

GCCC-2025



5th Global Congress on

CLIMATE CHANGE

**September 29 - 30, 2025
at Berlin, Germany**



Venue: NYX Hotel Berlin Köpenick by Leonardo Hotels,
Grünauer Str. 1, 12557 Berlin, Germany

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Day
1

MONDAY

GCCC-2025

5th Global Congress on

CLIMATE CHANGE

September 29 - 30, 2025 at Berlin, Germany

Meeting Hall - Conference 2

Welcome & Registrations 08:30-09:00

Moderator: Francesca Demichelis, *Politecnico di Torino Facoltà di Ingegneria: Politecnico di Torino, Italy*

Opening Remarks 09:00-09:20

Keynote Talks

09:20-09:50 -----

Taking innovation into routine business – a national stormwater management case study

Brian James D'Arcy, *Houseplot SUDS Limited, UK*

09:50-10:20 -----

Climate-Driven Cascading Risks: A Dynamic Framework for Assessing Infrastructure Vulnerability to Compound Hazards

M. Reza Najafi, *Western University, Canada*

10:20-10:50 -----

Pollution, Climate Change, and Policy Implications

Ravi Arulanantham, *Geosyntec Consultants, USA*

Group Photo & Refreshment Break 10:50-11:10

Day
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MONDAY

GCCC-2025

5th Global Congress on

CLIMATE CHANGE

September 29 - 30, 2025 at Berlin, Germany

Technical session- I

Session Chair:

M. Reza Najafi, *Western University, Canada*

- 11:10-11:30** ----- **A Participatory Action Research strategy to elicit stakeholders' requirements in the development of a decision support system for natural disasters**
- Mariantonietta Morga, Anglia Ruskin University, United Kingdom*
- 11:30-11:50** ----- **Innovative decontamination of bromated plastics from Waste Electrical and Electronic Equipment (WEEE)**
- Chiraz Belouezzane, Institut Supérieur de Plasturgie Appliquée (ISPA), France*
- 11:50-12:10** ----- **Per- and polyfluoroalkyl substances (PFAS) in homegrown crops: Accumulation and human risk assessment**
- Robin Lasters, Natuurpunt, Belgium*
- 12:10-12:30** ----- **Exploring the feasibility and sustainability of converting wheat straw into bioenergy and bio-added products for soil application**
- Francesca Demichelis, Politecnico di Torino Facoltà di Ingegneria: Politecnico di Torino, Italy*
- 12:30-12:50** ----- **A decision-making support framework for transitioning to a resilient zero-carbon Healthcare Real Estate by 2050**
- Federica Pascale, Anglia Ruskin University, United Kingdom*
- 12:50-13:10** ----- **Global-Scale Long-Term Trends in Atmospheric Water Capturability**
- Jun Qiu, Beijing Normal University, China*

Lunch Break 13:10-14:00

Day
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MONDAY

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5th Global Congress on

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September 29 - 30, 2025 at Berlin, Germany

Technical session- II

Session Chairs:

Federica Pascale, *Anglia Ruskin University, United Kingdom & Mariantonietta Morga*, *Anglia Ruskin University, United Kingdom*

14:00-14:20 ----- **Perspectives on the climate-water balance in climate change scenarios – The Trimpancho watershed case study, Spain**

Teresa Albuquerque, *Polytechnic Institute of Castelo Branco-Polytechnic University, Portugal*

14:20-14:40 ----- **Accounting and Analysis of Gross Forest Carbon Sink Production in China**

Zhang Ying, *Beijing Forestry University, China*

14:40-15:00 ----- **Biochemical Adaptation of Wheat to Heat Stress: Focus on eEF1A Accumulation**

Stefan Markovic, *University of Kragujevac, Serbia*

15:00-15:20 ----- **Assessing Cascading Impacts for Resilient Infrastructure: A Machine Learning Approach for Enhanced Disaster Risk Management in Europe**

Florencia Victoria De Maio, *RINA Consulting S.p.A., Italy*

15:20-15:40 ----- **Validating small-scale sugarcane farmers' climate perceptions through scientific climate data to enhance awareness of climate change: The Case of Swayimana area in KZN Midlands, South Africa**

Zoleka Ncoyini-Manciya, *University of KwaZulu-Natal, South Africa*

Refreshment Break 15:40-16:00

16:00-16:20 ----- **Use of Information Communication Technology in Model Farmer Communication for Climate Change Adaptation by Grassroot Farmers**

Emily Chelangat, *Makerere University, Uganda*

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16:20-16:40 ----- Nature-Based Low-Density Urban Development for Climate Resilience in Arid Coastal Patagonia

Daniel P. Paris, *Ramp Energy, Argentina*

16:40-17:00 ----- Building resilient Agrifood Systems through Inclusive Technology Bundles in Zambia

Munyaradzi Junia Mutenje, *International Water Management Institute (IWMI), Zambia*

Pannel Discussions & End of The Day

Day
2

TUESDAY

GCCC-2025

5th Global Congress on

CLIMATE CHANGE

September 29 - 30, 2025 at Berlin, Germany

Meeting Hall - Conference 2

Moderator:

Francesca Demichelis, *Politecnico di Torino Facoltà di Ingegneria:
Politecnico di Torino, Italy*

Technical session- III

Session Chair:

Marcin Piotr Walkowiak, *Poznań University of Medical Sciences, Poland*
Teresa Albuquerque, *Polytechnic Institute of Castelo Branco-Polytechnic University, Portugal*

10:00-10:20 ----- **An adaptive strategy for current afforestation in the forest-steppe ecotone, north China, inferred from the Holocene geo-ecology dynamics**

Hongjuan Jia, *Hebei GEO University, China*

10:20-10:40 ----- **Climatic Drivers of Mortality Seasonality: A Refined Statistical Approach**

Marcin Piotr Walkowiak, *Poznań University of Medical Sciences, Poland*

10:40-11:00 ----- **Advancing Wetland Assessment in SADC with EO Data: The Role of WeMAST and SASSCAL in Climate Change Adaptation**

Nelago Indongo, *SASSCAL, Namibia*

Refreshment Break 11:00-11:20

11:20-11:40 ----- **Novel sediment source fingerprinting quantifying erosion-induced total nitrogen and total phosphorus outputs: A case study of an agricultural catchment in North China**

Hanqing Yu, *Chinese Academy of Agricultural Sciences (CAAS), China*

11:40-12:00 ----- **Shaping Sustainable Futures: The Role of Energy Policy in Combating Climate Change**

Nabila Amin, *Shenzhen University, China*

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TUESDAY

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12:00-12:20 ----- Carbon-Free Fuel (H₂) Production Strategy Based on Herbaceous Biomass

Tae-Jin Kang, *Institute for Advanced Engineering, South Korea*

12:20-12:40 ----- Guiding Sustainable Fertiliser Selection Using Life Cycle Assessment

Vincent Desaulniers Brousseau, *Bioeconomy Science Institute, New Zealand*

12:40-13:00 ----- RethinkAction – A Climate Action Platform for Sustainable Land Use and Climate-Resilient Futures

Elisa Crocco, *RINA Consulting S.p.A., Italy*

Lunch Break 13:00-14:00

Poster Viewing 14:00-14:40

Pannel Discussions & End of The Day

Day
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TUESDAY

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Poster Presentations

Poster Judge:

Marcin Piotr Walkowiak, *Poznań University of Medical Sciences, Poland*

- P-01** ----- Exploring links between physical activity and pro-environmental behaviors in children
Yannis Theodorakis, University of Thessaly, Greece
- P-02** ----- Recreational boating environmental footprint and climate change: Green strategies and practices in the manufacturing and service sector
Eli Marusic & Merica SLISKOVIC, University of Split, Croatia
- P-03** ----- Bioclimatic diversity of a medium-sized city on hot days in the context of climate change
Monika Okoniewska, Kazimierz Wielki University, Poland
- P-04** ----- Complex responses of vegetation diversity to Holocene climate change in the eastern Tibetan Plateau
Liang Chen, Hebei GEO University, China
- P-05** ----- Modelling Reference Evapotranspiration in Northern Pakistan Using Support Vector Regression
Sajid Gul, Guangzhou University, China
- P-06** ----- Development of NCC Carbon Reduction Technology Using Carbon-Free Fuels (H₂ & NH₃)
Tae-Jin Kang, Institute for Advanced Engineering, South Korea
- P-07** ----- The interaction between cardiorespiratory diseases and meteorological pollutant data: interpretability analysis of a machine learning approach
Vito Telesca, University of Basilicata, Italy

Virtual Scientific Program

Time Zone: CET (Berlin Time)

Join Zoom Meeting



Zoom Details:
Meeting ID: 881 0874 3830
Passcode: 249960

Day
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TUESDAY

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- 09:00-09:20 ----- **Promoting Māori values in the creation of built environments to address climate injustice**
Fleur Palmer, Auckland University of Technology, New Zealand
- 09:20-09:40 ----- **Groundwater Assessment under Climate Change Scenarios: The Myalup Case Study**
Panagiotis Giannouloupoulos, Department of Water and Environmental Regulation - Western Australia
- 09:40-10:00 ----- **Application of bio-stimulant Nano-Selenium in improving the quality and efficiency of fruits and vegetables**
Lu Kang, Xinjiang Academy of Agricultural Sciences, China
- 10:00-10:20 ----- **Stochastic models based on Cox process to model rainfall time series**
Nadarajah Ramesh, University of Greenwich, United Kingdom
- 10:20-10:40 ----- **Recruiting high-efficiency denitrifying consortia using *Pseudomonas aeruginosa***
Zhong Yu, Sun Yat-sen University, China
- 10:40-11:00 ----- **Reclamation of coastal marshes to croplands shifts the pool and chemical composition of soil organic matter**
Yidong Wang, Tianjin Normal University, China
- 11:00-11:20 ----- **Future Global River Ice in CMIP6 Models under Climate Change**
Yu Lin, Hohai University, China
- 11:20-11:40 ----- **Vehicular CO₂ Emission Capture Technology (VCECT)**
Mahil Chandrakant Parmar, One World International School, India

Day
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- 11:40-12:00 ----- In Looking Into India's Transition From Fossil Fuels To New Renewables-Based Energy Sources
Sovik Mukherjee, *St. Xavier's University, India*
- 12:00-12:20 ----- The correct scientific and geological explanation for Earth's climate change
Adel Saleh Mohammed Ali Al-Abyad, *Yemen*
- 12:20-12:40 ----- Use of microbial resources to counteract the effects of climate change in wine production
Lucilla Iacumin, *University of Udine, Italy*
- 12:40-13:00 ----- Green solutions to decrease chemical additives (nitrates and nitrites) in fermented meat productions to enhance human health
Michela Pellegrini, *University of Udine, Italy*
- 13:00-13:20 ----- Evaluating environmental impact of Organic egg production versus Conventional one
Luisa Paolotti, *University of Perugia, Italy*
- 13:20-13:40 ----- Warming and polymetallic stress reflecting global changes induce adaptive response in the neurotoxic marine dinoflagellate *Alexandrium pacificum*
Natacha JEAN, *Université de Toulon, France*
- 13:40-14:00 ----- An analysis of the effectiveness of extension teaching methods used for technology and skills transfer to farmers in the Pfumvudza climate smart agricultural extension project in Mutare District
Bertha Kundai Mashayamombe, *University of Fort Hare, South Africa*

Day
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-
- 14:00-14:20 ----- Tracking greenhouse gas (GHG) emissions from biomethane production from pig manure and comparison with conventional fuels
- María Del Pilar Martínez Hernando, *Universidad Politécnica de Madrid, Spain*
- 14:20-14:40 ----- Sustainable Management of Organizations: From Industry 4.0 to Industry 7.0
- Vojko POTOČAN, *University of Maribor, Slovenia*
- 14:40-15:00 ----- Comparative Sustainability Assessment of batteries production in Europe, China, and the United States
- María Del Pilar Martínez Hernando, *Universidad Politécnica de Madrid, Spain*
- 15:00-15:20 ----- Fine fuel does not accumulate over time in unburned areas of Guinean savanna
- Aya Brigitte N'DRI, *Nangui Abrogoua University, Ivory Coast*
- 15:20-15:40 ----- Comprehensive risk assessment of high-temperature disasters affecting rice production in Shanghai
- Gu Gaoyue, *Shanghai Meteorological Bureau, China*
- 15:40-16:00 ----- Natural sequestration of carbon dioxide is in decline: climate change will accelerate
- James Curran, *United Kingdom*
- 16:00-16:20 ----- Regional Impacts of the Great Green Wall and Saudi Arabia Green Initiatives
- Francesco Pausata, *UQAM, Canada*

Day
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TUESDAY

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-
- 16:20-16:40 ----- Intergenerational transmission and volcanic risk perception construction in Mexico
- Esperanza López-Vázquez, *Universidad Autónoma del Estado de Morelos, Mexico*
- 16:40-17:00 ----- The human exposome and climate change
- Amado Enrique Navarro Frómeta, *Technological University of Izúcar de Matamoros, Mexico*
- 17:00-17:20 ----- Simultaneous Aeration and Neutralization of Mine Water – an Apparently Forgotten Discovery
- Terry Ackman, *MT Water Management, Inc, USA*
- 17:20-17:40 ----- Socially Responsible Investors and Corporate Resistance to Climate Disruptions: Agents of Change or Passive Participants?
- Alejandro J. Useche, *Universidad del Rosario, Colombia*

Keynote Talks
DAY-1



Taking innovation into routine business – a national stormwater management case study

Brian James D'Arcy^{*1}, Rebecca Wade², Isobel Stoddart³ and Rachel Smillie⁴

¹Houseplot SUDS Ltd, United Kingdom

²University of Abertay Dundee, United Kingdom

³SENS, Cumbria, United Kingdom

⁴SAC, Edinburgh, United Kingdom

Stormwater management is a major climate change challenge: for pluvial flood risk management, water resources, diffuse pollution and storm sewage overflows in the built environment, health risks associated with mobilisation of water borne pathogens, and economic impacts. The types of technology traditionally involved in the management of stormwater have also been important for generation of climate change gases too: CO₂ from concrete production; methane release from organic sludge in storm tanks; N₂O and CH₄ from organic matter in stormwater sewers and in water body sediments during warm summer conditions. The degrading organic matter exacerbated by higher temperatures also causes pollution when flushed out in summer storms. Nutrient release too.

As everyone surely knows by now, doing more of the same and hoping for a different outcome is not going to fix problems. Management requires landscape interventions and at a catchment or sub-catchment scale. This presentation briefly reviews the process to introduce different technology, including contrasting ways to bring the technology into routine business in the different administrative regions of the UK. But the impacts of the developing severe weather patterns in the UK, as well as global scale awareness, has been driving a more energised approach recently. A new national project to produce UK technical guidance (Ciria P3298, Within Curtilage SUDS) is to commence this year for the built environment and will address some of the above issues by focusing on actions at source. It should also build stormwater resilience.

In parallel, there is development of innovative drainage techniques to manage rainwater at source (e.g. roof runoff), using existing and new techniques. These have included familiar options such as permeable pavement and green roof techniques, as well as an Innovate UK/Climate KIC UK award winning drain-down raingardens and other relatively new technological innovations. The examples to be given here exemplify the importance of commercial engagement with the challenges of climate change, in order to allow radical change at significant scale. Off-the-shelf technology for every new property at source, as routine business, should be the starting point for developers.

What is often overlooked however, is the scope for regulatory regime innovation to enable more desirable (necessary) technology to become routine for new developments and retrofits. Examples reveal opportunity and some failures as well as success. Economic issues and the rising power of public demand for a cleaner environment, including the global challenge of climate change, are also increasingly evident in the case study examples across the UK.

References:

Lead author: Wealth Creation without Pollution - Designing for industry, Ecobusiness Parks and Industrial Estates. D'Arcy, Kim and Maniquiz-Redillas (Eds.) (2018) IWAP. Now free on line: www.iwaponline.com

Chair, IWA Task Group on Land Use and Water Quality 2016-2024: Land Use and Water Quality: The impacts of diffuse pollution. Kajitvichyanukul and D'Arcy (2022). Technical and Scientific Report No. 28, IWAP, London. Cited sources and full list of references in the paper.

Biography:

Dr. Brian J. D'Arcy holds a BSc (Hons) in Biology from Queen Mary College, London, an MSc from the University of Salford, and a PhD from Abertay Dundee. He Worked in prevention and control of water pollution from 1974 to present; initially eleven years in NW England, then in Scotland. Worked on UK government working groups drafting regulations for oil and chemicals storage, and later for control of diffuse pollution, including stormwater. Faced many daunting environmental problems, notably the Mersey Estuary, once the worst in Western Europe and "too difficult, would be too expensive". Instead, saw how restoration work delivered good results. Personally took the lead in reducing 'intractable' pollution - working with industry, water utilities and agriculture sector to restore waterbodies (notably the restoration of Loch Leven in Scotland). Working with businesses/sectors achieved real progress, sharing clear, consistent messaging that actions were really necessary and not just an ephemeral aspiration. There is nothing more daunting than climate change. Led over 30ys a shift in the technology for managing stormwater in the UK; introducing the concept of sustainable drainage. Multiple benefits and joined up consistency helped. Published five IWA books of papers, and academic and magazine papers and articles too. Various awards personally and for projects including public engagement.



