

Global Summit on
**Climate Change &
Environmental Sustainability**

October 28-29, 2024 | Rome, Italy



Conference Programme

Day 1 - October 28, 2024

Meeting Hall: Ripa

08:00 - 08:45 Registrations

08:45 - 09:00 Opening Ceremony and Introduction

Keynote Presentations

9:00 - 9:40 Nancy Butler Songer, The University of Utah, USA

Title: Training a New Generation of Problem Solvers: The Eco-Solutioning Approach

9:40 - 10:20 Alfonso Marino and Paolo Pariso , University of Campania Luigi Vanvitelli, Italy

Title: Climate Change and Environmental Sustainability - Understanding the Connection and Exploring Solutions

Networking & Refreshments: 10:20 - 10:45 @ Lobby Bar

Oral Presentations

Session Chair Alfonso Marino, University of Campania Luigi Vanvitelli, Italy

Session Chair Nancy Butler Songer, The University of Utah, USA

Sessions: Marine Sciences, Marine Ecology and Aquatic Environment | Climate Justice and Equity | Circular Economy Practices | Climate Finance and Investments | Climate Policy and Governance | Carbon Reduction Initiatives | Climate Adaptation Strategies | Waste Management and Recycling | Climate Adaptation Strategies | Biodiversity Conservation

10:45 - 11:10 Bakos Christos and I Koliakou, Anatolia College STEM Center, Greece

Title: Investigation of GC-Content Variation in Relation to Sea Water Temperature: Case Study for Mediterranean Monk Seals

11:10 - 11:35 Maciej Czerwiński, Michal Kurek & Pawel Lipinski, Lazarski University, Poland

Title: Low Emission Zones Issues - European Perspective and Challenges in Human Rights and Public Administration

11:35 - 12:00 Kent Toyonaga, Texas A&M University, USA

Title: The Circular Economy in Schools

12:00 - 12:25	Liying Xu, Global Energy Sustainability, USA
Title: Climate Finance and Investments- Real Options Evaluation on Hydrogen Geological Storage	
12:25 - 12:50	Vanda Lamm, Szechenyi Istvan University, Hungary
Title: Climate Change and the World Court	
Group Photo: 12:50 - 13:00	
Lunch: 13:00 - 14:00 @ Ristorante	
14:00 - 14:25	Emmanuel Kabundu, Nelson Mandela University, South Africa
Title: Energy and CO ₂ Emission Efficiency Strategies for the Residential Housing Layouts: The Case of Ecosun Settlement, Ndlambe Municipality in South Africa	
14:25 - 14:50	Tapan Kumar Chakraborty, Action Against Hunger, Bangladesh
Title: Land and Water Based Farming Practices in Variedly Elevated Homesteads to Cope with Waterlogging	
14:50 - 15:15	Sergio Clemente Castro, ITENE, Spain
Title: Optimization and Characterization of Extracted Coffee Oil Obtained by Supercritical CO ₂ of Spent Coffee Ground	
15:15 - 15:40	Milan van Wyk, University of Johannesburg, South Africa
Title: Climate Related Integrated Reporting Practices: A Developing Country Perspective	
15:40 - 16:05	Heiniger Charlene, University of Applied Science and Art of Western Switzerland, Switzerland
Title: What Resources for Bees in Urban Areas? The Case of Geneva, Switzerland	
Networking & Refreshments: 16:05 - 16:40 @ Lobby Bar	
Day 1 Concludes followed by Certificate Felicitation	

Day 2 - October 29, 2024

Meeting Hall: Ripa

Keynote Presentations

9:30 - 10:10 **Ana Tapia, Houston Wilderness, USA**

Title: Targeted Large-Scale Native Tree Planting Framework for Ecosystem Services Enhancements in Urban and Industrial Areas to Improve Climate, Air Pollution, Health, and Urban Heat in Vulnerable Locations

10:10 - 10:50 **Seung-Hwan Han, Korea Expressway Corporation, South Korea**

Title: Estimation of GHG Emissions based on the LCA for Pavements & Bridges in South Korea by Considering the Use Stages

Networking & Refreshments: 10:50 - 11:15 @ Lobby Bar

Sessions: Climate Adaptation Strategies | Green Infrastructure and Urban Planning | Bioremediation and Biodegradation | Climate Adaptation Strategies | Renewable Energy and Resources | Biofuels, Biomass and Bioenergy | CO₂ Capture and Sequestration | Waste Management and Recycling

Poster Presentations

Poster Judge **Nancy Butler Songer The University of Utah, USA**

Poster Judge **Alfonso Marino University of Campania Luigi Vanvitelli, Italy**

CCP-01 **Eliseth Ribeiro Leao, Hospital Israelita Albert Einstein - Educational and Research Center, Brazil**

Title: Nature-Based Interventions for Enhanced Well-Being and Climate Resilience: A Randomized Clinical Trial Across Urban, Peri-Urban, and Rural Settings

CCP-02 **Maria Claudia Gatto, University of Naples "Federico II", Italy**

Title: Bioremediation of Potentially Toxic Elements: An OMICS Perspective

CCP-03 **Wacila Khoualdia, University Mohamed Cherif Mesaadia, Algeria**

Title: Climate Variability and Its Impact on Water Resources: Case Study of Northeastern Algeria South Mediterranean

CCP-04 **Moacyr Araujo, DOCEAN/UFPE, Brazil**

Title: Assessing Ocean Renewable Energy of Brazil

CCP-05	Pawel Wisniewski, Nicolaus Copernicus University in Torun, Poland
Title: Assessment of Greenhouse Gas Emissions from Crop Cultivation in the Sustainable Production of Biofuels in Poland	
CCP-06	Xiankun Li, Stockholm University, Sweden
Title: Are the Mechanisms Driving Heterotrophic Respiration after Rewetting Consistent in the Lab and the Field?	
CCP-07	Sergio Clemente Castro, ITENE, Spain
Title: Optimization and Characterization of Extracted Coffee Oil Obtained by Supercritical CO2 of Spent Coffee Ground	
Video Presentations	
VP01	Chengyi Ted Li, Daniel Chen, Greenfutures Foundation, Canada
Title: Integrating Indigenous Mariculture: Clam Gardens as a Model for Sustainable Coastal Management and Climate Resilience	
Day 2 Concludes followed by Panel Discussion - Awards & Closing Ceremony	
Lunch: 13:00 - 14:00 @ Ristorante	

Virtual Programme

Day 1 - October 28, 2024

Virtual Program (British Summer Time)

