nchia Shella Ndum and Kenichi Matsui
University of Tsukuba, Japan

Abstract

Past studies highlighted that municipal solid waste poses tremendous sustainability challenges. In developing countries like Cameroon, where rapid urbanization has made dramatic changes to society, waste management issues are acutely affecting the residents. However, despite the increasing interest of Western nations in sub-Saharan Africa for development and investment, these waste management challenges have gained scant attention from scholars. Considering this gap, this paper attempts to identify policy implementation challenges. To do so, this paper analyzes policies from 1997 to the present. In 1996, the first substantial policy, the National Environmental Management Plan, was released. More recently, Cameroon established the National Environmental Management Plan (2005) and National Strategy for Waste Management (2007). Our analysis focused on reports and budget information regarding these policies. It also clarifies waste management legal frameworks that explain some implementation shortcomings. The results of our analysis show that Cameroon waste management policies initially faced little changes in people's attitudes despite the imposition of severe penalties. More recently, Cameroon has emphasized more on promoting good practices and community participation than penalization and centralization. However, poor waste collection and improper disposal have persisted despite the devolution of administrative responsibilities to local municipal councils. On this point, this paper discusses how factors like financial/human resource capacity, political will, and technology availability influenced the way these municipalities handled waste management issues.

EXTREME CLIMATIC EVENTS: AN ANALYSIS OF SOCIO-ECONOMIC VULNERABILITY AND CROPPING MECHANISM IN SELECTED HOTSPOTS IN INDIA

Anuradha Tumma and Ravi Ande
University College of Science, Osmania University, India

Abstract

Vulnerability of the Mahanadi and Sabarmati hotspots have been selected by three component indices representing three sources of vulnerability: threats to livelihood (VIL), food security (VIF), and access to market (VIM) based on household responses to socio-economic vulnerability and cropping mechanism in selected hotspots in India. The temperature has risen by 0.7° C since 1900. The majority of models estimate that, based on 2005's yearly emission levels, GHG emissions will nearly double by 2050 from their pre-industrial levels, which were around 280 ppm CO_2 equivalent at around 1750. The global mean temperature would increase by 2–5°C as a result of this level of emission. A variety of SRES emission scenarios are expected to result in warming of about 0.2°C each decade for the next two decades (2010-2030). According to the low scenario B1, the projected average global surface warming from 2090 to 2099 in comparison to 1980 to 1999 would likely be between 1.1° and 2.9°C.

Objectives: In this background the objectives are to

- Identify hotspots in India with regard to climate variability and economic activity.
- Assess the socio-economic vulnerability of the hotspots due to extreme events.
- Analyses the cropping behavior at the micro level.
- Look at the feasibility of combining normal development goals with climate change- related policies.

Methodology: Method of choosing a study region or hotspot from the bottom up. Scientific models that examine the climate variability and water availability of the chosen hotspots served as the basis for the selection. The outlines the procedures used in gathering information and data about hotspot vulnerability and the capability to deal with the effects of extreme events like floods and droughts.

Results: In the Sabarmati hotspot almost 84% of the households have high vulnerability by VIL criteria in the Mahanadi hotspot it is 100% of the households. In terms of food security, 84% of the households in the Mahanadi are highly vulnerable but the incidence is less in the Sabarmati basin as 28% of households are in the high vulnerability category. The VIM shows extreme vulnerability for both hotspots. It is worse in the Mahanadi basin with an 85 to 150% price rise during past floods compared to 10 to 50% in the Sabarmati basin during past droughts.

Conclusion: The three basins identified for the study were – the flood-prone Mahanadi Basin, the drought-prone Sabarmati Basin, and the flood and drought-prone Alaknanda Basin. Besides climate data, the selection of the Alaknanda. SHU in the Himalayan mountain range has also been guided by the importance and uniqueness of a mountain ecosystem in shaping the socio- economic structure of hill communities.

Biography

Anuradha Tumma is an accomplished Geography professional with extensive experience in teaching and research. With an M.A., M.Phil, and Ph.D. in Geography, specializing in Agricultural Geography she has been teaching at Osmania University for 16 years. She is now holding the position of Chairman Board of Studies for the Department of Geography, Osmania University, Hyderabad, India. She has presented papers at national and international conferences, and organized conferences as well. She has completed three minor projects under UGC SAP and one under UGC CAS. She has published around 21 research papers and contributed to many chapters in various academic books. She is a member of professional bodies like NAGI, INCA, IGS, ISC, DGSI, and UGIT. Research interest is about agricultural geography.

HYDROGEOLOGICAL AND GEOPHYSICAL INVESTIGATIONS IN KODAKANDLA MANDAL, WARANGAL DISTRICT, TELANGANA, INDIA

Ravi Ande and T Anuradha

University College of Science, Osmania University, India

Abstract

The scope of groundwater exploration broadly includes determining the vertical and horizontal distribution of aquifers and their regional boundaries and tracing tectonically disturbed zones affecting groundwater movement by using the Hydrogeological and Geophysical methods. In hard rock areas, the distribution and movement of groundwater is controlled by constituents of secondary porosity-fractures, fissures, faults and joints that cross each other at various angles. These features are found in profusion close to the surface and reduce in frequency deeper down. Granite constitutes the host rocks for the entire Kodakandla region and is characterized by sheeting which is horizontal joining parallel to the surface.

Objectives

- To delineate shallow and deeper groundwater potential zones.
- To generate Hydrogeological and Hydrochemical database.
- To suggest groundwater management strategies for sustainable development.
- Determination of trends of water quality variation with reference to drinking and irrigation suitability.
- Integration of conventional geophysical methods like Electromagnetic (VLF), Electrical (VES) and Magnetic methods for investigations.

Methodology

- Topographical and Hydrogeological investigations such as water level monitoring and water level fluctuations for Pre, Post monsoon seasons of wells.
- Geophysical investigations to identify aquifer depth, groundwater potential zones Preparation of geological and geomorphological maps with field checks.
- Literature survey and secondary data collection.
- Water sample collection and analysis to know the major elemental concentration.