Climate-Driven Cascading Risks: A Dynamic Framework for Assessing Infrastructure Vulnerability to Compound Hazards

M. Reza Najafi*

Department of Civil and Environmental Engineering, Western University, Canada

Multihazard events, intensified by climate change, can cause severe disruptions to communities and critical infrastructure, particularly in densely populated or geographically constrained regions. These disruptions often trigger cascading failures across interconnected infrastructure systems. This presentation explores the dynamics of such multihazard scenarios, focusing on compound floods, through a case study involving Tropical Storm Matthew (2016). The study integrates pluvial, fluvial, and coastal flood characteristics, modeled using a high-resolution 2D hydrodynamic simulation. Critical infrastructure interdependencies are evaluated using a novel integrated framework that combines the Strongest Path Method with Bayesian network analysis. This framework captures conditional dependencies, incorporates external variables such as hazard mitigation and redundancy, and does not rely on preset thresholds or static assumptions. Multiple scenarios are examined, including baseline operations, extreme hazard conditions, and the presence or absence of mitigation strategies. Findings highlight a high probability of failure propagation within the network, even under normal conditions, with critical vulnerabilities identified in key facilities such as the international airport. The study emphasizes that static assessments often fail to represent the evolving, time-dependent nature of climate-driven hazards. To address this, a dynamic risk assessment approach is proposed, capable of capturing temporal changes in system functionality, cascading disruptions, and restoration processes. The results underscore the heightened vulnerability of essential infrastructure under compound climate hazards and reinforce the need for adaptive, system-based risk management approaches.

Biography:

Dr. Reza Najafi, PhD, P.Eng., is an Associate Professor in Civil and Environmental Engineering at Western University, Canada, where he leads the Hydroclimate Extremes and Climate Change Lab (HydroClimEX). His interdisciplinary research addresses nonstationary hydroclimatic extremes including floods, droughts, and compound events, by integrating hydrology, hydraulics, climate science, and risk analysis to develop frameworks for infrastructure resilience under climate change. Dr. Najafi has authored more than 70 peer-reviewed journal articles and over 120 conference contributions, with a record of international collaboration and leadership in climate risk assessment. He currently serves as Associate Editor for Water Resources Research (AGU) and Weather and Climate Extremes. He is co-founder and co-director of the Centre for Multihazard Risk and Resilience (CMRR) at Western University, a hub that engages over 20 faculty and external stakeholders. His contributions have been recognized with Ontario's Early Research Award (2024) and the Ontario Engineering Project Award (2025, Sustainable Development Impact).



Pollution, Climate Change, and Policy Implications

Ravi Arulanantham*

Geosyntec Consultants, Oakland, California, USA

More than 50% of the people living in California get their drinking water from groundwater resources. Industrial activities use a myriad of chemicals that eventually find their way into the shallow and deep usable aquifers. One such chemical is Perchloroethylene (PCE) which was widely used in the dry cleaner industry from late 1940s to 2023. In 2013, California EPA estimated that there are about 7000 dry cleaner spill sites, of which about 6000 are still undiscovered and potentially continuing to contaminate the groundwater resources. The behavior of PCE in groundwater from these drycleaner sites was largely not understood (as opposed to the behavior of petroleum hydrocarbons which was well studied, published and regulatory policies now exist to risk manages these sites in California) until this study was undertaken by the author.

Eighty three (83) contaminated drycleaner sites throughout California were selected from the California-EPA data base and statistical analysis of available groundwater data was performed to estimate maximum concentrations at the source area, groundwater plume length, plume stability, and correlations between plume length and concentrations, plume length and plume age, and plume age and concentrations. At 90% of the sites, the PCE and TCE plume lengths were less than 1,569 feet (478 meters) and 1,782 feet (543 meters), respectively. The average plume lengths for PCE and TCE were 670 feet (204 meters) and 701 feet (213 meters), respectively. At 90% of the sites that have reached stable conditions, the PCE and TCE concentrations at the source areas were less than 2,670 and 660 micrograms per liter ($\mu\text{g/L}$) respectively. I plan to show in my presentation how this study results can be used to develop regulatory policies that reduce GHG emissions from redundant remediation activities, protect human health and the environment that result in a net benefit to society.

Biography:

Ravi Arulanantham has more than 30 years of experience in developing public policies surrounding environmental compliance for land use and water quality issues. As the first staff toxicologist for the California Regional Water Quality Control Boards, he provided expertise and leadership in expanding the application of risk assessment and risk management to the areas of policy development, case review, and staff training. From 1993 to 2002, he has been the principal instructor for Cal-EPA/SWRCB– sponsored training courses on risk-based decision making at contaminated sites. These courses have attracted more than 2,000 regulators, consultants, and responsible parties throughout the state, significantly affecting the movement of consultants and regulators toward accepting risk based findings as a component of decision making and site closure.

In 2024 he received the lifetime achievement award from the AEHS Foundation for outstanding achievements and significant contributions to the field of environmental assessment and restoration.

Ravi was a Fulbright scholar at the University of California at Berkeley where he received his master's and doctorate degrees in physiology and biochemistry in 1988.

Scientific Session
DAY-1

A Participatory Action Research strategy to elicit stakeholders' requirements in the development of a decision support system for natural disasters

Mariantonietta Morga^{*1}, Nadeeshani Wanigarathna¹, Keith Jones¹, Femke Mulder² and Ephraim Zulu¹

¹*School of Engineering and the Built Environment, Anglia Ruskin University, Bishop Hall Lane, Chelmsford, CM11SQ, United Kingdom.*

²*Department of Risk and Disaster Reduction, University College London, Gower Street, London, WC1E.*

Decision-makers in disaster management use technical tools to help them assess the risk and resilience of infrastructure, businesses, and communities to specific natural hazards and choose the most advantageous risk mitigation strategy. The risk and resilience assessment must be based on the elicitation of stakeholders' requirements; thus, technical tools must be developed considering the stakeholders' requirements. An effective methodology to support the technical tool development eliciting the stakeholders' requirements becomes essential.

This research aims to present the Participatory Action Research (PAR) methodology developed within the European research project MEDiate. To develop the MEDiate multi-hazard decision support system, a PAR strategy was perfected to collect the stakeholders' requirements at the beginning of the development and their opinions at two stages of the decision support system development and the end. To improve participation without overburdening the stakeholders, they were divided into two groups in each of the four testbeds. The first group included scientists and principal decision-makers; the second group included infrastructure providers, business owners, community representatives and first responders. While the first group was consulted at least three times for each PAR cycle through workshops and sprint tests, the second group was once in the second and third PAR cycles and at the end of the development through workshops.

In the first instance, the methodology developed led to the identification of the most challenging natural hazards and their combination for each testbed, considering their geographical and climatic differences; secondly, it contributed to developing the risk and resilience workflow; thirdly, it supported the identification of more useful risk and resilience metrics; finally, it helped to improve the graphical interface of the decision support system for more friendly use. The successfully developed decision support system will be adopted in the four testbeds: Essex (UK), Oslo (Norway), Nice (France), and Mulathing (Island).

Innovative decontamination of bromated plastics from Waste Electrical and Electronic Equipment (WEEE)

Chiraz Belouezzane^a, Maud Plouzeau^a, Karine Seaudeau-Pirouley^b, Farida Tomasella^c and Laurent Caureta^d

^a Institut Supérieur de Plasturgie Appliquée (ISPA), Pôle universitaire d'Alençon, Campus de Damigny, 61250 Damigny, France

^b Innovation Fluides Supercritiques (IFS), Rovaltain TGV, BP 16109 Alixan, 26958 Valence Cedex 9, France

^c Environnement Recycling, ZAC de Maupertuis Ecopôle, rue Michel Faye, 03410 Domérat, France

^d Institut des Molécules et des Matériaux du Mans (IMMM), Avenue Olivier Messiaen, 72085 Le Mans Cedex 09, France

The amount of electric and electronic equipment (EEE) is annually increasing due to the current development in technology and the modern society new way of life.¹ In 2019, a record 53.6 million metric tons (Mt) of electric and electronic equipment wastes (WEEE) was generated worldwide.²

The plastic part of WEEE is very complex to recycle as it contains many toxic additives such as brominated flame retardants (BFRs) and antimony oxide. These additives can result in the emission of toxic fumes during heating or pyrolysis recycling causing negative impacts on health in case of human exposure.^{3,4}

The DEVIPEEE collaborative project, funded by ADEME agency, aims to develop recycling ways and methodology for non-recyclable WEEE plastics, using a combination of innovative processes. The first step is a triboelectric separation technique to sort the different plastics present in WEEE, increasing the recycled plastic content and purity. Decontamination will occur as a second step process, after separation and will allow extract toxic components such as bromine and antimony. Plastic granules will be obtained by formulation of the decontaminated products and co-products as bromine and antimony will be regenerated.

In this communication we will focus on methodologies for extracting bromine from plastics derived from WEEE. Several routes will be studied and compared, and the decontamination rates obtained will be related to authorized regulatory thresholds, with the aim of setting up a new recovery chain and new business models.

REFERENCES:

1. Mtibe et. al., *Current Opinion in Green and Sustainable Chemistry*, 2023, 40, 100762.
2. GEM 2020 - E-Waste Monitor (ewastemonitor.info)
3. Das et. al., *Chemical Engineering Journal*, 2023, 469, 144126.
4. Charitopoulou et. al., *Polymers*, 2023, 15, 709.

Per- and polyfluoroalkyl substances (PFAS) in homegrown crops: Accumulation and human risk assessment

Robin Lasters*

Natuurpunt, Belgium

Homegrown crops can present a significant exposure source of per- and polyfluoroalkyl substances (PFAS) to humans. Field studies studying PFAS accumulation in multiple vegetable food categories and examining the potential influence of soil characteristics on vegetable bioavailability under realistic exposure conditions are very scarce. Crop PFAS accumulation depends on a complex combination of factors. The physicochemical differences among the numerous PFAS makes risk assessment very challenging. Thus, simplification of this complexity into key factors that govern crop PFAS accumulation is critical. This study analyzed 29 targeted legacy, precursor and emerging PFAS in the vertical soil profile (0–45 cm depth), rainwater and edible crop parts of 88 private gardens, at different distances from a major fluorochemical plant. Gardens closer to the plant site showed higher soil concentrations which could be linked with historical and recent industrial emissions. Most compounds showed little variation along the soil depth profile, regardless of the distance from the plant site, which could be due to gardening practices. Annual crops consistently accumulated higher sum PFAS concentrations than perennials. Highest concentrations were observed in vegetables, followed by fruits and walnuts. Single soil-crop relationships were weak, which indicated that other factors (e.g., porewater) may be better measures of bioavailability in homegrown crop accumulation. Regression models, which additionally considered soil characteristics showed limited predictive power (all $R^2 \leq 35\%$), possibly due to low variability in crop concentrations. Human intake estimations revealed that the PFAS exposure risk via crop consumption was similar nearby and remotely from the plant site, although the contribution to the overall dietary exposure can be relatively large. The tolerable weekly intake was frequently exceeded with respect to fruit and vegetable consumption, thus potential health risks cannot be ruled out.

Biography:

Dr. Robin Lasters is PFAS-remediation coordinator for Natuurpunt, the largest nature organization in Flanders (Belgium). He recently obtained in 2024 a PhD in Science at the University of Antwerp, during which he investigated on PFAS-uptake in self-cultivated food, assessing how local factors affect PFAS accumulation in food and how this exposure route translates to human exposure risk. Currently, Robin Lasters is involved in one of the largest ongoing PFAS remediation trajectories situated in Linkeroever (Antwerp, Belgium) to investigate suitable innovative PFAS remediation techniques for nature areas. In this endeavor, he collaborates with multiple stakeholders including the policy, industry, university and private research institutes

Exploring the feasibility and sustainability of converting wheat straw into bioenergy and bio-added products for soil application

Francesca Demicheis*, Melania Fiore and Debora Fino

Department of Applied Science and Technology (DISAT), Politecnico di Torino, Corso Duca degli Abruzzi 24, 10129 Torino (TO), Italy.

This study evaluates the technical feasibility and environmental sustainability of converting wheat straw, supplied by Dematteis company (Puglia, Italy), into a value-added product via two processes: anaerobic digestion (AD), a biochemical process, and slow pyrolysis (sPY), a thermochemical process. The aim is to identify the most efficient and sustainable approach for valorising wheat straw as fertiliser or soil amendment.

AD was performed in 1 L reactors at 6% total solids at 37 °C, using wheat straw and cow manure in varying ratios (100:0, 90:10, 75:25, 50:50) to optimise the C/N balance for methane (CH₄) production. AD kinetics were assessed using Angelidaki's model and modified Gompertz. Gas yields were measured via water displacement and analysed by gas chromatography. sPY was performed in a fixed-bed reactor of 1 L at 400, 500, and 600 °C, at 10 °C/min, with a 60-min residence time to investigate temperature effects on biochar properties and product distribution. Biochar, bio-oil, and gas were recovered and quantitatively analyzed. Biochar was characterised through elemental analysis, BET, FTIR, fixed carbon content, and Van Krevelen diagram to assess its stability. A consequential Life Cycle Assessment (LCA), following ISO 14040-44 and using SimaPro 9.6 and Ecoinvent 3.8, compared the environmental impacts of AD and sPY from cradle to gate, with 1 kg of wheat straw as a functional unit.

Results showed that co-AD at a 75:25 ratio achieved the highest CH₄ yield (308.11 NL/kg VS), producing an energy sustainable index higher than 1 and a climate change impact of -0.57 kg CO₂ eq/FU. For sPY, the 500 °C configuration yielded 27%w/w biochar with 55 m²/g specific surface area and a climate impact of -0.214 kg CO₂ eq/FU.

These findings provide evidence-based guidance for promoting sustainable and scalable valorisation strategies for agricultural residues, supporting industrial applications and policymaking

Biography:

Francesca earned her master's in environmental engineering and PhD in chemical engineering at the Polytechnic of Turin. Currently, Francesca is a fixed-term tenure-track assistant professor at the Department of Applied Science and Technology. She focuses on organic waste conversion into high-added-value products and bio-energies, using a techno-economic and environmental assessment approach. Francesca has published 40 scientific papers, 1 book chapter, and presented at 13 international congresses.

A decision-making support framework for transitioning to a resilient zero-carbon Healthcare Real Estate by 2050

Dr. Federica Pascale*

Anglia Ruskin University, United Kingdom

Climate change is a reality, bringing significant shifts in climate patterns in the UK, including rising temperatures, prolonged heatwaves, and varying rainfall. Concurrently, climate change-induced disasters are occurring more frequently and with greater intensity than in previous decades. The NHS is a significant contributor to carbon emissions, and at the same time, healthcare services can be affected by disruptions caused by climate change, stemming from direct effects such as floods, heatwaves, and other extreme weather events. The NHS faces challenges with outdated healthcare buildings, necessitating major interventions to achieve net-zero emissions. There are two main strategies for addressing climate change: mitigation, which reduces carbon emissions, and adaptation, which addresses vulnerabilities and enhances resilience. Currently, the NHS primarily focuses on mitigation strategies while neglecting adaptation and failing to integrate both approaches. The project aims to develop a framework that can equip hospitals with integrated mitigation strategies to transition to a zero-carbon future by 2050, as well as adaptation strategies to address existing climate change through improved facilities and built asset management planning.

The research and development activities utilise a Participatory Backcasting (PB) methodology to guide the co-design, co-development, and co-testing of the framework, supported by forecasting modelling to generate climate models. Healthcare leaders must advocate for sustainability and climate resilience, extending their role beyond clinical practice to decision-making regarding hospital estates. Given healthcare's complexity, leaders face challenges from evolving healthcare delivery, patient expectations, emerging technologies, climate change, and sustainability. Current strategies for new and existing hospitals often fail to consider the systematic interrelationship between hospital estates and their future socio-environmental context. To shape a sustainable and climate-resilient future hospital, it is essential to evaluate the interplay between evolving healthcare delivery strategies, shifting user expectations, emerging technologies, and the hospital's environmental impact and climate resilience. These societal and healthcare changes must be integrated into effective mitigation and adaptation strategies, recognising that hospitals are key players in a complex healthcare system. Enhancing the understanding of existing assets is the first step in developing a future-based estate management approach. However, the current estate's unsustainability, complexity, and age pose significant challenges to retrofitting and upgrading, particularly in achieving net-zero emissions and enhancing climate resilience. In conclusion, hospital leaders must understand the interrelationship of these factors to devise holistic, future-proof strategies. A future-oriented approach to estate management, such as backcasting, acknowledges hospitals' roles within a forward-looking care delivery system. This enables facilities management professionals to explore potential intervention pathways without being constrained by existing barriers or organisational memory.

Biography:

Dr Federica Pascale is an Associate Professor of Sustainable Built Environment at Anglia Ruskin University and was awarded the 2021/2022 THIS Institute's sustainability & healthcare improvement fellowship from The Healthcare Improvement Studies Institute at Cambridge University. With over ten years of international research experience, her expertise lies in community and healthcare sustainability, resilience to natural hazards, and addressing the needs of the ageing population. Dr. Pascale served as a Co-Investigator on several research projects, including the £8 million project titled "Towards More Earthquake-resilient Urban Societies Through a Multi-sensor-based Information System." She has also collaborated with the Department of Health to co-author the "Health Building Note 08-02" and worked with the World Health Organization (WHO) to co-author its guidelines on "Underground Shelters and Services in Hospitals."

Global-Scale Long-Term Trends in Atmospheric Water Capturability

Jun Qiu^{*1}, Fang-Fang Li² and Hou-Liang Lu³

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²College of Water Resources & Civil Engineering, China Agricultural University, Beijing, China.

³School of Water Conservancy and Environment, University of Jinan, Jinan, China.

