3rd Dryland Agriculture and Food Systems in the Face of Climate Change Conference

LUKENYA UNIVERSITY, MTITO ANDEI
DATES: JUNE 17TH - 18TH, 2026

Theme: Transforming Dryland Food Systems for Climate Resilience, Nutrition & Inclusive Growth

Official Conference Catalogue

Organised by:

EdSource AFRICA — Connecting for Growth

LUKENYA UNIVERSITY

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Welcome Message

From the Planning Committee Chair

It is my pleasure to welcome you to the 3rd Dryland Agriculture and Food Systems in the Face of Climate Change Conference.

This conference comes at a critical time as we continue to confront the realities of climate change, food insecurity, environmental degradation, and increasing pressure on natural resources. At the same time, it presents an opportunity to recognize and harness the immense potential of dryland regions as drivers of sustainable agricultural growth, economic development,
and resilience.

Over the past three years, this conference has grown into an important platform for dialogue, knowledge sharing, and partnership building. The increasing participation from government institutions, research organizations, development partners, academia, the private sector, and communities is a testament to the growing recognition of the importance of dryland agriculture and food systems within our national and regional development agenda.

As Chair of the Planning Committee, I have had the privilege of witnessing the commitment, expertise, and collaboration that have gone into organizing this year's conference. The success of this event reflects the collective efforts of many individuals and institutions who share a common vision of transforming dryland agriculture and strengthening food systems in the face of climate change.

This year's programme has been carefully designed to foster meaningful engagement around some of the most pressing issues affecting dryland communities. The discussions will explore climate adaptation and resilience, livestock and pastoral systems, agricultural innovation, research, financing, policy development, sustainable natural resource management, food security, technology, and investment opportunities. These themes are interconnected and require integrated approaches if we are to achieve lasting impact.

Importantly, this conference recognizes that solutions must be inclusive. The active participation of women, young people, farmers, pastoralists, researchers, entrepreneurs, policymakers, and development practitioners is essential to ensuring that the strategies and actions emerging from this platform are responsive, practical, and sustainable.

While the formal sessions will provide valuable insights, I encourage all delegates to take advantage of the opportunities for networking, collaboration, and knowledge exchange throughout the conference. The relationships formed and ideas generated through these interactions are often the foundation for future partnerships, innovations, and initiatives that extend well beyond the conference itself.

The challenges facing dryland regions cannot be addressed by any one institution acting alone. Success will require collaboration, coordination, and a shared commitment to translating knowledge into action. This conference provides an opportunity to strengthen those connections and identify practical pathways towards sustainable and resilient food systems.

I wish to express my sincere appreciation to all our partners, sponsors, speakers, exhibitors, delegates, and members of the organizing and technical committees whose dedication and support have made this conference possible. Your contributions demonstrate the power of collective action in addressing complex challenges and creating opportunities for sustainable development.

As we engage in the discussions ahead, I encourage all participants to contribute openly, share experiences, challenge assumptions, and explore new opportunities for collaboration. Together, we can help shape a future where dryland communities are more resilient, productive, and prosperous.

I wish you a productive and enriching conference and look forward to the ideas, partnerships, and actions that will emerge from our deliberations.

Welcome, and thank you for joining us.
Eng. Laban Kiplagat
Agricultural Engineering Secretary, Ministry of Agriculture and Livestock Development

Opening Statement

from Conference Co-convenor and Host

The 3rd Dryland Agriculture and Food Systems in the Face of Climate Change Conference builds on a journey that began in 2022 when Lukenya University, in collaboration with the International Livestock Research Institute (ILRI), convened a workshop for youth pastoralists from Kenya, Tanzania, Uganda, and Somalia. This was also attended by trainers from Nigeria, Ghana and Cameroon. Participants shared experiences of devastating livestock losses due to prolonged droughts, alongside increasing flood events, affirming that climate change is a present reality requiring urgent and collective action.

A key outcome of the workshop was the recognition of Acacia as a resilient dryland tree species widely used for livestock fodder and capable of thriving with minimal human intervention. These insights inspired Lukenya University to launch a One (1) Million Trees Initiative espoused by the Founder Mrs. Martha Mulwa in November 2022, beginning in Kibwezi East Sub-County, and formally operationalized through the Inaugural Tree Marathon in March 2023. This was expanded to Ten (10) Million Trees Initiative in November 2023. The initiative, in which KEFRI played a key role in identification of tree species suitable for the region, seeks to advance climate change mitigation, biodiversity conservation, environmental restoration, and livelihood improvement in arid and semi-arid lands.

The momentum generated by these efforts led to the inaugural Dryland Agriculture and Food Systems in the Face of Climate Change Conference in 2024 to facilitate networking and partnerships, sharing of experiences and progress made in climate change mitigation, biodiversity conservation, environmental restoration, and livelihood improvement. This was a collaboration between Lukenya University and Edsource Africa with sponsorship from ILRI. Since then, achievements have included collaborative Acacia research with ILRI in Kajiado, Makueni, Baringo, and Mandera Counties, ongoing research of Lukenya University, Dorcas Aid International and Groasis on the best tree growing method by comparing use of waterboxx, zudrot and normal method, outreach programmes benefiting over 30,000 community members, policy briefs, conference reports, strengthened partnerships, and development of academic programmes supporting climate action.

In preparation for the 2026 conference, key pre-events included the Stakeholder Engagement on the Regional Dryland Resilience Position Paper held on 13 April 2026 at Kilimo House, Nairobi, and the High-Level Diplomatic Missions and Development Partner Dialogue on Regional Dryland Resilience held on 23 April 2026 at ILRI, Nairobi. The position paper and recommendations from these engagements will form part of the conference. A planned Youth and Women Innovation Challenge, designed to nurture early-stage food systems innovations through mentorship and recognition, was rescheduled as a post-event. Together, these initiatives demonstrate a shared commitment to ensuring that no one is left behind in building resilient dryland food systems and sustainable livelihoods.

Thank you Ministry of Agriculture and Livestock Development and government agencies , AGRA-FOLU, ILRI, AU-IBAR, World Vision International, Pelum Kenya, Childfund, KEFRI, TISA, ZEP RE, KCB Bank, KCB Foundation, all diplomatic missions, development partners, civil society organization, NGOs, Universities,

farmers, farmer associations and all who have contributed to the conference through financial and/or moral support.

On behalf of the Board of Trutees, Council, University Management, Staff and students of Lukenya University, I welcome all participants to use this conference as an opportunity to share knowledge, forge new collaborations, showcase innovations, and develop actionable solutions that can transform the future of dryland communities across Kenya, Africa and beyond.

Thank you.

Dr. Judith Wafula
Deputy Vice Chancellor,
Lukenya University

Introduction Letter

Priscilla Kerebi
CEO, Edsource Africa & Conference Co-convenor

Welcome to the 3rd Dryland Agriculture and Food Systems in the Face of Climate Change Conference.

As we gather for the third edition of this conference, I am grateful and optimistic as I reflect on the journey we have undertaken together over the past three years. What began as a platform to elevate conversations around dryland agriculture has steadily evolved into a growing ecosystem of stakeholders committed to unlocking the potential of dryland regions. Each year, we have witnessed increasing interest, stronger partnerships, and deeper engagement from government, academia, research institutions, development partners, the private sector, farmers, pastoralists, community leaders, and young innovators. This growth reflects a shared recognition that the future of our food systems, climate resilience, and sustainable development cannot be discussed without addressing the opportunities and challenges within dryland areas.