Results: The second recharge model is with varying depth to the basement for different constant soil resistivity, for example, 25 m, 50 m, 75 m, and so on up to 300 m. Again, total annual precipitation has been taken at 700 mm throughout the calculation for entire plots. The non-linear is trend of curve.

Conclusion: The important second and affecting factor the recharge natural of the basement is depth, indicates which the space to availability of the infiltrated accommodate from the soil water zone. In it was discovered to have low and high recharge in the case of shallow basement recharge.

Biography

Ravi Ande, I did my PhD in Hydrogeological and Geophysical Investigations and M. Tech in Mineral Exploration from the University of Hyderabad. Topographical and Hydrogeological investigations such as water level monitoring and water level fluctuations for Pre, Post monsoon seasons of wells. Geophysical investigations to identify aquifer depth, groundwater potential zones and Preparation of geological and geomorphological maps with field checks. I used Geophysical instrumental Techniques in the Hydrogeological Field work and followed the Integrated Strategies: Comprehensive presentation and analysis of the inferences of Electrical, VLF-EM and Magnetic methods. At Present pursuing my M. Tech in Data Science, Artificial Intelligence and Machine learning.

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LAKE CHAD VEGETATION COVER AND SURFACE WATER VARIATIONS IN RESPONSE TO RAINFALL FLUCTUATIONS UNDER RECENT CLIMATE CONDITIONS (2000–2020)

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Abstract

Monitoring the evolution of the Sahelian environment is a major challenge since the great Sahelian droughts marked by significant environmental consequences and social impacts. We combined remote sensing images with a water level database from the Hydroweb project to determine the response of Lake Chad vegetation cover and surface water variations to rainfall fluctuations in the Lake Chad watershed under recent climate conditions. The variance in lake surface water levels was determined by computing the monthly anomaly time series of surface water height and area. The spatiotemporal variability of watershed rainfall and vegetation cover of Lake Chad was highlighted through multivariate statistical analysis. The results show an increase in watershed rainfall, vegetation cover, and surface water area and height, as their slopes were all positive i.e., 5.1 10^{-4} (mm/day); 4.26 10^{-6} (ndvi unit/day); 1.2 10^{-3} (km^2 /day) and 6 10^{-5} (m/day), respectively. The rainfall variations in the watershed drive those of Lake Chad vegetation cover and surface water, as the rainfall trend was strongly and positively correlated with those of vegetation cover (0.79), surface water height (0.57), and area (0.53). The time lag between the watershed rainfall fluctuations and lake surface water variations corresponded to approximately ~112 days. Between rainfall variations and vegetation cover changes, the time lag was <16 days in the western shores of the lake and on both sides of the great barrier, about 16 days in the bare soils of the northern basin and the eastern part of the south basin, and >64 days in the marshlands of the southern basin. This research provides a robust method that computes the variances of the lakes trends and seasonality and correlates them with the variances of climate changes. The correlations obtained have strong potential for predicting future changes in lake surface water worldwide.

Biography

Paul Gerard Gbetkom is a research Engineer at the French National Center for Scientific Reseach and a holder of PhD in Geography. His research focuses on monitoring climate indicators over continental water surfaces as part of the Climate Change Initiative (CCI) program of the European Space Agency (ESA).

AMINOLYSIS OF POLYESTERS WITH ANILINES OVER LACTATE-BASED IONIC LIQUIDS

Zhimin Liu
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Abstract

Chemical recycling of plastics into monomers or value-added chemicals is one of pivotal accesses to achieve a circular economy in the plastic life cycle, which also provides important way to access chemicals. Polyesters are a kind of major plastics widely applied in our life, and the spent polyesters can be decomposed via various strategies such as hydrolysis, alcoholysis, hydrogenolysis, aminolysis, which has attracted much attention. In our recent work, we reported an aminolysis strategy for polylactic acid (PLA) with anilines over lactate-based ionic liquids (ILs). With the assistance of water tetrabutylammonium lactate ($[N_{4444}][Lac]$) shows the best performance for PLA decomposition with anilines, affording N-aryl lactamides in high yields and 100% selectivity. It is found that water can inhibit the formation of hydrogen bond in lactate anion, thus strengthening the ability of lactate anion to form hydrogen bonds with other hydrogen bond donor and acceptor. With the assistance of water the lactate anion as hydrogen-bond donor could activate carbonyl C atom of PLA via hydrogen bonding with carbonyl O atom, meanwhile it as hydrogen-bond acceptor could enhance the nucleophilicity of the N atom of anilines via hydrogen bonding with amino H of amines. The nucleophilic attack of the N atom of aniline on the carbonyl C atom of PLA leads to cleavage of the C-O bonds of PLA and formation of N arylactamides. Interestingly, combined with water the lactate ILs could also efficiently upcycle poly(bisphenol A carbonate) (PC) with anilines, producing bisphenol A and corresponding diphenylurea derivatives. Especially, some ureas that are difficult to synthesize via conventional routes can be produced. This lactate anion catalysis strategy is simple and highly efficient to depolymerize PLA and PC, which also provides green and metal-free routes to produce N-aryl lactamides and diphenylurea derivatives, respectively.

Biography

Zhimin Liu has been working in green chemistry for over 20 years, with focus on designing green solvents and studying their properties and applications. In particular, she applies ionic liquids in catalytic transformation of renewable and recyclable carbon resources, and has developed a series of green routes to produce value-added chemicals from CO_2, biomass and spent polymers. For example, she designed CO_2-reactive ionic liquids, and achieved the conversion of CO_2 into valuable chemicals under metal-free and ambient conditions. She also investigated the ionic liquids-catalyzed decomposition of spent plastics, and presented green routes to upgrade spent polymers. Besides, the reaction mechanism over ionic liquids has been explored. Research interests include ionic liquids, chemical transformations of spent plastics, CO_2 and biomass.

ECO-EFFICIENCY: METHODOLOGICAL FRAMEWORK AND ASSESSMENT

Alexandra Gkoulgkoutsika, Evangelia Desli, Evangelia Sdrolia and Grigoris Zarotiadis

Aristotle University of Thessaloniki, Greece

Abstract

Background: Environmental data and related studies reveal a link between a country's higher per capita income and increased environmental burden, especially during periods of economic sprout. The concept of ecological efficiency (eco-efficiency/eco-eff) is used to capture economic activity along with the associated environmental burden. Although there have been methodological improvements in defining and measuring eco-efficiency, they do not satisfy the requirements of the economic definition of a production function, and the estimation frameworks have reduced the credibility of the empirical conclusions.