Global warming has changed precipitation patterns and increased atmospheric water vapor. However, global precipitation does not increase proportionally. Understanding how regions convert atmospheric moisture into precipitation remains a key challenge in climate science. Traditional approaches using water vapor content, thermodynamics, and atmospheric dynamics often fail to directly quantify precipitation responses to climate change. Existing metrics like Precipitation Efficiency (PE) have limitations in linking atmospheric moisture transport to precipitation. This study introduces a new metric: Capturability of Atmospheric Water (CAW), which measures a region's ability to convert transported atmospheric water into precipitation. Using reanalysis data (1979–2020), the study examines CAW's spatial and temporal trends and its mismatch with precipitation. Findings reveal significant regional differences in CAW. Over the past 42 years, CAW has declined in key areas like the Amazon, Congo rainforests, and Greenland, indicating reduced precipitation efficiency despite stable or rising atmospheric moisture. Meanwhile, Asia, particularly China, has seen increased CAW, aligning with regional humidification trends. The study also highlights mismatches between CAW and precipitation. High-altitude areas such as the Tibetan Plateau, Greenland, and the Andes show high CAW but low precipitation, making them more vulnerable to climate fluctuations. Conversely, regions like the Amazon, Eastern U.S., India, and Japan display a negative mismatch, suggesting a more stable precipitation response to climate change. These findings offer insights into atmospheric water transport and precipitation in a warming world. The CAW metric provides a new framework for assessing water resource vulnerability and climate adaptation. Addressing CAW declines in rainforests and Greenland is crucial for mitigating climate risks. This approach enhances precipitation predictability and informs water resource management and conservation globally.

Biography:

Qiu Jun, professor at the Institute of Water Sciences, Beijing Normal University, focuses on air- water resource utilization, acoustic wave environmental intervention, multi-environment perception, and desilting technology. He has published over 80 papers, including 50+ SCI journal papers as the first or corresponding author. He holds 30+ national and PCT patents and software copyrights. He has led major projects funded by the National Natural Science Foundation of China and key provincial R&D programs. He is a recipient of the National Young Talent Program and Qinghai Provincial Leading Talent Program.

Perspectives on the climate-water balance in climate change scenarios – The Trimpancho watershed case study, Spain

Teresa Albuquerque* and Natalia Roque

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This study aims to determine the potential evolution of the climatic water balance in the Trimpancho watershed, Spain, under various climate change scenarios to identify critical patterns and vulnerabilities, providing a spatial assessment of potential changes in water availability over time, which combines point-based climatic water balance with geostatistical techniques. The Trimpancho watershed is part of the Iberian Pyrite Belt and represents an example of a post-mining area in Europe. Understanding the water cycle is crucial for studying and comprehending pollution in watersheds. Historical precipitation and temperature data (1971-2000) were obtained from the WorldClim portal, along with future climate projections based on Shared Socioeconomic Pathways: SSP2-45: “Middle of the Road” (intermediate emission: CO₂ emissions around current levels until 2050, then falling but not reaching net zero); SSP3-70: “A Rocky Road” (high emissions: CO₂ emissions double by 2100) and SSP5-85: “Taking the Highway” (very high emissions: CO₂ emissions triple by 2075). The Thornthwaite equation was used to estimate potential evapotranspiration, enabling the computation of Climatic-water balances (CWBs) for the historical period and two future timeframes: 2041–2060 (centered on 2050) and 2081–2100 (centered on 2090), at a spatial resolution of 30 arc-seconds. The spatial distribution of the CWBs and their associated uncertainty were mapped using Sequential Gaussian Simulation (SGS), and significant spatial clusters were identified through G-cluster computation. Analysis focused on August (dry season) and December (wet season) revealed key patterns in the evolution of the CWBs. As highlighted in this survey, the Trimpancho watershed may be more affected by climate change, with critical seasonal and spatial disparities. The findings stress the urgency of implementing adaptive water management strategies focused on the most vulnerable identified areas. Namely, developing sustainable and resilient strategies to safeguard water resources and ensure its availability for future generations.

Biography:

Teresa Albuquerque is an Assistant Professor with Habilitation at the Polytechnic Institute of Castelo Branco and a senior researcher at CERNAS – Research Centre for Natural Resources, Environment and Society. Her research interests encompass spatial analysis, multivariate geostatistics, and compositional data analysis of earth and environmental processes. Under these subjects, she has been coordinating several theses in master's and Ph.D. programs and participating in several collaborative projects with international partners..

Accounting and Analysis of Gross Forest Carbon Sink Production in China

Zhang Ying*

School of Economics & Management, Beijing Forestry University, China

According to the data of the ninth National Forest Resources Inventory and China Forestry Statistical Yearbook, as well as the Technical Specification for Accounting Gross Ecosystem Product (GEP) officially issued by the state and the method of eco-output value recommended by the System of Environmental-Economic Accounting-Ecosystem Accounting (SEEA-EEA) by United Nations, the gross value of forest carbon sink product in China from 2013 to 2018 was calculated and the results were compared with those of the eighth and ninth forest resources inventory carbon sink monitoring. The results showed that China's forest carbon storage and carbon sink showed an increasing trend from 2013 to 2018, with an average annual growth rate of 3.58% for carbon storage and 14.95% for carbon sink. In terms of value accounting, the value of China's forest carbon stocks was 804.424 billion yuan in 2013 and 882.42 billion yuan in 2018, with an average annual growth rate of 1.87%. In 2013 and 2018, the value of forest carbon sink was 14.223 billion yuan and 27.206 billion yuan respectively, the value of forest carbon sink in 2018 accounting for 0.34% of the total forestry output value. According to the input-output complete consumption coefficient calculated by relevant studies, the total value of forest carbon sink production in 2018 was 14.147 billion to 15.235 billion yuan, accounting for about 0.015%~0.017% of China's total GDP in 2018. The results show that the proportion of forest carbon sink production in GDP showed a decreasing trend from 2013 to 2018, but the forest carbon storage and physical quantity of carbon sink showed an increasing trend. It is believed that the future GEP accounting should be oriented to establish a unified GEP accounting standard system, reduce the intermediate consumption of Natural Resource Economics of forest ecosystem, improve the output efficiency and productivity of forest resources, and strengthen the statistical monitoring and basic research of related data.

Biography:

Dr. Zhang Ying is a professor of resource and environmental economics in School of Economics and Management, Beijing Forestry University, an affiliate professor in Colorado State University, and an editor of the International Journal of Green economy (IJGE) at Oxford University and an editorial board of Global Economics Science of ScienceGate. He got a PhD from Beijing Forestry University in 1999, and studied as a post-doc. in Korea University in 2000. In 2003, he was a visiting professor in forest economics, Taiwan University of Taipei, Taiwan. In 2007-2008, he was a Fulbright visiting professor at Yale University, USA. In 2014-2015, he was a visiting professor in Giessen University, Germany. His major is applied economics, and over 280 papers and 53 books by a sole author and co-authors have been published in this field. There are 7 provincial and ministerial outstanding scientific and technological achievement awards in China, 5 international awards, and 6 excellent paper awards have been earned from 1999 to 2023.

Biochemical Adaptation of Wheat to Heat Stress: Focus on eEF1A Accumulation

Stefan Marković^{1*}, Djordje Minić¹, Katarina Marković², Jovana Jovankić¹ and Nevena Djukić¹

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²Institute for Information Technologies Kragujevac, University of Kragujevac, Kragujevac 34000

Heat stress in wheat often results in detrimental effects, including protein denaturation, cell membrane damage, and chlorophyll degradation, leading to significant yield loss. Understanding the protective mechanisms in wheat under heat stress is crucial for enhancing resilience. Recent research highlights the role of elongation factors in the plant's abiotic stress response, particularly elongation factor 1A (eEF1A), which has been identified as a key player in cellular protection during heat stress. eEF1A, a cytosolic protein, not only facilitates protein translation but also exhibits chaperone-like functions by preventing the aggregation of denatured proteins, thus supporting cell function under stress conditions. This study investigates the role of eEF1A in four winter wheat varieties exposed to different temperature regimes in field conditions. We evaluated the expression and accumulation of eEF1A, alongside photosynthetic pigment levels and yield in different wheat varieties. Our results demonstrate that eEF1A accumulation is positively correlated with heat tolerance, as varieties with higher eEF1A levels exhibited better retention of chlorophyll a, chlorophyll b, and carotenoids. Moreover, a significant correlation was found between eEF1A accumulation and both hectoliter mass and yield under heat stress conditions. These findings suggest that eEF1A accumulation serves as a valuable molecular marker for selecting heat-tolerant wheat genotypes, which could support breeding strategies to improve wheat productivity in the face of global climate challenges.

Biography:

Dr. Stefan M. Marković has been working at the University of Kragujevac, Serbia, since 2015. He earned his PhD in Biological Sciences in 2021, with a focus on plant stress adaptation. His primary research interest lies in plant responses to abiotic stress, particularly in the context of climate change. Dr. Marković has made significant contributions to plant physiology and stress biology. He has authored 39 scientific papers, including 13 in SCI-ranked journals. His work supports the development of sustainable agricultural practices and enhances crop resilience under changing environmental conditions.

Assessing Cascading Impacts for Resilient Infrastructure: A Machine Learning Approach for Enhanced Disaster Risk Management in Europe

Florenzia V. De Maio*, Saimir Osmani and Clemente Fuggini

RINA Consulting S.p.A, Genova, Italy

This abstract addresses the assessment of cascading impacts in Europe by focusing on multiple interacting natural hazards through a resilient, service-oriented, and people-centred approach. It is part of the European project named “Multi-risk and risk-informed system for better local and regional disaster risk management (MEDiate)”, which aims to develop a decision support system (DSS) for disaster risk management that accounts for modifications due to climate change, aging infrastructures, population changes, and other dynamic factors. The work emphasizes the importance of understanding the interdependencies between critical infrastructures—especially transport, energy, water, and supply chains—and how these dependencies amplify cascading impacts during disasters. Using machine learning methodologies applied to harmonized global spatial datasets of critical infrastructure and historical disaster loss databases, the study proposes a methodology to identify direct impacts and foresee subsequent cascading effects. The work highlights key definitions involving direct, cascading, and synergistic impacts and stresses the complex nonlinear interrelations in infrastructure systems.

The project responds to the increasing risks posed by climate change, which is expected to lead to more frequent and intense extreme weather events, exacerbating vulnerabilities and cascading failures in infrastructure networks. Existing approaches to modelling these dependencies and impacts are reviewed, including empirical, agent-based, system dynamics, economic theory-based, network-based, and machine learning techniques.

The proposed methodology integrates geospatial data and machine learning to predict direct impacted sectors and subsequent cascading disruptions, considering geographical and logical dependencies. This approach aims to provide a scalable and replicable tool for evaluating risks, losses, and resilience across various hazards and infrastructure types. The work contributes to advancing disaster risk reduction by offering a novel, data-driven perspective on infrastructure interdependencies and cascading disaster effects in Europe.

Biography:

Mrs. De Maio excels in building resilience for complex systems. Her background in structural engineering with a focus on climate vulnerability translates to expertise in risk assessment. From earthquake loss models to damage scenarios, she uses models to estimate risks and translate them into practical tools for decision-making. Beyond her technical expertise, Mrs. De Maio brings a range of soft skills to the table, including excellent analytical and problem-solving abilities. Her relentless focus on achieving results compels her to consistently deliver impactful outcomes.

Validating small-scale sugarcane farmers' climate perceptions through scientific climate data to enhance awareness of climate change: The Case of Swayimana area in KZN Midlands, South Africa

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Climate change presents a significant challenge, adding to the existing difficulties in the agricultural sector and threatening the sustainability of current production methods. Previous studies suggested that people in developing countries viewed climate change as a distant issue. However, recent research indicates that rural communities are becoming more aware of climate change and variability. This study aimed to compare small-scale sugarcane farmers' perceptions of climate change with scientific data from the study area. It analysed 20 years of rainfall and temperature trends and assessed whether farmers had implemented adaptation strategies to address observed climate changes. The findings reveal that nearly 40% of farmers noticed increases in temperature, rainfall, drought frequency, and frost occurrence, closely aligning with scientific data showing a rise in maximum temperature (0.049°C per year) and rainfall (15.475 mm per year) from 1997 to 2017. Despite accurately perceiving climate change, farmers struggle to adapt due to limited resources, aggravating their vulnerability. The study recommends government intervention to foster better collaboration between academics and farmers, facilitating information sharing and identifying adaptation strategies for small-scale farmers in the study site.

Biography:

Dr. Zoleka Ncoyini-Manciya is an emerging researcher at the University of KwaZulu-Natal with a keen focus on climate change, the derivation and dissemination of climate information, and climate change adaptation. Her work also explores rural development and the engagement of youth in the agribusiness value chain. Dr. Ncoyini-Manciya is currently leading a study on the capacitation needs of agricultural advisors, or extension officers, in understanding climate change and extreme events. Her research examines whether these advisors have access to the necessary climate information to effectively guide farmers in adapting to climate challenges.

Use of Information Communication Technology in Model Farmer Communication for Climate Change Adaptation by Grassroot Farmers

Emily Chelangat*

Makerere University, Uganda

The paper examines the use of Information Communication Technology (ICT) for climate change adaptation by grassroot farming communities with a focus on use of digital platforms by model farmers in coffee farming. The paper is premised on studies that show that regardless of communication from several sources including extension workers, there is still low adoption of agricultural climate adaptation technology which has negatively affected productivity and sustainability of farming. The paper emphasizes that without the use of ICTs for communication at the grassroot level, communities will be left further behind and yet about 70 percent of the total food supply in Africa comes from domestic small holder farmers, making them an important factor in the main food security chain on the continent.

Studies have shown that smallholder farmers in Africa need help accessing reliable and timely climate information for adaptation. The absence of relevant information makes adaptation difficult, and farmers are made vulnerable and exposed to the adverse effects of climate change while negatively affecting their livelihoods. Therefore, with focus on model farmer communication for adaptation, the paper presents the status of digital communication, identifies the challenges and makes recommendations to aid the increase in use of ICT to counter the challenges of limited and untimely information for climate change adaptation by grassroot farmers. The paper employs the diffusion of innovations theory to explain use of ICT for climate change adaptation.

Biography:

Emily Chelangat is a PhD Student at Makerere University and a Strategic Communication Specialist with over 14 years of experience in Communication for Development. She has a passion for grassroots transformation through sustainable communication interventions. She holds a Bachelor's degree in Mass Communication from Makerere University and Master Degree in Human Rights. She serves Uganda's National Planning Authority (NPA) as Senior Communication Officer, where she oversees communication and public relations activities for the National Development Plans (NDPs) in Uganda. She is also a member of the Communication Network of the African Peer Review Mechanism (APRM), the Governance organ of the African Union.

Nature-Based Low-Density Urban Development for Climate Resilience in Arid Coastal Patagonia

Daniel P. Paris*

Ramp Energy, Argentina

As population growths, the need for resilient cities and human settlement coupled with climate change effects, accelerates the degradation of ecosystems - particularly in arid coastal regions- demanding integrated solutions that prioritize ecological resilience and human well-being. This presentation introduces a private-sector initiative that proposes a scalable, low-density urban/rural development model grounded in ecological integration, renewable energy deployment, and coastal adaptation in southern Patagonia.

The project aligns with the UN Sustainable Development Goals (SDGs) and Argentina's Nationally Determined Contributions (NDCs) under the Paris Agreement. It aims to reduce anthropogenic pressures on fragile dune and marine ecosystems while promoting inclusive, sustainable living environments. Key strategies include the use of off-grid renewable energy systems, water desalinization, landscape regeneration, and coastal dune stabilization to mitigate erosion serving as a coastal reserve for ecosystemic services.

Located in an arid zone severely affected by landfills waste disposal, erosion, and biodiversity loss, the site has been subject to interdisciplinary observation. Over one hundred landfills have been mapped along with associated impacts on coastal dynamics and community health. The proposed urban design redefines the human-nature interface through eco-urbanization principles, reinforcing socio-ecological relationships and enabling energy transitions and tackling water scarcity in arid regions.

By creating conditions for climate-resilient settlement, this model offers a replicable pathway for environmentally responsible development in similar vulnerable geographies. It highlights the critical role of private actors in implementing climate mitigation and adaptation actions, while also supporting green recovery efforts in the post-pandemic context.

Biography:

Mr. P. Paris has more than 30 years of international experience in energy and urban planning private, predominantly acquired with Dow Chemical, Schlumberger and specialized consulting firms. Currently, he is the founder partner and Director of Ramp Energy Consulting. He has served as Vicepresident in the Geothermal Argentina Chamber. Their assignments included positions in Latin America, Europe and Africa. He is the author of 28 technical publications at prestigious congresses. He is an Electronic Engineer from S.J. Bosco University, with studies in Reservoir Sciences at the University of Tulsa, Harvard Business School's and MSc in International Business from RGU University, and PgDip in Development of Renewable Energy Projects at UCEMA.

Building resilient Agrifood Systems through Inclusive Technology Bundles in Zambia

Munyaradzi Junia Mutenje*

International Water Management Institute (IWMI), Zambia.

Socio-technical innovation bundling is gaining increasing attention in the development of sustainable agri-food systems as a strategy to enhance access to agricultural technologies and scale gender-equitable impacts in smallholder farming systems across Southern Africa. However, gender-equitable pathways—especially the how of socio-technical innovation bundling for smallholders—remain poorly understood.

This study draws on quantitative and qualitative data from 1,350 households and 18 sex-disaggregated focus group discussions, conducted across nine districts where the Accelerated Innovation Delivery Initiative has been implemented over the past three years. The objective was to examine how bundled socio-technical innovations can be tailored to be gender-responsive, enhance household adaptive capacity, and contribute to improved overall household welfare. The bundles assessed included improved access to maize-legume seed varieties and strengthened extension support across all districts. Winter activity bundles varied by region to respond to specific agro-ecological and market conditions in Central Province, with improved horticultural markets, the focus was on scaling efficient irrigation technologies, complemented by affordable finance and climate information access. These efforts aimed to improve the resilience of smallholders in the face of changing climatic conditions. While in Northern and Luapula Provinces, the emphasis was placed on aquaculture production, supported by improved access to both input and output markets. Goat, poultry and apiculture production emerged as key activities. These practices were bolstered by robust market access.

