

2nd World Congress on

RECYCLING, ENVIRONMENTAL SCIENCE & CLIMATE CHANGE

June 09-10, 2025 | Zurich, Switzerland



Venue: Intercity Hotel Zurich Airport
Flughofstrasse 63, 8153 Rumlang, Switzerland

Day 1

June 09, 2025 | Zurich

Scientific Program

08:30–08:45: Registrations

08:45–09:00: Opening Ceremony

Keynote Presentations



09:00–09:40

Title: How Vacuum Insulation Achieves Energy Savings and Makes Bills Affordable

Saim Memon

Department of Industrial R&D in Vacuum Insulation Energy Technologies, Sanyou London Pvt Ltd, UK



09:40–10:20

Title: Impact of environmental Aging on EPDM/ EPDMd Compounds: Influence of Mediterranean and Pyrenees Climates

Xavier Colom

Universitat Politècnica de Catalunya Barcelona Tech, Barcelona, Spain

Group Photo | Coffee Break 10:20-10:40 @ Foyer

Special Workshop Session

10:40–11:40

Title: Transforming Business: Redefining Profit-Driven Business Models for Sustainable Impact

Adina-Iuliana Deacu

University of Surrey, UK

Oral Presentations

11:40–12:05

Title: Trends in Lake Maggiore floods event (NW Italy) and impacts on macroinvertebrates assemblages

Marzia Ciampittiello, Angela Boggero

National Council for Research Water research Institute, Italy

12:05–12:30

Title: Overall benefits of biochar, produced from agricultural waste, for the farming system

Sara Tahery

The University of New South Wales, Australia

Session Introduction

Tracks

Recycling Basics | Circulatory Economy | E-Waste Recycling and Management | Solid Waste Management | Organic Waste Recycling | Pollution Control and Climate Change | Climate Change | Biodiversity Conservation | Environmental Sustainability and Development | Environmental Chemistry | Civil and Environmental Engineering | Waste Management and Treatment

Session Chair: Saim Memon, Department of Industrial R&D in Vacuum Insulation Energy Technologies, Sanyou London Pvt Ltd, USA

12:30–12:55

Title: Unlocking the potential of chemical recycling: key learnings on the way
Irina Yarulina
Sulzer, Switzerland

Lunch Break 12:55-13:45

13:45–14:10

Title: Tailoring Recycled Polyol Properties for Polyurethane Foams and Adhesives through Solvolysis Conditions
Alejandra Moyano Vallejo
INESCOP Footwear Technology Centre, Alicante, Spain

14:10–14:35

Title: Impurities and microplastics in organic wastes: implications for a circular economy
Paula Oulego
University of Oviedo, Spain

Poster Presentations (14:35-16:35)

P001

Title: Environmental Problems of the Northern Aral Sea Region and Vegetation Conservation
Liliya Dimeyeva
Institute of Botany and Phytointroduction, Almaty, Kazakhstan

Networking & Refreshments 14:55-15:15 @ Foyer

P002

Title: Assessment of the Current State of Botanical Diversity of the Western Kazakhstan Region
Anastassiya Islamgulova, Gulnara T. Sitpayeva
Institute of Botany & Phytointroduction, Almaty, Kazakhstan

P003

Title: Bioremediation potential of Effective Microorganisms (EM) in cosmetic wastewater treatment

Daria Kowalczyk-Chrzastowska

Wroclaw University, Poland

P004

Title: Rehabilitation of landfills in Thessaloniki: from landscape destruction to recovery

Vaya Karypidou and Argyri Voumvouraki

Regional Association of Solid Waste Management Agencies of Central Macedonia, Greece

P005

Title: Eco-Conscious Soil Management for Chemical-Free Saffron Cultivation

Dimitrios Alivertis

Ioanna-Efpraxia Parigoridi

University of Ioannina, Greece

Panel Discussion & Certificate Falcitation

Day –1 Ends

Day 2

June 10, 2025 | Zurich

Scientific Program

08:30–08:45: Registrations

08:45–09:00: Opening Ceremony

Keynote Presentation



09:00–09:40

Title: New Technology for Utilizing Of Spent Claus Catalyst in Manufacturing of Portland Cement
Ibrahim Alzahrani
Advanced Analysis Group, Saudi Aramco Dhahran, Saudi Arabia

Oral Presentations

09:40–10:05

Title: Use of an Ionic Liquid for Biochemical Production from Biomass
Nirmala Deenadayalu
Durban University of Technology, South Africa

10:05–10:30

Title: Circular Economy in Underground Construction: Enhancing Grout Sustainability with Recycled Waste
Alireza Entezam
University of Southern Queensland, Australia

Group Photo | Coffee Break 10:30-10:50 @ Foyer

Special Workshop Session

10:50–11:50

Title: Transforming Business: Redefining Profit-Driven Business Models for Sustainable Impact
Adina-Iuliana Deacu
University of Surrey, UK

11:50–12:15

Title: Potential of Reprocessed and Recycled HIPS as Food-Grade Materials
Javiera Sepulveda Carter
Polytechnic University of Madrid, Spain

12:15–12:40

Title: Sustainable waste management in Brunei: A pilot proposal for material recovery and composting to achieve landfill diversion and circular economy goals

Nilesh Patil

Touch N Glow Common Bio Medical Waste Treatment & Disposal Facility, India

Lunch Break 12:40-13:40

13:40–14:05

Title: The Future Demands the Youth: Youth Leadership in the Frontlines of the Climate Crisis

Sophia Long

University of Chicago, USA

14:05–14:30

Title: Design of a Sulfide Treatment System for Petrochemical Wastewater

Naveed Ahmad

Northern Border University, Saudi Arabia

14:30–14:55

Title: OMWW Soil Amendment: Analyzing Its Impact On Vicia Faba And Soil Parameters

Dahbane Oumaima

Cadi Ayyad University Faculty of Science Semlalia, Morocco

Panel Discussion & Certificate Felicitation
Day –2 Ends





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KEYNOTE PRESENTATIONS

DAY 1



Saim Memon ^{1, 2, 3, *}

¹ Department of Industrial R&D in Vacuum Insulation Energy Technologies, Sanyou London Pvt Ltd, United Kingdom.

² Department for Engineering, School of Engineering and the Built Environment, Birmingham City University, England, UK

³ Jiangsu Sanyou Dior Energy-saving New Materials Co., Ltd (SANYOU DIOR), West Tai Lake Science and Technology Industrial Park, Jiangsu, China.

How Vacuum Insulation Achieves Energy Savings and Makes Bills Affordable

Achieving the United Nations Sustainable Development Goals (SDGs) necessitates transforming academic innovations into scalable technologies that significantly cut energy use and carbon emissions. This keynote addresses pioneering vacuum insulation solutions, designed for mass production, targeting critical sectors including building energy efficiency and temperature-controlled logistics. Highlighted innovations include the Vacuum Insulated Heatable Curtain (VIHC) and Vacuum Insulated Wallpaper (VIW), ultra-thin (4 mm), cost-effective solutions achieving exceptional insulation performance with thermal conductivity below 5 mW/m•K, significantly enhancing energy efficiency in both hot-arid and cold-arid climates. Complementing these innovations are Vacuum Insulation Panels (VIPs), fabricated from fibreglass or fumed silica, providing superior thermal insulation with conductivity values as low as 2.5 mW/m•K at 15 mm and 4.5 mW/m•K at 25 mm thicknesses. Decorative integrated VIPs, composed of Metal Composite Materials (MCM), offer external wall insulation with conductivity under 7 mW/m•K at 30 mm, delivering substantial energy savings up to 22%, alongside marked reductions in noise and heat ingress. Additionally, the Vacuum Insulated Bag-or-Box (VIBB) system, employing flexible VIPs combined with polyurethane (PU), ensures sustained internal temperatures without external cooling. Designed specifically for medical, pharmaceutical, and food logistics, variants like the Medical Box, Deep Cold Box, Rolling Cart Cover, and Fresh Bag cater precisely to diverse temperature control requirements. Collectively, these advancements substantially reduce energy consumption, lower carbon footprints, and deliver cost-effective, reliable insulation, thereby making energy bills affordable again.

Keywords: Vacuum Insulation, Energy Savings, Vacuum Insulated Wallpaper (VIW), Vacuum Insulated Heatable Curtain (VIHC), Vacuum Insulation Panel (VIP), Decorative Integrated VIP

Biography:

Prof. Saim Memon is CEO and Industrial Professor of renewable energy engineering. He built his academic research career in the UK, earning a Ph.D. in mechanical, electrical & manufacturing engineering, a PGCert in teaching qualification, an M.Sc. in mechatronics, and a B.Eng. (Hons) in electrical engineering. Prof. Memon is Chartered Engineer and Fellow of the Higher Education Academy, holding qualified teacher status granted by the General Teaching Council for Scotland in the UK. With multidisciplinary expertise in electrical, mechanical, and renewable energy engineering, he published over 140 research papers, delivered more than 100 invited talks, and engaged in collaborative research across 40+ countries. He taught 41 academic modules and supervised numerous Ph.D. and M.Sc./M.Eng. projects. His specialised teaching of AI in Renewable Energy and Power Engineering Materials Innovation attracted worldwide participation.



Xavier Colom

Universitat Politècnica de Catalunya Barcelona Tech, Spain

Impact of environmental aging on EPDM/ EPDMd compounds: Influence of Mediterranean and Pyrenees climates

MEPDM is one of the most versatile and reliable elastomers, known for its exceptional resistance in severe environments, flexibility across a wide temperature range, and excellent durability, making it suitable for a broad range of industrial applications. Sectors like the automotive industry use it for manufacturing seals, hoses, drive belts, and electrical cable insulation, while in the construction and civil engineering sectors, it is commonly used as a waterproofing membrane for roofs and façades.

The major challenge with these materials lies in their cross-linked structure, which makes them difficult to recycle, hindering the development of a circular economy process. Devulcanization and blending with virgin elastomers offer a viable method to reuse this type of waste.