Objective: The paper aims at a two-fold contribution: (i) a mechanism to estimate a robust eco- efficiency measure that can be used along with any index of environmental burden at a country, sector or firm level and (ii) an empirical worldwide comparison of countries' eco-efficiencies.

Methods: The empirical analysis studies a wide range of environmental burdens covering all main pollutants, for all countries with available data worldwide (47), over the period 1990–2017. The country set includes developed and developing economies that might display different environmental concerns and covers 78% of the OECD countries, the entire EU and 92% of the countries committed to the Kyoto Protocol.

Results: The evidence shows the countries running at less than half of their ecological potential, on average, with very few countries consistently performing well in terms of eco-eff and several countries showing low eco-efficiency scores over the entire time period.

Conclusion: The applied methods in the literature are overstating the number of eco-efficient countries, leading to a false perception of adequacy. Even members of environmental agreements and protocols that declare their intentions to monitor and reduce pollution have not improved their ecological performance during the past three decades. The findings reveal myopic attention to economic growth, as evidence shows that pollution hinters at its economic vitality and future economic growth will become uncertain.

Biography

Alexandra Gkoulgkoutsika earned her PhD in economics from Aristotle University of Thessaloniki (2019) and has recently completed a one-year postdoctoral fellowship on environmental efficiency. Currently, she is a teaching fellow in the department of Social Policy at the Democritus University of Thrace. Before that, she was a teaching fellow for two years in the School of Economics at Aristotle University of Thessaloniki (2020 - 2022). She is a highly motivated researcher with a strong background in empirical analysis published in peer-revied academic journals such as Cleaner Environmental Systems and Economic Modelling. She was a vital team member in the above-presented research, leading the empirical analysis under Prof. Desli. Research interests are environmental economics, public economics and economic growth.

A FUZZY WEIGHTED MOVING AVERAGE APPLIED TO ANNUAL TEMPERATURE IN THE WORLD

Jianmin Jiang[1,2]

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Abstract

Background: The moving average or low pass filter has been employed widely in various scientific even social fields. However, users often remain the beginning and end points without calculation or set as a constant of average, especially in studies of climate changes. The applications were motivated by Tolleson, who reported a <Feature News> on September 19, 2019 in the <Nature>.

Objective: The method reduces the data boundary influence in calculations. The applications compare the annual anomalies and the variance-adjusted anomalies (standardized differences) among ten temperature series including for 7 nations reported in by Tolleson, the globe, global land and global sea.

Methods: The fuzzy weighted moving average (FWMA) was developed specially to calculate the beginning and end parts of the series. Used data of the ten series covering 1901-2020 or 1850-2020 were downloaded from the IPCC database.

Results: 1. The FWMA curves of the annual anomalies showed much difference from the sequence order of cumulative CO_2 emissions among 7 nations. 2. The FWMA curves of the annual variance-adjusted anomalies showed much better than the anomalies in coincidence with the cumulative CO_2 emissions. In contrary, the globe got warming obviously higher than all the 7 nations. 3. The phenomena of 'land/sea warming contrast' disappeared in the standardized differences. 4. The FWMA curves for the globe was actually much closer to that of the sea than to that of the land.

Conclusion: The variance-adjusted anomalies are better than the anomalies to reflect the impacts of CO_2 emissions on climate changes. The 'land/sea warming contrast' depends upon the land/sea contrast of climatologic variance. The ocean seems role a key direct contributor to the global warming.

Biography

Jianmin Jiang has his expertise in climate change and statistical analysis. His researches focus on the change-points detection plus coherency analysis in Earth-sciences. He has published articles and a monograph on the scanning tests for detecting multi-scale change points in four statistic parameters (mean, variance, trend, correlation) and applied to monthly temperature in China, globe, hydro-ecology and tree-ring chronology. Research interests are Earth and Environment science.

WATER RESOURCES - THE ISRAELI EXPERIENCE

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Abstract

The global population has grown significantly over the past years. Quality of life is generally increased along with the higher need for energy and water, alongside the proliferation of environmental issues to be resolved. High-quality drinking water is essential for day-to-day living, food production, better living standards, industry, and the somehow neglected nature.

The need for water increases rapidly, and freshwater resources cannot deal with all the requirements. Water is not accessible to all as a natural, self-renewable low-cost resource. The drought in various regions on earth followed by desertification and the gravitation of populations towards this essence of life is calling for different considerations in terms of economic and social effects.

Solutions for clean water supply in remote locations are urgently required. Water is needed in locations where agriculture is the basis for life. The development of low-cost water sources could be the basis for the increased industry in a thirsty world. It is a global question of the same type of usage of diminishing natural energy resources and solutions for environmental problems. The future of humankind depends on proper answers related to these questions, together with the questions of global peace and human wealth on earth. Sharing water expertise and industry best practices between counties worldwide would help fight water security challenges. It is not enough, however, to produce low-cost water. It is also important to educate people on the proper usage of water that will improve their way of life.

This presentation summarizes Israel's experience, including the main techniques for utilizing alternative water sources like brackish water, seawater, and domestic wastewater. Explanations regarding the physics and chemistry of the different processes are given. Membrane-based technologies are discussed with emphasis given to their energy consumption and cost as well as potential and actual environmental impacts.

NURSES' EDUCATION AND PERCEPTIONS ON CLIMATE CHANGE: A SCOPING REVIEW

Thierno Amadou Diallo, Martin Roberge and Anouk Bérubé
Laval University, Canada

Abstract

Background: Climate change (CC) is a major threat to human health. Risks to health include air pollution, threats related to extreme weather events, changes in the geographic distribution of vector-borne diseases, water availability and quality, access to food, forced migration and mental health. As one of the largest group of health professionals, nurses have a critical role to play in raising awareness of this phenomenon and addressing health consequences experienced by the most vulnerable populations. They must constantly adapt their practice to adequately respond to new health issues caused by CC. Working in a multitude of settings, nurses need to be involved in fighting those issues, individually and collectively, and should promote policies to protect populations from the adverse effects of CC. To do so, nurses should be aware of their role in the fight against the climate crisis.