09:00 - 09:15 **Opening Ceremony and Introduction**

Oral Presentations

09:15 - 09:40 **Emina Kristina Petrović, Polly Stupples & Natasha Perkins, Victoria University of Wellington, New Zealand**

Title: Transitioning Away from Environmental Heath Harm from Building Materials

09:40 - 10:05 **Emina Kristina Petrović, Polly Stupples & Natasha Perkins, Victoria University of Wellington, New Zealand**

Title: Examining Impacts of Synthetic Pollution from Building Materials on the Environment and Social Justice

10:05 - 10:30 **Lei Zhang, Chinese Academy of Sciences, Xinjiang, China**

Title: Global Nitrous Oxide Emissions from Livestock - Manure during 1890–2020: An IPCC tier 2 inventory

Keynote Presentation

10:30 - 11:00 **Ashanendu Mandal, Energy Expertise and International Speaker, India**

Title: Phenol Removal from Wastewater using Innovative Biological and Industrial Wastes as Adsorbents

Oral Presentations

11:00 - 11:25 **Ghanshyam Singh, Dr YSP UHF Nauni Solan, India**

Title: Climate Change and Its Impact on Floral Vegetation and their Distribution.

11:25 - 11:50 **Lamrot Yohannes, University of Gondar, Ethiopia**

Title: Microbiological Quality of Edible Vegetable Oils Produced and Marketed in Gondar city, Northwest Ethiopia, 2021

11:50 - 12:15 **Elijah Kwasi Peprah, University of Health and Allied Sciences, Ghana**

Title: Public Health Implications of Climate Change in Small and Vulnerable Coastal Communities in Ghana

12:15 - 12:40 **Omar Portela Dos Santos, Universidade Católica Portuguesa, Portugal**

Title: Assessing Climate Change's Impact on Cardiopulmonary Health in the Canton of Valais: A Pilot Study

12:40 - 13:05 **Brian Krop, Green Equitech, Kenya**

Title: Comprehensive Proposal for Establishing a Renewable Energy Station Integrating Wind Power, Biogas, Solar Power, and Water Distribution Systems

13:05 - 13:30 **Bai-Sesay Gassimu, South Eastern Kenya University (SEKU), Kenya**

Title: Impacts of Cooperative Interventions on Beekeeping, Household Incomes and Forest Conservation: A Case Study of Kamaki Farmers' Cooperative Society in Kitui County, Kenya



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Keynote Presentations

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TRAINING A NEW GENERATION OF PROBLEM SOLVERS: THE ECO-SOLUTIONING APPROACH



Nancy Butler Songer

The University of Utah, USA

Abstract:

While our world consistently presents complicated, interdisciplinary problems with foundations in science, technology, engineering, and mathematics (STEM), most pre-university educational programs do not encourage STEM learning focused on creating solutions. We developed an instructional approach, Eco-Solutioning, that challenges youth to adopt and study one local environmental issue, such as invasive insects that can harm ecosystems, agriculture, and human health. In their study, youth investigate the life cycle and ecosystem disruption of their invasive insect and then do activities that include cycles of design, build, data collection, and refinement of their solution. The final product is the physical build of a trap to mitigate local invasive insect populations. We implemented the instructional program with 554 youth over three research cycles. Results document students' significant statistical improvements in problem-solving and engineering design. In addition, while before the program, students' views of engineers were narrow, after the program, students' views included descriptions of engineers as individuals who design solutions in fields including medicine and the environmental sciences. Perhaps most importantly, every instructional program concluded with student teams presenting their final traps and data on the effectiveness of their traps to local scientists, environmentalists, and community members. In this way, students could recognize that their learning had value in solving local environmental challenges. Our work suggests that educational programs that guide students towards interdisciplinary solution generation are needed so that youth recognize the importance of this work at early and pivotal ages.

Biography

Nancy Butler Songer, Ph.D., is the Associate Provost of Science, Technology, Engineering, and Mathematics (STEM) Education at the University of Utah. Over many years, Songer and her research team have developed and studied a new instructional model and multi-week instructional programs for youth's problem-solving in STEM fields. The curricular model, Eco-Solutioning, begins with an invitation from the local government to solve an environmental issue influenced by climate change. Youth conduct a series of activities that include multiple rounds of data collection and the building of solutions. Final activities include presentations to scientists and community members. Songer received a United States Presidential Faculty Fellowship from former President William Clinton and a Computerworld Smithsonian award for early work exploring the Internet's educational value.



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INVESTIGATION OF GC-CONTENT VARIATION IN RELATION TO SEA WATER TEMPERATURE: CASE STUDY FOR MEDITERRANEAN MONK SEALS

Bakos Christos and I Koliakou

Anatolia College STEM Center, Greece

Abstract:

In this work the GC-content of several Mediterranean Monk Seals (MMS) skin DNA samples, taken from the National Center for Biotechnology Information (NCBI) database published by Alba Rey-Inglesia et al. 2020, is calculated and useful conclusions were drawn regarding the association of GC-content variation with the sea water temperature. For the calculation of GC-content a Python program was developed using the Biopython package. The DNA samples were sorted by collection date, with only a few individuals lacking collection date information. For the GC-content calculation, twenty (20) historical and modern (mainly skin) samples are used. The division between historical and modern samples was set at 1975, as up to then there are records of resident monk seal groups in Central and Western Mediterranean. For the historical samples (1859–1975) all DNA extractions, library preparations and PCR set-ups for the historical samples were performed in a dedicated ancient DNA facility. All subsequent molecular biology-based laboratory work, such as PCR amplification, Bioanalyzer runs and sequencing, was performed in a separate DNA facility. For modern samples (1975–present) skin and muscle samples were extracted using the DNeasy Blood and Tissue kit as for historical skin samples. The results show strong correlation of MMS GC-content with sea water temperature and the findings could be useful to assess MMS dispersion or migration.

Biography

He is a student at Anatolia College in Thessaloniki, Greece and serves as the Member of the Green Ambassadors Club as well as the President of the Research & Innovation Club. Additionally, he is an active member of the Greek non-governmental environmental organization MOm/The Hellenic Society for the Study and Protection of the Monk Seal. In these roles, he is involved in initiatives related to climate change mitigation and environmental sustainability as well as research on wildlife mobility prediction models and stochastic models that simulate the complex dynamics of wildlife population growth.