Findings from a recursive bivariate probit model showed that access to climate information and advisory services—delivered via radio, roadshows, and drama—significantly increased adoption of drought-tolerant maize and legume varieties, soil and water conservation practices and pest management practices by 12.3; 23 and 16% respectively. Additionally, the study revealed that active participation of women in male-headed households in agricultural decisions and plot management significantly increased the adoption of drought tolerant maize legume varieties, soil water conservation practices and farm investment by 21.6; 31.2 and 17.4% respectively. These insights were corroborated by findings from the sex-disaggregated focus group discussions. Both men and women emphasized that improved access to climate information and agro-advisory services enhanced intra-household transparency, fostering better agreement and collaboration in decision-making.

Using a multinomial endogenous treatment effect model, the study further found that bundling of improved irrigation efficient systems—with affordable finance and extension support had a significant impact on household welfare and adaptive capacity to climate shocks. Notable outcomes included increase in yield profitability and household income by 115, 77, 60% respectively. Additionally, combining rainfed climate-smart production with small livestock and apiculture contributed to income diversification, increasing household income by 35%. Bundling rainfed maize-legume production with aquaculture also led to improved income and profit by 15 and 6% respectively.

The findings of this study highlighted the gender-differentiated impact of the bundled innovations. Where women were actively involved in agricultural decision-making and had direct access to climate information services, the improvements in household income, profit, and adaptive capacity were more pronounced. These insights underscore the importance of gender-inclusive approaches in agricultural technology dissemination, and the pivotal role that women play in enhancing the resilience and productivity of smallholder farming systems.

Scientific Session
DAY-2

An adaptive strategy for current afforestation in the forest-steppe ecotone, north China, inferred from the Holocene geo-ecology dynamics

Hongjuan Jia*

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Remarkable achievements have been made in improving the ecological environment through afforestation on the forest-steppe ecotone north China, where forest coverage has increased from 11.4% to 82%, and timber volume has increased by 30.4 times. Additionally, the average annual precipitation has risen from <410 mm to 479 mm. However, in recent years, regional ecological degradation and continuous shrinkage of lakes have been observed despite increased regional precipitation. Research on historical vegetation can provide background data and suitable restoration strategies for future ecological rehabilitation. Studies on Holocene vegetation in artificial forest areas reveal that the historical vegetation during this period was predominantly herbaceous, transitioning from a grassland dominated by Chenopodiaceae, Poaceae and Artemisia to one where Poaceae became the most abundant. Woody vegetation, including scattered distributions of Betula, Quercus, Ulmus, Carpinus, Rosa, and Rhododendron, was sparse, with only large-scale artificial pine forests being planted in the last decade. The grassland vegetation evolved from ferns-dominated communities to Artemisia-dominated steppes and then to Cyperaceae-dominated grasslands. Given the current occurrence of seasonal dry soil layers and the projected warming and drying climate, large-scale afforestation should be avoided in future ecological restoration. Instead, priority should be given to herbaceous plants and shrubs.

Biography:

Hongjuan Jia Professor of Hebei GEO University, specializing in micropaleontology, Quaternary geology, and ecological restoration research. She serves as the leader of the Quaternary Paleobiology Research Team at Hebei GEO University. Her primary research focuses on ecological environmental changes and restoration in northern China. Her research provide fundamental data for understanding the ecological and environmental evolution of northern China, offering a scientific basis for national water resource management policies and evidence-based afforestation strategies.

Climatic Drivers of Mortality Seasonality: A Refined Statistical Approach

Marcin Piotr Walkowiak^{*1}, Jarosław Walkowiak¹, Rodney P Jones² and Dariusz Walkowiak¹

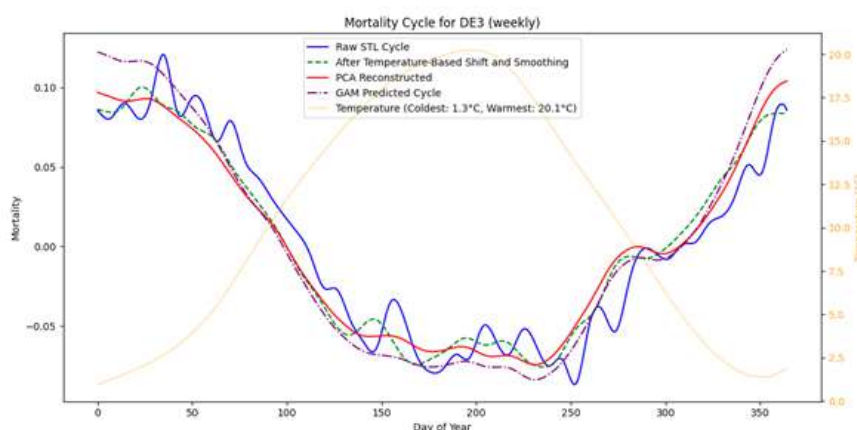
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²Healthcare Analysis & Forecasting, United Kingdom.

The link between climate and mortality seasonality is well-known, yet gaps remain in understanding its processes. Studies either overgeneralize across climate zones, missing local nuances, or analyze regions individually, overlooking global patterns. This study models mortality seasonality as a continuous, climate-driven process with a global pattern.

Data span 1990–2024, sourced from Eurostat, UN Demographic Statistics, All-Cause Mortality Database, Short-term Mortality Fluctuations Data Series, and Brazil's Sistema de Informação sobre Mortalidade (SIM), managed by the Ministry of Health. Climate data from the CRU TS4.07 temperature dataset are weighted by population density (GPW Version 4.11) to reflect human exposure. The methodology uses a Seasonal-Trend Decomposition using Loess (STL) model to extract localized mortality cycles, phase-shifted to synchronize with local climatic timing, accounting for peak temperature month variations. These cycles are denoised using Multidimensional Kernel Smoothing, weighting observations by temporal and climatic proximity. Principal Component Analysis (PCA) identifies variability modes, validated by reconstructions. Generalized Additive Models (GAMs) predict cycles using climate variables and PCA dimensions. Preliminary findings show strong climate-mortality alignment, with the European pattern extending globally, suggesting a universal mechanism. Seasonal patterns shift from flat mortality in polar regions to flat tropical climates, with a subtle increase in coldest months, peaking in intermediate zones. Continental climates show a sine-wave-like pattern. Colder temperate climates have a short infection season with sharp viral peaks in mild winters. Hot summer temperate and hot desert climates exhibit a shortened infection season, mid-summer heatwave mortality spikes, and early autumn minima, with peak amplitude in hot desert climates. As minimum temperatures rise, infection seasons shorten, reducing amplitude; tropical regions show nearly flat cycles, occasionally with a subtle increase in coldest months. Ongoing analyses will refine findings, and feedback will inform improvements, offering insights for public health and climate strategies.

EXAMPLE CYCLE ANALYZE FOR BERLIN:



Advancing Wetland Assessment in SADC with EO Data: The Role of WeMAST and SASSCAL in Climate Change Adaptation

Prof. Indongo Nelago*, Albano dos Santos, Sylvia Thompson, Baptista Joao and Budzanani Tacheba

Southern African Science Service Centre for Climate Change and Adaptive Land Management, Windhoek, Namibia.

Wetlands are among the most vital ecosystems in Southern Africa, contributing significantly to biodiversity conservation, water purification, climate regulation, and local livelihoods. However, these ecosystems are under increasing threat due to unsustainable land use practices, population pressure, climate variability, and natural hazards such as atmospheric (Droughts) and hydrological (Floods). To address the growing need for wetland conservation, the Wetland Monitoring and Assessment Service for Transboundary Basins in Southern Africa (WeMAST) was developed under the GMES & Africa Support Programme now integrated into the Africa Space Programme, jointly funded by the African Union Commission (AUC) and the European Commission (EC). The initiative, led by the Southern African Science Service Centre for Climate Change and Adaptive Land Management (SASSCAL) in partnership with regional academic and research institutions, aims to promote sustainable wetland management using Earth Observation (EO) technologies.

The WeMAST geoportal is an online platform that provides near real-time and historical EO data for four transboundary basins: Cuvelai, Limpopo, Okavango, and Zambezi. The platform integrates satellite-based datasets from the Copernicus program (Sentinel-1, Sentinel-2, MODIS, Landsat) with derived wetland indicators such as surface water extent, land use/cover, vegetation phenology, water quality, and climate variability. Additionally, the system incorporates ancillary datasets from the SASSCAL WeatherNet, as well as rainfall-based Standardized Precipitation Index (SPI) and other climate parameters, provided through the SASSCAL Open Access Data Centre (OADC). These data are used to model Basin Vulnerability Indicators (BVIs), which combine environmental and socio-economic factors to assess wetland sensitivity and resilience to climate hazards.

Phase II of WeMAST has enhanced the platform's functionality by enabling user account features, mobile application integration for data validation, and expanded coverage of indicators across all river basins. Training and outreach activities have strengthened capacity building among diverse stakeholders, from policymakers to local communities. Moreover, the WeMAST Mapographics, an infographic-rich compendium, provides visual insight of wetland conditions and trends to policymakers.

SASSCAL envisions continued development of the WeMAST platform to link it with additional products from the WeatherNet system, supporting climate change impact monitoring and informed decision-making in water resources management throughout the SADC region.

Theme: Integrating Satellite Data and SASSCAL WeatherNet products for Adaptive Wetland Monitoring under Climate Change.

Keywords: Wetlands, climate change, water management, earth observation, southern Africa

Biography:

Professor Nelago Indongo, the Executive Director of SASSCAL is a distinguished social scientist with expertise in social statistics and sociology. She has over 13 years of senior management experience from the University of Namibia (UNAM), supported by a track record in research management, academic leadership, and institutional development. After serving in academia for more than 25 years, Prof Indongo is now leading SASSCAL, a joint initiative of Angola, Botswana, Germany, Namibia, South Africa and Zambia in response to the challenges of global change. Her leadership vision is to make SASSCAL a leading regional centre in integrated climate change and adaptive land management science services for improved quality of life in southern Africa. Prof Indongo leads collaborative teams that aims to strengthen regional capacity to generate and use scientific knowledge products and services for decision making on climate change and adaptive land management through research management, human capital development and service brokerage.

Novel sediment source fingerprinting quantifying erosion-induced total nitrogen and total phosphorus outputs: A case study of an agricultural catchment in North China

Hanqing Yu^{a*}, Zhaoyang Lu^a, Suarau Odutola Oshunsanya^d, J. Adu-Gyamfi^b, Adrian Chappell^c, Hongyu Wang^a, Wenxiang Liu^{a,c}, Yu Zheng^a, Tingting Xue^a and Lee Heng^b

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^d*Department of Agronomy, University of Ibadan, Nigeria.*

^e*School of Earth and Environmental Sciences, Cardiff University, Cardiff, United Kingdom*

Intensive farming is a primary cause of increased sediment and associated nitrogen (N) and phosphorus (P) loads in surface water systems. Especially, a shift in policy to intensive agricultural production and land management with consequent detrimental effects to water bodies. We quantify the sources and magnitude of sediment N and P from different sources using a novel application of compound-specific stable isotope (CSSI), ¹³⁷Cs and ²¹⁰Pbex in an agricultural catchment in North China, and investigated the impact of land management policy shift by quantifying the seasonal change in sediment N and P outputs across one year using ⁷Be combined with CSSI in the catchment. Before the land management policy shift, sediment sources from surface and sub-surface soils were estimated by FRNs fingerprint (¹³⁷Cs and ²¹⁰Pbex), while surface soil from land uses that originated from hillslope were identified by CSSI fingerprint. Using a novel application of FRNs and CSSI sediment fingerprinting techniques, the dominant sediment source was maize farmland, followed by channel bank. The sedimentation rate was quantified by the ¹³⁷Cs cores at the outlet of this catchment. The TN and TP in sediment were both mostly derived from maize farmland and least from channel banks. The channel banks are significant sediment sources but contribute little to the input of sediment N and P for eutrophication. After the policy shift, our study identified forest and crop farmland converted from forest (F + C(F)) as the dominant sediment source, intermediate on vegetable farmland (V), and least on crop farmland (C). Sedimentation rate coincided with shifted land use policy and rainfall distribution. The TN and TP in sediment were both mainly derived from F + C(F) and least from V. The novel application of FRNs (¹³⁷Cs, ²¹⁰Pbex and ⁷Be) and CSSI techniques cost-effectively quantified sediment N and P loads from different sources, enabling rapid assessment for optimizing soil conservation strategies and land management practices.

Biography:

Dr. Hanqing Yu has a professor of soil erosion and environmental effects at the Institute of Environment and Sustainable Development in Agriculture, Chinese Academy of Agricultural Sciences. She have been working on the assessment of soil redistribution and sediment deposition using environmental radionuclides for nearly 10 years. Her current research interest is in identifying the sources and loads of non-point source pollutants in sediment and surface water in the agricultural catchment by using integrated nuclear techniques.

Shaping Sustainable Futures: The Role of Energy Policy in Combating Climate Change

Nabila Amin*

Shenzhen University, china

Climate change poses a critical challenge to global sustainability, necessitating urgent reforms in energy policy to mitigate its impacts. This study examines the intersection of climate change and energy policy, highlighting the need for a transition towards low-carbon energy systems to reduce greenhouse gas emissions while ensuring energy security. It explores the role of policy instruments such as carbon pricing, renewable energy incentives, and regulatory frameworks in promoting cleaner energy alternatives. Additionally, the research emphasizes the importance of balancing economic growth with environmental sustainability through integrated policy approaches. The findings underscore the necessity of global cooperation, technological innovation, and comprehensive policy reforms to accelerate the shift toward resilient, low-emission energy systems. This study contributes to the ongoing discourse by offering insights into policy pathways that support climate adaptation and mitigation while fostering sustainable development.

Keywords:

- *Climate Change*
- *Energy Policy*
- *Renewable Energy*
- *Carbon Emissions*
- *Sustainable Development*
- *Policy Reform*

Carbon-Free Fuel (H₂) Production Strategy Based on Herbaceous Biomass

Tae-Jin Kang*, Da-Hye Lee, Hyun-Ji Kim, Suk-Hwan Kang and Jin-Ho Kim

Institute for Advanced Engineering, South Korea

As climate change becomes a critical global issue, there is growing demand to drastically reduce greenhouse gas emissions by 2050. Accordingly, the necessity for developing technologies for environmentally friendly renewable energy that can reduce greenhouse gas emissions, replace fossil fuels, and enable sustainable use and development is increasing. Among renewable energy sources, biomass is a clean energy source capable of circular utilization and reproduction, and can resolve the intermittency issues of other renewable energy sources, making it a prominent practical alternative for carbon neutrality. Against this backdrop, interest in developing and disseminating alternative energy using biomass is growing. Therefore, this study analyzed the characteristics and latest research and development trends of torrefaction, gasification, and chemical looping gasification technologies among methods for producing hydrogen, a clean energy source, using herbaceous biomass.

Biography:

Dr. Kang Tae-jin is an expert with over 15 years of research experience in the energy and environment field. He obtained his master's and doctoral degrees in Energy Systems Engineering from Ajou University. He has worked at Ajou University, Korea Research Institute of Chemical Technology, Wonik Materials, and Korea Nexlen. His main research areas include low-carbon fuel upgrading, gasification, CCUS, and waste plastic pyrolysis. He has completed over 20 projects, holds 7 patents, and published more than 20 SCI papers. He currently serves as a principal researcher at the Clean Energy Transition Center of the Institute for Advanced Engineering, leading demonstration and commercialization research.

This research was supported by the Ministry of Trade, Industry & Energy(MOTIE), Korea Evaluation Institute of Industrial Technology(KEIT), [RS-2025- 13772969]

Guiding Sustainable Fertiliser Selection Using Life Cycle Assessment

Vincent Desaulniers Brousseau*¹ and Mark Lefsrud²

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² McGill University, Canada

Fertiliser choice is responsible for a large fraction of agricultural greenhouse-gas (GHG) footprints, yet decisions are still driven largely by price or total nitrogen content. Life-cycle assessment (LCA) supplies the cradle-to-grave lens that places mineral, organic and hybrid products on an equal functional footing and exposes trade-offs. This can be used both for novel, soil-less indoor agricultural system as well as in traditional farming systems.

In a previous study, a plant producing facility was supplied with an organic liquid fertiliser (OLF) produced in a two-stage aerobic bioreactor from insect frass. Growth trials confirmed functional equivalence with mineral salts for basil yield and nutrient uptake. A cradle-to-gate LCA coupled to a detailed nitrogen mass balance varied the fraction of gaseous N lost as nitrous oxide (N₂O). When N₂O constitutes five percent or less of gaseous N-loss, OLF lowers the 100-year global-warming potential (GWP) by thirty-two percent per kilogram of marketable basil relative to mineral fertiliser.

The same LCA framework can be used to benchmark traditional fertilizer products in traditional farming systems. Previous results show that it is possible to reduce GHG by optimizing fertilizer type in animal- and plant-producing systems. Future work will help to harmonise assumptions that convert disparate datasets into transparent decision-making tools. Ranking fertilisers by climate burden, nutrient-use efficiency and logistical constraints needs to be done. This matrix empowers growers selecting inputs, researchers directing R&D investment and policymakers designing emission-reduction incentives.

Biography:

Vincent Desaulniers Brousseau, PhD, is a LCA scientist specialising in innovations for low-emission food and biopharmaceutical systems. His work spans animal-waste valorisation, nutritional LCA and optimization of cannabis production. He has authored peer-reviewed studies on the environmental impacts of the Canadian cannabis cultivation and guides cross-disciplinary teams translating laboratory discoveries into commercially viable, climate-positive technologies. Vincent combines field experimentation with advanced modelling to create decision tools that help growers, industry and policymakers adopt evidence-based sustainability strategies.

RethinkAction – A Climate Action Platform for Sustainable Land Use and Climate- Resilient Futures

Elisa Crocco*

RINA Consulting S.p.A., Genoa, Italy

RethinkAction is a Horizon Europe project that empowers society to co-design, assess and adopt Climate Change (CC) mitigation and adaptation strategies by integrating advanced modelling, participatory approaches and policy support into a single, user-friendly platform. The project addresses the urgent need for informed decision-making on land use and management, tackling the interconnected challenges of CC, biodiversity loss, food security and social well-being.