Objective: To study nurses 'education and perceptions on climate change.

Methods: A scoping review was therefore conducted to answer the following questions: What are nurses' perceptions of CC? And how are CC issues addressed in the nursing education curriculum?

Results: Results show that nurses have a great concern for health impacts of CC but have a variable and generally low level of knowledge on the subject. They perceive CC issues as complex and the solutions as inaccessible. It is suggested that content related to CC and health be integrated from the baccalaureate to the doctoral level through case studies, simulations, and group discussions. The use of theoretical models could broaden the perspective of nursing students. However, several challenges arise: overloaded curricula, professors not trained in CC, effectiveness of teaching methods to be tested, etc.

Conclusion: Educational interventions could increase nurses' knowledge and awareness about CC, thus contributing to CC adaptation, mitigation and resilience.

Biography

Thierno Amadou Diallo is professor in the Faculty of Nursing at the Laval University in Quebec, Canada. His research interests focus on climate change and health, Health Impact Assessment and urban health. He has worked with public interest organizations, higher education institutions and government agencies in Europe and Canada, as well as United Nations agencies including the United Nations Environment Programme. Thierno holds a PhD in Environmental Sciences from the University of Geneva. He completed postdoctoral research at the Laval University on urban planning and public health. He serves as associate editor of *Global Health Promotion*. Research interest is about climate change.

Virtual Day-2
Oral Presentations

ENHANCED DEGRADABILITY AND MECHANICAL PROPERTIES OF BIODEGRADABLE PLASTIC COMPOSITES WITH NEW ZEALAND JADE WASTE

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[2]New Zealand Institute for Minerals to Materials Research, New Zealand

Abstract

Background: Plastic pollution has become a global concern, demanding urgent attention and concerted efforts to mitigate its environmental impact. Biodegradable plastics have emerged as a potential solution, offering the prospect of reduced harm through degradation over time. However, their lower mechanical strength and slower degradation process have hindered their widespread adoption.

Objective: To improve mechanical strength, reduce flammability, and increase degradability of poly (lactic acid) (PLA) by compounding with New Zealand (NZ) jade waste.

Methods: We investigate the incorporation of NZ jade (pounamu) particles, which were the waste produced by carvers, artists, and designers of jade, at various weight percentages (0, 5, 7.5, and 10 wt. %) into PLA by extrusion compounding. Then, we 3D printed and compression-molded the compound, respectively. We employed XRD, XRF, EDAX, SEM, tensile tests, three-point bending, density measurements, flammability test, rotational rheometry, and TGA to characterize jade particles, 3D printed composites, and compression-molded composites and to compare the two processing methods.

Results: Jade particles has significant impacts on the density, thermal stability, and mechanical properties of the composites. The addition of jade particles led to a reduction in flammability, indicating that these particles may possess flame-retardant properties. On the other hand, the addition of jade accelerated the thermal degradation process in terms of molecular weight decrease and decomposition temperature reduction. Considering the biodegradability of the composites, our results suggest that the presence of jade particles could potentially accelerate the biodegradation process. The effects of compounding jade particles on mechanical properties were found to be complex. Notably, we observed differences between the compression-molded and 3D printed samples.

Conclusion: This study demonstrates the successful production of biodegradable composites utilizing jade waste particles and PLA resin. The findings highlight the potential for repurposing ceramic waste into sustainable materials, contributing to waste reduction and environmentally friendly practices.

Biography

Lilian Lin is a Ph.D. candidate in Chemical and Process Engineering. She currently holds a Bachelor's Degree with Honors in Chemical and Process Engineering and a Bachelor's Degree with Commerce majored in Accounting and Taxation. She believes, by combining her knowledge in both degrees and her interest in research, that she will be able to produce unique and sustainable solutions that will benefit the global society. She has research background in a wide range of areas such as plastics, and materials for biomedical engineering, supercritical fluids, foams, cultured meat, sterilizing endospores of bacteria, zeolites, food sterilization and waste treatment. The main focuses in those research areas are generating better alternatives to our welfare, material characterization, environment, sustainability, project economics and energy savings. Research interests include biodegradable composites, polymers, sustainability and polymer characterization.

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SOIL ORGANIC CARBON MINERALIZATION AND STORAGE UNDER VARYING FIRE REGIMES IN A GUINEAN SAVANNA (CÔTE D'IVOIRE, WEST AFRICA)

Armand W. Koné, Guy R Yapo and Aya B N'Dri

Nangui Abrogoua University, Côte d'Ivoire

Abstract

Background: Offsetting atmospheric CO_2 emissions through strengthening carbon sequestration in biomass and soil is a major lever for mitigating climate change and promoting soil biodiversity. This study was carried out in the Lamto reserve (Central Côte d'Ivoire, West Africa), where the management of the Guinean savanna is fire-based. Although the prevention of bush encroachment was the main focus in that savanna, soil organic carbon (SOC) storage is also of high importance and should be investigated.

Objectives: To explore efficiency of two new fire regimes, early and late dry season fires (EDS and LDS), annually lighted at the onset and end of the dry season, relative to the usual mid-dry season fire (MDS) in promoting soil microbial activities and soil organic matter (C and N) accumulation.

Methods: Experiments took place at three sites, including three 150 m x 50 m plots each, corresponding to LDS, MDS and LDS, subjected to burning for eight years. Soil samples were collected at 0-10 cm depth for microbial activities, and 0-10 and 10-30 cm depths for SOC stocks.

Results: The rate of soil C mineralization was lower under EDS and LDS than under MDS fires. β- glucosidase activity was higher under LDS than under EDS and MDS fires. The SOC stock (0-10 cm- depth) was greater under MDS fires (20.1 ± 1.6 Mg ha^{-1}) than under EDS and LDS fires (17.3 ± 1.2 and 16.8 ± 0.4 Mg ha^{-1}, respectively). SOC stock at 0-30 cm depth did not vary between treatments, nor did total soil N stock.