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LOW EMISSION ZONES ISSUES - EUROPEAN PERSPECTIVE AND CHALLENGES IN HUMAN RIGHTS AND PUBLIC ADMINISTRATION

Maciej Czerwiński, Michal Kurek & Pawel Lipinski

Lazarski University, Poland

Abstract:

The topic of the presentation will be to put the issue of the low emission zones (LEZ) in a legal comparative context and to define the challenges associated with this topic in the field of human rights and public administration. The authors will primarily focus on answering the question of the impact of LEZ on environmental protection, supported by scientific studies from existing solutions (eg. London, Oxford, Berlin). At the beginning, the authors will present basic information about the LEZ, define their common goals and values. Next, the speakers will present the topic of the LEZ in terms of the right to a clean environment from an international legal perspective (focusing on the regulations from the EU, UN and Council of Europe). Thereafter, on the basis of the development of all the LEZ in European capitals, the speakers will select the most interesting ones and present their issues. Taking into consideration that LEZ expand and restrict individual rights, the authors will undertake to define the problem (in the area of the right to health, environmental protection and property rights). Using the example of the Warsaw LEZ, the speakers will highlight procedural and social issues in implementing this legal solution. They will present good practices that took place in Warsaw, as well as the challenges that the legislature had to face. In the end, the audience will hear what to pay special attention to when implementing LEZ. LEZs are a commodious topic, covering several fields of law and having a real impact on the lives of inhabitants. It is also a universal topic present in almost every European country and beyond Europe. The authors' presentation takes a holistic approach to the topic of LEZ from legal and environmental protection and will explore topics from many of the conference's scientific sessions.

Biography

We are a group of 4 young law students from various Warsaw Universities. We have been conducting research on low emission zones since December 2023. As part of our research, we have analysed low emission zones in all European capitals (in terms of legal basis, environmental impact, area and operating rules). We also focused on the Warsaw low emission zones, on the grounds of which we made an analysis in terms of property rights and details of solutions. Our project has received funding from our University (Lazarski University), and we are waiting for a decision on funding from the Polish Ministry of Higher Education. As part of the project, we carried out study visits to Berlin and organised a meeting with the Councilman of the Warsaw City Council. We are academically advised in the project by a supervisor (PhD) designated by the University.

Paweł Lipiński is a law student at Lazarski University. In his academic work, he focuses on the intersection of public policy and individual freedoms. His presentation will examine the impact of Low Emission Zones on individual rights and freedoms, analyzing how these environmental policies interact with personal autonomy and mobility rights.

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THE CIRCULAR ECONOMY IN SCHOOLS

Kent Toyonaga

Texas A&M University, USA

Abstract:

Japanese economic journal reports that in 2020, circular economy is only taught in K12 Civics and Geography classes at introductory level as a part of SDGs (Sustainable Development Goals) while industry like Mitsui Chemicals pushes to fund field activities that promote awareness of 3Rs, Reduce, Reuse and Recycle, applying textbook understanding into real life scenarios such as separating types of household waste, recycling notebooks, and composting animal waste. The study in collaboration further assesses the effectiveness of governmental incorporation of circular economy into the general curriculum from selected K12 schools (enhanced) to public schools nationwide. Typical public school students in Japan learns circular economy by 2nd year of middle school (age 14) together with other environmental sustainability concepts and climate change. Because of Japan's limited area of land and mandatory recycling, most schools employ the lessons that highlight the importance of recycle= (pronounced sairiyo) component of 3R. Private conglomerates are stepping in to help create program to promote circular economy lifestyle in next generation, offering the on-site work experience to raise environmentally responsible adults that hold the key to achieve decarbonization, global warming and climate change strategy. The promotion of global goal is to educate youths for early awareness of net zero is a study focus..

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CLIMATE FINANCE AND INVESTMENTS- REAL OPTIONS EVALUATION ON HYDROGEN GEOLOGICAL STORAGE

Liyang Xu

Global Energy Sustainability, USA

Abstract:

In the efforts to support sustainable finance and investments and to combat climate change, this research establishes a real options evaluation platform, integrating Geometric Brownian motion (GBM) stochastic price model, Black-Scholes options pricing model, and the project value model, to evaluate the geological hydrogen storage investments. The established evaluation platform is then applied to explore how the hydrogen market condition, i.e. hydrogen price volatility, and the storage operating parameters, including hydrogen storage operating cost, number of storage cycles each year, and the growth rate, affect the storage values. With the analysis of the data calculated from the established real options evaluation platform, this paper discovered that: 1) The volatility required for the base case to breakeven is as high as 264.5%, which indicates the future hydrogen market condition necessary for running the storage facility. 2) At the breakeven volatility, the options price is \$1.053/kgH₂. The options price provides insight on the minimum rent that a geological hydrogen storage charges. 3) Higher volatility results in higher options price and the project value, with decreasing rate after the volatility reaches around 150%. 4) The higher the storage operating cost, the less the options price and the less the project value, with a relationship close to a linear pattern. 5) Volatility and operating cost jointly affect options price and the project value. At low volatility, reducing operating cost will increase the project value. At high volatility (greater than 300%) range, the effect of volatility dominates the influence on options price. 6) Volatility and the growth rate affect project value in the same direction. At low volatility range, increase in growth rate does not change the project value significantly, while high volatility magnifies the effect of growth rate on the project value. 7) There is a linear relationship between the project value and the square root of the storage operating cycles each year within the studied operating cycle range. When the options exercise time is shortened along with the increase in the number of storage cycles each year, the volatility is reduced to reach the project breakeven point.

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CLIMATE CHANGE AND THE WORLD COURT

Vanda Lamm

Szechenyi Istvan University, Hungary

Abstract:

The Small Island Developing States have started their fights to get the advisory opinion of the ICJ on climate change more than ten year ago. Recently, as a result of these efforts, first in December 2022 COSIS, the international organization of the Small Island Developing States, submitted a request for advisory opinion to the International Tribunal of the Law the Sea on the effects of climate change; than in March 2023 General Assembly requested the International Court of Justice to render an advisory opinion on the obligations of States in respect to climate change. Increasing attention is paid to both cases by States, international organizations, and NGOs. The fact that the UN General Assembly initiated advisory proceedings before the ICJ on the obligations of the states in respect of climate change is certainly an important step toward fully implement the provisions set out in treaties relating to climate change. Advisory opinions do not have binding force, even to the requesting organ, however, they have great moral value and the interpretation of the legal norms by the two most prestigious international courts under all circumstances promote the solution of the problems. The clarification of the obligations of states relating to the protection of the climate system and other parts of the environment under international law and the determination of the legal consequences relating to the significant damages caused by the activities or omissions of the states will contribute substantially to climate justice and hopefully will guide the international community to urgently take measures against the deleterious effects of climate change.