At its core, RethinkAction develops a cross-sectoral decision-support platform that simulates future scenarios under varying climate, socio-economic and policy conditions. By combining Earth system models, socio-economic projections and local knowledge, the platform enables stakeholders—from policy makers to farmers, businesses and citizens—to explore the impacts of different land-based strategies on key sectors such as agriculture, forestry, energy, water and urban planning.

A distinctive feature of RethinkAction is its participatory co-creation process. The project actively engages diverse stakeholders in six case studies across EU, ensuring that local priorities, cultural contexts and socio-economic conditions are embedded into the design of adaptation and mitigation pathways. This approach bridges the gap between scientific modelling and real-world application, enhancing the relevance, acceptance and uptake of proposed solutions.

The RethinkAction platform delivers tailored, science-based insights to guide climate-resilient investments and policies. It supports the achievement of EU climate neutrality and biodiversity goals, while fostering sustainable livelihoods and equitable transitions. By providing accessible, transparent, actionable information, RethinkAction enhances the capacity of societies to anticipate, prepare for and respond to climate challenges.

Biography:

Elisa Crocco is a Project Manager at RINA Consulting S.p.A. in the Climate Neutrality & International Cooperation team. She manages and coordinates EU-funded projects and develops proposals under Horizon Europe, Interreg, LIFE and other programmes. With a background in Civil and Environmental Engineering, her expertise spans climate change impacts on urban environments, adaptation and resilience, energy transition, zero-emission cities, food loss and waste prevention, food security and international cooperation. She is strongly committed to delivering innovative solutions for climate neutrality, sustainability and integrated environmental and socio-economic development.

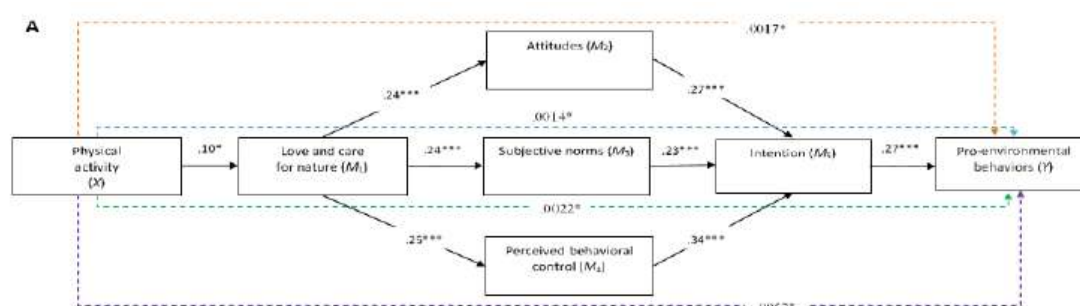
DAY-2
Posters

Exploring links between physical activity and pro-environmental behaviors in children

Yannis Theodorakis*, Karamitrou, A., Krommydas, C., Violatzi, K., Hassandra, M., and Comoutos, N.

University of Thessaly, Greece.

This study aims to examine the relationships between involvement in physical activity, love for nature, attitudes toward, and intentions to perform pro-environmental behaviors. General feeling connected to nature and relevant attitudes has been shown to be beneficial to adopt pro-environmental behaviors, however the specific routes of connectedness have not been examined systematically. Participants were 675 students aged 9 to 13 years old who completed several instruments measuring Physical activity (PA), the Love and Care for Nature, and, based on the Theory of Planned Behavior (TPB), attitudes, subjective norms, perceived behavioral control (PBC), and intentions to perform pro-environmental behaviors. Also, a list of pro-environmental behaviors, were given. Serial-parallel mediation analysis showed that PA significantly predicted love for nature, which in turn predicted attitudes, subjective norms, and PBC. These three TPB constructs positively predicted students' intentions to act in pro-environmental behaviors. In turn, intentions significantly predicted pro-environmental behaviors. The models revealed significant direct and indirect effects, supporting a robust pathway from PA to sustainable behaviors via psychological and attitudinal mediators. The findings underscore the value of the Theory of Planned Behavior in understanding how physical activity and a love for nature contribute to the development of positive attitudes, perceived social norms, and control beliefs related to pro-environmental behaviors among students. This study highlights the importance of fostering both physical activity and a connection with nature in educational settings, as these factors play a pivotal role in shaping children's intentions and actual engagement in sustainable, eco-friendly actions. Future interventions aiming to promote environmental responsibility in youth should consider incorporating activities that enhance both nature connectedness and physical activity related lifestyles.



Biography:

Yannis Theodorakis is a professor of Sport Psychology in the Department of Physical Education and Sport Science at the University of Thessaly, Greece. He was among others, vice-rector, a member of the Managing Council of the European Society of Sport Psychology, president of the Greek Society of Sport Psychology, member of the Editorial Board of "Psychology of Sport and Exercise". He has published more than 38 books and chapters, and more than 280 articles. He has been involved in several projects related to physical activity promotion. The present study was funded by the H.F.R.I. project (Project Number: 16567) entitled 'Environmentally Literate Youth Through an Interdisciplinary Intervention'.

Recreational boating environmental footprint and climate change: Green strategies and practices in the manufacturing and service sector

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¹University of Split, Faculty of Maritime Studies, Split, Croatia

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The recreational boating sector significantly contributes to the economy and employment worldwide and is a vital segment of the blue economy. The sector's economic growth, competitiveness, and sustainability highly depend on consuming natural resources and energy and on the quality and preservation of the environment. Therefore, the continuous expansion of recreational boating globally provokes questions about its environmental footprint and related climate change challenges. Moreover, climate change's adverse effects impact the recreational boating community. Thus, the sector's green transition is not just a choice but a pressing need, and it requires all stakeholders to take responsibility for climate action and environmental protection. This research analyses green strategies and best practices along the industry value chain by investigating the manufacturing industry (boat builders) and the recreational boating service sector (marinas, charter agencies). The aim is to identify the involvement of all players in greening and mitigating climate change. The results indicate that the nautical sector plays a meaningful role in combating and mitigating climate change, mainly through green solutions, such as reduction of water usage, energy efficiency, switching to renewables, carbon offsetting, biodiversity protection, green infrastructures, waste control, and other sustainable practices. These green strategies mitigate climate change and bring about positive changes in the industry, such as cost savings, improved efficiency, and enhanced reputation. Integrating these green strategies and climate change-related actions in recreational boating relies heavily on industry stakeholders' collaboration, partnership, and engagement. This research uses secondary data to identify problems and solutions regarding green strategies and climate change action and create the corresponding value chain framework. The proposed framework addresses critical environmental and climate change issues in the recreational boating industry. The framework is evaluated and revised by conducting in-depth interviews with industry experts. Finally, the created framework enables a comprehensive understanding of the industry value chain regarding strategic solutions for key stakeholders in addressing environmental impacts and climate change action.

Keywords: Recreational boating sector, green strategies, climate change action, environmental footprint, partnership

Biography:

Eli Marusic is an associate professor at the University of Split, Faculty of Maritime Studies, and Faculty of Kinesiology, Split, Croatia.

Katija Kovacic is a lecturer at the University of Split, Faculty of Kinesiology, Split, Croatia.

Joško Soda is an associate professor at the University of Split, Faculty of Maritime Studies, and Faculty of Electrical Engineering, Mechanical Engineering, and Naval Architecture, Split, Croatia.

Bioclimatic diversity of a medium-sized city on hot days in the context of climate change

Monika Okoniewska*

Kazimierz Wielki University, Poland

Climate change affects the bioclimate of cities, primarily leading to rising temperatures and an increased frequency of extreme weather events, which negatively impacts the health of residents and the quality of life in urban areas. The aim of this study is to investigate the impact of urban structure, the distribution of green spaces, and the presence of water bodies on the micro- and bioclimate of various areas of a medium-sized city located in the temperate zone on days with maximum temperatures (t_{max}) $\geq 30^{\circ}\text{C}$. Research was conducted in different locations of the city, with varied building structures, topography, and the presence of green areas and water bodies. Based on meteorological data, biothermal and thermophysiological indicators were calculated: the Universal Thermal Climate Index, Physiological Subjective Temperature, Heart Rate, and Risk of Hyperthermia. The study found that elevated areas, partially covered with vegetation, recorded lower air temperatures and more stable biothermal conditions. The highest air temperatures, along with significant heat stress and feelings of "hot," were most commonly observed in the city center. Overheating risk and high heart rate frequency were also recorded there. Additionally, relatively challenging conditions were observed outside the city in a single-family housing estate, where there was significant variation in biothermal conditions, with feelings of "very hot" particularly around 2 PM, as well as cold stress at night and the risk of hyperthermia, which could occur within an hour. However, no significant effect of the water body on reducing thermal sensations was observed, likely due to the area being almost entirely open, resulting in a high influx of solar radiation, which contributed to increased heat load on the human body.

Complex responses of vegetation diversity to Holocene climate change in the eastern Tibetan Plateau

Liang Chen*

Hebei GEO University, China

Biodiversity has attracted much attention recently due to its important relationships with ecosystem function under various global warming scenarios. However, an understanding of biodiversity mechanisms requires study over long time scales. Three high-resolution pollen records of Zoige Basin in the eastern Tibetan Plateau are used to reconstruct changes in vegetation diversity during the Holocene, allowing the mechanisms that drove the dynamic to be quantitatively explored. Rarefaction and Hill's indices are used to estimate the diversity richness and evenness based on pollen data. The results show that changes in palynological richness can be divided into five stages: an abnormal change from 10,500 to 9,000 cal BP, an obvious increase from 9,000 to 6,500 cal BP, a decreasing trend from 6,500 to 4,000 cal BP, an increasing trend after 4,000 cal bp until 1,500 cal BP, and a highly fluctuating stage from 1,500 cal BP to the present. Palynological evenness is relatively stable throughout the Holocene except for during a briefly elevated period from ca. 4,000 to 1,500 cal BP. The result of Boosted Regression Tree analysis indicates that climate is the main driving factor and the effect of temperature is stronger than that of precipitation in the study region. However, during ca. 4,000–1,500 cal BP, palynological diversity is primarily affected by vegetation structure, as shown by an increase in palynological evenness, which can in turn be explained by the climate threshold theory. This research provides a long-term, high-resolution reconstruction of palynological diversity which could be used to infer vegetation diversity change in the ecologically sensitive Tibetan Plateau. The results imply that vegetation diversity in the region may increase under global warming if human impacts are not considered.

Biography:

Dr. Chen Liang earned her Ph.D. from the Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, and currently serves as a faculty member at Hebei GEO University. Her research focuses on global climate change and its ecological impacts, with particular emphasis on arid regions of East Asia and the Tibetan Plateau. Specializing in quantitative statistical approaches to paleoecological studies, she has successfully reconstructed Holocene vegetation diversity patterns in ecologically sensitive areas of the Tibetan Plateau, providing critical insights into ecosystem responses to climate change.

Modelling Reference Evapotranspiration in Northern Pakistan Using Support Vector Regression

Sajid Gul* and Xia Cui

School of Economics and Statistics, Guangzhou University, Guangzhou, China.

This study examines the precision of support vector machines (SVM), a regression methodology, in modelling reference evapotranspiration (ET_o). Since current models take into consideration the crop coefficient (K_c) as a function of time, they do not take into account fluctuations brought on by the surface environment, wetting techniques, weather, and other biophysical factors. These constraints lead to inaccurate evapotranspiration estimations. In order to replicate ET_o as determined by the FAO-56-Penman-Monteith equation, the support vector machines are fed with daily meteorological data, solar radiation, air temperature, relative humidity, and wind speed from twelve stations in the province of Khyber Pakhtunkhwa, Pakistan: Balakot, Cherat, Chitral, D.I Khan, Drosh, Kakul, Parachinar, Peshawar, Risalpur, Saidu Sharif, and Kohat. The SVM's estimates are compared to those of the Hargreaves, Ritchie, and Priestley Taylor methods. The models' performances were evaluated by contrasting the SVM results with the aforementioned method using root mean-squared errors, mean-absolute errors, and determination coefficient statistics. According to the comparison results, Khyber Pakhtunkhwa's ET_o process could be successfully modelled using support vector machines.

Biography:

Dr. Sajid Gul completed his PhD degree in Probability theory and mathematical statistics from Zhengzhou University China. His current research interests focuses on Applied Statistics, Climatology, Climate Change, Water Resource Management and a Machine learning theory. Currently, he is doing Postdoc in Environmental statistics from Guangzhou University, Guangdong, China.

Professor Dr. Cui Xia (PhD in Science). She is Executive Director of Guangdong Branch of China Field Statistics Society; Director of Resources and Environment Branch of China Field Statistics Society. She has been committed to the research of missing data analysis, causal inference, high-dimensional data modeling, etc., and has published more than 20, SCI - indexed journal papers in domestic and foreign academic journals such as Annals of Statistics, Biometrika, Scandinavian Journal of Statistics, Computational Statistics and Data Analysis, and Science in China Mathematics, one of which is a highly cited paper on WOS.

Development of NCC Carbon Reduction Technology Using Carbon-Free Fuels (H₂ & NH₃)

Tae-Jin Kang*, Hye-Sung Lee, Jin Hee Lee, Hyo-Sik Kim, and Jin-Ho Kim*

Institute for Advanced Engineering, South Korea

As of 2018, Korea's petrochemical industry's carbon emissions recorded 46.9 million tons, ranking second among high greenhouse gas-emitting industries after the steel industry (101.2 million tons). The petrochemical industry's greenhouse gas emissions account for approximately 18% of the entire industrial sector, with direct emissions comprising about 64% and indirect emissions about 34% of the total. Among direct emission facilities in the petrochemical sector, NCC(Naphtha Cracking Center) emits 20 million tons, representing the largest portion. The carbon-free fuels proposed in this study—hydrogen and ammonia—when utilized as fuel for naphtha cracking in NCC processes, can fundamentally eliminate greenhouse gases generated during conventional by-product gas combustion, enabling eco-friendly carbon reduction. Therefore, this study comprehensively examined domestic and international technology trends, market conditions, and expected effects of applying carbon-free fuels (hydrogen and ammonia) to NCC processes.

Biography:

Dr. Kang Tae-jin is an expert with over 15 years of research experience in the energy and environment field. He obtained his master's and doctoral degrees in Energy Systems Engineering from Ajou University. He has worked at Ajou University, Korea Research Institute of Chemical Technology, Wonik Materials, and Korea Nexlen. His main research areas include low-carbon fuel upgrading, gasification, CCUS, and waste plastic pyrolysis. He has completed over 20 projects, holds 7 patents, and published more than 20 SCI papers. He currently serves as a principal researcher at the Clean Energy Transition Center of the Institute for Advanced Engineering, leading demonstration and commercialization research.

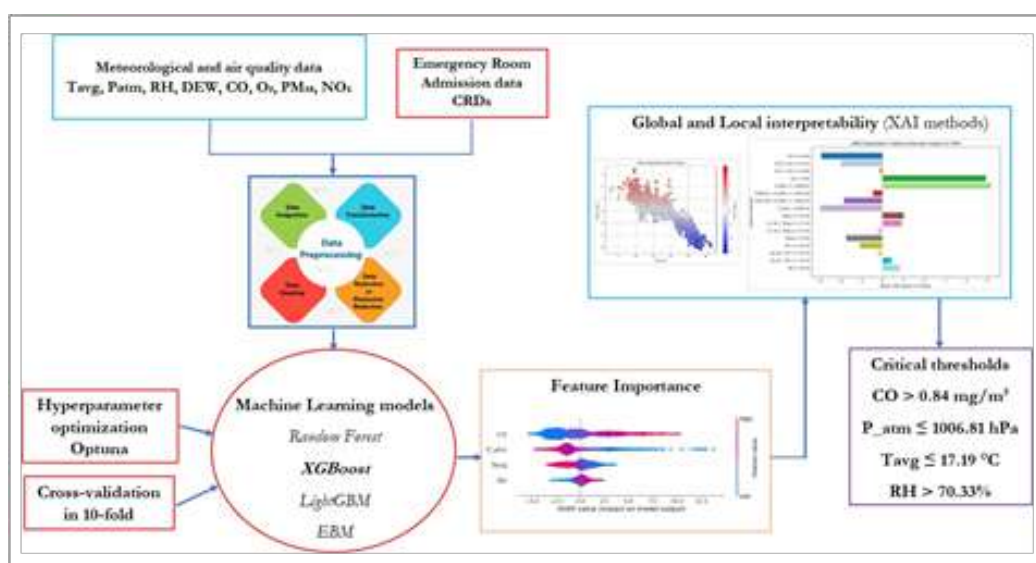
This research was supported by the Ministry of Trade, Industry & Energy(MOTIE), Korea Evaluation Institute of Industrial Technology(KEIT), [RS-2025- 13772969]

The interaction between cardiorespiratory diseases and meteo-pollutant data: interpretability analysis of a machine learning approach

Vito Telesca^{*1} and Marica Rondinone¹

¹Department of Engineering, University of Basilicata, Potenza, Italy

This study introduces a machine learning (ML) framework to examine the link between Emergency Room (ER) admissions for CardioRespiratory Diseases (CRDs) and environmental conditions. The aim is to develop and validate an interpretable model that integrates atmospheric and health data to assess daily CRD risks and identify critical exposure thresholds. The dataset (2013–2023) comprises meteorological and air quality data from the Metropolitan City of Bari (Southern Italy), including carbon monoxide (CO), atmospheric pressure (P_{atm}), average air temperature (T_{avg}), relative humidity (RH), particulate matter (PM₁₀), dew point (DEW), ozone (O₃), and nitrogen dioxide (NO₂). Four ML models were evaluated: Extreme Gradient Boosting (XGBoost), Random Forest (RF), Explainable Boosting Machine (EBM), and Light Gradient Boosting Machine (LightGBM). Hyperparameters were optimized via Bayesian search using the Optuna framework, and model performance was assessed through 10-fold cross-validation. XGBoost achieved the highest accuracy ($R^2 = 0.901$; MAE = 0.047 cases/day). To ensure transparency, model interpretability was analyzed using SHAP values, revealing that elevated CO and RH, low P_{atm}, and mild temperatures are strongly associated with higher CRD admissions. Local Interpretable Model-Agnostic Explanations (LIME) identified key thresholds: CO > 0.84 mg/m³, P_{atm} ≤ 1006.81 hPa, T_{avg} ≤ 17.19°C, and RH > 70.33%. A follow-up analysis confirmed that the simultaneous occurrence of all four conditions aligns with the 95th percentile of CRD cases.