Conclusion: Burning the Guinean savanna at the onset or the end of the dry season is less efficient than doing it at the mid-dry season in terms of SOC storage. These findings may be useful in decision-making in the management of the Guinean savanna taking into account both above- and below-ground compartments.

Biography

Armand W. Koné graduated in 2009 with a PhD in Soil Ecology/Agroecology and 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 (cash crops: cocoa, coffee, coconut, rubber. and food crops: maize, rice, cassava, yam, market gardening). 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. I have a proven track-record in publishing scientific articles in international journals on topics closely related to soil ecology, agroecology, soil fertility, nutrient cycling and carbon issues. In addition, he currently acts as a reviewer for international journals and is an active member of 4 international research networks. Research interests include soil ecology, agroecology, agroforestry, soil organic carbon, soil biology, soil microbial activity and crop production.

TOXICITY OF FINE PARTICULATE MATTER DURING FIREWORK EVENT IN DELHI, INDIA

Khushbu Dahiya, Shivani and Ranu Gadi
Indira Gandhi Delhi Technical University for Women, India

Abstract

Background: Air pollution in megacity Delhi, the capital of India known to have detrimental impact on human health. Over a Decade Delhi has been suffering large exposure to pollutants especially fine particulate matter ($PM_{2.5}$) which is extremely fatal owing to its fine size (2.5 µm). Mass concentration of $PM_{2.5}$, key indicator of air quality is not adequate to categorise the hazardous health impacts due to $PM_{2.5}$ levels. Oxidative Potential (OP) is considered as an indicator of toxicity and $PM_{2.5}$ health impacts.

Objective: To study the influence of firework activity during Diwali event (7th November 2018) and associated toxicity.

Method: 12-hour and 24-hour $PM_{2.5}$ samples were collected during 6th -26th November 2018 at Indira Gandhi Delhi Technical University for Women. Oxidative Potential (OP) of $PM_{2.5}$ samples were assessed using Dithiothreitol (DTT) assay in terms of intrinsic (mass-normalised, OP_m^{DTT}) and extrinsic (air volume-normalised, OP_V^{DTT}) to study the toxicity of $PM_{2.5}$ samples.

Result: The fireworks resulted in the elevated concentration of $PM_{2.5}$ in Delhi. 24-hour averaged $PM_{2.5}$ concentrations during pre-Diwali and post-Diwali days were 132.5±19.1 µg/m^3 and 248.1 µg/m^3. 12-hour $PM_{2.5}$ concentration on Diwali night was almost ten times (1426.3 µg/m^3) more than the day-time concentration (115.5 µg/m^3) which clearly revealed the firecrackers burning effect on $PM_{2.5}$ concentration. During Diwali, 24-hour average $PM_{2.5}$ levels exceeded 12 times more than the permissible limit (60 µg/m^3) prescribed by National Ambient Air Quality Standards (NAAQS). OP_m^{DTT} and OP_V^{DTT} during Diwali event was 5.60 nmol min^{-1} µg^1 and 46.8 pmol min^{-1} m^{-3} respectively.

Conclusion: This study highlights that air quality measurements should include oxidative potential along with $PM_{2.5}$ mass concentration to consider the associated health impacts due to toxic potential. We also suggest that the use of OP as a complementary measure to the PM mass concentration because the high oxidative potential of $PM_{2.5}$ that indicates strong ability of city air to cause oxidative stress.

Biography

Khushbu Dahiya is presently Research Scholar at Indira Gandhi Delhi Technical University for Women, India, 110006. Research interests include chemical characterization of ambient aerosols, source apportionment and health risk assessment.

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DESIGN OF OBJECTIVE FUNCTION BASED SEGMENTATION TECHNIQUE AND SUPERVISED CLASSIFICATION SCHEME FOR REMOTE SENSING IMAGES

Ravi Ande and Ayesha Choudhary

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Abstract

The present a fast and accurate multi-level image segmentation approaches and hybrid classification scheme of remote sensing images which can enhance the overall segmentation as well as classification accuracy. First and foremost, an innovative objective function-based image segmentation approach is proposed which is based on the normalized index value of image pixels and the probability of the pixel intensities to reduce the computational complexities of segmentation problem. In another work, rectangular sum-table based concept known as the Integral Image (II) combined with the probability of the pixel values of grayscale images has been applied to find the local threshold values at a faster rate. To solve a multi-level problem, a recursive approach is desired which can improve the computational complexity. So to improve it further, some of the nature-inspired popular optimization algorithms namely Differential Evolution (DE), Particle Swarm Optimization (PSO), Genetic Algorithm (GA), Artificial Bee Colony (ABC), Cuckoo Search (CS), Firefly Algorithm (FA) have often been applied by the numerous researchers to achieve fast, accurate, and converged optimized results.

Objective of the Research

Following are the objectives of the research:

- Developing a new objective function for image segmentation.
- Developing an efficient and accurate optimization algorithm for segmenting images.
- Developing a quantum mechanics-based algorithm for segmenting specially color images with higher segmentation accuracy.
- Developing a hybrid image classification technique for multi-resolution remote sensing satellite images.

Results: Started to converge after 7000 FEs whereas ABC, GA, and PSO at 7500, 8000, 8500 iterations respectively. With the increase of levels like Lv=7 and 10, MIMPSO has also maintained its fast convergence rate at 11000, 14000 FEs whereas ABC, GA, and PSO converge at 11600, 12000, 13100 for 7 level and 14700, 15000, and 15600 for 10 level respectively.

Conclusion: It can be concluded that the proposed IPSO-MCET approach has effectively overcome the challenges of premature and late convergence problems of standard PSO algorithm. In the proposed technique, mutual and inclusive learning have been proposed and finally combined these two learnings to design MIMPSO algorithm.

Biography

Ravi Ande, I did my PhD in Hydrogeological and Geophysical Investigations and M. Tech in Mineral Exploration from the University of Hyderabad. Topographical and Hydrogeological investigations such as water level monitoring and water level fluctuations for Pre, Post monsoon seasons of wells. Geophysical investigations to identify aquifer depth, groundwater potential zones and Preparation of geological and geomorphological maps with field checks. I used Geophysical instrumental Techniques in the Hydrogeological Field work and followed the Integrated Strategies: Comprehensive presentation and analysis of the inferences of Electrical, VLF-EM and Magnetic methods. At Present pursuing my M. Tech in Data Science, Artificial Intelligence and Machine learning.

