



NM-AIST 2024 INTERNATIONAL CONFERENCE

Tropical Horizons: Advancing Sustainability in Agriculture, Environment, and Technology

On 17-19 July 2024

ARUSHA – TANZANIA

General Introduction:

The NM-AIST wishes to welcome you to the international conference with the main theme: **"Tropical Horizons: Advancing Sustainability in Agriculture, Environment, and Technology"**

We would like to invite you to Join us for a visionary exploration at the crossroads of innovation and sustainability. In the heart of Arusha, Tanzania, we converge to steer the course toward harmonious futures within tropical landscapes. This comprehensive conference is a convergence of diverse minds and expertise, poised to explore, collaborate, and propel forward six pivotal themes shaping the sustainability narrative.

From cultivating resilient banana-based systems to strategizing sustainable land-use management, nurturing aquatic environments amidst change, and addressing crucial water purification and sanitation challenges, to harnessing the power of ICT for agricultural and environmental progress. Moreover, we delve into pioneering approaches for sustainable natural resource management and technology transfer, weaving a cohesive narrative of progress.

Together in this platform, we welcome stakeholders and scientists to discuss exchange knowledge and information to allow us to embark on a transformative journey, forging pathways that align technology, nature, and innovation to sculpt a sustainable tapestry across tropical horizons.

Sub Theme 1: Cultivating Sustainable Production: Harnessing Banana-Based Systems in the Tropics

Background: The tropical region is challenged with the continuing trend of food and nutrition insecurity, which results from inefficient agricultural production systems. More concerning still, the Sustainable Development Goals (SDGs) are in jeopardy due to ongoing climate change and the world's expanding population, which confounds efforts to achieve food security. Therefore, urgent efforts are required to ensure that food systems in the tropical region become more diverse, productive, and resilient to environmental stressors. It is particularly crucial to address food and nutrition insecurity, and climate risk in smallholder farming settings, where land and natural resources are increasingly limited and degraded.

Objective: This session seeks to provide a neutral forum for the discussion of creative and innovative ideas that focus on enhancing the implementation of the FAO's Strategic Framework 2022-31 to transform into more efficient, inclusive, resilient and sustainable agrifood systems for better production, improved nutrition, a healthier environment and a better life, leaving no one behind. This should contribute to achieving the SDGs, especially SDGs 1, 2, and 12. Optimization of the existing banana production technologies in the tropical region will improve land productivity and profitability, without exerting further pressure on the environment, thus sustaining the production systems, food systems and livelihoods. Sustainable crop production systems must also promote greater resilience to climate change and protect biodiversity through integrated approaches (such as agroecology). We are, therefore, inviting scientific papers and presentations around the following areas:

- banana seed systems
- banana improvement/breeding
- natural resource (soil, water and nutrient) management in banana-based fields
- management of insect pests and diseases in banana-based fields
- bio-fertilizers and bio-pesticides utilization in banana production
- mechanization in banana production
- digital agriculture
- climate-smart banana-based farming systems
- banana processing and value addition
- banana distribution and marketing systems
- management of banana-related residues and wastes

Keywords: banana, sustainable food systems, climate change, agroecology, tropical agriculture, tropical region

Invited Keynote speaker: **Prof. Rony Swennen**

Sub Theme 2: Harmonizing Landscapes: Strategies for Sustainable Land-Use Management

Background: Global land use systems (including protected areas) are experiencing extensive transformation and degradation, due to unsustainable practices threatening biodiversity and ecosystem services around the world. Tropical (terrestrial and aquatic) ecosystems harbour rich natural resources and host key biodiversity hotspots. Land use in tropical ecosystems yields competitive advantages over other use types, with resulting unsustainable practices and other undesirable consequences. Within and across these LUS are varied population, climatic and anthropogenic pressures that threaten their functionality, productivity, services to society and sustainability.

Many scientists and stakeholders experience challenges to conceptualise and manage problems arising from pressures in different LUS. The effectiveness and sustainability of LUS can hardly be achieved if pressures and threats are not well addressed and managed. Yet, existing land management (and conservation) strategies do not adequately address their threats.

Objective: This theme welcomes papers with evidence on improved concepts, practices and standards that better describe land use in order to build sustainable land use and management information systems. We welcome papers with LU information and evidence, demonstrating how the integration of natural and social sciences has supported community-led change in sustainable management of different LUS.