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Day 2 Virtual

Promoting Māori values in the creation of built environments to address climate injustice

Fleur Palmer*

(Te Rarawa, Te Aupōuri, Ngāti Awa) Auckland University of Technology, New Zealand

Architecture in Aotearoa is more than the design of buildings; it's a practice deeply intertwined with the land (whenua), people (tangata), and the cultural narratives that shape our collective identities. The signing of Te Tiriti o Waitangi in 1840 established a foundational relationship between Māori and the Crown, emphasizing principles of partnership, protection, and participation. However, historical and ongoing breaches of Te Tiriti o Waitangi led to significant challenges for Māori, including land dispossession, cultural erosion, socio-economic disparities, ecological destruction and climate change. For architects, acknowledging and addressing these issues is not only a professional responsibility but a commitment to fostering equitable and culturally responsive built environments. This presentation discusses ways to promote Māori aspirations for development to support our collective futures.

Biography:

Dr Fleur Palmer comes from Māori and Scottish ancestry and is affiliated to the Northern (Muriwhenua) tribes of Te Rarawa, Te Aupōuri and Ngāti Awa in Aotearoa (New Zealand). She is an Architect and Associate Professor in Huri te Ao Hoahoanga (Future Environments) at Auckland University of Technology.

In her architectural and research practices she promotes indigenous thinking to honour a relationship to the Tiriti o Waitangi (the Treaty of Waitangi) and activate changes to address the adverse intergenerational effects of colonisation associated with climate change, land loss, homelessness, discrimination, ecological degradation, reduction in food security, and loss of biodiversity.

Groundwater Assessment under Climate Change Scenarios: The Myalup Case Study

Panagiotis Giannouloupoulos*

Department of Water and Environmental Regulation – Western Australia

Western Australia's South West has experienced a persistent drying trend since the 1970s, and climate projections consistently indicate hotter and drier futures. This creates significant challenges for balancing growing water demand with the protection of groundwater-dependent ecosystems and cultural values.

In 2024, the Bureau of Meteorology and the Department of Water and Environmental Regulation (DWER) collaborated to demonstrate how the Bureau's National Hydrological Projections (NHP) [3] can inform local-scale groundwater assessment. The Myalup groundwater system, located on the Swan Coastal Plain, was selected due to its critical role in supporting high-value wetlands, cultural landscapes, and irrigated agriculture. The system supplies about 80% of the water for the Myalup Irrigated Agricultural Precinct, where groundwater demand has risen steadily in recent decades.

A finite element numerical model (FEFLOW[1]) was developed [2] to simulate system response under current abstraction and a range of management options, including increased pumping, managed aquifer recharge, and revised irrigation practices to inform DWER allocation planning and licensing. The model was driven by 32 climate projections derived from the NHP (RCP 4.5 and RCP 8.5), enabling assessment of groundwater responses to climate variability and extremes. Results indicate a general decline in aquifer groundwater levels, coupled with increased interannual variability and growing uncertainty under hotter, drier futures.

The reduction of 32 equally plausible climate storylines into a smaller, decision-relevant subset proved a major challenge.

Our three-stage climate assessment framework was applied in Myalup to support water resource planning and decision-making. This involved understanding the water system and climate context, assessing the impact of climate change on recharge using a one-dimensional infiltration model, and communicating findings through climate storylines. These storylines linked system vulnerabilities with relevant climate drivers, offering water managers a way to select climate projections aligned with specific risk profiles and adaptation objectives.

The Myalup case study demonstrates how national-scale projections can be applied locally to guide sustainable groundwater use, protect ecological and cultural values, and inform adaptation planning and groundwater licensing under climate change.

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Biography:

Dr. Panagiotis (Panos) Giannouloupoulos is a Senior Hydrogeologist and Groundwater modeller at the Department of Water and Environmental Regulation (Western Australia) with over 30 years of experience in hydrogeology, groundwater modelling, and water resource management. He holds a PhD in Hydrogeology and Groundwater Modelling, and has worked across government, consulting, and academia in Australia, Europe, and Africa. His research and professional work focus on groundwater flow and solute transport modelling, managed aquifer recharge, and aquifer characterisation, data analytics, with numerous peer-reviewed publications and citations.

Research on Selenium-regulated health management of cucurbit crops

Lu Kang*

Xinjiang Uygur Autonomous Region Academy of Agricultural Sciences, China

The title of my report is " Research on Selenium-regulated health management of cucurbit crops ", and it mainly be presented from the following four aspects. First, the function of selenium and its research progress. Second, the preparation and characterization of Nano-selenium, as well as its application effects on powdery mildew of melon and Botrytis cinerea of cucumber. Third, the prospects for future research. Fourth, the acknowledgements.

Biography:

Lu Kang, born in 1987, is a male associate researcher and master's supervisor with a Ph.D. degree. He currently works at the Institute of Agricultural Quality Standards and Testing Technology, Xinjiang Uygur Autonomous Region Academy of Agricultural Sciences, specializing in agricultural product quality and safety. Dr. Lu has led over 10 projects, including the National Agricultural Product Quality Safety Risk Assessment Project, the "Tianchi Doctoral Program" of the Autonomous Region, and the "Tianshan Talent Program (Phase III)." He has authored or co-authored more than 10 papers as the first or corresponding author.

Stochastic Models Based on Cox Process to Model Rainfall Time Series

Nadarajah Ramesh*

University of Greenwich, London, England

Stochastic point process models based on a class of Cox processes are developed to analyse rainfall data. The model for the arrivals of rain cells is constructed using a Cox process for which the arrival rate is governed by an unobserved underlying Markov chain. Attached to these rain cells are rain pulses, with state-dependent initial depth, that decay exponentially with time. The mathematical formulation of the model is presented. Expressions for the second-order properties of the rainfall depth process and of the aggregated rainfall process are derived. The parameters of the models are estimated using a method of moment estimation process. Second-order properties of the aggregated rainfall at different aggregation levels are utilised in model assessment. The results of the analysis when the proposed models are used to analyse 69 years of sub-hourly rainfall data from Germany are presented. The ability of the proposed class of models, in reproducing some of the second-moment characteristics of the aggregated rainfall, is compared with that of the two other stochastic models. The proposed model is found to capture the empirical rainfall properties well and outperform the two alternative models considered in our analysis.

Ramesh, N. I, Rode, G and Onof, C (2022). Cox Process with State Dependent Exponential Pulses to Model Rainfall. *Water Resources Management*, 36, 297–313. DOI: 10.1007/s11269-021-03028-6

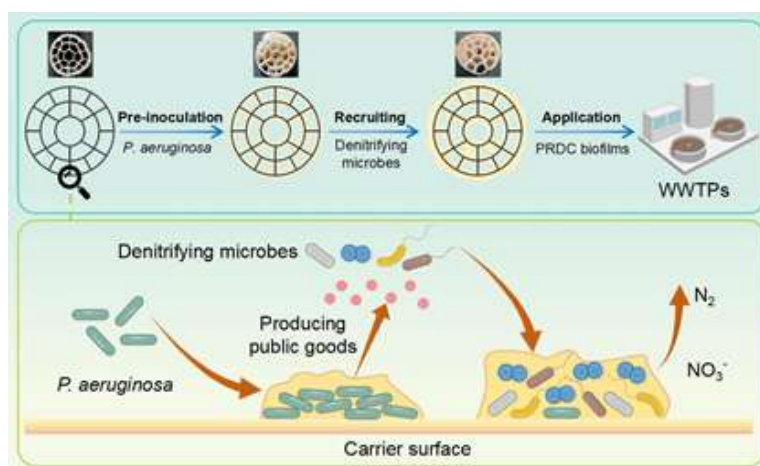
Recruiting high-efficiency denitrifying consortia using *Pseudomonas aeruginosa*

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Synthesizing the microbial community with a high denitrifying capacity is the key for achieving efficient removal of nitrogen species in wastewater treatment plants. Here, we integrated the evolutionary top-down enrichment and bottom-up bioaugmentation to construct a high-efficiency *Pseudomonas*-recruited denitrifying consortium (PRDC). A PRDC with a high specific denitrification rate of 109.49 ± 10.58 mg N/(g MLVSS·h) was enriched after 181 days of microbiota construction with pre-inoculation of *Pseudomonas* strain onto carriers. The 16S rRNA gene sequencing analysis suggested that the pre-inoculated *Pseudomonas* was quickly washed out and replaced by dominant denitrifying genera, such as *Halomonas* and *Thauera*, under different hydraulic retention times (HRTs). The pre-inoculated *Pseudomonas* can facilitate PRDC by providing public goods, but compromising its nutrient requirements. The dominant community assembly processes switched from homogeneous selection to ecological drift and dispersal limitation under shortened HRT. Furthermore, a shortened HRT facilitated the colonization of new immigrants and intensified their competition with the pre-existing dominant denitrifiers. The PRDC carriers achieved a 1.65-fold enhancement in sludge denitrification and reduced the corresponding chemical oxygen demand consumption at a carrier filling ratio of 30%. Overall, our study developed a novel technique using *Pseudomonas aeruginosa* as a trigger to enrich high-efficiency denitrifying consortia for wastewater treatment.



Reclamation of coastal marshes to croplands shifts the pool and chemical composition of soil organic matter

Yidong Wang*, Haijing Xu, Yuanshan Zhu, Xi Yang, Changcheng Guo, Zhigang Zhang and Yuntao Shang

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Reclamation of coastal marshes to croplands lost massive reserves of soil organic matter (SOM). However, it is uncertain how reclamation shifts chemical composition of SOM and its size fractions. Here, we investigated this issue at two coastal marshes (Qilihai, degradation with seasonal waterlog; Beidagang, annual long-term waterlog) along with adjacent long-term reclaimed croplands on the coast of the Bohai Bay, China. Three SOM fractions: coarse particulate (cPOM, >250 μm), fine particulate (fPOM, 53–250 μm) and mineral-associated OM (MAOM, <53 μm) were analyzed by pyrolysis-gas chromatography-mass spectrometry (Py-GC/MS). Compared with the Qilihai marsh, the Beidagang marsh had higher SOM contents and lower proportions of microbial-derived N-containing compounds, which was attributed to the waterlogging-induced weaker decomposition. Reclamation decreased the SOM contents (–53.6%–63.3%) and proportions of lignin in cPOM (–44%–52%) at both sites. However, reclamation-induced shifts of molecular composition of SOM between the two sites diverged. At the Qilihai site, reclamation decreased the relative abundances of N-containing compounds (–28%) but increased the proportions of lipids (+17%) and phenolics (+40.7%) in MAOM. At the Beidagang site, reclamation decreased the proportions of monocyclic aromatics (–60.3%–70.2%), but increased the relative abundances of N-containing compounds (+175%–407%) in all fractions. In contrast, the molecular composition of SOM at the two croplands had convergent pattern. In conclusion, despite of marsh locations with different waterlogging conditions, long-term reclamation of wetlands to croplands generated convergent patterns in storage and molecular composition of SOM, which was attributed to the similar cropland cultivation.

Biography:

Yidong Wang is the Director of Tianjin Key Laboratory of Water Resources and Environment, Tianjin Normal University. He is a full professor and works at soil organic carbon cycle and its geographic differentiation. He had published more than 100 papers. He serves as an Associate Editor of the Land Degradation & Development journal, an Executive Associate Editor-in-Chief of the Climate Smart Agriculture journal, and Youth Editorial Board of the journals of Carbon Research and iMeta.

Future Global River Ice in CMIP6 Models under Climate Change

Yu Lin*

Hohai University, China

River ice changes due to climate change significantly impact river hydrology, economies, and societies. This study employed the CMIP6 data and a river ice model to predict global river ice changes in response to climate change. Results indicate significant declines in global river ice due to global warming. With each 1 °C increase in surface air temperature (SAT) in the future, river ice extent of ice-affected rivers decrease by 2.11 percentage points, and ice duration shorten by 8.4 days. Under the shared socioeconomic pathways 2-4.5 (SSP2-4.5) scenario, the long-term mean SAT is 1.2°–2.5 °C higher than in the near term. This leads to a 1.9–4.4-percentage-point decrease in global river ice extent, a 6.8–15.1-day decrease in river ice duration, and ice-free rivers increasing by up to 4.02%. The SSP5-8.5 scenario predicts a warmer long term mean SAT, leading to greater reductions in river ice. Geographically, river ice loss is most notable in North America, Europe, Siberia, and the Tibetan Plateau (TIB), particularly in peninsular, coastal, and mountainous regions due to the combined effects of initial temperatures and temperature increases. Overall, the eastern Europe (EEU) shows the greatest loss of river ice on average. Monthly analyses show the most substantial decreases from October to June, indicating pronounced seasonal variability. This study provides valuable insights for addressing challenges related to river ice changes in high-latitude and high-elevation regions.

Biography:

Yu Lin is a PhD student at Hohai University in China. Her research focuses on river ice changes in the context of climate change. The aim of her work is to reveal the response mechanisms of hydrological processes to climate warming, providing scientific support for water resource management and climate adaptation.

Vehicular CO₂ Emission Capture Technology (VCECT)

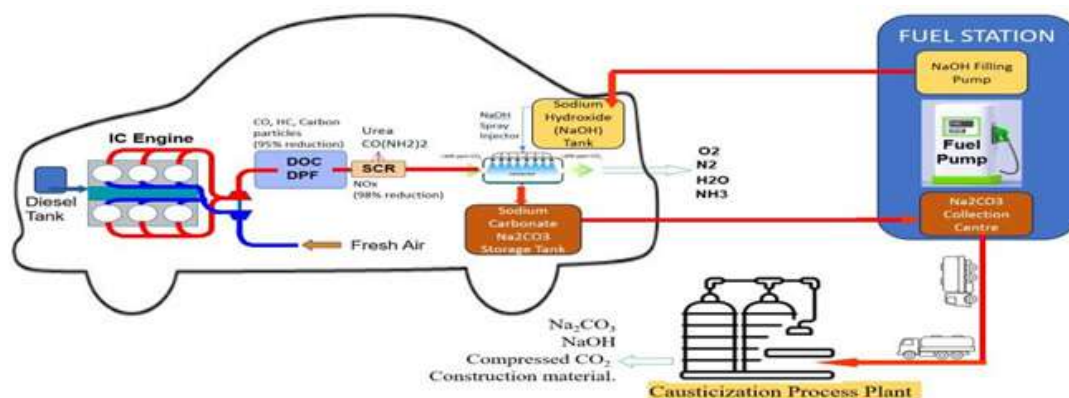
Mahil Chandrakant Parmar^{*1} and Uday Chandrakant Parmar^{*2}

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This paper introduces an innovative Vehicular CO₂ Emission Capture Technology (VCECT) aimed at capturing and converting CO₂ emissions from internal combustion engine (ICE) vehicles and stationary machines into useful byproducts. The system utilizes alkali solutions, such as sodium hydroxide (NaOH), sprayed into the exhaust system to convert CO₂ into compounds like sodium carbonate, offering environmental and economic benefits. A life cycle assessment and techno-economic analysis of NaOH in CO₂ capture are presented, along with the potential of other alkalis like potassium hydroxide and calcium hydroxide. With global CO₂ emissions exceeding 0.3 trillion tons annually, technologies like Carbon Capture and Utilization (CCU) are crucial in mitigating the greenhouse effect. This work explores the NaOH-based VCECT, capable of capturing CO₂ from vehicular exhaust and transforming it into commercially valuable carbonates, while potentially reducing the carbon footprint. Additionally, the technology could reduce emissions of other harmful pollutants like sulfur dioxide (SO₂) and particulate matter (PM). The system is economically feasible, showing potential for both greenhouse gas reduction and cost savings through the regeneration of sodium hydroxide and the production of low-carbon sodium carbonate.

The present disclosure is related to a system for capturing CO₂ emissions from vehicles. The system includes an Internal Combustion Engine (ICE) powered vehicle, its exhaust system, VCECT, NaOH solution, CO₂ sensor and a control unit. This design concept can capture CO₂ in a vehicular exhaust emission environment and economically feasible to implement in all ICE powered vehicles. We showed in this invention that net Green House Gas (GHG) emissions savings to the atmosphere is possible and potential cost reductions (negative capture costs) are attainable. Therefore, the merit of using sodium hydroxide is based on (i) the possibility of substituting industrially produced sodium carbonate, (ii) the performance of sodium hydroxide, able to capture a large amount of CO₂, and (iii) the re-production of sodium hydroxide from slurry that is by-product reaction in vehicle's exhaust system. It is important to remark that CO₂ capture technologies can involve co-benefits linked to the reduction of other emissions such as Sulphur Dioxide (SO₂) and Carbon Particulates matter (PM) contained in exhaust gases.