Biography

Vanda Lamm Professor Emeritus of international law in Hungary. Graduating from the University of Budapest, postgradual studies at the International Faculty of Comparative Law (France) and at the Hague Academy of International Law, visiting scholar at Columbia University. Received Ph.D. in Hungary, since 2007 member of the Hungarian Academy of Sciences. For more than 40 years she was research fellow at the Institute for Legal Studies of the Hungarian Academy of Sciences, between 1991-2011 director of the Institute. Since 2001 member of the Institute of International Law, in 2009-2010 vice-president of the Institute. Between 1981 and 1983 Member of the UN Committee on Elimination of Discrimination against Women. In 2020 elected to be Vice-President for Humanities and Social Sciences at the Hungarian Academy of Sciences, the first woman in that position. Author of 8 books and more than 200 articles on public international law and human rights, published in Hungarian, English and French.

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ENERGY AND CO₂ EMISSION EFFICIENCY STRATEGIES FOR THE RESIDENTIAL HOUSING LAYOUTS: THE CASE OF ECOSUN SETTLEMENT, NDLAMBE MUNICIPALITY IN SOUTH AFRICA

Emmanuel Kabundu

Nelson Mandela University, South Africa

Abstract:

South Africa derives over 70% its energy from fossil fuels such as coal, resulting a significant contribution to greenhouse gas emissions (32% of CO₂ emissions) compared to other African countries. In addition, the energy supply in South Africa has not been able to cover the local demand resulting in frequent load shedding countrywide, thus negatively affecting the country's industry and economic performance. Since residential buildings account for about 22% of global energy consumption and 17% of greenhouse gas emissions, efforts to ensure energy efficiency in residential buildings in South Africa could significantly contribute to a reduction in local residential energy demand, channeling the much needed energy to other sectors, leading to an improvement in the performance of local economy. Using Ekuphumleni Village cadastral planning layout (CPL) in Ndlambe Municipality, Eastern Cape, this research aimed to investigate whether the nature of cadastral planning layouts of settlements can significantly influence the building envelope design with a view to ensuring energy efficiency. An annualized energy consumption analysis. Evolutionary optimization and generalized linear modelling together with parametric building energy simulations (based on sequential search methods) related to the green village building model were used to investigate this phenomenon. The Window to wall ratios and annual loads not met significantly influenced the annual energy consumption (and hence CO₂ emissions). Significant operational energy (and hence CO₂) savings were realized using orientation-based WWRs, appropriate shading, Window materials (Double glazing Low-E) and Air Change Rates (ACH), with higher ACH values in, particular, significantly improving upon the energy (and CO₂) savings.

Biography

Emmanuel Kabundu holds a Master of Science in Property Economics and Valuation and a PhD in Construction Economics obtained from the Nelson Mandela University in South Africa. He is teaching, providing graduate supervision and pursuing sustainability research under the Department of Building and Human Settlement Development, School of Built Environment and Civil Engineering at Nelson Mandela University. His focus areas of research are in Human Settlements, including Property and Housing and Real Estate Economics (Including Finance), Sustainability in human settlements (Affordability, Energy use, minimization of greenhouse gas emissions, and lifecycle cost studies). He is publishing in local and international journals and continues to present papers in local and international scientific conferences.

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LAND AND WATER BASED FARMING PRACTICES IN VARIEDLY ELEVATED HOMESTEADS TO COPE WITH WATERLOGGING.

Tapan Kumar Chakraborty

Action Against Hunger, Bangladesh

Abstract:

Waterlogging is one of the major problems in the south-western region of Bangladesh; this study was conducted in the eight most-affected areas in order to enhance agricultural production by applying Land and Water-based adaptive and alternative Farming Practices (LWFP). The study was designed to support some target (research) farmers by raising one part of their homestead to use for living and agricultural farming, with the other part excavated to store rainwater and use for aquaculture. The study also selected two groups of control farmers: those with ponds and those without. During this study, each year was divided into three cropping seasons: summer, rainy season, and winter. The study found that the research farmers produced significantly higher amounts of vegetables, dyke crops, fish, livestock, and poultry in every season compared to the control farmers. Moreover, the research supported the empowerment of women, which was not found in the control farms. Overall, the research program was embraced by the local communities as a very successful model study that showed how waterlogging marginally affected very poor people; they can cope with this severe problem by adopting various farming practices, and therefore, the application of this research approach is suggested for similarly affected areas.

Biography

Tapan Kumar Chakraborty has over 30 years of experience in development sector in Bangladesh, working mainly in the areas of climate change adaptation and resilience building with major focus on climate smart agriculture and farming practices, disaster risk management with a focus on forecast based anticipatory actions. Throughout the career, he has been working with the marginalized community and peasant households in disaster prone areas to understand the negative impacts of climate change on their livelihoods, how they perceive the changes and their own ways to cope with these changes, what type of support from external stakeholders they need to strengthen their capacity to address the adversities of climate induced disasters. He has been working with research institutions, academia and government technical departments to identify innovative technologies and approaches related to climate change adaptation. He has been continuing his endeavor to blend community knowledge with scientific knowledge to find a proper solution for the most vulnerable people affected by climate change. Tapan Kumar Chakraborty completed graduation in Agriculture from Bangladesh Agricultural University and post-graduation in Disaster Management from BRAC University.

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OPTIMIZATION AND CHARACTERIZATION OF EXTRACTED COFFEE OIL OBTAINED BY SUPERCRITICAL CO₂ OF SPENT COFFEE GROUND

Sergio Clemente Castro

ITENE, Spain

Abstract:

Spent coffee grounds (SCGs) are one of the most massive wastes from coffee processing and consumption worldwide. Although SCGs have a high content of carbohydrates, fatty acids and polyphenols, SCGs are usually valorized energetically or discarded, losing all these value-added compounds for the cosmetics industry. An option that is gaining many followers is to extract coffee oils containing these residues with supercritical CO₂ (scCO₂), since it is a method that does not damage the environment as much as other extractions and does not destroy the most valuable compounds. In the framework of the HOOP project, SCGs were collected from the Madaloki restaurant in the city of Kozani, Western Macedonia, and an oil fraction was extracted from this biowaste using scCO₂. The production of fatty acids by scCO₂ extraction is optimized and then compared with other conventional extraction methods such as hexane extraction and the Folch method. The conditions for scCO₂ were temperatures of 313.15K, 323.15K and 333.15K, pressures from 150 bar to 200 bar, and extraction times between 1 and 3 h.

In addition, the extraction of oils from coffee grounds with scCO₂ in the company of green co-solvents such as ethyl lactate was evaluated to see if solvents improve the reaction conditions. It has been shown that the use of co-solvents together with scCO₂ can lead to improvements in oil yields. Therefore in HOOP it will be determined whether this improvement makes the process more sustainable or whether including solvents can be counterproductive from an environmental point of view.