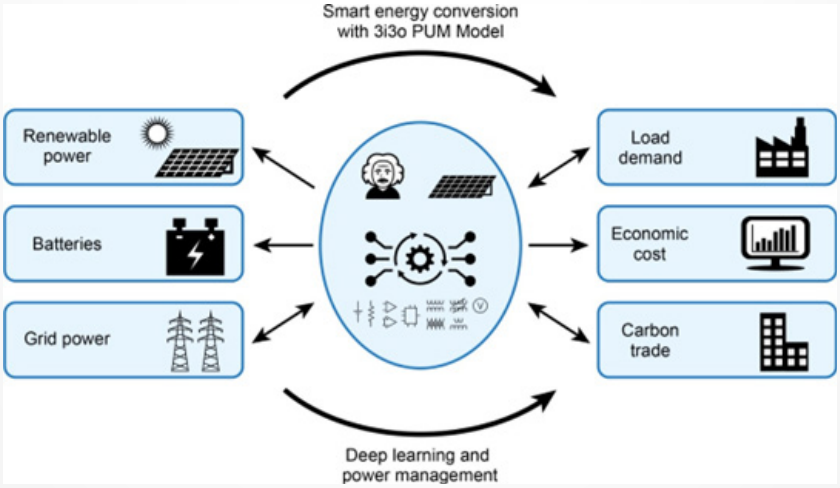
THEORETICAL MODEL AND SIMULATION OF THE POWER UTILITY MATRIX IN ORDER TO ACHIEVE CARBON PEAK AND CARBON NEUTRALITY

AJ Jin
Ningbo University, China

Abstract

This talk will present the methodology and broad applications of smart distributed energy resources (DER) in terms of energy generation, consumption, transaction, and power scheduling. The study discovers that the above DER approach follows a simplified and ubiquitous math model for 3i3o relationship that characterizes a smart DER system theory with a power utility matrix. The theory in part interprets the carbon emission in terms of an energy-mass conversion index. Case studies are presented to optimize smart energy management; control algorithms are applied to predict and control the carbon emissions. The theory is a valuable tool for a DER system that implements its exergy and that has the highest efficiency for the utilization of energy resources. A solution to the theoretical model can be effective market drivers to achieve carbon neutrality through smart energy management.

A graphic abstract and the keywords are attached below.



IMPACTS OF CLIMATE CHANGE TO AFRICAN INDIGENOUS COMMUNITIES AND EXAMPLES OF ADAPTATION RESPONSES: CASE OF THE BAKAS AND BANTOUS PEOPLE LIVING AT THE PERIPHERY OF THE DJA BIOSPHERE RESERVE

Nwafi Ngeayi Adi, Walter Leal Filho, Newton R Matandirotya and Johannes M Lütz

ACOBIDER, Cameroon

Abstract

Background: 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, 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.

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 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 with regard to 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 particular 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 1000 women actively involved in Agriculture and NTFP 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 include environmental sustainability and development.

MODIFICATION AND SURFACE FUNCTIONALIZATION OF FLY ASH FOR VARIOUS APPLICATIONS

Sangeeta Tiwari
Amity University, India

Abstract

Fly ash (FA) is an industrial waste produced in large quantities from thermal power plants and poses big environmental concern. The utilization of fly ash is still a challenge. The chemical constituents that are mainly present in fly ash are SiO_2, Al_2O_3, Fe_2O_3 and occasionally CaO. Besides many bulk utilization reported for Fly ash, very few value added applications have been reported. The present study reports some value- added application of Fly ash as extender in paints, in NIR reflective coatings and as a photocatalyst.

The surface of Fly ash is inert and difficult to chemically modify. Efforts have been made to activate the surface and uniformly coat with certain metal oxide nano particles like TiO_2 and ZnO resulting in core shell structure. Synergy of the two materials is created to produce a multifunctional composite material which can have multifarious applications in low cost NIR reflective coatings, as photo catalyst etc.

TiO_2 shell on the FA core was achieved by use of an anionic surfactant (SDS). NIR reflectivity increased with increase in annealing temperatures as result of fusion of nanoparticles and formation of rutile phase. The present study discusses development of favourable conditions for incorporation of TiO_2 on FA while establishing the concept of making a sustainable material for energy conservation. In another application, ZnO nano flakes were grown on Fly ash surface and used for dye degradation. Ly ash provides an excellent inert support and is easily removed after application.

Biography

Sangeeta Tiwari is Professor in Chemistry at Amity Institute of Applied Sciences, Amity University Noida. She is actively associated in teaching, research and other important developmental activities at Amity University. She did her PhD from CSIR-Advanced Materials Processes and Research Institute (AMPRI), Bhopal, India, in the year 1999. During her early research career, she was awarded M.P. State Young Scientist as well as Indian Science Congress -Young Scientist Award. She had two granted patents with CSIR-AMPRI and research project from Building Materials Technology Promotion Council, New Delhi.

After Ph.D., she joined Amity University where she is a Professor in Chemistry at present and Head (Academic Co-ordination) AIAS. She has quite a good number of high impact research publications to her credit, produced Ph.Ds and has filed no of patents with Amity University, out of which two are granted. Her current area of research is functional materials for various applications like removal of toxic contaminants from water, carbon dioxide conversion and NIR reflective coatings. She has sponsored National and International collaborative projects.