Our research group has studied EPDM/devulcanized EPDM compounds through a thermomechanical process, subjected to aging over six months in two different climate conditions: Barcelona, which has a humid, saline climate, moderately low precipitation, and average temperatures between 10 and 35°C, and a mountainous area in the Pyrenees at an altitude of 800 meters, with a dry climate (65% relative humidity), high precipitation, and temperatures ranging from -5 to 30°C.

We analyzed the physical, mechanical, thermal, and morphological properties of compounds containing 0, 10, 20, and 40 phr of devulcanized EPDM (EPDMd) after various aging periods (0, 1, 2, 4, and 8 months).

The results show that the compounds with a higher content of devulcanized EPDM (EPDMd) experienced more significant degradation, although during the first four months, the samples exhibited almost no signs of deterioration. It is worth noting that the Mediterranean climate, characterized by high humidity, salinity, and prolonged sunlight exposure, accelerates the degradation process when exposed to outdoor conditions.

Keywords: EPDM waste; thermomechanical devulcanization; Rubber recycled.

Biography:

Prof. Xavier Colom is Industrial Engineer and Director of the POLQUITEX Research group. He has been part in different research Projects as IP. He has published 115 research articles. According to Scopus, his h-index is 30, and the total number of citations is 3450. He has presented more than 110 papers in Congresses, participated as a speaker and published 10 book chapters. He has been advisor of 7 PhD and advised 65 PFG and 25 PFM. He is a member of the Editorial Board of the Polymers and Frontiers in Materials and referee of multiple journals both on materials and polymers.



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WORKSHOP SESSION



Adina-Iuliana Deacu

Research Institute for Sustainability, Potsdam, Germany

Transforming Business: Redefining Profit-Driven Business Models for Sustainable Impact

As the global climate crisis intensifies and social inequalities widen, the need to redefine the role of business in society has never been more urgent. Traditional profit-maximizing models often overlook long-term environmental and societal consequences, reinforcing systems that are unsustainable. This presentation proposes a transformative framework for business that integrates sustainability as a core value positioning companies not only as economic actors but also as stewards of ecological and social well-being. Drawing from environmental psychology, systems thinking, and sustainability research, the framework addresses the structural and behavioral barriers that currently inhibit meaningful business transformation. By spotlighting real-world case studies and pioneering models, the presentation will explore how enterprises can transition toward regenerative economies, circular value chains, and stakeholder-centered decision-making processes. Participants will gain practical strategies for designing and implementing business models that create value beyond profit, supporting the achievement of the UN Sustainable Development Goals. Key themes include integrating sustainability into governance structures, aligning internal culture with long-term impact, and fostering cross-sector collaborations that amplify systemic change. This session will also examine the role of policy, regulation, and education in accelerating the shift toward sustainability-driven business practices. Attendees will get insights on how business leaders, investors, and policymakers can co-create resilient economic systems that serve both people and the planet. By reframing business success through a sustainability lens, this talk invites participants to become active contributors to a new economic paradigm—one where profitability and planetary health go hand in hand.

Key Words: sustainability, entrepreneurship, social innovation

Biography:

Adina-Iuliana Deacu is a social entrepreneur, systems thinker, and environmental psychology researcher committed to transforming business into a catalyst for sustainable development. As a Klaus Töpfer Sustainability Fellow at the Research Institute for Sustainability (RIFS) in Potsdam, she is developing a framework to align profit-driven business models with long-term ecological and social value. She is also the founder of Tianmei's World Academy, a cross-cultural learning platform that integrates environmental psychology and systems thinking to support regenerative and inclusive approaches to business development.



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SPEAKER PRESENTATIONS

DAY 1



**Marzia Ciampittiello,
Angela Boggero**

National Research Council for The Water
Research Institute, Italy



Trends in Lake Maggiore floods event (NW Italy) and impacts on macroinvertebrates assemblages

Lake levels fluctuations and flood events are conditioned by seasonal variability, water resources management and, most importantly, by climate change. Among these factors, global warming, hydrological system conditions, and the characteristics of local precipitation significantly impact flood risk, leading to social, economic, and environmental consequences. To assess the environmental impacts, we analysed flood event trends for Lake Maggiore over return periods of 3, 5, 10, 25, 50, 100, 250, and 500 years. We used a two-century time-period (1868 – 2021) as a reference to evaluate flood frequency, discuss the probability distribution of flood peaks, and map the flood hazard along the lake shores. The effects on macroinvertebrate taxonomic and functional diversity, as well as their abundances, were also assessed. Our findings indicate a high probability of experiencing a flood event every three years and predict a flood level of approximately 197 m asl (3.14 m above the average lake level) occurring every ten years. An increase in the lake level will impact the reed bed area at 193 m asl, with more pronounced effects observed at 194.5 m, potentially resulting in a total reduction of up to 10%. Furthermore, significant relationships were identified between water levels and the abundance and diversity attributes of macroinvertebrates.

Biography:

Marzia Ciampittiello works since 2001 at Italian National Council of Research, Water research Institute in Verbania, on Lake Maggiore (North-Wester Italy).

The areas of her research concern the hydrology, hydro-morphological aspects of lakes and rivers, climate change and its effects on hydro-morphology and consequently on the quality of aquatic ecosystems and the water resources.

She started to deal with climate change within the EUROLIMPACS project in 2005, delving into the aspect of long time series analyses. Subsequently she developed analysis and statistical models for the evaluation of climate change in the Alpine area and its consequences on aquatic ecosystems and natural hazards.

Since 2007, she has been the Italian national contact person for the implementation of the Water Framework Directive 2000/60 for the evaluation of the hydro-morphological quality of lakes. In this context she took part in the CEN working group - TC 230/WG 2/TG 5 Water quality for Developing standard method for assessing lake hydromorphology (first standard, 2008-2010) and for Guidance standard on determining the degree of modification of lake hydromorphology (second standard, 2010-2014).

Since 2008 to today she has been responsible for various research projects relating to hydromorphological aspects, climate change and water resources, also providing support to regional, provincial and municipal bodies in relation to her research areas through hydrological analysis, analysis of the impact of climate change on the fluctuation of lake levels, assessments of the impacts of the use of water resources on aquatic ecosystems.

From October 2022 she is part of a CIS working group (CIS Water Scarcity and Droughts) as an Italian representative.

To address the management of water resources taking into account climate change, the quality of aquatic ecosystems and the interrelationships between them, she is deepening the use of system dynamics.

In September 2004 she received the award for best researcher in the environmental field.

Biography:

Angela Boggero is a specialist in both fundamental and applied research, with a particular focus on systematics, biology, DNA barcoding, and the biogeography of Diptera, particularly Chironomidae and Oligochaeta. Her basic research delves into the classification and biological understanding of these groups, while her applied research explores the relationship between systematic and functional zoology and biological monitoring. Angela's work is crucial in assessing the impacts of climate change and human activities on aquatic ecosystems, including rivers and lakes at various altitudes.



Sara Tahery

The University of New South Wales (UNSW), Australia

Overall benefits of biochar, produced from agricultural waste, for the farming system

The rapid increase in global population, combined with escalating concerns about food security and the inefficient management of agricultural waste due to deforestation and poor farming practices, presents critical challenges. Converting nutrient-rich agricultural waste into valuable carbon-based products, such as biochar, offers an innovative waste management solution while providing agronomic benefits for farming systems. Biochar, a porous carbon-rich material derived from the pyrolysis of waste biomass, has also shown potential as a feed supplement for dairy cattle, contributing to improved animal productivity, soil health, and pasture sustainability. In this study, a mixed-feedstock biochar was produced from agricultural waste biomass, including 50% eucalyptus wood chips, 25% soybean residue, and 25% tea tree mulch, using a pyrolysis temperature of 450 °C. A 9-month feeding trial was conducted on a South Australian (SA) dairy farm to evaluate the impact of biochar supplementation, mixed at 0.006% of the total dry matter (DM), on milk production, manure properties, and the nutrient cycling of soil and plants. Results demonstrated a 2.2% increase in average milk yield compared to pre-trial levels, alongside improved feed conversion efficiency with reduced fodder consumption. Additionally, biochar-fed cows produced manure with elevated levels of key nutrients, such as N, Ca, P, and K, which enriched soil and plant nutrient concentrations after manure application. This study underscores the potential of converting agricultural waste into biochar as an effective strategy for enhancing waste management, promoting sustainable farming practices, and supporting agricultural productivity.

Keywords: Agricultural waste, Biochar feed supplement, Livestock productivity, Characterization, Soil and plant health.

Biography:

Dr. Sara Tahery completed her PhD in Materials Science and Engineering at the University of New South Wales in 2016. She is currently a Senior Research Fellow and Lecturer. Her research focuses on the sustainable development of carbon-based products, such as biochar, derived from waste biomass for environmental and agricultural applications. By employing advanced analytical techniques, she characterizes the physical, electrochemical, and microstructural properties of these materials to assess suitability for intended applications prior to large-scale production. Dr. Tahery has successfully led multiple projects centered on waste management and sustainability, contributing to innovative solutions for a more sustainable future. She has authored numerous publications in this field.



Irina Yarulina
Sulzer, Switzerland

Unlocking the potential of chemical recycling: key learnings on the way

In my talk, I will provide insights into various chemical recycling technologies, emphasizing that there is no single “winning” technology. Instead, the choice of technology depends on the composition of the waste being processed. I will also stress the importance of considering the entire value chain and highlight that purification of monomers is essential for successful recycling. Finally, I will discuss how chemical recycling fits into the entire picture of waste management in circular economy.

The integration of renewable carbon sources, carbon capture technologies, and recycling processes creates a holistic approach to sustainable carbon management.

Chemical recycling complements mechanical recycling in Europe's circular economy strategy, offering a solution for hard-to-recycle plastics and contaminated waste streams that are currently landfilled or incinerated.