We invite a diverse range of experts from natural and social science disciplines to discuss these evidence and implementation gaps between scientists, decision-makers and practitioners using tropical ecosystems of various types and scales as case studies and explore their distinct configurations according to their land use perspective, management and other unprecedented pressures. We are, therefore, inviting papers and presentations around the following areas:

- Land use planning and management for socio-ecological resilience
- Prioritizing Ecosystem services for sustainable land management
- Payment for ecosystem services as incentives to SLM
- Land use planning and sustainable land management
- landscape connectivity and sustainable land management
- Emerging techniques and approaches to sustainable land management futures Integrated land management as a tool to sustainable land management

We hope that these presentations will catalyze discussions that can enable practitioners to start co-designing potential solutions, increasing their sense of efficacy and willingness to transform change and promote sustainable practices on socio-ecological systems (SES) surrounding LUSs. These discussions and papers are expected to provide a platform to generate a valuable conceptual framework around which pathways can be attained to sustainable SES within and across LUS and how challenges for sustainable land management in tropical ecosystems can be addressed.

Keywords: Land use; ecosystem services; sustainability; ecosystem connectivity; socio-ecological systems

Invited speaker(s): Keynote speaker(s): **Prof. Didas Kimaro**

Sub Theme 3: Nurturing Aquatic Vitality: Resilience Strategies Amid Environmental Changes

Background: The global water environment is facing significant challenges, including the deterioration of water quality and quantity and the loss of biodiversity on a global scale, resulting in severe impacts on aquatic ecosystems worldwide. Eco-hydrology, as an interdisciplinary field, recognizes the interconnectedness of ecosystems and water dynamics and seeks to understand and manage the intricate relationships between them.

Objective: This session aims to foster a multidisciplinary dialogue among scientists, policymakers, and practitioners to address the complex challenges faced by water resources in the context of global environmental changes. There should be special focus on the impact of the hydrology of river and/or wetland systems on the functioning of the aquatic ecosystems. The session provides a platform to integrate scientific knowledge, policy frameworks, and practical solutions to tackle evolving water-related issues.

Topics may involve:

- Ecosystem-Water Interactions
- Hydrology Advancements: Innovations and Challenges
- Water Challenges in Changing Landscapes: A Multidisciplinary Approach
- Integrating Ecology and Hydrology in Eco-Hydrology Research
- Climate Change and Water Resources: Implications and Adaptations
- Nature's Water Managers: The Roles of Wetlands, Floodplains, Forests, and Green Infrastructure in Regulating Water Flows and Pollution
- Innovations in Water Quality Monitoring and Assessment
- Ecosystem Dynamics in Intermittent Rivers and Temporary Wetlands
- Preserving Tradition in Modern Water Management: Indigenous Knowledge and Practices
- Holistic Approaches to Sustainable Water Resources: Bridging Science, Policy and Practices

We encourage the submission of papers that advance our understanding in this field, providing new theory and techniques for investigating the fundamental principles governing ecohydrological processes in the changing environment.

Keywords: eco-hydrology, ecosystem-water interactions, hydrology advancements, water quality, biodiversity loss, aquatic ecosystems, environmental changes, water dynamics, policy frameworks, climate change, water resources, wetlands, floodplains, forests, rivers, lakes, green infrastructure, water flows, ecosystem services, traditional knowledge, water management, ecohydrological processes.

Invited Keynote speaker:

Prof. Luc Brendonck

Sub Theme 4: Tropic Clean: Advancing Water Purification and Sanitation for Sustainable Environments

Background: Pollution of water resources from natural and anthropogenic sources is threatening the health of communities and their environment. Natural sources of contamination are known to introduce substances such as arsenic and fluoride to drinking water. Domestic and industrial wastewater introduce nutrients, heavy metals and other pollutants to water bodies causing eutrophication with impact on aquatic life. Many tropical regions experience problems with treatment of waste water, resulting in continued degradation of surface and ground water resources. Accumulation of toxic substances such as heavy metals along the food chain is threatening aquatic life and humans. Research has developed different ways of dealing with the water pollution problem.

Objective: This theme will provide a platform for scientists and practitioners to present and discuss their most recent research, innovations, trends, and challenges related to pollution control and prevention of water resources.

The following topics are invited:

- Emerging technologies for water purification and treatment
- Sanitation of water pollution by means of natural and biological systems such as constructed wetlands, pond systems etc.
- Circular economy and pollution control
- Water quality assessments
- Defluoridation of water supply
- Materials for water purification
- Emerging water contaminants including PFAS
- Faecal sludge treatment
- Management and Resource recovery from wastewater

Keywords: Water, sanitation, pollution, Faecal sludge, Surface water, Ground water. Emerging contaminants.