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CLIMATE RELATED INTEGRATED REPORTING PRACTICES: A DEVELOPING COUNTRY PERSPECTIVE

Milan van Wyk

University of Johannesburg, South Africa

Abstract:

Climate change has become a critical discussion point globally and a significant risk for many organisations. Organisations are called upon to contribute to the United Nations' Sustainable Development Goals (SDGs), which stems from the Paris Agreement. Climate change is regarded as one of the most critical SDGs due to its widespread impact, not only from an environmental perspective, but also on economies and the livelihoods. Climate change also has significant impact on organisations and can cause major disruptions as part of the value chain. The role of corporate reporting on climate related risks and opportunities are crucial from a transparency and comparability point of view. Integrated reporting <IR> is a valuable tool to communicate contribution to sustainable development matters, including climate change, by focusing on value creation to stakeholders outside the boundaries of the organization. The aim of the research is to illustrate the evolution of reporting of climate related matters in integrated reports of banks listed on the JSE stock exchange. The research followed a thematic content analysis methodology of all the JSE listed banks from 2016. The results indicate that climate change gathered more prominence from a risk management point of view with banks regarding it as one of their top ten risks in recent years. Furthermore, excellent reporting practices were observed where organisations manage to integrate climate related matters in the business model of the organization by linking risk management, strategy, performance management. The importance of involvement of key stakeholders in climate action is also observed. The research has practical implications for organisations that want to report on climate related matters within the context of value creation and describes examples of integration of climate related matters into business models. The research contributes to existing body of knowledge regarding sustainability reporting with a unique context from a developing country.

Biography

Milan is a qualified chartered accountant CA(SA) specializing in IFRS and sustainability reporting. He started his career at PwC and gained experience across various industries. He has a passion for developing young professionals and therefore chose a career in professional education. Milan is a senior lecturer in corporate reporting at the University of Johannesburg. He is currently completing his PhD in sustainability reporting specializing in climate reporting. Milan has extensive experience in quality reviews of corporate reports of listed companies on the Johannesburg Stock Exchange (JSE). He is a member of the JSE Proactive Monitoring team. He presents many CPD events and conferences on new developments in IFRS and sustainability reporting. Milan is also a member of various Pension Fund Trustee boards and other institutional committees over the last decade.

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WHAT RESOURCES FOR BEES IN URBAN AREAS? THE CASE OF GENEVA, SWITZERLAND

Heiniger Charlene

University of Applied Science and Art of Western Switzerland, Switzerland

Abstract:

In this 21st century, awareness about the biodiversity crisis has constantly raised. Meanwhile, the crucial role of Insects in ecosystem functioning has been underlined and causes of their decline have largely been studied. Landscape simplification inducing habitat loss and the use of pesticides have been identified as the main causes of biodiversity reduction in agricultural habitats. Besides, urbanization also induces habitat conversion and loss, which is detrimental for the species. However, studies on urban biodiversity have shown that at certain conditions, cities could host diverse Insect communities. Moreover, many cities implement adaptation of their green space maintenance policies and take actions such as banning the use of pesticides from their common practices in order to be more respectful to nature. In Geneva, we investigated the hosting potential of urban habitats for pollinator populations in green infrastructures such as parks. Our research mainly focuses on domestic and wild bees. What floral resources do they need? We confirmed that ligneous vegetation is an important resource for urban domestic bees, but what about wild bees? We showed that a melliferous meadow, including several key plants species and diverse plant families is an efficient tool to enhance wild bee diversity in urban parks. We also worked on direct observations of pollinator visits on bushes, to understand whether ligneous vegetation also represent valuable food source for wild bees. Besides trophic resources, wild bee species need an array of different habitats to complete them reproduction. Do their find them in the city? For example, several studies show that cavity nesting bees are favored in urban environment, when we know that most wild bee species nests in the soil. We investigated the availability of favorable microhabitats for ground nesting bees in three urban parks. We found more than 300 nests, mainly of species in the Halictidae family, that appreciate nesting in compacted soil. We observed many cases where human activity had an influence on creating favorable nesting microhabitats for bees, such as desire path and made recommendations about practices favoring their conservation in the common maintenance of green spaces. Altogether, our past and ongoing research shows that Geneva city hosts many wild bee species and that we can further promote them in urban green spaces by 1) providing suitable ligneous and herbaceous vegetation as food source and 2) adapting maintenance practices regarding species displaying less known reproduction strategies, such as ground nesting bees.



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Day 2

Keynote Presentation

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TARGETED LARGE-SCALE NATIVE TREE PLANTING FRAMEWORK FOR ECOSYSTEM SERVICES ENHANCEMENTS IN URBAN AND INDUSTRIAL AREAS TO IMPROVE CLIMATE, AIR POLLUTION, HEALTH, AND URBAN HEAT IN VULNERABLE LOCATIONS



Ana Tapia

Houston Wilderness, USA

Abstract:

Through a multi-partner, large-scale targeted native tree planting framework, implemented in Houston, Texas, thousands of the high-ranking tree species are being planted in locations that experience substantial flooding, have high rates of health effects exacerbated by air pollution and experience multiple days of elevated heat and air pollution. This multidisciplinary framework, made up of major oil, gas and other energy companies and port operators, municipal governments and other large landowners, help to setup a critical blueprint needed to provide interventions accessible to the community, educate on the connection between climate change adaptation, air pollution mitigation and health, and foster multisectoral leadership to accelerate local resilience actions. Two regional case studies based on this framework are discussed: (1) a large-scale targeted tree planting program called *Houston Ship Channel Trees and Riparian Enhancement of Ecosystem Services (HSC TREES)* – that enhances ecosystem services through targeted large-scale tree plantings along the 25 miles of the Houston Ship Channel, and (2) a pioneering program called *Riverine Targeted Use of Buyouts (Riverine TUBs)* that assists in addressing the challenge of prioritizing FEMA-qualified buyout properties adjacent to riparian corridors leading to Galveston Bay and the Gulf of Mexico. Both programs are developed to enhance ecosystem services on the recovered green spaces for the health, welfare, and resilience benefits of the surrounding communities. With the assistance of local, regional, and federal partners, the Riparian TUBs Program implements targeted large-scale tree planting and bioswale installations on these contiguous public lands to increase coastal and riverine resilience, address harmful impacts from frequent rainwater and storm events and establish green stormwater infrastructure (GSI) *best management practices (BMPs)* that can be emulated by other stakeholders/decision-makers in the United States and around the world. The GSI techniques provide nature-based flood mitigation, air and water quality enhancements, increase carbon sequestration and riverine erosion control.