While promising, chemical recycling faces challenges including the need for increased waste collection and sorting, quality standards for feedstock, and transparency in environmental impact assessments. Its role should be carefully evaluated.

Biography:

Irina Yarulina is the Head of Recycling at Sulzer, leading initiatives within the technology and innovation group. With over a decade of experience in heterogeneous catalysis, polymer recycling, and sustainable technology development, she previously held research and development roles at BASF. Her expertise spans recycling, renewables, and next-generation sustainable technologies. Currently, she focuses on advancing Sulzer's recycling strategy to align with global sustainability goals. With a strong background in both academic research and industry applications, Irina is driving innovative solutions within the circular economy.



Moyano Vallejo Alejandra

INESCOP Footwear Technology Centre, Spain

Tailoring Recycled Polyol Properties for Polyurethane Foams and Adhesives through Solvolysis Conditions

Polyurethanes (PUs) are commonly materials used as foams and/or adhesives, among others, for a broad range of industrial applications. Therefore, a high amount of PU waste are produced presenting significant environmental challenges. Chemical recycling of polyurethane waste to recover polyols offers a promising route for reducing this impact. This study investigates the use of solvolysis to recycle polyols from footwear polyurethanes waste and tailor their properties for reuse in polyurethane based foams and adhesives. The influence of solvolysis conditions—solvent, temperature, time, and catalyst—on the molecular structure, hydroxyl functionality, and reactivity of the recovered polyols have been evaluated. Through characterization techniques such as FTIR, TGA, DSC, viscosity, hydroxyl value and acid value measurements, the quality and suitability of the recycled polyols for new PU synthesis have been assessed. The performance of these recycled polyols in the production of polyurethane adhesives is then tested to determine their feasibility for commercial applications. Our findings demonstrate that optimizing solvolysis parameters allows for control over the recycled polyol's properties, resulting in materials with comparable performance to virgin polyols from fossil origin. This approach not only enhances the recyclability of polyurethanes but also supports the development of more sustainable PU formulations, contributing to a circular economy model. This work provides valuable insights into the potential of chemical recycling of such waste to create recycled polyols for diverse PU applications, paving the way for more sustainable practices in the polyurethane industry.

Biography:

Alejandra Moyano-Vallejo is a Chemist with a PhD in Materials Science, completed in 2015 at the University of Alicante (Alicante, Spain). Since then, she has worked both in academia and industry, gaining experience primarily in adhesives, encapsulation resins for electronics, polyurethanes, and chemical and mechanical recycling of polymeric materials. Her research has been published in various scientific journals and presented at international conferences.



Paula Oulego
University of Oviedo, Spain

Impurities and microplastics in organic wastes: implications for a circular economy

Plastics are a significant environmental threat due to their persistence and widespread accumulation. While this material offers convenience, its durability led to severe ecological issues [1]. In 2021, 41% of plastic waste was recycled in Europe [2], but global recycling levels remain much lower. Much plastic waste still ends up in landfills, is incinerated, or, worse, is littered, polluting ecosystems. Microplastics (MPs), defined as polymeric particles smaller than 5 mm, have become a growing concern due to their adverse effects on the environment and risks to human health [3]. Even with efficient waste management, MPs often escape into the environment due to recycling limitations, particularly during mechanical sorting.

This study investigates the presence of MPs and other impurities (glass and metal), in organic amendments and digestates obtained from organic waste, focusing on their impact on material quality within a circular economy framework. Larger impurities were manually extracted and quantified, while MPs were isolated through the digestion of organic matter with hydrogen peroxide and Fenton's reagent, followed by density separation. MPs were then analyzed under a stereomicroscope to quantify them and examine their morphology and color.

The results showed impurities ranging from 0.1-3.5% of dry weight, with plastics forming a significant proportion, of which MPs smaller than 2 mm made up for 30-65%. The highest values were observed in bio-stabilized materials from the organic fraction of mixed municipal waste. Digestates from separately collected municipal biowaste also exhibited high MP concentrations, increasing MP accumulation when used in organic amendments following composting with untreated wood waste as a bulking agent. These findings highlight the need for improved waste separation and treatment processes to reduce plastic contamination in digestates and organic amendments. Minimizing MPs release into agricultural systems will not only enhance the quality of organic fertilizers but also support a sustainable circular economy.

Key words: Circular economy, microplastics, organic amendments, organic wastes

Biography:

Dr. Paula Oulego is an Associate Professor of Chemical Engineering at the University of Oviedo. Since 2023, she has served as the Deputy Director of Cátedra COGERSA de Economía Circular. She obtained her Ph.D. with International Mention from the University of Oviedo in 2015. Her scientific output includes more than 80 articles in high-impact journals (JCR), several book chapters, and around 60 presentations at national and international conferences. Additionally, she is a co-author of an international patent on a method for the removal of cyanides in industrial wastewater, developed from her research at the University of Amsterdam.



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POSTER PRESENTATIONS
DAY 1



Liliya A. Dimeyeva

Institute of Botany & Phytointroduction, Almaty, Kazakhstan

Environmental Problems of the Northern Aral Sea Region and Vegetation Conservation

In Kazakhstan, the Aral Sea region is classified as an ecological crisis zone. The desiccation of the sea has resulted in climate changes along the coastal area and has negatively impacted biodiversity. The accelerating process of desertification is a consequence of combined effects of both natural and anthropogenic factors. Over 70% of the former seabed of the Aral Sea (Aralkum) is now covered by salt marshes. While desert plants have already colonized much of the vast area, vegetation cover has only developed in a small portion, with the majority of the territory still in need of afforestation. The study of natural and anthropogenic vegetation dynamics has established a scientific foundation for phytoreclamation efforts. Aquatic plants are now classified as rare and endangered. Changes in the species composition have not affected the zonal desert vegetation; rather, they are associated with seasonal fluctuations, anthropogenic factors and the life cycle of dominant plants. Human activities, such as water management, grazing, and fires, have particularly harmed wetlands, diminishing tugai forests and grass marshes. To preserve the Ramsar wetlands, it is essential to maintain the water balance of the Syr Darya River and the Small Aral Sea. The Barsakelmes Nature Reserve, which includes three distinct clusters, is located in the region. The flora of the reserve consists of 337 vascular plants, including five species listed in the Red Book of Kazakhstan and 13 endemics. To better protect the region's unique ecosystems, it is necessary to expand the network of nature reserves.

Key words: Aral ecological crisis, anthropogenic factors.

Biography:

Dr. Liliya Dimeyeva, Head of laboratory of Geobotany "Institute of Botany & Phytointroduction" (IBPh), Republic of Kazakhstan. Education: Dr Sci, Ecology. Botanical Institute RAS, Saint Petersburg/Russia, 2011; PhD, Biology, Institute of Botany, Kazakhstan, Alma-Ata, 1990. Work experience: more than 40 years in IBPh. Scientific interests: mapping of vegetation and ecosystems, vegetation dynamics, ecological restoration, Nature conservation. Member of the editorial board of journals "Arid Ecosystems" (Moscow/Russia), "Botanical Journal" (Saint Petersburg, Russia). Member of scientific societies: Russian Botanical Society; IAVS; ABCD Net; Kazakhstan National Committee of the UNESCO program "MAB"; international expert on desertification. Published 250 articles including chapters in monographs.



**Anastassiya F. Islamgulova*,
Gulnara T. Sitpayeva**

Institute of Botany & Phytointroduction, Almaty,
Kazakhstan



Assessment of the Current State of Botanical Diversity of the Western Kazakhstan Region

Western Kazakhstan encompasses four administrative regions, covering an area of 736,247 km² (27.1%). The network of Nature reserves in this region accounts only 5.9% (43,506 km²). This region is situated within a zone of high-risk agriculture, characterized by increasing soil and vegetation degradation and a growing shortage of water resources.

Project objective: inventory with the creation of an information and analytical database on algal flora, myco- and lichen biota, phytocenotic diversity, flora of vascular plants, trees and shrubs in settlements (<https://biokadastr.kz/map>). In 2024, extensive material was collected, after office processing of which the database will be supplemented. Interesting findings were revealed, for example, was found not previously listed species *Dactylorhiza incarnata* (L.) Soó (Orchidaceae), and also *Phellorinia herculeana* (Pers.) Kreisel a mushroom from the Red Book of Kazakhstan.

Identifying modern threats and risks to the state of biodiversity, the most significant were: climate changes, leading to a series of adverse consequences, in particular, xerophytization of floodplain and mesophilic ecosystems, droughts, floods, etc.; industrial development of the region with direct destruction of vegetation in places of mining, construction of enterprises and grazing.

Inventory of biodiversity will contribute to sound planning of the region's development. Identification of current risks and trends in the state of biodiversity in connection with climatic and anthropogenic factors will serve as the basis for measures to preserve the biodiversity of the region as a whole, and its most vulnerable components, such as rare, endangered and endemic plant species.

Key words: vegetation, flora, anthropogenic disturbances

Biography:

Anastassiya Islamgulova, Leading researcher of laboratory of geobotany "Institute of Botany & Phytointroduction" Ministry of Ecology & Natural Resources, Republic of Kazakhstan. ORCID iD <https://orcid.org/0000-0002-0103-0100>, Scopus Author ID: 56910238900, Web of Science ResearcherID: AEN-2924-2022. Education: PhD, Biology. Institute of Botany & Phytointroduction, Ministry of Education and Science of Kazakhstan. Almaty, 2010. Scientific interests: monitoring, dynamics and mapping of vegetation cover and ecosystems, interpretation of remote sensing data, Nature conservation. Participated in international projects (WWF, FFI, UNDP Kazakhstan). Member in scientific societies: IAVS.