This year's conference marks an important milestone. Beyond the conference itself, we have expanded engagement through pre-conference activities including the Dryland Marathon and the Diplomatic and Development Partners Dialogue. These platforms have enabled us to reach new audiences, strengthen partnerships, and create opportunities for broader participation in shaping the future of dryland development.

The timing of this conference is also particularly significant. We convene in close alignment with the International Day of Combating Desertification and Drought, observed globally on 17th June. This important observance reminds us that the challenges of land degradation, desertification, and drought continue to threaten livelihoods, food security, ecosystems, and economic growth across many parts of the world, particularly in dryland regions.

For the communities represented at this conference, these are not distant challenges but lived realities that affect households, farmers, pastoralists, businesses, and entire economies. Yet this day is not only a call to action it is also a call to recognize opportunity. It challenges us to rethink how we manage our land, water, livestock, and natural resources while investing in innovative solutions that strengthen resilience and promote sustainable development. By hosting this conference at this time, we reaffirm our collective commitment to restoring landscapes, strengthening food systems, supporting livelihoods, and unlocking the immense potential of dryland regions across Kenya, Africa, and beyond.

What excites me most is the opportunity to move beyond conversation and towards coordinated action. The dryland sector is rich with knowledge, innovation, experience, and investment opportunities. Yet too often, efforts remain fragmented, with stakeholders working in isolation despite pursuing similar goals. One of the most important roles of this conference is to serve as a convening platform where diverse actors can connect, align priorities, share experiences, and identify opportunities for collaboration.

Throughout the conference, we will engage in critical discussions on livestock and pastoral systems, climate adaptation, food security, research and innovation, financing, policy, natural resource management, sustainable production systems, market access, peace and conflict, governance, and the role of technology in transforming dryland economies. These conversations are essential, but their true value lies in the partnerships, initiatives, and actions they inspire long after the conference concludes.

I am particularly encouraged by the growing attention being given to livestock and pastoral economies, which remain among the most significant contributors to livelihoods and economic resilience across dryland regions. Equally important is the continued focus on research, innovation, and evidence-based solutions that can support sustainable development and climate adaptation. As we explore financing models and investment opportunities, we must continue asking how we can unlock the resources needed to scale solutions and deliver meaningful impact where it matters most.

The conference also provides an important platform for discussing issues that cut across sectors and stakeholders from climate resilience and sustainable land management to governance, inclusion, investment, and regional cooperation. These conversations are critical if we are to create integrated solutions capable of responding to the complex and interconnected challenges facing dryland communities today.

As we advance these conversations, we must also remain intentional about ensuring that women and young people are not merely participants but active leaders, innovators, entrepreneurs, and decision-makers within dryland economies. Women play a central role in agriculture, food systems, natural resource management, and community resilience, while young people bring innovation, energy, and new perspectives that are essential to transforming the sector. Their meaningful inclusion is not simply desirable; it is necessary for achieving sustainable and inclusive development.

I also encourage delegates to take full advantage of the networking opportunities throughout the conference. Some of the most impactful ideas, partnerships, and innovations often emerge not only from formal sessions but also from conversations held during breaks, exhibitions, field visits, and informal engagements. This conference provides a unique opportunity to connect with like-minded individuals and organizations, exchange perspectives, explore collaborations, and build relationships that can drive meaningful change beyond these few days together.

As Co-Convenor, I am encouraged by the momentum we continue to build together. The conference itself is not the end goal; rather, it is a catalyst for a broader movement dedicated to advancing resilient, productive, and inclusive dryland food systems. It is a platform for building the coalitions, partnerships, and shared commitments that will help transform ideas into action and action into lasting impact.

Before I conclude, I would like to express my sincere appreciation to the Ministry for its unwavering support in making this conference possible. In particular, I wish to acknowledge the exceptional leadership and commitment of the Planning Committee Chair, whose dedication to this process has been truly remarkable. From providing technical guidance and strategic direction to ensuring that resources, expertise, and institutional support were readily available, the Chair and their office have been true partners throughout this journey.

The Ministry's willingness to open its doors for planning meetings, provide technical support, facilitate stakeholder engagement, and actively contribute to shaping the programme reflects a genuine commitment to advancing the dryland agriculture agenda. This spirit of collaboration has been instrumental in bringing together the diverse stakeholders represented at this conference, and we are deeply grateful for that support.

I also extend my heartfelt appreciation to our partners, sponsors, exhibitors, speakers, delegates, organizing committees, volunteers, and all those who have contributed their time, expertise, and resources towards making this conference a reality. The growth of this conference over the past three years is a reflection of your belief in the importance of this agenda and your commitment to shaping a more resilient and sustainable future for dryland communities.

I would like to extend special appreciation to the partners who have journeyed with us over the years and played a significant role in shaping the growth and impact of this platform. Organizations such as FOLU Kenya, AGRA, ILRI, and PELUM Kenya have consistently provided technical, strategic, and institutional support that has helped strengthen the conference and expand its reach. Their contributions, together with support for key initiatives such as the Diplomatic and Development Partners Dialogue and other conference engagements, demonstrate the value of sustained partnership and shared commitment to advancing resilient dryland food systems.

I am equally grateful to the many organizations that have contributed financial resources, technical expertise, knowledge, and thought leadership to this conference and its associated activities over the years, including AU-IBAR, World Vision Kenya, ZEP-RE, Welthungerhilfe, TISA, the Fertilizer Association of Kenya, ChildFund Kenya, GAIN Kenya, KCB Foundation, WRI Africa, research institutions, development partners, private sector actors, and government agencies. Your collective support has enabled this platform to grow into a trusted space for dialogue, collaboration, innovation, and action. The success of this conference is not the achievement of any one institution. It is the result of a growing coalition of partners united by a shared vision of transforming dryland agriculture, strengthening food systems, and improving livelihoods across our region.

I look forward to the insights, connections, and collaborations that will emerge over the coming days and to the collective impact we can achieve together.

Welcome to the conference, and thank you for being part of this growing community committed to shaping the future of dryland agriculture and food systems.

Together, let us move from conversation to collaboration, and from collaboration to action

Message from Partner

Michael Onchabo
Country Lead, Food and Land Use Coalition (FOLU) Kenya

It gives me great pleasure to welcome you to the 3rd Dryland Agriculture and Food Systems in the Face of Climate Change Conference.

Over the past three years, this conference has grown into an important platform for dialogue, knowledge sharing, partnership building, and action on some of the most pressing challenges and opportunities facing Kenya's dryland regions. FOLU Kenya is proud to have been part of this journey from the very beginning, supporting the establishment and growth of a platform that continues to elevate the importance of dryland food systems within national development, climate, and sustainability conversations.

At FOLU Kenya, we believe that transforming food and land use systems is one of the most powerful pathways to achieving sustainable development. Our work focuses on supporting transitions towards sustainable food systems, climate resilience, landscape restoration, nature-positive production, and inclusive economic growth through promoting productive regenerative agriculture, food loss and waste reduction, consumption of health diets, protecting and restoring nature as well as whole food systems policy planing and coordination. These priorities are deeply connected to the future of Kenya's dryland areas, which occupy a significant proportion of the country's land mass and support millions of livelihoods through agriculture, livestock production, trade, and natural resource-based enterprises.

Drylands are often viewed through the lens of vulnerability. While challenges such as climate change, drought, land degradation, and food insecurity remain significant, drylands are also landscapes of opportunity. They hold enormous potential for sustainable livestock production, regenerative agriculture, ecosystem restoration, renewable energy development, biodiversity conservation, and green economic growth. Unlocking this potential requires coordinated action, innovation, investment, and strong partnerships.