Biography

Ana studied Forest Resources and Conservation at the University of Florida and now serves as the Senior Director of Environmental Projects for Houston Wilderness. Her research experiences comes from projects in Carbon Sequestration in pine trees, diseases in gopher tortoises, and field work with various ecological systems and their inhabitants. Her passion is in making groundbreaking impacts by connecting people to their natural environment- whether bringing out corporate volunteers to plant trees or leading high schools on their first backpacking trip both helping to make a lasting impact on the individual and the natural world around them.

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ESTIMATION OF GHG EMISSIONS BASED ON THE LCA FOR PAVEMENTS & BRIDGES IN SOUTH KOREA BY CONSIDERING THE USE STAGES



Seung-Hwan Han

Korea Expressway Corporation, South Korea

Abstract:

Life cycle assessment(LCA) is a methodology for assessing environmental impacts associated with all the stages of the life of a commercial product, process, or service including infrastructures like roads and expressways. These stages are specified in the standards like ISO, EN, and Korean standards. A carbon footprint estimation based on the life cycle assessment for highway infrastructure including pavements and bridges, was conducted in this research by considering the emissions in the use phase such as operation, rehabilitation, and emissions from the passing vehicles by road users. Including use stage in this estimation has an importance for engineers to consider how well they build the highways in view of smooth surface, gradient of road profile and so on. In this study, some highways in South Korea were analyzed based on the data from the design stage, construction stage, use stage, and end-of-life stage. Primary emission factors such as fuel emission factors were adopted from the National LCI DB in South Korea. It is verified that the GHG emissions in the use phase is a dominant one comparing to those in the other life stages. The results can be also utilized to estimate Scope-3 emissions of highway network or organization by providing the emission factor based on any appropriate functional unit.

Biography

Seung-Hwan HAN is a Chief Research Adviser at Research Institute of Korea Expressway Corporation in South Korea. He received his M.S in 1993 and a PhD in 1997 from Seoul National University. More than 30 years of research experience for cement concrete pavement and concrete structures in the civil engineering field with so many consulting works, will be of value. Recently he is working on the research projects for life cycle assessment of road pavement construction and rehabilitation, and now focusing on developing a platform of LCA tools and DB for quantifying the GHG emissions from the highway system.



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NATURE-BASED INTERVENTIONS FOR ENHANCED WELL-BEING AND CLIMATE RESILIENCE: A RANDOMIZED CLINICAL TRIAL ACROSS URBAN, PERI-URBAN, AND RURAL SETTINGS

Eliseth Ribeiro Leão

Hospital Israelita Albert Einstein – Educational and Research Center, Brazil

Abstract:

The benefits of nature-based interventions (NBIs) on human well-being are increasingly recognized, yet robust clinical trials are needed to support their implementation in public health. This study evaluates the effects of two NBIs on well-being, vitality, self-perception of happiness, connection to nature, and engagement with nature conservation, analyzing these effects across urban, peri-urban, and rural areas. In this randomized controlled trial, 486 adults (249 control, 237 intervention) were randomly assigned to either a multi-component NBI (intervention group) or a forest bathing activity (control group). Primary outcomes included well-being, subjective vitality, and self-perception of happiness, assessed using the WHO-5 Well-Being Index and single-item measures of happiness and vitality. Secondary outcomes included connection to nature and engagement in nature conservation, measured pre-intervention, immediately post-intervention, and 30 days post-intervention. Overall well-being increased significantly in the peri-urban intervention group at the 30-day follow-up ($p=0.036$), with no significant changes in urban or rural areas. Subjective vitality increased significantly immediately post-intervention in both groups ($p<0.001$) but decreased at the 30-day follow-up. Notably, the intervention group showed a higher vitality score post-intervention, especially in urban areas ($p=0.020$). Self-perception of happiness increased significantly post-intervention in both groups ($p<0.001$) and remained higher at 30 days in the peri-urban areas for both groups (control $p=0.041$, intervention $p<0.001$). Connection to nature increased significantly post-intervention in both groups ($p<0.001$), with the intervention group maintaining higher levels at the 30-day follow-up ($p=0.021$). Engagement in conservation activities was higher in the peri-urban intervention group at 30 days compared to baseline. This study provides evidence supporting the superior efficacy of multicomponent NBIs in enhancing well-being, vitality, and nature connection, particularly in peri-urban areas. These findings highlight the importance of integrating peri-urban natural spaces into urban planning and public health strategies to foster well-being, environmental engagement, and climate resilience.

Biography

Dr. Lis Leão is a senior researcher and has expertise in the development of light healthcare technologies and passion in improving health and wellbeing combined with biodiversity conservation. She leads the interdisciplinary research group e-Natureza (e-Nature, at The National Council for Scientific and Technological Development) in which she coordinates projects and develops models to support nature-based health interventions, focusing on connecting with nature and thus contributing to a better scenario related to climate change. National and international lecturer, she has numerous peer-review publications, books and book chapters. She is the editor of the book "Nature, Climate and Public Health" (2024), Editora dos Editores Publishers (in Portuguese), with the aim of strengthening dialogue between professionals who work in the areas of health and the environment on issues that involve the future of the planet. She has contributed to nature and health expert committees of the Nature and Health Alliance and the International Union for Conservation of Nature (IUCN). She is also a wildlife photographer.

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BIOREMEDIATION OF POTENTIALLY TOXIC ELEMENTS: AN OMICS PERSPECTIVE

Maria Claudia Gatto

University of Naples "Federico II", Italy

Abstract:

This study, conducted in collaboration with the Stazione Zoologica Anton Dohrn of Naples, focuses on evaluating the bioremediation potential of marine bacteria and fungi isolated from polluted sites to remove potentially toxic elements (PTEs). Due to the concerning tendencies of PTEs to biomagnify and bioaccumulate, bioremediation presents itself as a promising, eco-friendly alternative for mitigating pollution and its toxic effects. This research employs complementary omics approaches, including proteomics and metabolomics, to elucidate the mechanisms of bioremediation and to identify bioactive molecules suitable for large-scale applications. Understanding these mechanisms is crucial for advancing bioremediation technologies and improving environmental health. The PTEs tested, As, Cd, Co, Cu, Zn, and Pb, are the most prevalent in the Gulf of Naples and Bagnoli, particularly around the former Italsider steel mill. Microbial resistance was assessed by determining the maximum tolerance concentration (MTC) for each metal, supplied as soluble salt at pH 7 in a concentrations range of ppm to test toxicity. Four bacterial strains were identified as most promising: *Pseudohalocynthiaibacter aestuariivivens* P96, *Planococcus* sp. B27, *Lysinibacillus sphaericus* PG22, and *Rhodococcus* sp. AH, all showing over 50% growth at their highest tolerated metal concentration. The genome analysis in search of metal resistance genes revealed that PG22 has resistance to As, Cd, Zn, Cu, Co, Ni, and Mn, while P96 shows resistance to As, Cd, Co, Cu, and Zn. DNA extraction and genome sequencing for AH and B27 are still in progress.