Biography: Gulnara Tokbergenovna Sitpayeva: General Director of the Republican State Enterprise on the Right of Economic Management "Institute of Botany and Phytointroduction" of the Committee of Forestry and Wildlife of the Ministry of Ecology and Natural Resources of the Republic of Kazakhstan, Doctor of Biological Sciences, Honorary Academician of the National Academy of Natural Sciences of Kazakhstan. The main directions of scientific

research are flora and plant resources of the steppe regions of Kazakhstan. 5 monographs and more than 200 articles and theses have been published. She is the scientific director of projects on DFI, STP and experience exchange programs with international organizations: Washington State University, the Botanical Society of France, Singapore Botanic Gardens, Kongju National University, Osnabrueck University etc.



Daria Kowalczyk-Chrzastowska
Microbiology Department, Wroclaw University, Poland

Bioremediation potential of Effective Microorganisms (EM) in cosmetic wastewater treatment

Five commercially available microbial culture mixtures (B, F, G, H, I) were selected for bioremediation of industrial cosmetics effluents with EM. The selection of the mixtures for bioremediation tests was based on the manufacturers' claims, such as: enzyme content, content of selected microorganisms, elimination of unpleasant odours, degradation of detergents or reduction of COD parameter. A laboratory system was set up to test the susceptibility of industrial wastewater to bioremediation using selected EMs. Each experiment was conducted in parallel for raw and pre-ozonated wastewater. The effluent was kept at constant room temperature for 4 weeks and continuously aerated with pharmaceutical grade oxygen at a flow rate of 2g/h O₂. The system was continuously stirred with a magnetic stirrer at 150 rpm. Every seven days, stirring and oxygen were stopped for 30 minutes to allow the sediment to settle. After this time, samples were taken for analysis of COD (chemical oxygen demand), pH and CSA (concentration of anionic active matter). Aeration and stirring were restarted.

In each of the experiments analyzed, the effluent turned from light grey or white to dark brown or even green. A very unpleasant odor was emitted during sampling for analysis. The best % reduction results for COD and CSA parameters were obtained for formulation G, with 78% and 58% for raw effluent and 78.5% and 57% for pre-ozonated effluent, respectively. The worst results were obtained for preparation F, where no % reduction was achieved for both raw and ozonated effluents. The pH remained slightly reduced from 7 to 6 during the normal bioremediation process. It was shown that wastewater from the cosmetics industry is suitable for bioremediation with EM

Key words: bioremediation, wastewater treatment, effective microorganisms, cosmetic industry

Biography:

Daria Kowalczyk-Chrzastowska is a PhD student at the University of Wroclaw, Poland. She graduated in Environmental Chemistry at the University of Wroclaw in 2007. She works in a Polish cosmetics company where she is COO. She is responsible for production process optimization, new product and machine development and quality assurance. Her interests include waste minimization and environmental protection in industrial production. She takes part in the program of the Polish Ministry of Science and Higher Education called: Implementation Doctorate, where she is working on the new cosmetic waste water treatment plant for this company.



**Vaya Karypidou,
Argiri Voumvouraki**

Regional Association of Solid Waste Management
Agencies of Central Macedonia, Greece



Rehabilitation of landfills in Thessaloniki: from landscape destruction to recovery

Landfills are vital to public health, society and the environment, with considerable impact on the landscape. The locations of landfills tend to be marginalized, degraded areas on the outskirts of a city. Due to their size, they have a local and supra-local character. This is a factor that should be considered when designing their rehabilitation and integration into the environmental, social and cultural landscape of the wider area in which they are located. Indeed, landfill rehabilitation should not be seen as a purely technical or engineering challenge, but rather as an opportunity to upgrade the social and environmental value at a local and regional scale. By reclaiming and redefining the use of such sites, landfills can be transformed into parks, green spaces, or other development projects that can benefit the community. It is thus obvious that landfill rehabilitation should not be seen as an expenditure, but rather as an investment towards a sustainable future for urban areas.

In Greece, landfills take the form of either uncontrolled or controlled waste disposal sites, while in recent years there has been a rise in the development of sanitary landfills. Here, we present two applied examples of landfill rehabilitation in Thermi (80.000m²) and Derveni (132.000m²), located in the outskirts of the city of Thessaloniki (northern Greece), which today are used as environmental parks by the citizens. The implemented rehabilitation scheme in each site, was designed to comply with the relevant provisions of the EU Waste Framework Directive 75/442/EEC and the Greek regulation defined in the Joint Ministerial Decision 114218/1997 "Establishment of a framework of specifications and general waste management programs". In addition, the evolution of their aftercare over the years was based on the aforementioned framework. Both sites demonstrate successful case studies, where the rehabilitation was not treated solely on a technical level but was analyzed and designed according to environmental and socio-cultural criteria, factoring-in the character of the landscape and its uses. Ultimately, these spaces were upgraded as locations of great value for the quality of life in a city with limited open spaces and were integrated in the environmental units of Thessaloniki.

Keywords: Landfill rehabilitation, wasteland reclamation, environmental park, environment, community

Biography:

Ms Vaya Karypidou is an agriculturist with a postgraduate degree in landscape architecture from the Aristotle University of Thessaloniki. In addition to their qualifications, she possess a Master's degree in Business Administration with a focus on agile project management. She has been working for the Central Macedonia Solid Waste Management Agency as an agriculturist and landscape architect since 2007. Since then, she has been working in the Department of Inactive Landfills, Post-Landfill Landfills and Uncontrolled Landfills, and specializes in the rehabilitation of these sites

Biography:

Ms Argiri Voumvouraki is an agriculturist MSc from the Aristotle University of Thessaloniki. She has been working for the Central Macedonia Solid Waste Management Agency as an agriculturist since 1995 and Head of Department of Inactive Landfills, Post-Landfill Landfills and Uncontrolled Landfills since 2014



**Dimitrios Alivertis,
Ioanna-Efpraxia Parigoridi**

University of Ioannina, Greece



Eco-Conscious Soil Management for Chemical-Free Saffron Cultivation

Saffron (*Crocus sativus* L.) is a highly valued spice known for its distinctive flavor and rich content of bioactive compounds, including crocins, picrocrocin, and safranal, which contribute to its color, taste, and aroma, respectively. Iran leads global production, followed by

India (Kashmir), Spain, Greece, and Afghanistan. Harvesting is labor-intensive, requiring over 150,000 flowers to produce 1 kg of dried saffron, contributing to its high market price (€5,450– €9,800/kg). Climate change-induced temperature rises have facilitated the spread of *Rhizoctonia*, a soil-borne pathogen causing bulb rot and reducing yields by 40%–80%. Conventional control involves chemical fungicides, which risk soil contamination. The BIO-CROCUS SATIVUS project (NSRF 2014–2020, EU) explored an eco-friendly alternative using mycorrhizal fungi to protect saffron bulbs. This symbiotic approach is the first to investigate mycorrhiza's role in managing *Rhizoctonia*-related diseases in saffron cultivation. Initial findings indicate that mycorrhiza-treated bulbs showed up to 26% increased productivity without compromising soil physicochemical properties or saffron quality. Additionally, bulb production was notably enhanced. These results suggest that mycorrhizal inoculation offers a sustainable strategy to mitigate disease impact and improve saffron yield, aligning with environmental safety goals.

Keywords: Eco-technology, Mycorrhiza, Soil protection, *Rhizoctonia*

Biography:

Dr. Alivertis is Assistant Professor of Organic Chemistry at the University of Ioannina, specializing in the physicochemical applications of bioactive supramolecular compounds, medicinal plant properties, and environmental sample analysis. He has significant experience in teaching, research, supervision, curriculum development, and academic leadership. Dr. Alivertis holds a PhD in Organic Chemistry (2008, Excellent), MSc in Chemical & Biochemical Technologies (2005, Excellent), and BSc in Chemistry (2001, Very Good). He has published 19 articles in peer-reviewed journals and serves as an editorial board member. Previous roles include Teaching & Research Fellow and Quality Control Supervisor.

Biography:

Dr. Parigoridi is an Academic Teaching Assistant at the University of Ioannina, specializing in food technology, recycled food packaging materials, and environmental sample analysis. She holds a PhD in Food Chemistry and Technology, an MSc in Bioinorganic Chemistry, and a BSc in Chemistry. Dr. Parigoridi has published six articles in peer-reviewed journals and serves as an editorial board member. She is experienced in designing and applying HACCP self-monitoring systems and implementing food safety standards, including ISO 22000, IFS, FSSC, and BRC. She is also a certified Head Auditor for ISO 22000.



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HYBRID EVENT

KEYNOTE PRESENTATION
DAY 2



Ibrahim Alzahrani

Advanced Analysis Group, Saudi Arabia

New Technology for Utilizing Of Spent Claus Catalyst in Manufacturing of Portland Cementr

The Claus process is the most widely used process worldwide to convert hydrogen sulfide separated from acid gas or refinery to elemental sulfur. It consists of a two-stage process: thermal and catalytic. During the first process (thermal), the H₂S is oxidized with air at high temperatures (1000°-1400°C). Sulfur is formed, but some H₂S remains unreacted and SO₂ is also formed, as showed below:



During the catalytic process, the remaining H₂S is reacted with the SO₂ at lower temperatures (200°-350°C) over a catalyst to produce additional elemental sulfur, as follows:



The Claus catalyst has high surface area, low density, high macroporosity and contain > 50 % Aluminum oxide (Al₂O₃). These properties provide maximum activity for the conversion of sulfur compounds. However, the Claus Catalyst performance reduces with time resulted low conversion of hydrogen sulfide to sulfur. Thus, the engineering and operation must replace it with a new catalyst and dispose of the old Claus Catalyst by sending to land fill which causing environmental issues and cost. To overcome this issue, a comprehensive study has been conducted to find alternative methodologies for utilizing spent Claus catalyst instead of disposal. The feasibility study showed that the spent Claus catalyst can be utilized without any pretreatment as a raw material for manufacturing Portland cement to substitute for both bauxite and clay due to the its composition including high content of Al₂O₃. The study included different spent Claus catalyst samples that were mixed and calcined in proper ratio with limestone, sand, and iron to produce Portland cement samples. The physical and chemical properties of the final Cement product were evaluated using advanced analytical instruments (e.g. XRD, ESEM, XRF, ICP) and the results revealed that the properties of the final cement products were comparable to the cements produced from the conventional raw materials.