This is why platforms such as this conference are so important.

The complexity of challenges facing dryland communities demands solutions that cut across sectors and disciplines. No single institution can deliver the transformation required. Governments, research institutions, development partners, private sector actors, farmers, pastoralists, financial institutions, and civil society organizations must work together to develop integrated approaches that strengthen resilience, improve productivity, restore landscapes, and create economic opportunities.

This year's conference comes at a particularly important moment as Kenya continues to advance its commitments on climate action, food systems transformation, landscape restoration, and sustainable development. It also coincides with global efforts to address desertification, land degradation, and drought, reminding us of the urgent need to invest in solutions that protect both people and ecosystems.

I am particularly encouraged by the growing emphasis on livestock systems, sustainable land management, research and innovation, climate adaptation, financing, and market development reflected in this year's programme. These

are critical areas for unlocking the economic potential of dryland regions while building resilience to future shocks.

Equally important is the focus on inclusion. Women and young people remain at the heart of food systems and rural economies, yet their contributions are often under-recognized and under-supported. Ensuring their meaningful participation in decision-making, innovation, entrepreneurship, and leadership is essential if we are to achieve sustainable and equitable development outcomes.

As we engage over the coming days, I encourage all participants to think beyond the conference itself. Let us use this platform to forge new partnerships, strengthen existing collaborations, share practical solutions, and identify opportunities for collective action. The conversations we have today must translate into investments, policies, innovations, and partnerships that create lasting impact for dryland communities.

On behalf of FOLU Kenya, I extend my appreciation to the Ministry of Agriculture and Livestock Development, Lukenya University, Edsource Africa, our fellow partners, and all stakeholders who have contributed to making this conference possible. We remain committed to supporting collaborative efforts that advance resilient food systems, sustainable land use, and inclusive development.

I wish you fruitful deliberations and look forward to the ideas, partnerships, and actions that will emerge from this important gathering.

Together, we can build food and land use systems that are productive, resilient, inclusive, and sustainable for generations to come.

POLICY, EVIDENCE & SYSTEMS TRANSFORMATION

Theme: Transforming Dryland Food Systems for Climate Resilience, Nutrition & Inclusive Growth

Time	Session & Details	Speakers / Leads
08:00 – 9:00	**Registration & Networking Breakfast** • Exhibition opens (innovations, research posters and demos)	**Conference Secretariat**
09:00 – 11:40	**Opening Plenary** • Welcome & Overview: Lukenya University – Dr. Judith Wafula, AG. Vice Chancellor • Co-Convenor Remarks – Edsource Africa – Priscilla Kerebi, Director & Mutheu Kasanga • Partner Reflections – Pan African Network for Climate Action (PANFCA) • Michael Onchabo, Director Food and Land Use Coalition (FOLU) • Arch. Sylvia Kasanga, Lukenya University – Board of Trustee Chair • Ruth Okowa – Country Director, Global Alliance for Improved Nutrition (GAIN) • Dr. Huyam Salih, Director, AU-IBAR • **Keynote:** "Drylands as Africa's Growth Frontier" – Dr Kelvin Shikuku - Senior Scientist and Economist, Livestock, Climate and Environment Program, International Livestock Research Institute (ILRI) • Opening Remarks: Planning Committee Chair Eng. Laban Kiplagat Agriculture Engineering Secretary, Min. of Agriculture and Livestock Development • **Chief Guest Address:** Cabinet Secretary, Ministry of Agriculture	**Moderator (Lukenya University):** Dr. Virginia Mwanzia **Keynote:** Dr Kelvin Shikuku - Senior Scientist and Economist, Livestock, Climate and Environment Program International Livestock Research Institute (ILRI) **Chief Guest:** CS, Ministry of Agriculture
10.40 - 11.00	Student Innovation Showcase (Plenary – Main Hall) Format: 10 minutes per presentation 1. Lawrence Okoti – BioRegen Tablets innovation 2. Yvonne Chebet – Mobile solar-powered grain dryer innovation	Moderator (Lukenya University): Ms. Purity Mutheu
11:00 – 11:30	Group Photo Session Health Break & Networking	All Delegates
11:30 – 12:40	*Research Paper Presentations (Academic Session)* *Format: 12–15 minutes per paper (presentation + discussant Q&A)* **Parallel Break-out Rooms – delegates split into two rooms:** **Break-out Room 1: Conference Hall (Harris Mule Hall)** **Theme: Climate-Resilient Dryland Food Systems** 1. L. Weisiko – CSA adoption & impact, Kigumo 2. J. Nyangao – CSA technologies, Kitui & Tharaka Nithi 3. C. Wakhungu – Climate-resilient crops (sorghum & teff), Isiolo 4. J. Gandi – Integrated vegetable–maize CSA, Malindi **Break-out Room 2: Lecture Hall One (LH – Block A)** **Theme: Technology, AI & Agri-Digitization** 1. M. Kalenya – Climate information services & CSA adoption, Homa Bay 2. A. Muiruri – Climate information services & bean productivity, Elgeyo Marakwet 3. F. O. Oloo-Anyanga – AI pricing of weather derivatives, NSE 4. M. Kasimbi – Geospatial analysis of urban expansion, Kitui	**Chair: Dr Virginia Mwanzia** Lukenya University **Room 1 Moderator (Lukenya University):** Dr. Vincent Kathumo **Room 2 Moderator (Lukenya University):** Dr. Vane Bonareri

DAY ONE
17th June 2026

Conference Programme

POLICY, EVIDENCE & SYSTEMS TRANSFORMATION

Theme: Transforming Dryland Food Systems for Climate Resilience, Nutrition & Inclusive Growth

Time	Session & Details	Speakers / Leads
12.40 - 13.10	**Strategic Perspective Session** **From Soil Degradation to Soil Wealth: Regenerative Pathways for Resilient, Productive and Nutrition-Sensitive Dryland Food Systems** **Focus Areas** • Restoring soil health as the foundation of dryland resilience • Regenerative agriculture and sustainable nutrient management • Soil health and nutrition outcomes • Enabling policies and investments for resilient food systems ***Q & A Session***	Moderator (Lukenya University): Dr. John Mulinge **Presenter;** Dr. Lillian Wanjiru, Fertilizer Association of Kenya
13.10 - 14.00	**Networking Lunch**	**All**
14:00 – 14:30	**Plenary-Perspective** Strengthening governance of agrifood systems ***Q & A Session***	**Moderator (Lukenya University):** Mr. Bernard Kivyatu **Perspective:** Sheila Lyona, Program Officer, The Institute of Social Accountability(TISA)
14:30 – 15:30	**Research Paper Presentations (Academic Session)** **Format: 12–15 minutes per paper (presentation + discussant Q&A)** **Parallel Break-out Rooms – delegates split into two rooms:** **Break-out Room 1: Conference Hall (Harris Mule Hall)** **Theme: Nutrition & Indigenous Food Systems** 1. L. Kiswii – Kitchen gardens & drought-tolerant crops, ASAL 2. J. Ndolo – Gender & access to indigenous foods / nutrition, ASALs 3. V. Okul – High-value indigenous fruit trees for food security **Break-out Room 2: Lecture Hall One (LH – Block A)** **Theme: Indigenous Food Systems & "Stubborn" Livestock Diseases** 1. A. K. Ngaruiya – Cassava as a climate-smart crop, Murang'a 2. P. Mutheu – Regenerative cassava systems for drylands (review) 3. Tackling "Stubborn" Livestock Diseases (veterinary research, surveillance) – paper(s)	**Room 1 Moderator (Lukenya University):** Dr. Virginia Mwanzia **Room 2 Moderator (Lukenya University):** Mr. Bernard Kivyatu
15.30 - 16.00	**Water Sovereignty in Drylands** From Water Scarcity to Water Reliability Through Integrated Water Management, Landscape Restoration, and Productive Use Systems ***Q & A Session***	Moderator (Lukenya University): Dr. Vane Bonareri Presenter; Caroline Maua, Food Security Coordinator, World Vision
16.00 - 17.00	**Field & Ecosystem Immersion (Living Lab Experience)** Rotations: CSA plots, Rangeland restoration, Water harvesting/irrigation, Private sector demos ● Climate-smart irrigation systems ● Rangeland reseeding & restoration models ● Drought-resilient crops ● Livestock health interventions ● Digital advisory tools	**Facilitators:** Field Station Managers & Tech Partners **Partner:** KEFRI – forest & rangeland restoration demos
17:00-18:00 Optional	***Fireside Networking Dinner*** – Impact Stories from the Drylands ***	All