USE OF IONIC LIQUID PRETREATED AND FERMENTED SUGARCANE BAGASSE AS AN ADSORBENT FOR CONGO RED REMOVAL

Uroosa Ejaz

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Abstract

A large amount of industrial wastewater containing pollutants including toxic dyes needs to be processed prior to its discharge into the environment. Biological materials such as sugarcane bagasse (SB) have been reported for their role as adsorbents to remove the dyes from water. In this study, the residue SB after fermentation was utilized for the dye removal. A combined pretreatment of NaOH and methyltrioctylammonium chloride was given to SB for lignin removal, and the pretreated SB was utilized for cellulase production from *Neobacillus sedimentimangrovi* UE25. The strain produced 118 IU mL^{-1} of endoglucanse and 70 IU mL^{-1} of β-glucosidase. Scanning electron microscopy and FTIR spectra showed lignin and cellulose removal in fermented SB. This residue was utilized for the adsorption of an azo dye, congo red (CR). The thermodynamic, isotherm and kinetics studies for the adsorption of CR revealed distinct adsorption features of SB. Untreated SB followed Langmuir isotherm, whereas pretreated SB and fermented SB obeyed the Freundlich isotherm model. The pseudo-second-order model fitted well for the studied adsorbents. The results of thermodynamic studies revealed spontaneous adsorption with negative standard free energy values. Untreated SB showed a 90.36% removal tendency at 303.15 K temperature, whereas the adsorbents comprised of pretreated and fermented SB removed about 98.35% and 97.70%, respectively. The study provided a strategy to utilize SB for cellulase production and its use as an adsorbent for toxic dyes removal.

Biography

Uroosa Ejaz (Lecturer at Shaheed Zulfiqar Ali Bhutto Institute of Science And Technology (SZABIST), Karachi Campus & PhD scholar at Department of Microbiology, University of Karachi). Ms. Uroosa Ejaz is a young PhD scholar and lecturer. Her six years of research career shows her potential. She has published 23 articles in well-reputed International Journal. She also wrote 5 book chapters published by Springer and Elsevier. She has work experience from Aga Khan University and Hospital, Patel Hospital, Bahria University and University of Karachi. She worked as a research assistant in HEC funded project NRPU 6579.

Virtual Day-2
Poster Presentations

IMPACTS OF AGGREGATE QUARRIES ON THE ENVIRONMENT, IN PARTICULAR THE ATMOSPHERE (DUST IMPACTS) "CASE OF HELIOPOLIS GUELMA AGGREGATE QUARRY"

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Abstract

Background: Due to the increase in human continuous needs for building and reconstruction materials, mining projects have increased, thus their negative effects on the environment have increased against the fauna and flora. Causing many environmental problems, serious respiratory and carcinogenic diseases in addition to allergic skin diseases, against the people who live next to these quarries, especially the workers breathing those dust particles of different sizes (pm 2.5, pm 5, pm10 … ug/m^3).

Objective: To define the relationship between quarries, environmental impacts and human health.

Methods: To understand this phenomenon, the presence study was carried out on the large quarry located nearly 2.5 km from the national road n° 21 connecting Guelma to that of Annaba so we will quantify the dividing effects of pollution generated by the exploitation of aggregates on this quarry Through :

a. Knowledge of the sedimentary environment

b. Quantification of dust degraded by the quarry

The study of the sedimentary environment: The sedimentary approach consists of studying the working face of the quarry and taking samples from the different levels for lithological and chemical analysis.

The study of dust: The study of degraded aerosols interests us both from a quantitative and qualitative point of view in this process of pollution by dust, we distinguish two dynamics transport and deposit both are conditioned by the wind speed and grain size.

Quantization: The approach followed to quantify the dust consists in taking samples of sediment deposits in the 0.22 m^2 surface bins they are placed in the 07 stations around the emission center, station 1 is located in the interior of the quarry, the other stations are respectively installed at 10 et 20, 40 et 60, 80 et 100 m in the directions, west- north, north east- and east the choice of distribution is based on the direction and the power of wind the samples were taken in winter 2022.

Results: As it IS mentioned in the table 1. We can see that when we approach to the aggregate crushing site, the dust measurements increase very quickly, so this shows that the environmental impact factor is very high in relation to the processes treatment of aggregates, accordingly will affect significantly and seriously on human health. For the information that the area where this quarry is located is an agricultural area, so we found that the dust covers the surfaces of the plants surrounding the quarry, which disrupted the process of photosynthesis and thus led to the weakening of agricultural production.

Distances (m)	Pm2, 5 (ug/m³)	Pm 10 (ug/m³)	TVOC	HCHO	HUM	T°	State
100	003	004	0,047	0,007	32	35,7	good
60	021	027	0,024	0,004	30	35	good
40	143	190	0,035	0,005	33	33,4	grave
20	515	676	0,074	0,011	31	34,1	grave

Conclusion: Based on the results obtained, it is necessary in the future to establish more precise conditions for the exploitation of quarries and organize a project monitoring committee during and after the exploitations to avoid any air pollution, Or to reduce its effects at least. In order to protect our planet and preserve our precious environment.

METAL BIOSORPTION BY EXOPOLYSACCHARIDES PRODUCED BY BACTERIAL STRAINS ISOLATED FROM MARINE HYDROTHERMAL VENTS

Johnthini Munir Ahamed, Hans-Uwe Dahms and Yeou Lih Huang
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Abstract

Exopolysaccharides are biopolymer produced by the microorganisms such as bacteria and fungi to protect themselves and survive in harsh environmental conditions such as fluctuating temperature, pressure, salinity and toxic substances like heavy metal conditions. The study highlights the metal biosorption capacity and metal chelation ability of bacterial EPS extracted from the four HV associated bacterial strains namely *Exiguobacterium aquaticum, Mammaliicoccus sciuri, Micrococcus luteus*, and *Jeotgalicoccus huakuii*. Increased EPS production was recorded by metal amended conditions, medium composition and carbon sources. The four EPS were chemically characterized by BCA assay and phenol sulphuric acid method revealed that it contains relatively high carbohydrate content and little protein content. Scavenging of radicals was done by DPPH assay showed that EPS influences free radical scavenging and has a high synergetic effect on antioxidant activity. FTIR analysis were done with and without metal ions showed shifting of functional groups after adding metal ions. SEM and CLSM results showed that EPS secretion and biofilm formation in metal stress conditions. Biosorption assay was carried out with eight metals such as As, Cu, Co, Cr, Pb, Ni, Cd, and Hg revealed that high removal efficiency of As (84%) by *E. aquaticum*, Cd (95%) by *M. sciuri*, Cu (95%) by *M. luteus*, and Ni (80%) by *J. huakuii* when compared to other studied metals. Metal removal by EPS and adsorption capacity of metals was further increased at acidic conditions (pH 5) and longer contact time. Langmuir compared to the Freundlich model was found to fit better the having maximum adsorption capacity for As (34.65 mg/g), Cd (52.88 mg/g), Cu (24.91 mg/g) and Ni (58.38 mg/g) adsorption by EPS. The maximum metal adsorption of EPS of 4 bacterial strains suggested their ability as bio sorbents of metal ions.