This technology "Utilization of spent Claus catalyst for manufacturing of Portland Cement" has been licensed to Cement company and provide significant environmental, cost-saving benefits and enhance circular economy as well as promote local economy, providing a solution for ≥ 2000 tons of spent Claus catalyst yearly. In this presentation, the presenter will present the comprehensive study of this technology to the audience.

Biography:

Dr. Ibrahim Al-Zahrani is Research Science Consultant and SME for Materials and Hydrocarbon characterization and development in RASD Department. He issued 10 patents and 35+ publications in peer reviewed journals and international conferences. Ibrahim developed several competencies and led projects to overcome Saudi Aramco critical issues. Dr. Zahrani was chairman of SAICSC-ACS in 2014 and chair for labTech 2017. Also, he was a BOD member of SAICSC-ACS during the period of 2009 to 2015. He received several recognitions from Saudi Aramco for his great support and developing technologies.



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ORAL PRESENTATIONS
DAY 2



Nirmala Deenadayalu
Durban University of Technology, South Africa

Use of an Ionic Liquid for Biochemical Production from Biomass

Due to global warming effects caused by fossil fuel burning to produce energy and chemicals new and sustainable technologies need to be developed to mitigate against climate changes. Alternate ways to produce chemicals need to be investigated to reduce the dependence on crude oil refining.

Biomass which is a natural sustainable resource presents a unique opportunity to be investigated to produce biochemicals and biofuels. In South Africa the annual sugarcane bagasse (SCB), "waste biomass", produced after the sugarcane refining process amounts to 7 million tonnes. This commodity is currently not used maximally and is burnt in sugarcane fields causing further greenhouse gas emissions. Valorisation of sugarcane bagasse presents a sustainable option to produce biochemicals, bioplastics and biofuels.

The transformation of SCB to value-added chemicals will require chemical methods that do not use corrosive and harsh chemicals. A class of solvents/catalysts namely ionic liquids (ILs) have properties such as low vapour pressure, recyclability, liquidity at room temperature and "design to suit a purpose" are possible replacement solvents/catalysts for biomass processing. In this work an IL was investigated to produce platform chemicals such as levulinic acid (LA) and to gamma valerolactone (GVL). The IL 1-ethyl-3-methyl imidazolium hydrogen sulphate (EMIM HSO₄) was used as a catalyst for levulinic acid production and conversion to gamma valerolactone in a Box- Behnken design of experiments.

The optimization parameters for LA production ranged from (25 - 200) °C for temperature, (2-10) h for time, and (0.5-5) g for catalyst loading. The yield of LA from depithed sugarcane bagasse was 55% and the conversion to GVL was 77.6%. A less toxic and harmful solvent namely methanesulfonic acid (MsOH) was investigated and compared with traditional solvents, water and alcohols, for GVL production.

The yield of GVL produced from SCB was 1% lower than that produced from commercially produced LA. GVL has applications in food additives, insecticides, and lacquers.

Key words: Biomass, biochemicals, sustainable development, ionic liquids

Biography:

I have 30 years academic with 100 published peer-reviewed journal articles and book chapters. I am a NRF C2 rated scientist. I have peer reviewed research papers for a number of international journals and examined a number of Masters and PhD thesis. I have visited the following international universities: Delhi University, India 2009; Warsaw University of Technology, Poland; University of Campinas, Brazil ; Kurukshetra University, India 2014; Imperial College, UK ; Hamburg University of Technology, Germany and have numerous local and international collaborations. My research area is in thermodynamics, ionic liquids, biomass processing and biogas production.



Alireza Entezam

University of Southern Queensland, Australia

Circular Economy in Underground Construction: Enhancing Grout Sustainability with Recycled Waste

The construction industry is facing increasing pressure to adopt sustainable practices, particularly in underground infrastructure, where traditional cementitious materials contribute significantly to environmental impact. This study explores the development of an eco-friendly grout incorporating recycled waste materials, specifically waste glass, as partial replacements for conventional cement-based components. By integrating recycled materials, the proposed grout aims to reduce carbon emissions, minimise waste disposal challenges, and enhance resource efficiency in line with circular economy principles. Laboratory investigations were conducted to assess the fresh and hardened state characteristics of the modified grout, including workability and mechanical properties. The findings demonstrate that the inclusion of optimised proportions of recycled materials not only maintains the mechanical performance required for underground applications but also improves sustainability by lowering the reliance on virgin resources. The study further highlights the potential of such sustainable grouting solutions to support environmentally responsible underground construction while promoting waste valorisation. This research contributes to the advancement of greener construction materials, offering a viable pathway for integrating waste recycling into underground engineering. The findings underscore the importance of innovative material design in achieving a balance between performance, sustainability, and economic feasibility.

Keyword: Sustainability – circular economy – cementitious grout – waste materials

Biography:

Alireza is a third-year PhD student in civil engineering at the University of Southern Queensland, focusing on developing sustainable grout using waste materials for mining and geotechnical applications. He has contributed to multiple industrial projects in sustainability and materials science, delivering impactful results so far. With his background in metallurgical engineering and his expertise in materials testing, he also serves as a technical support officer in the university's civil engineering laboratory, assisting post graduate researchers with technical requirements.



Javiera Sepulveda Carter
Polytechnic University of Madrid, Spain

Potential of Reprocessed and Recycled HIPS as Food-Grade Materials

This study examines the recycling of post-consumer High Impact Polystyrene (HIPS) yogurt cups collected at the Universidad Politécnica de Madrid and reprocessed HIPS subjected to one extrusion cycle. Films were produced with 30, 40, and 50% recycled content, characterizing their properties and evaluating their suitability for food contact applications. Scanning Electron Microscopy revealed morphological irregularities in yogurt cups, especially at higher recycled content, linked to contaminant residues. Reprocessed HIPS displayed surface roughness, confirming degradation from repeated extrusion, consistent with mechanical tests that showed both material types exhibited lower tensile strength and impact resistance compared to virgin HIPS. However, post-consumer yogurt cups displayed higher hardness. Melt Flow Index showed higher values, reflecting lower viscosity. Overall migration tests showed lower values for post-consumer yogurt cups compared to reprocessed HIPS, suggesting reduced contaminant mobility. These findings provide insights into the performance and migration behavior of yogurt cups and reprocessed HIPS, supporting their potential feasibility for food contact use.

Keywords: Polystyrene, Recycling, Reprocessing, Food-Contact

Biography:

Javiera Sepúlveda-Carter is pursuing a PhD in Environmental, Chemical, and Materials Engineering at the Universidad Politécnica de Madrid under the SDGine program with ECOEMBES. Chemical Civil Engineer from the Universidad de Santiago de Chile, formerly Development Engineer for SMU S.A., leading Chilean retail. Her research focuses on recycling technologies and eco-friendly materials, with experience in plastics analysis and packaging.



Nilesh Patil

Partner, Touch N Glow Common Bio Medical Waste Treatment & Disposal Facility, India

Sustainable waste management in Brunei: A pilot proposal for material recovery and composting to achieve landfill diversion and circular economy goals

This pilot proposal outlines a comprehensive plan for improving waste management in Brunei Darussalam through the development of a Material Recovery Facility (MRF) and a composting plant. Brunei faces significant waste management challenges, including high per capita waste generation, limited landfill capacity, and low recycling rates. In 2023, Brunei generated approximately 191,482 tonnes of municipal solid waste (MSW), with a recycling rate of only 2.39% for MSW. The country's primary landfill, Sungai Paku, is expected to reach capacity by 2030, raising concerns about the future of waste disposal.

To address these issues, the pilot proposal aims to divert up to 80% of MSW from landfills by implementing advanced sorting and composting technologies. The MRF will focus on recovering recyclable materials such as plastics, paper, metal, and glass, while the composting plant will process organic waste, producing valuable compost for agricultural and landscaping use. The facility will be designed to process 100 metric tonnes of MSW per day, significantly improving recycling rates, reducing greenhouse gas emissions, and fostering a circular economy.

The success of this initiative depends on strong collaboration between government bodies, private sector entities, and the public. Public awareness campaigns will be crucial in encouraging waste segregation at the source, while the establishment of local recycling infrastructure will reduce Brunei's reliance on exporting recyclables. Additionally, the project will create green jobs and contribute to long-term environmental and economic sustainability. By aligning with Brunei's Wawasan 2035 goals of sustainability, this pilot project represents a pivotal step towards reducing Brunei's environmental footprint and supporting a clean, green, and sustainable future. The proposed MRF and composting plant will enhance resource recovery, reduce landfill dependency, and contribute to Brunei's aspirations of becoming a sustainable, circular economy.

Keywords: Material Recovery Facility (MRF); Composting Plant; Municipal Solid Waste (MSW); Recycling; Circular Economy.

Biography:

Mr. Nilesh Patil has completed his M.Sc in Organic Chemistry at the age of 22 years from Mumbai University and M.Phil in Natural Resource Management from Indian Institute of Forest Management Bhopal . He is certified Lead Auditor -ISO 14001(EMS) from TUV India. He is the partner of M/s. Touch N Glow, a Common Bio Medical Waste Disposal Facility authorized by Maharashtra Pollution Control Board since 2004. He is member of International Solid Waste Association (ISWA), Solid Waste Association of North America (SWANA), Air & Waste Management Association (AWMA).