DAY TWO
18th June 2026

Conference Programme

INNOVATION, INVESTMENT & ACTION

Theme: Transforming Dryland Food Systems for Climate Resilience, Nutrition & Inclusive Growth

Time	Session & Details	Speakers / Leads
08:30 – 9:00	Arrival & Networking	All
09:00 – 9.20	Day 1 Reflections Key insights harvested	**Rapporteur: Mr. Derrick Mutiso** Lukenya University
09.20 - 09.30	**Special Keynote (Brief Address)** A 10-minute address among the conference keynote speakers	**Keynote:** Prof. Josphert Kimatu, South Eastern University of Kenya
09:30 – 10:30	**Panel: Financing Dryland Transformation** • Development finance & Blended finance/insurance for ASALs • Private capital, impact investing, and job creation • Financing climate-smart agriculture & livestock enterprises; De-risking dryland agribusiness investments; Local manufacturing & agro-processing in ASAL counties; Structured outgrower models & pastoral value chains **Confirmed Paper Presentation:** **Format: 12–15 minutes (presentation + Q&A)** 1. M. Maluki – Green Roads for Water: road runoff harvesting for resilient livelihoods	**Moderator:** Michael Onchabo, Director, Food and Land Use Coalition (FOLU) **Moderator** (Lukenya University): Ms. Purity Mutheu **Panelists:** • Clarisse Aduma, Senior Manager, Enterprise Development Program, KCB Foundation • Zep-Re, Africa • Mr. Tom Kinara, DRIVE (MoALD) • Nancy Rapando, AfriCCLAN (Africa Centre for Climate Agri-Food and Nature) • Del Monte Kenya – Mr. Simon Bunyasi & Mr. Samuel Chomba • Chyulu Development Foundation (value addition for jobs)
10.30 - 11.00	**Health Break**	**All**
11.00 - 12.00	**Emerging a Fodder Economy in the ASAL** To sustain a robust Livestock & Leather Economy in Kenya; The Sustainable ASAL Fodder Economy (S.A.F.E), a sector-funded infrastructure for commercial fodder production and sustained livestock growth **Paper Presentation:** **Format 12 – 15 minutes (Presentation + Q&A)** 1. Dr. Judith Wafula: Moringa as a Superior Dryland Tree for Sustainable Livelihoods and Development in Kenya	**Moderator (Lukenya University):** Dr. Bernard Nyabwari **Panelists:** ● David Maina, Agri-Finance and Markets Systems Development Specialist; Feed & Fodder Business Development Expert, RAFFS, AU-IBAR ● Dr. Richard Kyuma, PhD, MBS, OGW, CEO, National Livestock Development & Promotion Services (MOLD)
12.00 - 01.00	**Youth, Women & Pastoralism** (Land access, Agribusiness) ● Women in herd management & livestock economies; Youth-led agritech & climate adaptation solutions; Pastoral mobility & governance models ● Youth and women-led agroecological enterprises & regenerative practices as viable dryland business models ● Nutrition & Indigenous Food Systems (Local diets, Climate-smart nutrition) **Paper Presentations:** 1. J. K. Musyoki – Gender roles & climate resilience, Kibwezi East 2. L. M. Muindi – Community participation in protecting woodlands, Makueni & Kitui 3. J. K. Musyoki – Promotion of Melia volkensii for resilience & livelihoods	**Moderator:** Emmanuel Ochola, Food and Land Use Coalition **Moderator** (Lukenya University): Dr. Vane Bonareri **Panelists:** ● Ruth Okowa – Country Director, Global Alliance for Improved Nutrition (GAIN) ● Sheila Lyona Program Officer, TISA ● Ms. Monica Nyagah, Programme Officer Gender and Youth, PELUM ● ChildFund – Child wellbeing & household nutrition ● Justina Musyoki, Nuclear Family Foundation

INNOVATION, INVESTMENT & ACTION

Theme: Transforming Dryland Food Systems for Climate Resilience, Nutrition & Inclusive Growth

Time	Session & Details	Speakers / Leads
13.00 - 14.00	Lunch	All
14:00 – 15:00	**Cross-Cutting Plenary: Peace, Conflict & Hybrid Governance Integrating Pastoralism Insights & 2026 International Year of Rangeland and Pastoralists** • Pastoral mobility as climate adaptation • Resource governance & peace-building; Cross-border coordination • African Justice in Pastoral Lands • Women in Herd Management • Rangeland Restoration & Resilience Models ***Q & A Session*** **Paper Presentations:** **Format: 12–15 minutes per paper (presentation + Q&A)** 1. Ms. Mutheu Kasanga – Indigenous governance & pastoral resource conflicts 2. Prof. P. Mbutu – Environmental security: contemporary threats 3. Dr. Judith Wafula - Moringa Oil Quality in Comparison with Conventional Oils and Implications for Sustainable Rural Development in Dryland Regions	**Moderator** (Lukenya University): Dr. Vincent Kathumo **Strategic Perspective:** • Arch. Sylvia Kasanga, Chair, Board of Trustees, Lukenya University • Beldine Atieno, Global Technical Advisor for Advocacy for the Horn of Africa, Concern Worldwide • Irene Nganga, Research Officer, Livestock, Climate and Environment Program, International Livestock Research Institute (ILRI)
15.00 - 16.00	**Closing Plenary: From Dialogue to Action** Commitments, Next Steps and Way forward The Dryland Policy & Investment Position Paper Presentation	**Moderator**: Priscilla Kerebi, Managing Director, Edsource Africa **Moderator (Lukenya University)**: Dr. Virginia Mwanzia
16.00 - 17.00	***Host Remarks: Closing Remarks - Lukenya University*** ***Alignment with UNCCD COP17 processes and global policy*** Closing Address: Ministry of Agriculture	Dr. Judith Wafula, Ag. Vice Chancellor Lukenya University Eng. Alice Nyaga, Agriculture Secretary, Ministry of Agriculture Mr. Bishar Fille Elmi, Director of Livestock Development, State Department for Livestock Development

Conference
Speaker profiles

Michael Onchabo

Director,
Food and Land Use (FOLU) Coalition – Kenya

SPEAKER AND MODERATOR

Mr. Onchabo is the Director Food and Land Use (FOLU) Coalition – Kenya. He provides overall leadership, developing and delivering on FOLU Kenya strategy, programming framework, fundraising, project delivery, building and managing partnerships & communications. He gives strategic direction on approaches and best practices related to food systems transformation in Kenya by operationalizing and delivering on four critical transitions namely: i) Productive and regenerative agriculture; ii) Protecting and restoring nature; iii) Reducing food loss and waste; and iv) Healthy diets. He serves as a bridge between the Kenya country platform, FOLU partners and the FOLU Global Secretariat.