Biography

Johnthini Munir Ahamed, a marine biologist with over 5 years of experience in the field. I was born and raised in a coastal town and developed a love for the ocean at a young age. After completing my postgraduate degree in marine science, I came to earn a Ph.D. in the same field. My area of research focuses on the effects of heavy metals on marine ecosystems, particularly hydrothermal vents. I had conducted fieldwork and labwork in various parts of the world, including the Andaman and Nicobar Islands, India and Kueishantao island, Taiwan. In addition to my research, I am so passionate about ocean conservation. I have worked with various institutions to gain knowledge about the importance of preserving marine ecosystems. I also serve as a mentor to young marine biologists and encourage them to pursue their passion for studying the ocean. Research interests include marine biology, microbiology, biotechnology, biosorption technology, marine pollution, environmental biology.

USE OF MIXED RECYCLED AGGREGATES IN CONCRETE: INFLUENCE OF WATER COMPENSATION METHOD ON PHYSICAL AND MECHANICAL PROPERTIES, FREEZE-THAW PERFORMANCE OF CONCRETE RESPECTIVELY

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Abstract

Background: In concrete mixtures with recycled aggregates a certain amount of water is typically extra added to compensate for the water absorbed by the recycled aggregates. The water compensation method (WCM) can affect the performance of concrete. Mixed recycled aggregates (MRA), with their higher water absorption, require greater attention to the influence of the WCM on the properties of concrete than the recycled concrete aggregates.

Objective: To investigate the influence of the WCM on fresh and hardened properties of concrete with MRA.

Methods: The initial slump value, compressive strength, electrical resistivity, and freeze-thaw performance of concrete with MRA were experimentally examined in this study. Two research parameters were varied: the replacement ratio of limestone by MRA (25 Vol-% and 50 Vol-%) and the WCM (80% and 100% of the 24 hours water absorption of the MRA as additional free water, i.e. 0.8AF and AF; 80% and 100% of the 24 hours water absorption of the MRA as pre-wetting water for the MRA, i.e. 0.8S and S). Electrical resistivity and freeze-thaw performance were only studied for concrete with 50 Vol-% MRA.

Results: The WCM has a significant impact on the performance of concrete. Among the four methods, the AF method can lead to the highest initial slump, the lowest strength and the worst freeze-thaw resistance. Besides, the pre-wetting methods show a generally better performance than the additional free water methods. Electrical resistivity decreases with the increase of MRA in concrete but is not significantly influenced by the WCM.

Conclusion: The AF method should be avoided in concrete production. By selecting an appropriate WCM, it is possible to achieve comparable or even superior performance for concrete with MRA in comparison to concrete with limestone.

Biography

Haoyu Hao is a doctoral researcher at the research group RecyCon, KU Leuven Campus Brugge, where he is pursuing a PhD in Civil Engineering Technology. He is currently researching the circularity of construction and demolition waste (CDW) material, with a particular focus on the frost-resistance performance and improvement of concrete with mixed recycled aggregate. His work aims to find practical and sustainable solutions for improving waste material recycling and enhancing the lifespan of concrete structures. He has expertise in concrete technology and structure analysis of concrete. He has conducted extensive laboratory tests to evaluate the performance of concrete incorporating mixed recycled aggregates, such as compressive strength, water transport behavior, and frost resistance. He has also studied the mechanisms and factors affecting the behavior of recycled aggregates in concrete. Research interests include recycling of construction and demolition waste and concrete durability.

SPATIAL DISTRIBUTION OF ANTHROPOGENIC RADIONUCLIDES IN THE SOIL-FRESHWATER ECOSYSTEM OF THE ARCTIC OF CENTRAL SIBERIAN (RUSSIAN FEDERATION)

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Erismann' Federal Scientific Centre Hygiene, Russian Federation

Abstract

Background: The Arctic, included Siberian territory, contains an abundant and wide range of freshwater ecosystems, including lakes, ponds, rivers and streams and a complex array of wetlands and deltas. Consideration is migration anthropogenic radionuclides in system soil-freshwater ecosystem and also given to the possible consequences of accidents and other possible future sources of contamination in the Arctic. The major contaminant groups in the Arctic are persistent organic pollutants (POPs), heavy metals and artificial radionuclides.

Objective: Samples of soil, grass and organs of herbivore mammal were collected from different sampling locations in five states within the south-western area of the Arctic of central Siberia.

Methods: The activity concentrations of natural and artificial radionuclides present in the collected samples were detected with a method of gamma spectrometry using High Purity Germanium detector.

Results: Much of the nuclear activity of the Russian Federation took place within or adjacent to the confines of the Ob and Yenisei Rivers drainage basin. These sites have been the locations of accidental and planned releases of major amounts of radioactive materials since the dawn of the nuclear era. More important, these sites contain vast amounts radioactive waste, in storage, released to the environment, and injected into geologic formations at relatively shallow depth. Our research reveals the gradual emergence of a new source of radioactive contamination in high latitudes of the Arctic that is essentially secondary by origin. Anthropogenic radionuclides (^{137}Cs, ^{241}Am, and ^{207}Bi) produced in atmospheric nuclear tests in the 1950s–1960s were deposited by glaciers.

Conclusion: The Yenisei and Ob are of the largest rivers flowing into the Arctic, there has been considerable concern over past delivery of radioactive contaminants to the Arctic and the potential for much larger future releases.

Biography

Lydia Bondareva, PhD of Analytical Chemistry, Full Professor of Ecology, Leader research in Analytical laboratory. Education: Lomonosov's Moscow State University, Analytical chemistry. Field: analytical chemistry, radioecology, chemistry of pesticides, aquatic plants. I have more than 200 scientific articles in top-rated scientific journals and am the author and co-author of monographs. Research interests are analytical chemistry, radioecology, chemistry of pesticides and aquatic plants.

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