In Looking Into India's Transition From Fossil Fuels To New Renewables-Based Energy Sources

Sovik Mukherjee*

St. Xavier's University, Kolkata, India

India imports 85% of its oil and 50% of its gas. And India, at this point, cannot stop the use of coal immediately. The dependence on imported energy sources has always been seen as a source of strategic weakness by Indian policymakers. In this background, the paper is divided into two parts. The first part of the paper focuses on India's relations with the Gulf region, IOR belt, USA, Africa, China, Pakistan, and other countries, particularly in the South Asian region and the related geopolitics cum energy security issues that influence (or are going to influence) India's energy-mix. Given such a geopolitical narrative, there must be a tradeoff between India committing to its long-run goals of greenhouse gas emissions and the short-run use of new renewables in its developmental efforts. The second part discusses how the optimum fuel mix design should look for 2031-2032 and 2041-2042, involving the use of new renewables and keeping in mind the related geopolitics. The paper develops an econometric model for future projection of growth of energy demand modeled on a Gaussian-Markov process. As we approach 2030, the estimates in the paper suggest that climate finance of \$0.1 trillion per year will be required in line with the carbon emissions intensity of the GDP target of 33-35%, significantly exceeding the current mobilized amount of \$50-80 billion annually.

These results broadly support the targets set by the current Government regarding the creation of new renewables-based power generation capacity. India would gain from establishing a green bank that would allow it to raise money from domestic and foreign sources in addition to extracting resource rents. The establishment of the National Adaptation Fund for Climate Change (NAFCC) and the National Clean Energy Fund are shining examples of India's commitment to promoting clean energy and supporting climate-resilient infrastructure.

Biography:

At present, Sovik Mukherjee is an Assistant Professor in Economics in the Faculty of Commerce and Management at St. Xavier's University Kolkata. His profile features in the "Top 30 Most Influential Young Economists-2022" list published by the Institute of Certified Chartered Economists. He is a recipient of the prestigious "Bhabatosh Dutta Memorial Award 2020," awarded by Artha-Bishleshon and the Society of Economic Research in Bengali (Kolkata). His research interests are in the areas of applied microeconomics, energy economics, econometrics and development economics. He has extensively contributed to edited volumes and national and international journals of repute.

The correct scientific and geological explanation for Earth's climate change

Adel Saleh Al-Abyad*

Yemen

There is a relationship between the change in the Earth's climate and the movement of the Earth's North Magnetic Pole towards Siberia and the slowing of the rotation of the Earth's core. Because the scientific reason for these phenomena is one reason, because the reason for climate change is the presence of an imbalance and weakness in the Earth's magnetic field, which resulted in this weakness moving the Earth's north magnetic pole towards Siberia. It also resulted in a slowdown in the rotation of the Earth's core, the scientific reason that led to the weakening of the Earth's magnetic field and the cause of these phenomena. It is a change in the geological masses of iron in the Earth's outer crust in the regions of the Earth's magnetic poles because iron has a fundamental role in the strength of the Earth's magnetic field and iron is present in all layers of the Earth. That is why the Earth's magnetic poles are located in iron-rich regions, such as the North Pole in northern Canada, because northern Canada is the region richest in iron in the northern hemisphere, and Western Australia is the region richest in iron.

The geological change of iron masses in the Earth's outer crust occurred in the regions of the Earth's magnetic poles as a result of the extraction of very large quantities of iron from those regions. Canada is ranked third in the world in iron ore exports, and Australia is ranked first. The combined annual iron exports of Canada and Australia are approximately 970 million tons. As a result of extracting these enormous quantities from the interior of the Earth, an imbalance occurred in the Earth's magnetic field, resulting in the movement of the Earth's North Magnetic Pole from northern Canada towards Siberia. Because the quantities of iron geological masses in the Earth's outer crust in that region were no longer sufficient to balance, stabilize, and strengthen the Earth's magnetic field, this led to the Earth's north magnetic pole moving away. The pole's distance from the Earth's magnetic poles increased, and the greater the distance between the poles, the weaker the Earth's magnetic field becomes. This is the scientific and geological explanation for the slowing of the Earth's core's rotation. I have a scientific study that shows how the geological change of iron masses in the Earth's outer crust occurred in the regions of the Earth's magnetic poles, when and where. What is the relationship between geological change and the occurrence of these phenomena: climate change, the movement of the North Magnetic Pole, and the slowing of the rotation of the Earth's core?

Among the scientific evidence that proves the validity of the scientific result that I reached is that the beginning of the movement of the Earth's North Magnetic Pole was in 1831, which is the same date of the Industrial Revolution when the use of iron began on a large scale.

The date the Earth's North Magnetic Pole began to move is the same date as the Industrial Revolution.

It can be noted that the periods of movement of the North Magnetic Pole coincide with the periods in which the demand for iron increased, for example, the increase in distance between 1904 and 1949, and during this period the world witnessed the First and Second World Wars. The demand for iron increased for the manufacture of heavy weapons and other industries. After this period, the movement of the magnetic pole slowed down because the major countries had large quantities of iron used in war and it was produced again.

In other industries, the movement of the magnetic pole decreased in 1962. After this date, we notice that the increase in the movement of the magnetic pole corresponds to the increase in the demand for iron and the increase in the quantities extracted from the Earth's outer crust. Especially in the regions of the Earth's magnetic poles, the correct scientific and geological explanation for the cause of climate change on Earth has revealed to us the only solution and the last chance to save the Earth, which is the immediate cessation of iron extraction. In order for the North Magnetic Pole to stop moving away before it reaches the point of no return, the polar reversal point. I hope that this scientific study will receive sufficient attention and confirmation of the scientific evidence that proves the validity of the scientific result it has reached.



Biography:

Adel Al-Abyad is interested in studying the scientific and geological explanation for climate change and the relationship between climate change, the movement of the Earth's North Magnetic Pole, and the slowing of the Earth's core rotation. Interested in studying the correct scientific and geological explanation for the existence of lunar seas.

Use of microbial resources to counteract the effects of climate change in wine production

Lucilla Iacumin*, Emma Gridello, Michela Pellegrini, Debbi Andyanto and Giuseppe Comi

Department of Agricultural, Food, Environmental and Animal Science, University of Udine, via Sondrio 2/A, 33100 Udine, Italy

Climate change is profoundly impacting viticulture and enology, leading to elevated temperatures, altered precipitation patterns, and extreme weather events. These shifts result in grapes with higher sugar content, reduced acidity, and unbalanced phenolic profiles, challenging traditional winemaking practices. Moreover, the changing climate fosters the proliferation of vineyard pathogens, including fungi and spoilage microorganisms, complicating disease management and threatening grape quality. In response, the utilization of non-Saccharomyces yeasts and other microbial resources presents promising strategies to mitigate these adverse effects. Species such as *Lachancea thermotolerans*, *Torulaspora delbrueckii*, *Metschnikowia pulcherrima*, and *Schizosaccharomyces pombe* have demonstrated potential in reducing ethanol content, enhancing acidity, modulating aromatic complexity, and improving microbial stability in wines.

Furthermore, certain non-Saccharomyces yeasts exhibit bioprotective properties, offering a natural means to suppress spoilage organisms and reduce reliance on chemical preservatives like sulfur dioxide. For instance, *Metschnikowia pulcherrima* produces pulcherrimin, an iron-chelating compound that inhibits the growth of undesirable microbes, thereby enhancing the microbial stability of both grapes and musts. This presentation explores the multifaceted challenges posed by climate change in viticulture and enology and highlights how selected microbial resources can serve as innovative biotechnological tools. By tailoring microbial consortia and fermentation protocols, it is possible to enhance the resilience and adaptability of wine production systems, promoting sustainability without compromising quality.

Biography:

Lucilla Iacumin is a Professor of Food and Wine Microbiology at the University of Udine, Italy. Her research focuses on microbial ecology, food safety, and the use of beneficial microorganisms in food production, with a particular emphasis on fermented products and bioprotection. She has published extensively in international journals and collaborates with academic and industrial partners across Europe. Prof. Iacumin is recognized for her work on non-Saccharomyces yeasts in winemaking and microbial strategies to mitigate climate change impacts in agri-food systems. She is actively involved in scientific dissemination and innovation projects in the field of sustainable food microbiology.

Green solutions to decrease chemical additives (nitrates and nitrites) in fermented meat productions to enhance human health

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Department of Agricultural, Food, Environmental and Animal Science, University of Udine, via Sondrio 2/A, 33100 Udine, Italy

Nitrate and nitrite salts are commonly used in fermented meat products to enhance their quality and safety. These additives are effective against both vegetative cells and spores of *Clostridium botulinum*, help prevent lipid oxidation and contribute to the characteristic red coloration of meat. However, increasing concerns about the potential health risks associated with synthetic additives have driven the search for alternative methods to ensure food safety and extend shelf life. Lactic Acid Bacteria (LAB) and Coagulase-Negative Catalase-Positive Cocci (CNCPC) are widely recognized for their safety and fermentation capabilities. They have shown promising potential due to their in vitro antioxidant properties and their ability to produce enzymes such as Nitric Oxide Synthase (NOS), which converts L-arginine into Nitric Oxide (NO). NO binds to myoglobin, forming nitroso-myoglobin (NO-Mb), the pigment responsible for the desirable red color in cured meat products. Several strains of *Staphylococcus* spp. and LAB have been characterized for their ability to produce NO through the NOS pathway or NOS-like enzymes. The strains exhibiting the highest NOS activity were selected for the production of low-nitrite fermented sausages. Their performance was assessed in terms of color stabilization through NO-Mb formation, as well as their proteolytic and antioxidant activities. In addition, the impact on physicochemical parameters, microbial communities, volatile compounds, and sensory properties was evaluated. The findings suggest that starter cultures with NOS activity represent a promising approach for producing clean-label meat products. These cultures can maintain product safety and sensory quality without relying on synthetic additives, offering a sustainable and innovative solution for the meat industry.

Biography:

Michela Pellegrini is a Postdoctoral Researcher at the University of Udine. She earned her PhD in Food and Human Health with a focus on the bioprotective potential and health-promoting properties of lactic acid bacteria. Her research work explores the ability of selected bacterial strains to inhibit spoilage and pathogenic microorganisms in food and also investigating their role in enhancing food safety and quality. Throughout her academic journey, Michela has developed strong expertise in microbiology, molecular biology, and fermentation processes. She has worked extensively on the selection, characterization, and application of beneficial microbes, particularly in the context of sustainable food preservation strategies.

Evaluating environmental impact of Organic egg production versus Conventional one

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Department of Agricultural, Food and Environmental Sciences - University of Perugia, Italy

According to FAO estimates, meat and fish production should increase by 70% by 2050 to meet the needs of growing global population and its protein requirements. The poultry industry has been one of the industries that mostly responded to the growing demand for protein, with a sensible increase in egg and chicken meat production. Although eggs are important foods in human diet, environmental impacts and ethical aspects could also affect dietary choices. The aim of this study was to assess the environmental impacts of egg production, by means of LCA methodology. In particular, the study aimed to compare two different farming systems: conventional and organic egg production, referring to two case studies in the Italian context. The two scenarios showed that the main difference between organic and conventional egg production, in terms of environmental impact, resides on the feed production. The Organic Scenario showed some critical aspects, such as the need for large agricultural area, low feed conversion rates and crop yields. Therefore, it is essential to work on the low input formulation, substituting the most impacting components of the diet, and adopting strategies to obtain an increase in yields or a reduction in resource consumption during the cultivation phase

Biography:

Luisa Paolotti is RTD-B researcher (tenure-track assistant position) at Department of Agricultural, Food and Environmental Sciences – Section of Bio-Economics. University of Perugia. Her main research interests deal with: Sustainable development; Sustainability analysis and evaluation; Environmental Economics; Agro-environmental economics; Environmental Assessment; Life Cycle Assessment (LCA) of processes and products; Life Cycle Costing (LCC) of processes and products; Ecological Footprint; Circular Economy; Multi-criteria Decision Analysis (MCDA); Spatial Multi-criteria Decision Analysis; Multi-objective Optimization; Optimization in farm management. Luisa Paolotti has a PhD in Agri-food Economics and Policy, accomplished at University of Perugia.

Warming and polymetallic stress reflecting global changes induce adaptive response in the neurotoxic marine dinoflagellate *Alexandrium pacificum*

Natacha JEAN*

Université de Toulon, Mediterranean Institute of Oceanography (MIO), France

Harmful Algal Blooms (HABs) involving the neurotoxic dinoflagellate *Alexandrium pacificum* increase in ecosystems suffering the climate warming and anthropogenic pressure. Changes in the proteome and physiological traits of the mediterranean *A. pacificum* SG C10-3 strain were measured in response to increasing temperature (24°C, 27°C, 30°C) and trace metal contamination (Cu_{2+} , Pb_{2+} , Zn_{2+} , Cd_{2+}). Warming reduced the cell growth, however *A. pacificum* SG C10-3 persisted at 30°C, with more large cells. The polymetallic stress increased cell sizes, whereas it reduced cell growth at 24°C-27°C but increased this at 30°C. Among the Paralytic Shellfish Toxins (PSTs) produced by *A. pacificum* SG C10-3, GTX1 increased under warming and STX appeared at 30°C, knowing that they are among the most toxic. Proteins were more quantitatively produced by *A. pacificum* SG C10-3 under warming, in accordance with the high levels of up-regulated proteins found in its proteome under this condition. Polymetallic stress led to low proteomic modifications compared to warming that induced strong (52 %) modified proteomic response, mainly based on up-regulated proteins involved in: photosynthesis, carbohydrate metabolism and translation. Our results show that warming triggers a strong up-regulated *A. pacificum* SG C10-3 proteome, which could help it to withstand stress conditions. This could presage the success of *A. pacificum* in anthropized ecosystems submitted to global warming, in which this dinoflagellate might be more toxic.

Biography:

Natacha JEAN, assistant professor at the Université de Toulon (France) since 2007, works on the proteomes expressed by the marine Harmful Algal Bloom (HAB) species *Alexandrium pacificum* (ex. *catenella*) under various environmental conditions. She shows that this neurotoxic dinoflagellate displays high resistance to many stresses (trace metals, warming) thanks to its proteomic adaptive response under these perturbed conditions.

An analysis of the effectiveness of extension teaching methods used for technology and skills transfer to farmers in the Pfumvudza climate smart agricultural extension project in Mutare District

Bertha Mashayamombe*

University of Fort Hare, South Africa

Agricultural extension has the purpose of supporting rural development through skills transfer, and knowledge dissemination to farmers. In Zimbabwe, the Pfumvudza climate change adaptation project was introduced to enhance farmer knowledge and skills on climate smart agriculture technologies. Since the introduction of this extension model, it is not known if it has been effective in facilitating technology transfer and skills among farmers. By assessing the level of skills acquired during training it can be determined if training was effective enough to translate to technology transfer from extension agents to farmers. This study seeks to investigate the effectiveness of the extension teaching methods used in technology and skills transfer to farmers in the Pfumvudza climate smart agricultural extension project in Mutare District. A sample of 400 farmers was purposively selected to target those trained in the project. The distribution of trained farmers according to gender, ages, marital status, household size and level of education was determined. An ex-post method was used to evaluate the skills acquired during training. Farmers were also asked to rank the extension training methods from the most to the least effective in terms of skills and technology transfer. Findings from the analysis pointed out that more women than men, older participants above 50 years of age, married participants and those with at least secondary level education were more willing to learn Pfumvudza skills. Results also revealed that while most farmers acquired the skills of manure and mulch application fewer farmers could dig Pfumvudza holes with the correct measurement and applying fertilizers and lime using the correct measurements and method. This was attributed to the conventional land preparation methods used prior to the project and the high price of fertilizers preventing farmers from applying them onto their plots. Demonstration plots were ranked the most effective method used by the extension agents to transfer the skills and technology to the farmers. The study concluded that the Pfumvudza project had effective extension teaching methods for skills transfer to farmers with the demonstration method being ranked the most effective. Similar projects should be promoted to upscale climate smart technology skills transfer.

Keyword: Effectiveness, Extension method, technology, skills transfer.

Biography:

Bertha Mashayamombe is a District Head in the Department of Agricultural Technical and Extension Services supervising 110 extension staff in Mutare Rural District, Zimbabwe. She is also a PhD student at the University of Fort Hare in the Department of Agricultural Economics and Extension where her research focuses on Extension and Training methods, climate change adaptation and food security. She pioneered the Pfumvudza Climate Smart adaptation project in Mutare District and has realized food and nutrition security in more than 75 000 households. She has published 5 peer-reviewed research papers in local and international journals and has presented more than 10 conference papers. Her areas of research interest include climate change, technology adoption, food security and rural livelihoods.

Tracking greenhouse gas (GHG) emissions from biomethane production from pig manure and comparison with conventional fuels

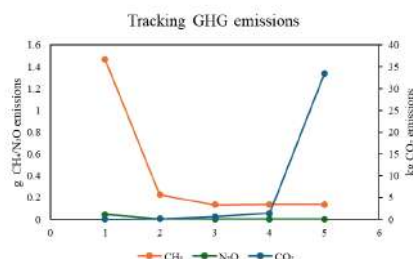
María-Pilar Martínez-Hernando*, María del Carmen Suárez Rodríguez, David Bolonio, María-Jesús García-Martínez and Marcelo F. Ortega.

Universidad Politécnica de Madrid, Spain

The agricultural sector is one of the largest contributors to anthropogenic methane emissions, which significantly impact on climate change. Addressing this issue requires innovative solutions to reduce emissions on this sector. One solution is the production of biomethane from manure waste, which produce a reduction on methane emissions and it transforms agricultural waste into a valuable resource for industries or for automotive sector. Biomethane production provides a practical and sustainable solution to mitigate environmental impacts

This study examines the potential of biomethane derived from pig manure, using data from a pilot production plant, which produces biomethane through anaerobic digestion of pig manure and it use an upgrading system of biogas based on microalgae. Life Cycle Assessment (LCA) methodology is used to analysed impact produced, utilizing primary data to compare the sustainability of biomethane and conventional fuels. Results show that highest methane (CH_4) and monoxide dinitrogen (N_2O) emissions are produced during manure storage and highest carbon dioxide emissions (CO_2) are produced during usage phase (including fossil and biogenic), as shown in the following figure.