Arch. Sylvia Mueni

Chairperson of the Board of Trustees of Lukenya University

SPEAKER

Senator Kasanga is a distinguished architect, arbitrator, corporate leader, and former Senator whose career spans infrastructure development, governance, education, and public policy. She serves as Chairperson of the Board of Trustees of Lukenya University, Board Member of Lukenya Schools, and Managing Director of Sycum Solutions Company Limited. She also represents Kenya at the International Chamber of Commerce (ICC) International Court of Arbitration and serves in leadership roles within the Chartered Institute of Arbitrators (CIArb) Kenya Branch.

During her tenure as a Nominated Senator (2017–2022), Dr. Kasanga championed landmark reforms, including the Mental Health (Amendment) Act, which modernized Kenya's mental health framework, and legislation promoting Alternative Dispute Resolution to enhance access to justice. A strong advocate for sustainable development, education, and gender inclusion, she provides strategic leadership to Lukenya University, advancing initiatives in green energy, dryland agriculture, and environmental sustainability. She is also a Fellow of the Architectural Association of Kenya (AAK) and the Chartered Institute of Arbitrators (CIArb), and has been recognized for her contributions to public service, mental health advocacy, and community development.

Ruth Okowa

Kenya Country Director,
GAIN International

SPEAKER

Ruth Okowa, GAIN's Kenya Country Director, is passionate about transforming food systems to sustainably deliver nutritious, healthy, and safe foods. Among other program portfolios, Ruth oversees the 'Vegetables for All' project that aims to improve dietary diversity for 1.1 million urban and peri-urban bottom-of-the-pyramid consumers by increasing the consumption of vegetables.

Previously, she served as the Regional Director for Africa at BRAC International and has held top leadership positions in local and international organizations in numerous countries across the African region. Ruth was a Council member of a local university in Kenya and on the Board of Directors of a leading health college in East and Central Africa. Ruth brings more than 25 years of experience in development across fields such as agriculture and food security, welfare and education, water, hygiene and sanitation, health, human rights advocacy and equality, and youth empowerment.

Dr. Huyam Salih

Director, AU-IBAR

SPEAKER

Dr. Salih is the current Director and a highly accomplished expert in veterinary epidemiology, animal health, and livestock development, with over 20 years of experience leading transformative initiatives in livestock systems, disease prevention, and animal health at national and international levels. She holds a PhD in Preventive Medicine and Veterinary Public Health and a Master's Degree in Tropical Animal Health.

A visionary leader and strong advocate for sustainable agriculture and animal health, Dr. Salih has extensive expertise in transboundary animal disease risk assessment and early warning systems, livestock value chain development with a focus on smallholder producers, compliance with international sanitary standards, and strengthening monitoring and evaluation systems for antimicrobial resistance (AMR). She has also been instrumental in advancing the One Health approach, fostering multi-sectoral collaboration to address antimicrobial resistance and zoonotic diseases while promoting resilient and sustainable livestock systems.

Eng. Laban Kiplagat

Agricultural Engineering Secretary, Ministry of Agriculture and Livestock Development

OPENING REMARKS

Eng. Kiplagat is the Agricultural Engineering Secretary at Kenya's Ministry of Agriculture and Livestock Development. With over 29 years of civil service experience, he is a leading voice for climate-smart agriculture, agricultural mechanization, and the integration of modern engineering technologies in farming. Eng. Kiplagat is heavily involved in high-level advocacy for sustainable food systems, water management, and the modernization of Kenya's agricultural infrastructure

Mutheu Kasanga

Deputy Vice Chancellor, Partnerships, Research & Innovation, Lukenya University and Co-Founder of Edsource Africa Ltd

SPEAKER

Mutheu Kasanga is the Deputy Vice Chancellor, Partnerships, Research and Innovation at Lukenya University and Co-Founder of Edsource Africa Ltd. She is an accomplished education leader, researcher, and development practitioner with extensive experience in higher education, research, skills development, institutional partnerships, and sustainable development.

Throughout her career, Mutheu has championed initiatives that strengthen collaboration between academia, industry, government, and communities to drive innovation, knowledge sharing, and sustainable development. She has provided leadership in advancing research, strategic partnerships, innovation, and community engagement, while promoting practical solutions to societal and development challenges.

She has been instrumental in designing and implementing programmes that promote education, skills development, youth empowerment, entrepreneurship, research dissemination, and multi-stakeholder collaboration. Her work has brought together diverse stakeholders to foster dialogue, build partnerships, and advance initiatives that create lasting impact across sectors, including education, agriculture, entrepreneurship, and sustainable development.

Mutheu is passionate about leveraging research, innovation, and partnerships to drive inclusive growth, strengthen resilience, and contribute to sustainable development outcomes. Her work reflects a strong commitment to bridging knowledge and practice through collaborative approaches that create meaningful impact for institutions, communities, and future generations.

Eng. Alice Nyaga

Agricultural Engineer,
Ministry of Agriculture and Livestock Development

SPEAKER

Eng. Nyaga is a respected practitioner in agricultural engineering, agroecology, climate-smart agriculture, and sustainable food systems. She has extensive experience in agricultural development, mechanization, technology adoption, farmer capacity building, and agricultural policy implementation.

Throughout her career, Eng. Nyaga has contributed to the design and promotion of innovative agricultural technologies and approaches aimed at improving productivity, strengthening resilience, and enhancing the livelihoods of farming communities. She has played an important role in advancing sustainable agricultural practices and supporting the implementation of national strategies that promote climate resilience, food security, and environmentally sustainable food systems.

She currently serves as Chair of the National Agroecology Technical Committee, where she works closely with government agencies, county governments, development partners, research institutions, and other stakeholders to advance Kenya's agroecology agenda and support the implementation of the National Agroecology Strategy for Food Systems Transformation.

Eng. Nyaga is passionate about promoting innovation, sustainable land management, farmer-centered technologies, and evidence-based approaches that contribute to resilient and productive agricultural systems. She brings valuable expertise in agricultural engineering, policy implementation, agroecology, climate adaptation, and stakeholder coordination.

Dr. Lilian Wanjiru

Chief Executive Officer – Fertilizer Association of Kenya

STRATEGIC PERSPECTIVE

Lilian is a soil scientist with a special interest in agricultural management practices that enhance soil fertility, sustainable crop production and environmental quality. She has key strengths in research and training; policy, and advocacy; product and business development; soil fertility and crop nutrition; soil analysis; and leadership & management. She is currently the CEO of the Fertilizer Association of Kenya. Between 2016 and 2024, Lilian managed the Israel Chemical Ltd (ICL Fertilizers) as the Lead Agronomist, in East Africa and acted as the Research Coordinator for the International Potash Institute (IPI) in the region. In 2015, she oversaw the research and product development on the re-use of treated bio-solids for agricultural production for Sanergy Kenya Ltd as the Soil Science Specialist.

Lilian holds a PhD, in Plants, Soils and Insects from the University of Tennessee, Knoxville, USA and a MSc. International Horticulture, from Leibniz Universitat Hannover, Germany. Before her studies abroad she worked with Osho Chemicals Ltd, a local Kenyan company that deals in agrochemicals.