Sophia Long
University of Chicago

The Future Demands the Youth: Youth Leadership in the Frontlines of the Climate Crisis

I plan to present a talk underscoring the urgency of immediate climate interventions, with a focus on the disproportionate effects of climate change on marginalized communities. While youth are emerging as powerful drivers of climate action, they look to today's leaders to lay the foundation for transformative change. This presentation will spotlight global youth-led climate initiatives, emphasizing the critical need to integrate young voices into policy making-especially as current world leaders fall behind on bold climate commitments. I will share my own efforts fostering youth leadership in climate action through collaborative projects that promote sustainability both locally and globally. To humanize the crisis, I'll include testimonies from orphanages I've worked with, illustrating how environmental degradation affects vulnerable populations. Visuals of rising global temperatures and extreme weather events-floods, wildfires, and more-will illustrate the reality that climate change is a present emergency. I will urge leaders to invest in youth-driven solutions, support our innovations, and recognize our generation as the catalyst for a healthier, more sustainable world. The time to act is now. The younger generation is watching-waiting for leaders to become the role models we need. We must eliminate fossil fuels, transition to renewable energy, and protect biodiversity. This is not just about saving our planet-it's about protecting our health and humanity. I will close with a powerful call to action, reminding stakeholders that our future depends on what we do today.

Biography:

Sophia Long, an incoming freshman at the University of Chicago, is an internationally recognized activist and Co-founder of Science Humanitarian International. She delivers STEM, health, and climate education to underserved students across 20+ countries and leads global humanitarian initiatives. A 2024 Diana Award recipient and UN Global Goals Ambassador, she has briefed the U.S. Senate and House on health equity and climate resilience. Sophia also co-hosts the Science Humanitarian Podcast, engaging global leaders in climate dialogue, including the 48th President of Costa Rica and National Geographic Photojournalist.



Naveed Ahmad

Department of Chemical and Materials Engineering, College of Engineering, Northern Border University, Arar, Saudi Arabia

Design of a Sulfide Treatment System for Petrochemical Wastewater

Wastewater from petrochemical plants causes major environmental challenges and must be treated before disposal. The present research work concentrates on the design of an efficient and effective treatment system specifically for the removal of sulfide in wastewater produced by a petrochemical facility. The research work examines several treatment alternatives based on efficiency, cost, and environmental impact, ultimately choosing an air absorption process as the most workable option for industrial-scale operation.

The design process followed certain standards, including the D107-10 AWWA and API650 for the storage tank, and ANSI/API 610-1995 and API Std.No. 617 for the centrifugal pump and compressor. A detailed cost analysis was carried out, encompassing both working capital and fixed capital costs. The system's efficiency was rigorously verified and validated using real industrial samples from the PetroRabigh petrochemical plant, Saudi Arabia, demonstrating a remarkable sulfide removal efficiency of 99.9%.

Results revealed that sulfide removal rates enhanced with increased air flow rates and oxygen partial pressures, aligning with the US Environmental Regulations Act of 2003 regarding effluent discharge standards. This research contributes to the establishment of sustainable wastewater management practices in the petrochemical industry, emphasizing the effectiveness of the proposed treatment system.

Keywords: Wastewater, petrochemical, air absorption, environmental standards, cost analysis, sulfide treatment.

Biography:

Dr. Naveed Ahmad is an esteemed academic with a PhD from the University of Naples, Italy, and a Master's degree in Chemical Engineering from Universiti Teknologi Petronas, Malaysia.

He is currently working as Assistant Professor at Northern Border University in Saudi Arabia. He has published 40 articles along with one patent. Actively involved in academics, Dr. Naveed serves as a reviewer for numerous scientific journals and is on the editorial committee of the Energy Engineering Journal. His research focuses on environmental and polymer engineering, aiming to bridge both fields to develop innovative solutions for pressing challenges.



Dahbane Oumaima

Cadi Ayyad University Faculty of Science Semlalia, Morocco

OMWW Soil Amendment: Analyzing Its Impact On Vicia Faba And Soil Parameters

The olive oil extraction generates an enormous quantity of secondary products annually, such as olive mill wastewater (OMWW). Because of their high nutritional value, like most of agricultural wastes, they are used as soil amendment. This study sought to investigate the influence of the amendment with OMWW from three-phases cold-pressed system on soil properties, as well as the growth, physiological and biochemical parameters of the Vicia faba plant. The investigation also examined the influence of bacterial inoculation to improve soil fertility, stimulate plant growth and detoxify OMWW in situ avoid an apparent phytotoxicity. An increasing volume of OMWW was used in the experiment (215 m³/ha; 360 m³/ha; 575 m³/ha with three different ratio 1:2 / 2:1 / 0:3 v: v). The results showed that the amendment with OMWW has a significant effect on soil properties (pH, EC, Carbone rate, decomposition rate and phosphorus rate), Vicia faba plant growth parameters (dry biomass, Shoots height, and root height), physiological parameters (Fv/Fm, stomatic conductance, and SPAD index) and biochemical parameters (soluble sugar content, protein content, pigments concentration). Generally, the best parameter values are noted in the second volume especially with a 0:3 ratio of system amendment with OMWW. As a result, our study has proven that these wastes can be considered effective biofertilizers.

Keywords: Olive Mill Wastewater; Waste valorization; soil amendment; soil fertility; leguminous crops

Biography:

Dahbane Oumaima is a second-year doctoral researcher in Microbial Biotechnology, Agro-Sciences, and Environment at Cadi Ayyad University. Her academic journey is distinguished by an exemplary foundation in life and earth sciences education, achieved with high honors. Her research focuses on the environmental biotechnology and wastewater treatment, she has notably contributed as a second author to a scientific publication in these fields in reputed journal. Additionally, she possesses substantial experience in university teaching and scientific outreach, reflecting her profound commitment to the dissemination of knowledge and innovation.



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Zoom Meeting (GMT+2) Time in Zurich

VIRTUAL PRESENTATIONS
DAY 3



Dhritimona Deka

Indian Institute of Science Education and Research, Kolkata, India

Modelling the Dispersion of Industrial Air Pollutants in Guwahati Using the Gaussian Plume Model

Amid rapid industrial expansion, Guwahati one of Northeast India's fastest-growing cities is facing an escalating air quality crisis. Yet, scientific assessments of industrial pollutant dispersion at a local scale remain virtually unexplored. This study presents the first integrated modelling of industrial air pollution dispersion in Guwahati, combining the Gaussian Plume Model (GPM) with advanced Geographic Information Systems (GIS) tools to assess real-time pollutant behaviour. Twelve strategically selected industries across **Boragaon, Noonmati, Amingaon, and Bhangagarh** (certain areas in Guwahati) were studied for key pollutants $PM_{2.5}$, SO_2 , NO_2 , and PM_{10} using emission data collected from official environmental records. Covering an entire seasonal cycle from August 2023 to July 2024, the study incorporates detailed meteorological parameters such as wind speed, wind direction, solar radiation, cloud cover, temperature, and humidity to classify atmospheric stability conditions dynamically. By leveraging GIS platforms like Google Earth Pro to map plume trajectories and calculate source-receptor distances and crosswind displacements, the model visualises pollution spread with spatial accuracy. Results reveal significant seasonal variability, with pollutant concentrations peaking during stable, low-wind conditions, particularly in winter, posing a greater threat to downwind populations. The study not only provides a robust, scalable framework for localised air quality assessment but also offers critical insights for targeted emission control strategies in fast-developing urban-industrial regions. This pioneering research bridges a major data and knowledge gap for Northeast India and contributes directly to environmental planning, policy formulation, and sustainable urban development

Biography:

Dhritimona Deka is currently pursuing a Master's degree in Environmental Science from the Indian Institute of Science Education and Research, Kolkata. The research focuses on industrial air pollution modelling using dispersion techniques such as the Gaussian Plume Model. They have surveyed over a dozen industries across Guwahati and have actively engaged in GIS-based air quality assessment. This is their first international conference presentation.



Bereket Gutema Gelchu

Indian Institute of Technology Roorkee, India

Evaluation of Environmental Flows Using Desktop Hydrological Approaches for Sub basins of Upper omo-Gibe River basin, Ethiopia

Rivers play a vital role in sustaining ecosystems and human livelihoods yet increasing water extraction and infrastructure development have significantly altered natural flow regimes. In the Upper Omo-Gibe River Basin, the lack of adequate environmental flow assessments has raised concerns about the sustainability of aquatic habitats and local communities dependent on these water resources. This study aims to evaluate environmental flow requirements using desktop hydrological approaches, IWMI and IHA focusing on natural flow patterns. The analysis was conducted at four key sites: Asendabo, Baco, Limmu Genet, and Seka-employing methods such as Flow Duration Curves (FDCs) and Environmental Management Classes (EMCs). The findings revealed substantial seasonal variability, with peak flows from July to September and low flows from January to April. Environmental flow thresholds varied significantly, with low flows ranging from 3.05 cumec at Seka to 15.3 cumec at Asendabo. The study concludes that preserving natural flow variability is essential for sustaining riverine ecosystems. It is recommended implementing flow management strategies that mimic natural patterns and establishing minimum flow standards to support both ecological health and community livelihoods.

Biography:

Bereket Gutema is a Master of Technology (M.Tech) candidate in Water Resources Development at the Indian Institute of Technology Roorkee (IIT Roorkee), India. As an emerging researcher, he specializes in hydrological modeling, climate change impact assessments, and sustainable water resources management. His academic pursuits aim to advance integrated water resources strategies for resilient and adaptive development



Vaibhav Damle
University of York, United Kingdom

The 15-Minute City: Bridging Urban Promise and Practical Reality in Sustainable Development

This research explores the "15-minute city" model, a transformative urban planning concept aimed at improving sustainability, accessibility, and social equity. First conceptualized by Carlos Moreno in 2016, the 15-minute city strives to provide residents access to essential services within a 15-minute walk or bike ride from their homes. This study assesses the practical implementation of this model in various global cities, with a specific focus on London's unique urban fabric. Through a comprehensive literature review, public perception surveys, and interviews with key policymakers, the research highlights both the potential benefits such as enhanced urban livability, reduced carbon emissions, and improved public health and the significant challenges, including infrastructure investment, gentrification, and socioeconomic disparities.