Biography

Maria Claudia Gatto is a PhD candidate in Chemical Sciences, having completed her first year of study. With a bachelor's and master's degree in Chemical Sciences, she has specialized in proteomics and mass spectrometry, focusing on human health research. Currently, her doctoral research is expanding her expertise by integrating chemical skills with microbiology, marine biotechnology, and the broad field of bioremediation.

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CLIMATE VARIABILITY AND ITS IMPACT ON WATER RESOURCES: CASE STUDY OF NORTHEASTERN ALGERIA SOUTH MEDITERRANEAN

Wacila Khoualdia

University Mohamed Cherif Mesaadia, Algeria

Abstract:

Climate variability has been identified as one of the major factors affecting water resources. The purpose of this study is to characterize climate variability in the northeastern Algeria and to evaluate its impact on surface and groundwater resources. Various statistical methods, including Mann–Kendall test, Pettitt test, drought indices, and Fourier filter were used. Pettitt test revealed the occurrence of breaks over the period (1994–1996), showing significant increase in the annual rainfall and temperature data time series. The analysis of drought indices provided insights into the relationship between meteorological and hydrological droughts in the study area. This mainly revealed that rainfall deficit results in an immediate response to runoff regime and a delayed response to groundwater level. Moreover, it was found that both meteorological and hydrological drought conditions significantly decreased after the climatic shift in terms of frequency, intensity and duration. Such information is of great importance for managing water resources and preparing drought mitigation measures.

Biography

Professor and researcher specializing in hydrology, with over 20 years of experience teaching hydraulics and hydrology. Earned a PhD in 2015, became a Senior Lecturer (Maître de conférences A) in 2018, and promoted to full professor in 2023. Served as head of the hydraulics program from 2012 to 2018, and head of the civil engineering and fundamental sciences department from 2012 to 2014 and 2020 to 2022. Vice-Dean of Pedagogy from 2015 to 2018. Supervised several master's theses and participated in the evaluation of PhD dissertations, along with overseeing doctoral entrance exams. Research focuses on climate and water resource management, particularly in northeastern Algeria. Led several research projects and published multiple scientific articles in this field. Currently leading the "Climate and Water Resource Management" team within the Infrarés laboratory.

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ASSESSING OCEAN RENEWABLE ENERGY OF BRAZIL

Moacyr Araujo

DOCEAN/UFPE, Brazil

Abstract:

Climatic change mitigation strategies include the reduction of fossil fuels dependency and the increase of energy mix contribution from renewable sources. Oceanic renewable energy sources emerge as a promising alternative to diversify the energy mix. In the southwestern tropical Atlantic off Brazil, the Ocean Thermal Energy Conversion (OTEC) and the potential energy from surface currents were investigated. Time series of 40 years (1983 - 2022) of water temperature data (surface and 1000 m depth) were used to estimate thermal gradients. The temporal gradients showed no significant differences between the months over the annual cycle, with maximum thermal gradients $>20^{\circ}\text{C}$ throughout the study region. The spatial gradient showed high thermal efficiency coefficients throughout the study region ($\eta > 0.8$), mainly in the North and Northeastern. The combined analysis of thermal efficiency and distance from the coast showed three points with the highest thermal efficiency ratings ($\eta > 0.85$) and the shortest distance (<30 km) for the effective implementation of an Ocean Thermal Energy Conversion-OTEC projects. Furthermore, the presence of the strong western boundary subsurface North Brazil Undercurrent (NBUC) in this region lead to the investigation of the current power density (CPD) at different vertical levels. The results showed four hotspots for marine current energy exploitation with CPD higher than 1000 Wm^{-2} , two of them related to the NBUC at depths between 150 and 250 m. All the hotspots identified were a consequence of flow-topography interactions, in particular because of changes in current dynamics due to coastline and shelf-break isobaths direction changes. We compared the hotspots in terms of closeness to the coast, closeness to oil and gas exploration blocks, stability of current core and absence of deep reef system at the subjacent shelf. Our results indicate that, besides the challenges of current core being in deeper layers, the undercurrent provides a stronger and seasonally stabler CPD than the surface currents. Finally, current and OTEC technologies can promotes access to clean, non-intermittent and sustainable energy sources, reducing greenhouse gas emissions and contributing to the mitigation of climate change.

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ASSESSMENT OF GREENHOUSE GAS EMISSIONS FROM CROP CULTIVATION IN THE SUSTAINABLE PRODUCTION OF BIOFUELS IN POLAND

Pawel Wisniewski

Nicolaus Copernicus University in Torun, Poland

Abstract:

Support for development of the use of renewable energy sources and reducing greenhouse gas emissions (GHG) emissions have become a very important objective within the EU. Biofuels play an important role in the structure of obtaining energy from renewable sources. Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (RED II directive) defines the levels of GHG emission savings from the use of biofuels, bioliquids and biomass fuels. The greatest impact on the total GHG emissions from biomass production is caused by field emissions of nitrous oxide (N_2O). Nitrous oxide is a very potent greenhouse gas whose concentration in the atmosphere is steadily increasing. Almost 80% of the annual N_2O emissions in Poland originate from agriculture, and its main source is the use of agricultural soils. The aim of the study is to estimate GHG emission caused by cultivation of selected plants (wheat, triticale, rye and maize), used for sustainable production of biofuel production in Poland, as well as to recognize the structure of emission from biomass production. For this purpose, the methodology that was recommended by the certification system of sustainable biofuels and bioliquids production, as approved by the European Commission, was used, in line with the RED II directive and the Commission Implementing Regulation (EU) 2022/996 of 14 June 2022 on rules to verify sustainability and greenhouse gas emissions saving criteria and low indirect land-use change-risk criteria.