Sheila Lyona Maloba

Program Officer
The Institute of Social Accountability (TISA)

STRATEGIC PERSPECTIVE

Ms. Maloba joined TISA in July 2023 as a Program Officer, leading the pillar on Inclusive Economies. Her scope of work involves Strengthening food systems and Human Based Approach Advocacy. Among her achievements since she has joined TISA has been building sustainable, inclusive and equitable food systems at County Level in Vihiga and Strengthening Accountability for the Right to Food.

Sheila holds a Bachelor of Science Degree in Agricultural Economics from Kisii University and currently pursuing her Master of Science Degree in Agricultural Economics in the same University.

Caroline Maua

Food Security Coordinator
World Vision

SPEAKER

Caroline is a food security and resilience specialist with extensive experience in designing and implementing programmes that strengthen livelihoods, nutrition, climate resilience, and sustainable food systems. She serves as a Technical Programme Manager at World Vision Kenya, where she supports initiatives aimed at improving food and nutrition security, building community resilience, and enhancing sustainable development outcomes across vulnerable communities.

Over the course of her career, Caroline has contributed to the development and implementation of integrated food security, nutrition, and resilience programmes, working closely with governments, development partners, research institutions, and local communities. Her expertise spans food systems strengthening, nutrition-sensitive programming, climate adaptation, livelihoods development, community resilience, and partnership building.

She has represented World Vision Kenya in national and regional forums on food security and nutrition and is passionate about advancing collaborative approaches that improve household resilience, strengthen livelihoods, and promote sustainable solutions to hunger and food insecurity. Caroline brings valuable practical experience in linking policy, programming, and community action to improve food security and resilience outcomes, particularly within arid and semi-arid regions.

Clarisse Aduma

Senior Manager, Enterprise Development program,
KCB Foundation

PANELIST

Ms. Aduma is a development and sustainability professional with extensive experience in designing and implementing programs that promote economic empowerment, community resilience, and inclusive growth. She serves at KCB Foundation, where she contributes to initiatives focused on sustainable livelihoods, agriculture, entrepreneurship, youth empowerment, and social impact.

In her role, Clarisse works closely with communities, development partners, government institutions, and private sector stakeholders to develop and scale interventions that improve livelihoods and create long-term opportunities for vulnerable populations. Her work has included supporting programs that strengthen agricultural value chains, enhance financial inclusion, and build the capacity of youth and women-led enterprises.

Clarisse is passionate about leveraging partnerships and innovative approaches to address development challenges and drive sustainable transformation. She brings valuable experience in programme management, stakeholder engagement, and community-centered development, with a strong commitment to advancing resilient and inclusive economic growth.

Tom Kinara

DRIVE Project Liaison Officer,
State Department for Livestock Development

PANELIST

Mr. Kinara is the DRIVE Project Liaison Officer and Coordinator under the State Department for Livestock Development in Kenya's Ministry of Agriculture and Livestock Development. He plays a key role in coordinating the implementation of the DRIVE (De-risking, Inclusion, and Value Enhancement of Pastoral Economies) project, working closely with government agencies, development partners, and stakeholders to strengthen pastoral livelihoods and resilience across Kenya's Arid and Semi-Arid Lands (ASALs).

Mr. Kinara is instrumental in advancing initiatives that enhance drought risk management, financial inclusion, and market access for pastoral communities. Through the World Bank-supported DRIVE programme, he supports efforts to expand access to innovative financial services, including drought index insurance, digital payments, and savings products, while promoting stronger integration of pastoralists into livestock value chains and commercial markets. His work contributes to building more resilient and sustainable pastoral economies within Kenya and across the Horn of Africa region.

Nancy Rapando

Lead Expert - AFRICCLAN (Africa Centre for Climate Agrifood and Nature) -Panelists

PANELIST

Nancy Rapando is the Lead for the Africa Climate Agrifood and Nature (AFRICCLAN), an Africa expertise centre working to advance the Food, climate and biodiversity nexus across Africa, through expertise development and expert support. Before that She worked with WWF as the Leader for Africa's Food systems Initiative. Nancy is a sustainable agriculture specialist with broad experience in Africa in program management, policy, and technical advisory work. She has worked with diverse actors across East, Central and Southern Africa on agriculture value chains, natural resource management, climate change, and food and nutrition security. Nancy holds an M.Sc. in Agronomy from Egerton University (focused on ecological food systems) and now pursuing her Ph.D. in Climate Change and Adaptation from the Institute of Climate Change and Adaptation at the University of Nairobi. Nancy is passionate about nature-positive agriculture that advances the Food, conservation and climate change nexus, and quite motivated to design programs, initiatives and strategies that ensure food systems have reduced negative impacts on biodiversity

Emmanuel Ochola

Project Coordinator, FOLU - Moderator

MODERATOR

Mr. Ochola is an Agri-Food Systems Specialist with over a decade's experience in agroecology, climate resilience, sustainable agri-food and land systems, and knowledge management. He holds an MSc in Landscape Planning and Conservation and a BSc in Environmental Horticulture and Landscaping Technology from JKUAT, together with a Postgraduate Diploma in Global Management from Utsunomiya University, Japan.

He has led transformative programmes with AfriCCLAN, SNV, Solidaridad Network, and Climate Adaptation Services, advancing food and land use transformation, climate adaptation, and gender equity through strategic advice, multi-stakeholder engagement, and policy influence. Emmanuel has co-developed agroecology strategies and policies, and produced key resources such as Kenya's Climate Adaptation Atlas and farmer training manuals. Passionate about sustainable food production, Emmanuel practises organic farming, mentors young people in agriculture, and writes on food security and land-use transformation. His work continues to strengthen food security, climate adaptation, and nutrition across Africa.

Dr. Richard Kyuma

Chief Executive Officer
Livestock Development and Promotion Service (NLDPS)

PANELIST

Dr. Richard Kyuma is the Chief Executive Officer of the National Livestock Development and Promotion Service (NLDPS), a state corporation mandated to coordinate and promote the development, marketing, and transformation of Kenya's livestock sector. He is a seasoned livestock development expert with extensive experience in livestock marketing, agribusiness development, food security, animal health, and pastoral economies.

Throughout his career, Dr. Kyuma has championed initiatives aimed at enhancing livestock productivity, strengthening livestock value chains, expanding market access, and improving the competitiveness of Kenya's livestock sector. He has been actively involved in promoting livestock commercialization, disease control, livestock insurance, feed and fodder development, and strategies to unlock domestic, regional, and international markets for livestock and livestock products.

As CEO of NLDPS, Dr. Kyuma is leading efforts to position livestock as a key driver of economic growth, food security, and livelihoods, particularly within Kenya's arid and semi-arid lands (ASALs). He is a strong advocate for investment, innovation, cooperative development, and public-private partnerships that enhance resilience and create opportunities for pastoralist and livestock-dependent communities.

Dr. Kyuma brings valuable expertise in livestock sector transformation, market systems development, policy implementation, and sustainable livestock production, with a passion for unlocking the full economic potential of Kenya's livestock industry.

David Maina

Feed & Fodder Business Development Expert
RAFFS, AU-IBAR

PANELIST

David is an agribusiness professional with over 21 years of experience in the agricultural sector, including 15 years specializing in livestock and feed systems. He is an expert in Markets and Financing Systems Development, delivering impact through advisory, consulting, and advocacy at both enterprise and sector levels. As an entrepreneurial founder, David combines strategic insight with a strong commitment to shared value creation and sustainability, helping businesses, value chains, and markets unlock growth opportunities. A passionate advocate for food security, he champions the role of livestock as a driver of economic development, resilient livelihoods, and sustainable food systems.