Biomethane produced at the pilot plant generates, during all process, 20.4 g CO_2 -eq/MJ. This meets the requirements of European Regulation 2015/1513, which stipulates that renewable fuels must achieve at least a 60% reduction in emissions compared to reference fuel emissions, defined as 94 g CO_2 -eq/MJ. The biomethane achieves a 78.2% reduction in emissions compared to the reference fuel, underscoring its classification as a sustainable energy source. These findings highlight the potential of biomethane to contribute to climate goals and promote greener energy alternatives in the agricultural sector.



Biography:

Pilar Martínez Hernando is a trainee professor at UPM. She is an Energy and Mining Engineer and is currently pursuing Doctorate in Research, Modeling, and Risk Analysis in the Environment. Her current research focuses on Life Cycle Assessment, Material Flow Analysis, and Critical Raw Materials. She also works on biogas production with the Project Engineering Laboratory.

Sustainable Management of Organizations: From Industry 4.0 to Industry 7.0

Dr. Vojko POTOCHAN*

Faculty of Economics and Business, University of Maribor, Slovenia

The paper examines the development of sustainable management of organizations (SMO) in a rapidly developing industrial environment. The SMO combines knowledge of sustainable development and management for the achievement of the organization's goals defined by the sustainable interests of organizations, their stakeholders and societies. The ability of modern organizations to achieve sustainable goals – as framed by the idea of Society 5.0 (in Japan) and Industry 5.0 (in Europe) – is significantly influenced by new technological visions. That is why in our research we analyze the shift from traditional treatment of technology in organizations to the contribution of technological visions from Industry 4.0 to Industry 7.0 and beyond, for achieving SMO. Thus, our study indicates that Industry 4.0 supports the use of renewable resources, development of new sustainable and resilient industries, human-centric operating and use of socio-technical approach to the industrialization of society. Industry 5.0 is focused on the incorporation of new industries supporting sustainability through solving problems of protection of the natural environment, responsible economic development, and solving social issues in society. Industry 6.0 combines human intelligence, artificial intelligence, digital transformation, cloud computing energy, human–robot working big data, and quantum computing for new industrial production aimed at achieving sustainability' vitality, adequate satisfaction of needs on earth, and protection of nature. The emerging vision of Industry 7.0 is developing around Natural Organic Artificial Intelligence Systems (NOAI-Systems) and represents new production and consumption models aimed at sustainable development in the environment of integrated cyberspace (virtual) and physical (real) spaces for further humans being and living. The results of our study have theoretical implications, indicating how different industrial visions support and may affect the course of further societal sustainable development and SMO. The practical implications relate to the extension of SMO with technological dimension for improvement of further sustainability of organizations.

Biography:

Vojko POTOCHAN, Ph.D. (in Business) is a Full Professor of Management and Organization at the Faculty of Economics and Business (FEB), University of Maribor. He teaches in three universities in Slovenia and four universities abroad. He has published over 450 articles, including 12 books - with leading publishers Pearson, IGI, Palgrave Macmillan. Dr. Potocan has published over eighty articles in respected peer reviewed scholarly journals including but not limited to Journal of Business Ethics, European Journal of Management, Journal of Business Research, Journal of World Business, and Human resource management journal. More information about him is available on <https://orcid.org/0000-0001-6578-668X>.

Comparative Sustainability Assessment of batteries production in Europe, China, and the United States

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The transport sector produced 25.8 % of global CO₂ emissions in 2023. The use of internal combustion vehicles contributes to cities pollution and it could produce severe health issues. Electric vehicles (EVs), which do not produce emissions during the use phase, offer an alternative that improves urban air quality. Lithium-ion batteries dominate EVs owing to their high energy density, scalability, and cost efficiency. However, producing these batteries requires a larger amount of strategic minerals than conventional vehicles, demanding intensive extraction to meet global climate goals. This study aims to analyze critical points in battery production across the European Union (EU), China, and the United States (USA) to identify supply risks and monopolistic trends. The methodology used is Environmentally Extended Multi-Regional Input Output Analysis (EEMRIO) which combines Material Flow Analysis (MFA) and Life Cycle Analysis (LCA). EEMRIO allows to perform a regional analysis so it is possible to locate the impact produced in each country. Using CEPII's BACI database, the study examines the trade flows of batteries, detecting the main productors. Sustainability impacts are assessed based on EXIOBASE and Ecoinvent databases with input-output models. Results show that production in China and the United States produces similar climate change emissions and European Union the lower emissions of CO₂-eq, as shown in the following figure. This research seeks to understand batteries flows and sustainability challenges to inform realistic, impact-reducing policies for the global transition to electric vehicles.



Biography:

Pilar Martínez Hernando is a trainee professor at UPM. She is an Energy and Mining Engineer and is currently pursuing Doctorate in Research, Modeling, and Risk Analysis in the Environment. Her current research focuses on Life Cycle Assessment, Material Flow Analysis, and Critical Raw Materials. She also works on biogas production with the Project Engineering Laboratory.

Fine fuel does not accumulate over time in unburned areas of Guinean savanna

Aya Brigitte N'DRI*, Aoussou DOUMBIA and Aka Jean-Noël KPRE

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Following fires, fine fuel accumulation is a positive feedback that may enhance the likelihood of subsequent fire. However, the duration of fire exclusion on fine fuel accumulation remain uncertain. In protected areas of the Guinean savannas (humid savanna of West Africa), where woody encroachment is increasingly occurring, the accurate study of fine fuel dynamic in encroaching areas is urgent. This study aimed to compare fuel load dynamic on plots burned annually during the prescribed burning: mid-dry season fire (BU) and an unburned plots (UNB). In a 10-year experimental field study (2014-2023) of a Guinean savanna (Lamto reserve, Côte d'Ivoire), we quantified fine fuel load (standing grass and fallen leave of grasses and trees) and grass density under BU and UNB treatments. Contrary to accumulations of fine fuels during fire free years generally reported, in our study UNB led to decrease in the total fuel load the first four years. Total fine fuel load was found to increase only the seventh year relative to the first. Globally, fire treatment did not affect significantly total fine fuel load after 10 years (0.656 ± 0.061 and 0.662 ± 0.051 kg m⁻² respectively for UNB and BU). Nevertheless, in UNB plots, the greatest total fine fuel was generally observed in alternate years. While the grass biomass generally did not vary among fire treatment, litter was generally highest on UNB plots. Thus, when grass biomass increased, it end up as litter in UNB plots. But due to grass tillers density decrease, and most likely to a high decomposition rate and termite activity on UNB plots, basic levels of total fuel load in UNB plots is maintained. Further, these findings indicate that fire exclusion does not lead to fuel accumulation in Guinean savannas.

Biography:

Aya Brigitte N'Dri is Fire and Plants Ecologist at Nangui Abrogoua University. Her current research is on ESMS (Ecology and Sustainable Management of Savannas) for Biodiversity and climate change mitigation in West Africa savannas. Her studies are based on experimental fires (early, mid and late dry season fires and no fire).

Comprehensive risk assessment of high-temperature disasters affecting rice production in Shanghai

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In recent years, the rice-producing areas in Shanghai have often been threatened by extremely high temperatures. Evaluating the risk of high-temperature disasters in rice in the region is necessary for developing disaster preparedness and response reduction measures for agriculture. This study established a database for evaluating the risk of high-temperature disasters in rice. Then, eight indicators were selected from hazard, vulnerability, and exposure to assess the risk of high-temperature disasters. Simultaneously, five indicators, including heat and water, were selected to evaluate the climate suitability of rice and used as one of the exposure evaluation indicators. The corresponding weights of eight indicators selected from hazard, vulnerability, and exposure were obtained through the entropy weight method and expert scoring method. The results show that: (1) the areas with high climatic suitability for rice mainly surround the central city in the shape of a trumpet, indicating that the climate in the area from the northwest side of the central city to the area in Songjiang and Minhang is suitable for rice growth; and (2) the high-risk area for high-temperature disaster for rice in the research region mainly focuses on the southwest of Shanghai, indicating that rice yields are vulnerable to high-temperature disasters in the southwest of Shanghai. The framework proposed in this study can be applied to the risk assessment of high temperature disasters in global rice production areas, which has practical guidance significance for agriculture and provides reference for disaster prevention, reduction, and planting planning of rice.

Biography:

Gu Gaoyue is employed at the Risk Assessment Division of the Shanghai Meteorological Disaster Prevention Technology Center, working in the risk assessment position. She is engaged in the field of high-temperature disaster risk census and assessment. Her current research on the impact of high-temperature disasters on rice yield has been recognized both domestically and internationally.

dioxide is in decline: climate change will accelerate

James C Curran* and Samuel A Curran

United kingdom

Analysis of the Keeling Curve shows that the rate of natural sequestration of CO₂ from the atmosphere by the terrestrial biosphere has peaked and is now in decline. Atmospheric CO₂ concentrations will therefore rise more rapidly than previously, in proportion to annual CO₂ emissions. The effect is significant – for example, the current atmospheric increment of around +2.5ppm CO₂ per year would have been +1.9ppm CO₂, if the biosphere had maintained its 1960s growth rate. This effect will accelerate climate change and emphasises the close connection between the climate and nature emergencies.

Biography:

James Curran is retired. He has a doctorate in Meteorology and pursued an early professional career in meteorology, oceanography and hydrology, ending up as Chief Executive of the Scottish Environment Protection Agency. He is a Fellow of the Royal Society of Edinburgh, Chair of Scottish Environment LINK, and a Visiting Professor in the Centre for Sustainable Development at the University of Strathclyde, Glasgow.

Regional Impacts of the Great Green Wall and Saudi Arabia Green Initiatives

Pausata Francesco S.R.*, Ingrosso Roberto and Camargo Suzana J.

UQAM, Canada

The Great Green Wall (GGW) is a multibillion-dollar African initiative to combat desertification in the Sahel. However, the potential climate impacts of the most recent GGW plan on northern Africa have not yet been adequately evaluated, raising concerns about unforeseen climate ramifications that could affect stability in northern Africa and undermine the goals of the initiative. Using a high-resolution (13 km) regional climate model, we evaluate the climate impacts of four GGW scenarios with varying vegetation densities under two extreme emission pathways (low and high). Higher vegetation density GGW scenarios under both emission pathways show enhanced rainfall, reduced drought lengths, and decreased summer temperatures beyond the GGW region relative to the cases with no GGW. However, all GGW scenarios show more extreme hot days and higher heat indices in the pre-monsoonal season. These findings highlight the GGW contrasting climatic effects, emphasizing the need for comprehensive assessments in shaping future policies. Regarding the far-field impacts of the GGW, our results reveal a shift in Atlantic tropical cyclone (ATC) genesis from the subtropical Atlantic to the eastern Main Development Region under medium to extreme vegetation density scenarios, compared to cases without the GGW. An increase in genesis is also observed off the southeastern U.S. coasts under the high-concentration pathway. Our analysis highlights the primary role of African Easterly Waves in driving changes in ATC genesis across the basin, with a secondary contribution from large-scale environmental factors. Hence, we find no significant impact of GGW on ATC activity, primarily due to counteracting changes: a decrease in the central-western and an increase in the eastern basin. No changes induced by the GGW in the ATC intensity and translation speed and other TC metrics are found across the full basin.

Intergenerational transmission and volcanic risk perception construction in Mexico

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Active volcanoes can have high levels of impact on nearby populations. It is observed that despite the danger, people do not intend to leave their territory. The risk perception of these populations is complex to manage, due to factors such as territorial rootedness, social identity, cultural factors, as well as diverse positions among generations. A qualitative research was conducted in the municipality of Tetela del Volcán in Mexico, located in a high volcanic risk zone. The main objective of this research was to analyze the social construction of the perception of volcanic risk considering the exchange of knowledge between different generations. An ethnographic and participatory study was carried out from symbolic interactionism, using elements of grounded theory and deductive elements for the analysis of information. The participants were adolescents, adults, and seniors from different social sectors. The results allowed the construction of a theoretical mapping of the processes of intergenerational construction of volcanic risk perception. It was found that different generations coexist, including adults born during the current period of volcanic activity. Also, risk perception is constructed from the integration of different dimensions. This work can help decision makers improve public policies, risk management practices, and risk communication strategies and disaster risk reduction.

Biography:

Dr. Esperanza López-Vázquez is director of the Risk Psychology and Environmental Behavior Laboratory at the Universidad Autónoma del Estado de Morelos. She was founder of the Latin American Risk Analysis Society. She is a specialist in the analysis of risk perception of people exposed to natural hazards, psychosocial responses to disaster risks and in the study of environmental behavior.

The human exposome and climate change

Amado Enrique Navarro-Frómeta*, Paula Montserrat Crespo-Barrera and Guillermo Manuel Horta-Valerdi

Technological University of Izúcar de Matamoros, México

The concept of the human exposome establishes that human health depends not only on genetic factors but also on the totality of environmental exposures an individual experiences, from the prenatal period throughout their life. Based on this, the influence of climate change on the human exposome is understandable. Let's take a closer look.

First, climate change alters environmental conditions, causing drastic changes in human living conditions. Rising temperatures and changes in weather patterns directly affect air quality, increasing the presence of pollutants, which leads to an increase in respiratory and cardiovascular diseases. They also lead to desertification, a decrease in biodiversity, and an increase in the extinction of animal and plant species, essential components of our environment. There is a consequent decrease in food production and insufficient water quality and availability. This leads to an increase in the intake of pollutants, which decreases the ability to respond to disease. Likewise, forced displacement due to natural disasters directly or indirectly impacts the mental health of affected populations, diminishing their capacity to respond to climate adversities. It is also known that vector-borne diseases are on the rise, as mosquito reproductive patterns and habitats, for example, are changing, increasing human exposure to the diseases they transmit. All of this contributes to increasing social inequalities, and the poorest and most vulnerable people and communities have fewer resources to confront climate change.

Therefore, it is necessary to increase research and monitoring of changes and trends in climatic conditions, as well as the levels, transport, and toxicological effects of pollutants, primarily anthropogenic ones, on both ecosystems and humans. Likewise, the development of effective and inclusive public policies is required that mobilize society to confront and mitigate the consequences and influence of climate change with interventions that benefit the most vulnerable.

Biography:

Amado Enrique Navarro-Frómeta is a Full-time Professor at the Technological University of Izúcar de Matamoros. Bachelor's degree in chemistry, 1971, Faculty of Chemistry, University of Havana. PhD in Chemistry, 1977 at the Azizbekov Azerbaijan Institute of Petroleum and Chemistry. Fields of work: Petroleum chemistry; Petrochemical synthesis; Analytical chemistry; Environmental Chemistry and Technology. Member of the National System of Researchers of Mexico, level 1

Simultaneous Aeration and Neutralization of Mine Water – an Apparently Forgotten Discovery

Terry Ackman*

MT Water Management, Inc., Pittsburgh, Pennsylvania, USA

About 40 years ago, the U.S. Bureau of Mines developed a simple mine water treatment approach that appears to have largely been forgotten. The in-line aeration and treatment system or more simply, the In-line System (ILS), was designed to treat acid mine drainage (AMD) within existing pipelines. The initial device consisted of two inexpensive off-the-shelf components, a jet pump, which entrains air by Venturi action, and a static mixer, which induces turbulent flow. The system had no moving parts, could easily be assembled on site, and was designed to use the pressure generated by an existing mine water discharge pump. In pilot- and full-scale field tests, it was shown to be effective for treating both coal and metal mine drainage, on the surface and underground. Moreover, the iron oxidation kinetics and lime consumption efficiency far exceeded that which occurred in normal active treatment plants.

The ILS could also operate by water pressure provided by gravity flow with a head of approximately 50 feet, which eliminated the need for electricity. The head flow operation of the ILS can now be reduced to about 20 feet of head or less - thanks to the new MT water-powered motor that harnesses the “potential energy” of water. The MT water motor can also be used to convert temporarily raised and stored energy by either piston or shaft operation to support a variety of energy conversion attachments (water pumps, flywheels, hydraulic motors, compressor, generator, etc.). The recent development and modeling of a coupled horizontal discharge pump allows sound prediction of its potential capabilities. Finally, the feasibility of coupling the water motor to various other commercial technologies (shaft or piston) will be briefly discussed. The efficient widespread management and conversion of the potential energy of low-head water sources can meaningfully impact fossil fuel demand for water management.

Biography:

Terry Ackman is currently CEO of a small start-up company called MT Water Management, Inc. This position includes serving as an expert witness in litigation concerning a water treatment operation in western Pennsylvania. Furthermore, this position involves the development of multiple patents of a water motor that generates a broad spectrum of forces that can be converted into useful forms, for example, electrical power or compressed air storage. Previously, Mr. Ackman, a mining engineer, spent 43 years working in RD&D for the U.S. Bureau of Mines (USBM) and U.S. Department of Energy (DOE) and is well published.

Socially Responsible Investors and Corporate Resistance to Climate Disruptions: Agents of Change or Passive Participants?

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Climate change is nowadays a critical global challenge with far-reaching implications for corporate financial performance and stock market dynamics. In this study we investigate whether ownership by socially responsible investors (SRIs) enhances firms' resilience to climate shocks. Focusing on both transition and physical climate risks, our analysis explores whether SRIs contribute to reducing firms' stock return sensitivity to climate-related events. Using a panel of publicly listed European firms from 2018 to 2022, the findings reveal that SRIs are not merely passive capital providers; rather, they actively support firms in strengthening their capacity to manage climate disruptions. Results have important implications for climate risk governance and underscore the role of SRIs as promoters of adaptive corporate behavior amid intensifying climate risks.

Biography:

Associate and Distinguished Professor in Finance at School of Management, Universidad del Rosario (Colombia). Bachelor in Economics and PhD in Management Sciences, Universidad del Rosario (Colombia), and PhD candidate in Business Economics, University of Salamanca (Spain). A university professor and researcher for 25 years, he has created and directed undergraduate and graduate programs in the field of business and administration. In his professional practice, he has been a member of boards of directors, consultant and analyst in the media. His scientific publications deal with socially responsible investment, fintech, behavioral finance and competitiveness.

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