Biography

Pawel Wisniewski is a university professor at the Nicolaus Copernicus University in Torun and the University of Gdansk. His research interests include agriculture and rural areas, assessment of GHG emissions from agricultural production, sustainable development of rural areas, threats and protection of agricultural production space, programming and planning of environmental protection at the local level, shaping the development of rural areas and local government. He is the author or co-author of over 80 scientific publications, including over 20 articles published in journals indexed in international bibliographic databases Web of Science Core Collection. Principal investigator or contractor in 10 research projects. Expert, among others, in the National Centre for Research and Development, Ministry of Climate and Environment, National Fund for Environmental Protection and Water Management, Polish Agency for Enterprise Development. He combines scientific work with local government activities (he is the Chairman of the City Council in Naklo). He is a member of the Task Force for Rural Areas of the Committee on National Spatial Planning and Regional Planning of the Polish Academy of Sciences for the term 2023-2026.

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ARE THE MECHANISMS DRIVING HETEROTROPHIC RESPIRATION AFTER REWETTING CONSISTENT IN THE LAB AND THE FIELD?

Xiankun Li

Stockholm University, Sweden

Abstract:

Understanding the mechanisms driving CO₂ emissions from soils upon rewetting of a dry soil is important to develop models to predict soil carbon fate under climate change. While laboratory drying and rewetting (DRW) experiments have revealed many drivers of CO₂ emissions after rewetting, it is still unknown whether mechanisms inferred from these laboratory studies are consistent with mechanisms dominant in the field. Both the number of putative mechanisms and the challenge of scaling up from laboratory to field conditions have hindered the development of accurate models for CO₂ emissions. Here we collected mean CO₂ emission rates over 48 hours after rewetting from 38 laboratory studies with more than three DRW cycles, and from six field datasets recording hourly resolution soil moisture and respiration fluctuations. Laboratory and field respiration rates after rewetting were predicted by six predictors using random forest algorithms and partial dependence plots. In the laboratory studies, soil organic carbon content and temperature had positive effects on respiration that were similar to the effects observed in the field. Laboratory results were partly consistent with the positive effects of dryness before the rewetting and the negative (and surprising) effect of soil moisture increment on respiration in the field. Both laboratory and field studies highlighted the importance of climate background on respiration—a possible indication of microbial legacy effects. We concluded that the mechanisms driving CO₂ emissions after rewetting in the lab and the field were generally consistent, but some of the observed responses would be difficult to capture in classical soil carbon cycling models that do not include specific mechanisms to describe rewetting pulses and microbial adaptations.

Biography

My training is in physical geography and ecology. My research interests are microbial carbon use strategies after disturbance, soil carbon balance under climate change, integration of theory and data, validation of conceptual ideas with data. My main approaches are data collection, data analysis with the help of my expertise on R language and ArcGis. In my PhD, I mainly analyze microbial growth and microbial respiration response to rewetting, trying to link growth and respiration data with perception of soil microbes, investment in life history strategies, and microbial metabolism to infer soil carbon fate under climate change. I am curious about the extent to which the laboratory experiment can reveal the truth in nature. I am also interested in the integration of laboratory and field data. I am also interested in the effects of soil moisture storage on the response of soil respiration to changes in soil moisture.

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OPTIMIZATION AND CHARACTERIZATION OF EXTRACTED COFFEE OIL OBTAINED BY SUPERCRITICAL CO₂ OF SPENT COFFEE GROUND

Sergio Clemente Castro

Stockholm University, Sweden

Abstract:

Spent coffee grounds (SCGs) are one of the most massive wastes from coffee processing and consumption worldwide. Although SCGs have a high content of carbohydrates, fatty acids and polyphenols, SCGs are usually valorized energetically or discarded, losing all these value-added compounds for the cosmetics industry. An option that is gaining many followers is to extract coffee oils containing these residues with supercritical CO₂ (scCO₂), since it is a method that does not damage the environment as much as other extractions and does not destroy the most valuable compounds. In the framework of the HOOP project, SCGs were collected from the Madaloki restaurant in the city of Kozani, Western Macedonia, and an oil fraction was extracted from this biowaste using scCO₂. The production of fatty acids by scCO₂ extraction is optimized and then compared with other conventional extraction methods such as hexane extraction and the Folch method. The conditions for scCO₂ were temperatures of 313.15K, 323.15K and 333.15K, pressures from 150 bar to 200 bar, and extraction times between 1 and 3 h. In addition, the extraction of oils from coffee grounds with scCO₂ in the company of green co-solvents such as ethyl lactate was evaluated to see if solvents improve the reaction conditions. It has been shown that the use of co-solvents together with scCO₂ can lead to improvements in oil yields. Therefore in HOOP it will be determined whether this improvement makes the process more sustainable or whether including solvents can be counterproductive from an environmental point of view. The extracted oil was characterized to quantify fatty acids and analyze its physicochemical properties such as lipid oxidation, antioxidant capacity, moisture content, iodine value, total phenolic content and flavonoid content.

Biography

Sergio Clemente is native of Extremadura, and he has studied chemical engineering in Badajoz, Salamanca and Huelva, always with a focus on sustainability and renewable energies, before joining the ITENE team in Valencia in 2024. Since 2020, Sergio has studied and analyzed chemical processes of high temperature chemical recycling, starting with his study of prototypes of polystyrene waste depolymerization plants at the University of Salamanca with a project award. From 2020 to 2023 he has developed his PhD in biofuel production from fast growing biomass at the University of Huelva based on complex kinetic studies and pilot plant producing bio-oil as intermediate biofuel, gas for energetic purpose and biochar applied to agriculture improvers. He is currently developing his professional career as a chemical recycling and valorisation project engineer in ITENE participating in numerous projects with bio-waste, polymers such as PET, polyurethane and other complex polymeric systems such as printed electronics, as well as other wastes such as contaminated wood, bioplastics and functional polyolefins.

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INTEGRATING INDIGENOUS MARICULTURE: CLAM GARDENS AS A MODEL FOR SUSTAINABLE COASTAL MANAGEMENT AND CLIMATE RESILIENCE

Chengyi Ted Li and Daniel Chen

Greenfutures Foundation, Canada

Abstract:

The need for a sustainable, ecologically sound food system has become increasingly apparent in recent decades as societies experience repercussions from environmentally negligent practices. Clam gardens -- an intertidal mariculture rock-walled structure -- are a prime example of Indigenous resource management, increasing food production by 150% to 300%. This study examines the climate and eco-resilient aspects of clam gardens and discusses potential implementations and gaps for future mariculture approaches. Drawing on studies conducted on the coasts of the Pacific Northwest, this paper reviews the literature on the environmental and cultural aspects of clam gardens, providing insights and guidelines into future coastal management strategies. Results generally confirm clam gardens' positive impact on the local environment, including increased biodiversity, a more balanced ecosystem, and buffering against heat waves. Moreover, studies highlight the importance and possibility of integrating ancient wisdom into modern coast management strategies, noting a paradigm shift in conservation to an "ecocultural" restoration.

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