Monica Nyaga

Programme Officer for Gender, Youth and Advocacy
PELUM

PANELIST

Ms. Nyaga is the Programme Officer for Gender, Youth and Advocacy at PELUM Kenya, where she leads initiatives aimed at advancing women's leadership, youth empowerment, agroecology, policy advocacy, and inclusive food systems development. She is a passionate advocate for gender-transformative programming and meaningful youth participation in agriculture, natural resource management, and sustainable development.

With an academic background in Gender, Development, and Sustainable Food Systems, Monica has extensive experience designing and implementing programmes that strengthen the participation of women and youth in agroecology, agribusiness, climate resilience, and policy engagement. She currently oversees key regional initiatives including the Africa Women Leaders in Agroecology (AWOLA) programme and other initiatives focused on women's leadership, land rights, representation, and access to productive resources.

At PELUM Kenya, she works closely with civil society organizations, governments, development partners, and community groups to promote inclusive agricultural systems, strengthen youth and women's networks, and enhance their participation in decision-making processes. Her work focuses on building the capacity of women and young people to become leaders, entrepreneurs, advocates, and change agents within sustainable food systems and agroecology movements. Monica brings valuable expertise in gender mainstreaming, youth engagement, advocacy, leadership development, and agroecological systems transformation, with a strong commitment to advancing equitable and resilient food systems across Kenya and the region.

Esther Muli

Deputy Director, Research Lukenya University

CONFERENCE CO-ORDINATOR

Esther Muli is the Deputy Director, Research at Lukenya University, where she supports the advancement of research, innovation, knowledge dissemination, and strategic collaborations that contribute to sustainable development and societal transformation. She has extensive experience in research coordination, project management, stakeholder engagement, and academic programme support.

Beldine Atieno

Global Technical Advisor
Advocacy for the Horn of Africa Concern Worldwide

SPEAKER

Beldine Atieno is the Global Technical Advisor for Advocacy for the Horn of Africa at Concern Worldwide. A lawyer by training, she brings over a decade of experience in advocacy, human rights, food security, nutrition, social protection, and community resilience programming across the region.

Throughout her career, Beldine has worked with governments, civil society organizations, development partners, and local communities to advance policies and programmes that address poverty, food insecurity, and vulnerability among marginalized populations. Her work focuses on promoting rights-based approaches to development, strengthening community voices, and influencing policy and practice to improve livelihoods and resilience.

At Concern Worldwide, she supports advocacy initiatives across the Horn of Africa, with particular emphasis on food systems, nutrition, climate resilience, social protection, and sustainable development. She has also contributed to cross-border programmes aimed at addressing the underlying causes of malnutrition and vulnerability in fragile and drought-prone regions.

Beldine is passionate about ensuring that development interventions are informed by community realities and that policies effectively respond to the needs of vulnerable populations. She brings valuable expertise in advocacy, stakeholder engagement, policy influence, and resilience building within complex development contexts.

Dr. John Mulinge

Researcher and Educator
Lukenya University

MODERATOR

Dr. John Mulinge is an academic, researcher, and educator at Lukenya University with extensive experience in teaching, research, and stakeholder engagement. Throughout his career, he has contributed to advancing knowledge, fostering collaboration, and supporting initiatives that promote sustainable development and innovation.

Bishar Elmi

Director of Livestock Development, State Department for Livestock Development, Ministry of Agriculture and Livestock Development, Kenya.

PANELIST

Mr. Elmi is a seasoned livestock development professional and range ecologist, he has extensive experience in livestock production, rangeland management, pastoral development, livestock commercialization, and sustainable natural resource management. He holds a Master's Degree in Agriculture and Rural Development, a Bachelor's Degree in Natural Resource Management, and specialized training in Range Management.

Throughout his career, Mr. Elmi has championed initiatives aimed at transforming Kenya's livestock sector through improved productivity, commercialization, climate resilience, and market integration. He has played a key role in advancing livestock value chains, feed and fodder development, livestock marketing, rangeland restoration, and the adoption of modern livestock production technologies, particularly within Kenya's Arid and Semi-Arid Lands (ASALs).

Mr. Elmi has also provided leadership in major national and regional livestock programmes, including the Kenya Livestock Commercialization Project (KeLCoP) and other initiatives focused on enhancing pastoral livelihoods, strengthening resilience to climate shocks, improving market access, and increasing investment in the livestock sector. His work continues to support the realization of livestock as a key driver of food security, economic growth, and sustainable livelihoods in Kenya.

He brings valuable expertise in livestock systems development, pastoral economies, livestock policy, rangeland management, climate adaptation, and sustainable livestock production, with a strong commitment to improving the livelihoods of livestock-dependent communities across Kenya and the region.

Purity Mutheu

Lecturer, Department of Agriculture Lukenya University

MODERATOR

Ms. Maitha is an agronomist, crop scientist, and Lecturer in the Department of Agriculture at Lukenya University. She is passionate about advancing sustainable agricultural systems through teaching, research, and community engagement, with a focus on improving productivity, resilience, and food security.

Dr. Virginia Mwanzia

Deputy Vice Chancellor (Academic, Research and Student Affairs), Lukenya University

MODERATOR

Dr. Mwanzia is a distinguished scholar in agriculture, climate resilience, and sustainable development. She previously served as Dean of the School of Agriculture, Technical Studies and Natural Sciences, where she provided leadership in advancing agricultural education, research, and innovation focused on addressing challenges facing arid and semi-arid lands (ASALs).

Dr. Mwanzia is an accomplished researcher with expertise in dryland agriculture, crop production, biodiversity conservation, climate adaptation, and sustainable food systems. Her work has contributed to strengthening knowledge and practical solutions for resilient agricultural systems, environmental sustainability, and community development. She has published and supervised research across agriculture, education, and sustainable development disciplines while actively promoting evidence-based approaches to addressing emerging development challenges.

At Lukenya University, she champions research, innovation, academic excellence, and strategic partnerships that enhance the University's contribution to food security, climate resilience, and sustainable livelihoods. She has also been actively involved in initiatives that promote dryland farming, farmer capacity building, and community engagement, helping bridge the gap between research and practice.

Dr. Mwanzia is passionate about leveraging research, innovation, and collaboration to transform agricultural systems and improve resilience among vulnerable communities. She brings valuable expertise in dryland agriculture, climate-smart development, research leadership, and sustainable food systems transformation.

Dr. Bernard Kvyatu

Head of Department, Agriculture
Lukenya University

MODERATOR

Dr. Kivyatu is the Head of Department, Agriculture at Lukenya University and an experienced academic, researcher, and agricultural development practitioner. He has extensive experience in agricultural education, research, capacity building, and the promotion of sustainable agricultural systems.

Prof. Jospert Kimatu

Associate Professor at South Eastern Kenya University (SEKU)

SPEAKER

Prof. Kimatu is an Associate Professor at South Eastern Kenya University (SEKU), School of Science and Computing, Department of Life Sciences. He is a seasoned academic, researcher, and expert in plant molecular epigenetics, plant pathology, and dryland agricultural systems.

He holds a PhD in Plant Molecular Epigenetics and has extensive academic and research experience spanning botany, forestry pathology, agricultural education, and post-harvest systems. His work integrates plant science, climate adaptation, crop improvement, and sustainable agricultural practices, with a strong focus on addressing challenges in dryland and semi-arid environments.