The findings reveal a critical gap between the public's perception and the actual implementation of 15-minute city policies. While there is widespread support for the idea, concerns surrounding equitable access, affordability, and the risk of displacing long-term residents due to rising property prices must be addressed to prevent exacerbating existing inequalities. The study emphasizes the need for equitable and context-sensitive urban planning, recommending stronger integration of public transport and mixed-use development to create sustainable urban environments.

Overall, this research provides practical policy recommendations for policymakers and urban planners looking to adopt the 15-minute city model in the UK. It underscores the importance of community engagement, careful planning, and investment in public infrastructure to ensure the successful and inclusive adoption of this urban model across diverse urban contexts.

Biography:

Vaibhav Damle is an experienced professional with over six years in project management, data analysis, sustainability consulting, and GIS. He holds a Master's in Environmental Science & Management from the University of York and a Bachelor's in Mechanical Engineering from the National Institute of Technology, Raipur. Vaibhav has worked on diverse projects, including the Bulky Waste Project for the City of York Council and the interdisciplinary MoorFood project. His expertise includes City Planning and Policy development, circular economy, and production management. He is skilled in tools such as AutoCAD, QGIS, and SPSS, and is interested in sustainability and urban planning.



Ilaria Maria Cigognini

Experimental Station for the Food Preserving Industry, Italy

Eco-friendly extraction of cutin from unripe green tomatoes by using different ecological and sustainable technologies

Sustainable agro-food productions are an ambitious goal for the circular economy. Among the agro-food productions, tomatoes are certainly one of the most cultivated and consumed vegetables worldwide. The massive production of tomatoes is followed by a large amount of waste that comes from several phases: from the harvesting to the processing and the consumption. The waste that comes from harvesting phase consists of tomatoes with insufficient quality, such as unripe green tomatoes, rotten tomatoes and tomatoes damaged by mechanical events. Disposal of these residues poses many environmental and economic challenges, with current low-value uses. The main objective of AGRITOMACTIVE project is to valorize this particular waste, the green unripe tomatoes, through the set up and development of cascade extraction processes, which used innovative and ecological technologies and which allow to recover bioactive molecules to be used in different application sector. The present research work describes and explains the recovery of a particular biomolecules present in the tomato skins, on which the SSICA Packaging Division has gained a deep experience, thanks to previous European research projects, the cutin. This molecule presents interesting barrier properties and can acts as bio-based coating in food packaging. In this study the cutin extraction was set up and developed by using green technologies, in particular the Ultrasounds Assisted Extraction, the Microwave Assisted Extraction and the green solvents. These technologies have been tested to improve the extraction efficiency and the sustainability of the process, demonstrating that also this waste can be valorized through a green extraction protocol.

Keywords: cutin, agro-waste, ultrasounds, microwave, circular economy

Biography:

Ilaria Maria Cigognini graduated in Chemistry at the University of Modena in 2008. She is working in the SSICA Packaging Division since 2012, where she works in the field of bio-based coating for food packaging, in particular she studies innovative and eco-sustainable packaging functionalized with active molecules extracted from agro-industrial by-products. In previous years in SSICA she followed several European projects (BIOCOPAC, BIOCOPACPLUS, AGRIMAX, PROLIFIC) focused on the valorisation and extraction of bioactive molecules from agro-industrial waste to create new sustainable food packaging. She is one of the inventor of the cutin extraction patent and co-author of different publications.



Mirko Pesce
G. D' Annunzio University, Italy

Biological role for micro- and nano-plastics in autophagy modulation

Nanoplastics and microplastics, small plastic particles less than 5 mm in size, have emerged as pervasive environmental pollutants with significant implications for both human health and ecosystems. These particles originate from the degradation of larger plastic debris or from products designed at the nanoscale, such as cosmetics and clothing fibers. Due to their size, they are easily ingested or inhaled, entering the human body through various routes, including food, water, and air. Once inside, they have been shown to induce cellular stress, inflammation, and disrupt normal biological functions.

Autophagy, the cellular process responsible for degrading and recycling damaged cellular components, plays a critical role in managing the effects of environmental stressors, including the presence of nanoplastics and microplastics. However, excessive exposure to these particles can impair autophagic function, leading to cellular dysfunction, accumulation of toxic materials, and the development of various diseases such as cancer, cardiovascular, and neurodegenerative disorders.

The environmental impact of nanoplastics and microplastics extends beyond human health, affecting wildlife and ecosystems. These particles can be ingested by marine and terrestrial organisms, disrupting food chains and causing long-term ecological damage. The persistence of plastics in the environment, their ability to accumulate toxic chemicals, and their potential for biomagnification pose serious challenges for environmental sustainability.

This growing concern highlights the urgent need for more research to understand the mechanisms by which nanoplastics and microplastics interact with biological systems and to develop strategies for mitigating their environmental and health impacts.

Keywords: Autophagy, microplastics, nanoplastics

Biography:

Mirko Pesce is an Associate Professor at the Università G. d'Annunzio Chieti-Pescara, Italy. His work recently primarily focuses on environmental sciences, particularly in the areas of pollution and its effects on human health and ecosystems. Pesce has contributed significantly to the study of nanoplastics and microplastics, examining their impact on biological systems and the environment. His research aims to better understand the risks posed by emerging contaminants and to develop sustainable solutions for mitigating their harmful effects. Through his work, Pesce plays an important role in advancing environmental health science and policy.



Rania Remmani
Miguel Hernandez University, Spain

Life Cycle Assessment of Biochar Production from Date Palm Seed Waste: Environmental Impacts and Optimization for Arid Regions

This study presents a Life Cycle Assessment (LCA) of biochar (BC) production from date palm seed (DPS) waste, aiming to provide a comprehensive environmental impact evaluation for sustainable biochar production in arid regions. Utilizing the ISO 14040/44 framework, the analysis encompasses each stage of the BC production process, from DPS collection to pyrolysis and final product refinement. Region-specific impact categories, including water scarcity, land use, desertification potential, and global warming potential, are prioritized alongside global concerns, using the ReCiPe 2016 and AWARE methodologies. Differential Scanning Calorimetry (DSC) and Thermogravimetric (TG) analyses contribute empirical thermal decomposition data, enabling accurate quantification of emissions and resource usage throughout the biochar production process. Results reveal key environmental trade-offs and highlight potential optimizations in pyrolysis parameters to minimize emissions and resource consumption, supporting the use of DPS-derived biochar as an environmentally favorable solution for carbon sequestration and waste valorization. By applying LCA to biochar production from DPS waste, this study contributes a valuable framework for enhancing sustainable biochar applications in carbon management and circular economy strategies, especially within the unique ecological constraints of arid regions.

Biography:

Dr. Rania Remmani completed her doctorate in Inorganic Chemistry from the University of Biskra with very Honorable mention and Committee Praise. During her doctoral studies, she participated in the Erasmus+ International Credit Mobility Program at Sapienza University of Rome. She is currently a Research Fellow at the University of Miguel Hernández, Spain, specializing in date palm research and environmental remediation. She has published 9 papers in reputed journals, including high-impact publications in Environmental Science and Pollution Research and Materials. Dr. Remmani serves as a reviewer for several prestigious journals including Journal of Environmental Management and Applied Materials Today.



Anna Hnydiuk-Stefan
Opole University of Technology, Poland

Comparative Analysis of Conventional Electricity Generation and Oxy-Fuel Combustion

The paper presents a comparison of two electricity generation methods: conventional generation in supercritical conditions, based on the combustion of fossil fuels, and oxy-fuel combustion, which utilizes technologies focused on clean burning in an oxygen-rich atmosphere with CO₂ recirculation. Key aspects of both technologies are discussed, including energy efficiency, environmental impact, and greenhouse gas emissions. Particular attention is given to the potential reduction of CO emissions in oxy-fuel processes due to the easier capture of carbon dioxide for further utilization or sequestration within the CCS (Carbon Capture and Storage) process. The analysis also addresses technological challenges associated with the implementation of oxy-fuel technologies and their development prospects in the context of global climate goals. The results of the comparison highlight issues such as reduced system efficiency while emphasizing the growing importance of oxy-fuel technologies as an alternative to traditional electricity generation methods, especially in light of the necessity to mitigate negative environmental impacts.

Biography:

Assoc. Prof. Anna Hnydiuk-Stefan is a research at the Opole University of Technology, specializing in fields such as environmental engineering, energy, and management. She is the author of numerous scientific publications and monographs published by renowned publishers. She has actively participated in various research projects and international scientific conference and is a member of multiple associations and international organizations, including the Energy Commission of the National Academy of Sciences branch in Katowice. Since 2022, she has served as the editor-in-chief of the Multidisciplinary Journal of Engineering Sciences.



Rkia Zari

Cadi Ayyad University, Morocco

Development of Sustainable Mortar using tannery sludge and Wheat Straw fiber with improved thermo-physical and sound properties

Due to raw material shortages and waste management concerns, composite building materials made from industrial and agriculture by-products have become a key component of tomorrow's construction sector. Thus, the current research aimed to develop environmentally friendly mortar using tannery sludge (TS) and wheat straw fibers (WSF), with improved thermal insulation, sound absorption, while maintaining adequate mechanical strength. To reach this, different mortars samples were manufactured by substitute cement with 25% sludge as optimal rate and the fibers were added to the mixture in different proportions (from 1% to 6%) of the binder material mass. Mortar samples were characterized by mechanical, microstructural, thermo-physical and acoustic measurements. It is demonstrated that incorporation of WSF into sludge-mortar improves significantly the thermo-mechanical behavior of the new composite. Mechanical strength increased by up to 9% for WSF content of 1% then decreased with increasing straw fiber content, however, it was not too significant or below workable standards ($>2\text{MPa}$). The density and thermal conductivity measured at day 28 decreased with increasing fiber content; An addition of 6% of AF weight content makes composite material lighter by about 13%, enhances its insulating thermal capabilities by about 57%. Furthermore, the samples with high straw content showed good acoustic absorptions in the 500–1000 Hz range. These results were strongly dependent on the porosity of the composites, ascribed to the straw features and to the voids at the cellulose fibers/cement matrix interface as demonstrated by SEM micrographs. At last, it was found that adding up to 2 wt% WSF meets the structural requirements of lightweight concretes ($>3.5\text{ MPa}$) and could be used for wall structures.