Invited Keynote speaker: Prof. Karoli Njau

Sub Theme 5: Tech Harvest: Utilizing ICT for Agriculture and Environmental Advancements

Background: In the context of rapidly evolving global challenges, the integration of Information and Communication Technology (ICT) in agriculture and environmental management has become a central topic of concern. The current pressures of population growth, shifting dietary patterns, economic globalization, and climate change all conspire to create a scenario where innovative solutions are urgently needed, especially in regions like East Africa, where the livelihood of many populations are predominantly reliant on agriculture and the sustainability of natural resources. Traditional agricultural methods and environmental management practices have often failed to adapt quickly enough to mitigate these complex challenges. Moreover, access to pertinent agricultural and market information remains a significant bottleneck for many small-scale farmers and environmental stakeholders. This is where the role of libraries and the use of ICT tools and technologies can have a transformative impact.

Libraries, as repositories of knowledge and community learning hubs, can provide an effective bridge between advanced ICT tools and local communities. They can function as centers for knowledge transfer, not only providing information but also offering training in the usage of ICT tools, thus empowering people with knowledge and skills that they can use to tackle their unique challenges.

The role of ICT in agriculture is multifaceted. Tools such as Geographic Information Systems (GIS), Remote Sensing (RS), mobile applications, and cloud-based services have all shown promising applications in improving agricultural productivity and efficiency. These technologies can enhance decision-making, boost crop yields, reduce waste, and connect farmers with markets, thus creating sustainable livelihoods and economies. Simultaneously, ICT can also serve as an effective weapon in the battle against climate change, one of the most pressing global issues. The ability to gather and analyze vast amounts of environmental data can help monitor climate patterns, predict weather phenomena, optimize resource use, and foster sustainable practices. Real-time monitoring can aid in detecting and mitigating the effects of global warming, protecting the environment, and preserving natural resources.

However, while the potential is great, there are still many challenges to overcome in the application of ICT for agriculture and the environment. These range from infrastructural and economic limitations to skill gaps and social acceptance issues.

Objective: We encourage researchers and practitioners from various disciplines, including ICT, environmental science, agriculture, library and information science to submit their research findings, case studies, or innovative solutions addressing the above challenges. This will not only enrich the discussion around this sub-theme but also contribute to our understanding and implementation of ICT-based solutions to tackle agricultural and environmental challenges.

The following topics are therefore invited:

- ICT based solutions for sustainable management of natural resources
- ICT based solutions for improvement of livelihoods
- ICT based solutions for combating the effects of global warming in East Africa and beyond
- Harnessing GIS and Remote Sensing for Precision Agriculture
- Bridging the Knowledge Gap: Libraries as ICT Hubs for Rural Development

- Big Data Analytics and Computation for Climate, Environmental and Agricultural Management

Key words: Digital Technologies, Mobile Applications, Internet of Things, Big Data analytics, Climate change Modelling, Environmental and Agricultural Systems, Artificial Intelligence, Blockchain

Sub Theme 6: Innovations in Sustainability: Integrating Technology Transfer for Natural Resource Management

Background: Several studies have been conducted in various areas of natural resources. Despite the volume and scope of research, there is still a gap in adopting new ways to ensure sustainable management of natural resources of technology. Furthermore, researchers and practitioners have a variety of information, technological advances, and products to share, which will necessitate a variety of approaches for transfer to other stakeholders within the innovation ecosystem. Different institutions and governments emphasise aspects of technology transfer initiatives, financing options, strategies for marketing, and intellectual property management in the process of supporting technology transfer and commercialization. However, approaches differ and their impacts diverge, necessitating the development of innovative approaches to achieve high efficiency and sustainable outcomes in natural resource management and technology transfer.

Objective: This theme will provide a venue for researchers and practitioners to present and discuss their most recent research, cases, innovations, trends, and issues connected to Innovation approaches to sustainable natural resource management and technology transfer.

The following topics are invited:

- Innovative research approaches;
- Intellectual Property (IP) creation , management and valorization
- Managing Innovation ecosystems and collaboration
- Marketing Strategies for Science, Engineering, Technology and Innovation (SETI) products
- The role of Technology Transfer Offices (TTO's) in maximizing impact of SETI in Community
- Effectiveness of technology transfer system in research institutions
- How to maximize the impact of technology transfer using (TTOs, Incubation Center and IP Management Officers
- Financing and commercializing innovation

Keywords:

- Innovation Management, Innovative Approaches, Innovation Systems, Innovation Ecosystem, Technology Transfer, Commercialization, Marketing Strategies,