Key words: Sludge mortar, Wheat Straw fiber, Recycling, Mechanical properties, thermal and acoustic insulation.

Biography:

Rkia ZARI has her expertise in Sustainable Development. She aims to create new pathways for valorization of industrial solid waste. She has built this model after years of experience in research, evaluation, teaching and administration in university. Research is based on sustainable use of wastes in civil engineering and environmental applications. Research Interest :Environment, waste valorization, sustainable development, materials



Fernando Pinto Coelho
Federal University of Alagoas, Brazil

The Sustainability Of Seaweed Biomass For Biorefinery Processes: Studies Of Sampling In The Littoral Of Alagoas/Brazil

Alternative technologies for generating renewable energy offer the possibility of shifting to more sustainable systems in which natural resources are conserved through their own perennial cycles. Macroalgae as a marine substrate for the biomass energy sector is a natural resource of inexhaustible abundance in the oceans, growing three to four times longer than terrestrial plants. The aim of this work was to evaluate the sustainability of macroalgal biomass for biorefinery processes. Two studies were therefore carried out. In the first, the natural deposition of macroalgae was evaluated in 28 collections carried out in seven beaches of the Maceió coast over a period of 2 years. Samples were taken using the zigzag method and covered a deposition area of 135,000 m². The results obtained of 5.08 tons/ha for dry biomass by daily collection, it means the only type of biomass that you can get daily collections, with an efficiency 35 times greater than sugarcane biomass production. The second study evaluated the calorific value of the biomass and, as a result, the low calorific value of 8.82 MJ / kg in 13 species analysed was similar to the main biomass used in Brazil, the sugarcane bagasse evaluated at 8, 91 MJ / kg. Based on the results obtained, it is observed that the macroalgae biomass has potential for biorefinery.

Key words: biomass, coral reefs, energy, sampling studies, seaweed, sustainability.

Biography:

Javiera Sepúlveda-Carter is pursuing a PhD in Environmental, Chemical, and Materials Engineering at the Universidad Politécnica de Madrid under the SDGine program with ECOEMBES. Chemical Civil Engineer from the Universidad de Santiago de Chile, formerly Development Engineer for SMU S.A., leading Chilean retail. Her research focuses on recycling technologies and eco-friendly materials, with experience in plastics analysis and packaging.



Asher Siebert

Senior Scientist on Loss and Damage, Climate Analytics, USA

Climate Related Loss and Damage with a Case Study in the Caribbean

Climate change poses significant challenges throughout the world, particularly because of heat extremes, hydrometeorological extremes and sea level rise/storm surge risk and particularly for least developed countries (LDCs) and small island developing states (SIDS). The societal impacts of these climate hazards are closely connected to both quantifiable and non-monetary loss and damage across multiple sectors (eg. health, energy, water, food security, national security, disaster management, infrastructure, transportation) and to presently or potentially insurable risks.

This presentation will explore the scientific, socioeconomic and financial/policy lenses of climate related loss and damage, both at a global scale, referring to the UNFCCC's Fund for Responding to Loss and Damage (FRLD) and other global initiatives, and at a local scale with a case study on the potential for climate related index insurance in the Caribbean Island nation of St. Kitts and Nevis. The case study will explore a range of observational and climate modeled data and analysis of historical and future potential extreme events and the potential implications for index insurance pricing in the context of climate change.

This project is being conducted by the company Climate Analytics and is funded through by UN Office for Project Services (UNOPS). This methodology may inform the quantification of a national loss and damage policy and plan, in coordination with multiple stakeholders in St. Kitts and Nevis and the Caribbean Climate Risk Insurance Facility (CCRIF).

Biography:

Dr. Asher Siebert is an accomplished climate scientist and physical geographer with over 15 years of experience in seasonal predictability, climate extremes analysis, adaptation to climate risks, and climate-economy modeling. His work is driven by a passion for addressing complex challenges across geographies and sectors, including loss and damage, food security, public health, and humanitarian responses to natural disasters.

In his current role as Senior Scientist on Loss and Damage at Climate Analytics, Dr. Siebert focuses on climate science, multidisciplinary analysis of climate-related loss and damage, stakeholder engagement for climate adaptation, and climate finance. He leads a key project in St. Kitts and Nevis and provides advisory support for various initiatives involving small island developing states (SIDS) and least developed countries (LDCs).

Prior to joining Climate Analytics, Dr. Siebert worked at the International Research Institute for Climate and Society (IRI) at Columbia University Climate School from 2016 to 2022. At IRI, he contributed to projects on seasonal forecasting for food security and forecast-based financing for anticipatory humanitarian responses. His responsibilities included developing seasonal forecasts, training meteorologists from partner nations in Africa, creating educational curricula, and conducting peer-reviewed research.

Dr. Siebert earned his PhD in Geography from Rutgers University, an MA in Climate and Society from Columbia University, and a BA in Geosciences from Princeton University. He has held postdoctoral positions at Princeton University and Columbia University, further solidifying his expertise in climate science.

Beyond his professional pursuits, Dr. Siebert enjoys spending time with his wife and two young children. He is also an avocational musician, bringing creativity and harmony to both his work and personal life.



**Paulo Cesar Velasco Maldonado*,
Jose Roberto Garcia Chavez**
Universidad Autónoma Metropolitana, México



Application of Thermography Technologies for Analysis and Evaluation for Urban Heat Island Effects

Urban areas have several features that increase temperatures and consequently, cause heat conditions, whilst provoking some other adverse effects in ecosystems. Certainly, most dense cities worldwide have sealed roads in avenues, streets, highways, and buildings. These surfaces absorb enormous amounts of heat during daytime hours and release it at nighttime. Other inhabitants and urban infrastructure systems also release heat. Buildings use significant quantities of energy, mainly coming from the burning of fossil fuels for artificial climatization and lighting their architectural spaces, among other services. This condition has been termed as Urban Heat Island (UHI) effect. And, as a result, this situation also leads to escalated energy and water demands, increasing cities' ecological footprint. The effects of extreme heat are not only uncomfortable but also unsafe. Notwithstanding unbearable temperatures which can cause dehydration, heat-stroke and other short and long term adverse physical effects, UHI effects also trap pollution, which reduces air quality and leads to longer term health risks. These extremely affect vulnerable and marginalized groups of people in dense urban cities: lower-income, unemployed and homeless people, as well as children, older people, and those affected by chronic health conditions. In this research, thermography technology was applied to case studies in Mexico City Areas and abroad. This technology has sought to demonstrate its importance for the detection and analysis of temperature increases in various environmental contexts. Through advanced techniques, it provides detailed information about heat distribution and thermal variations in the environment. Additionally, the infrared cameras used capture images of thermal radiation to identify temperature variations on opaque surfaces, enabling noninvasive and precise inspection of structural integrity and the thermal behavior of materials of buildings and surrounding surfaces. The interaction between building materials and the urban environment is crucial for understanding how cities absorb, retain, and redistribute heat. Therefore, the temperature of building materials and adjacent surfaces, significantly influences the increase of ambient temperature, that is the UHI effect. This research work explores how the thermal properties of materials in urban cities affect ambient temperature and presents key parameters for obtaining relevant climatic data. It also examines how these parameters can be used to model and manage the thermal impact in urban environments. The results showed that there are significant increases in temperature in the locations investigated and some preventing measures proposed include: Integrating and enhancing green infrastructure such as promoting green walls and roofs, and increasing the number of trees and vegetated surfaces, all these have an outstanding capability to cool the air, promoting urban farming; sustainable and more efficient use of water; retrofitting, renovation and resilience of buildings applying bioclimatic systems; change the reflectance of current surfaces of urban areas, to reduce the absorptance and emittance of heat, among other activities.

Keywords: Thermography, technologies, analysis, Urban Heat Island, buildings, vegetation.

Biography:

Paulo Cesar Velasco Maldonado PhD in Bioclimatic Design, Universidad Autónoma Metropolitana (UAM) Master in Architecture, Universidad Nacional Autónoma de México (UNAM) Architectural Engineer, Instituto Politécnico Nacional (IPN) He works as Construction Manager at Architectural Innovation VV, where he leads the development of sustainable architectural projects, coordinates the construction and renovation of residential buildings, and supervises the site. He is a certified expert in the international EDGE for Green Buildings program With over 20 years of experience in the construction sector, he has worked at Jorica Construction Company, where he was Site Coordinator for projects involving roadway repaving, primary school renovations, and apartment building construction. He also has an outstanding career in the public sector, having served as Works Coordinator at the Municipal Government of Tizayuca, Hidalgo, participating in major projects under the Federal Habitat Program 2003-2006. In academia, he is a Professor at ITESM State of Mexico and has taught in architecture and sustainable development programs at various universities. He has taught courses in Sustainable Housing, Executive Projects, Budgets, and Construction Materials. He is currently conducting a doctoral stay at Juniata College in Huntingdon, Pennsylvania, USA, as part of his PhD in Bioclimatic Design at UAM, with a thesis focused on the development of a method for detecting Urban Heat Islands (UHI) and their impact on the urban-architectural environment. In his Master's degree in Architecture at UNAM, he developed a thesis on sustainable rehabilitation in low-income communities in tourist areas in the state of Guerrero, Mexico. Among his academic achievements, he stands out for his participation in the Sustainable Development in the 21st Century course at Yonsei University, South Korea, with Ban Ki-moon.

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