Prof. Kimatu has contributed significantly to research and innovation in agriculture and environmental sustainability, including work on crop resilience, soil systems, biodiversity, and sustainable food production. He has also been involved in interdisciplinary collaborations linking academia, research institutions, and communities to advance practical solutions for food security and climate resilience.

He is passionate about knowledge generation, scientific innovation, and capacity building in agriculture and environmental sciences, with a commitment to strengthening sustainable agricultural systems in Kenya and beyond.

Dr. Vane Bonareri

Lecturer, School of Education and Social Sciences
Lukenya University

MODERATOR

Dr. Ondiere is a lecturer in the School of Education and Social Sciences at Lukenya University and an academic with a strong background in environmental and analytical chemistry. She holds a PhD in Chemistry and has research experience in environmental chemistry, with a focus on water quality, heavy metals, nutrients, and environmental pollution studies.

Irene Nganga

Research Officer,
International Livestock Research Institute

SPEAKER

Ms. Nganga is a Research Officer with over 7 years experience in academic and applied research working with various pastoral communities across Kenya through implementing social development projects to impact change on communities through research advancement, technology improvement, policy changes, anthropogenic assessments and alternative livelihoods to improve food security, nutrition, education, communication, access to health and self-awareness among people thereby driving a better informed, food secure and educated people well in touch with themselves, their environment and the world around them.

Dr. Vincent Kathumo

Lecturer and researcher, Lukenya University

MODERATOR

Dr. Kathumo is a lecturer and researcher at Lukenya University with a strong background in agriculture, soil science, land resource management, and geospatial technologies. He has extensive experience in teaching, research, and supervision in areas related to agricultural systems, environmental management, and sustainable land use.

Allan Kodundo

lecturer, Department of Languages and Communication Studies, Lukenya University

MODERATOR

Allan Kodundo is a lecturer in the Department of Languages and Communication Studies at Lukenya University. He is an academic, researcher, and communication scholar with interests in literature, communication, cultural studies, and interdisciplinary approaches to knowledge production.

Acknowledgement

To all the participating organizations, speakers, panelists, sponsors and partners

Ministry of Agriculture and Livestock Development

ILRI International Livestock Research Institute

AGRA Sustainably Growing Africa's Food Systems

The Food and Land Use Coalition

Embassy of Eritrea

Embassy of Italy

Ambasáid na hÉireann Embassy of Ireland

Makueni County

PELUM Kenya

African Union Interafrican Bureau for Animal Resources

acre Africa

World Vision Kenya

Welt Hunger Hilfe

Fertilizer Association of Kenya (FAK)

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

KCB Foundation

Republic of Kenya – Kenya Meteorological Department

World Resources Institute

ANFCA African Network For Climate Action – Empowering Africa, Protecting the Planet

Kenya Forestry Research Institute KEFRI

KALRO Kenya Agricultural & Livestock Research Organization

TISA

Tsavo Trust – a culture of conservation

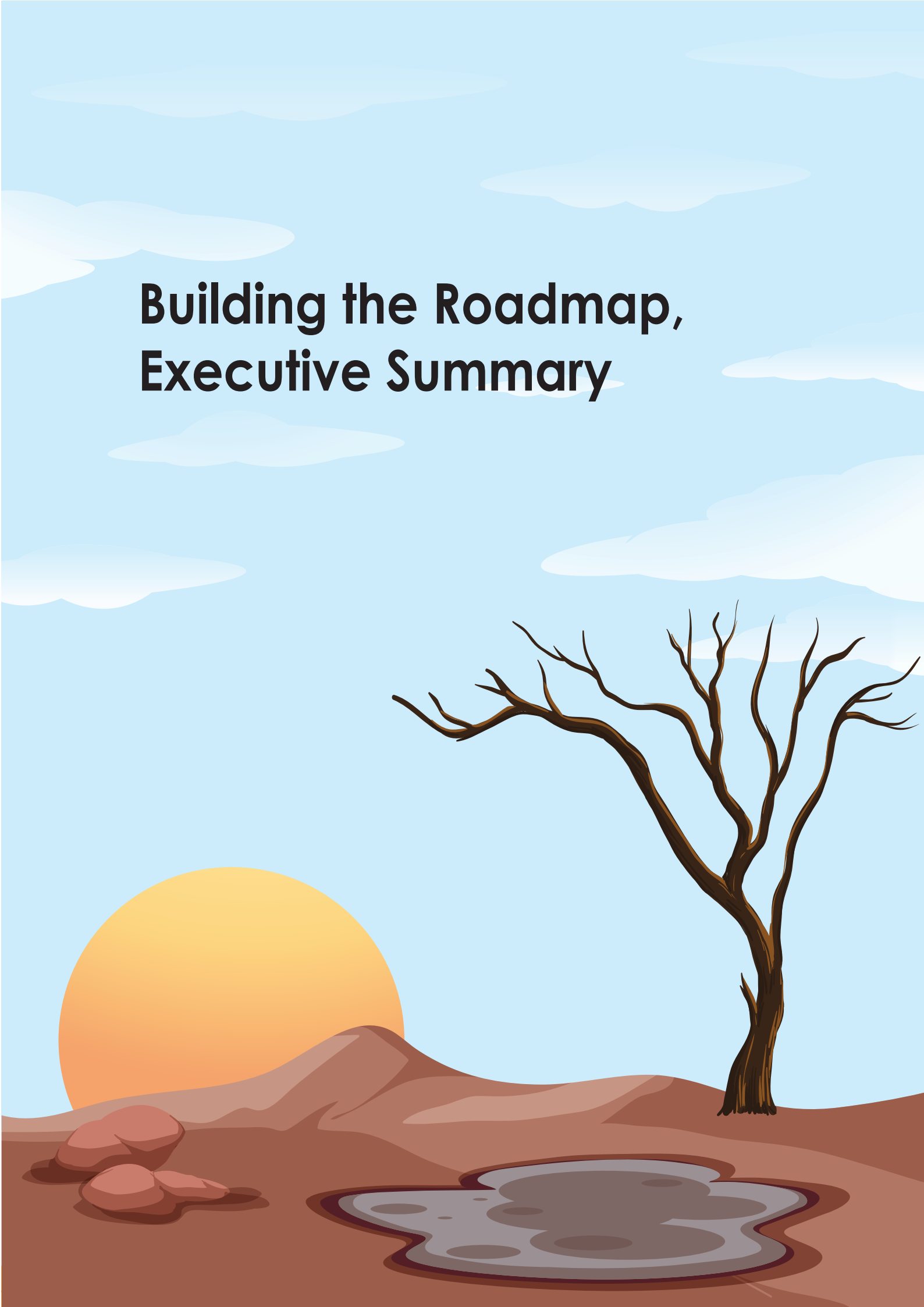
ZEP-RE (PTA Reinsurance Company)

ChildFund Kenya

Tana & Athi Rivers Development Authority

PACJA Panafrican Climate Justice Alliance

Building the Roadmap, Executive Summary



Building the Roadmap for Dryland Transformation

The 3rd Dryland Agriculture & Food Systems Conference is the culmination of a broader engagement process designed to elevate dryland agriculture and food systems within national, regional, and global development agendas. As part of this process, a High-Level Diplomatic and Development Partner Dialogue was convened on 23 April 2026 at the International Livestock Research Institute (ILRI), bringing together representatives from government, diplomatic missions, development partners, research institutions, financial institutions, the private sector, and civil society.

The Dialogue was intentionally designed as a strategic platform to move beyond discussion of individual projects and programmes and instead examine the systemic opportunities and challenges facing Africa's drylands. Participants reflected on the future of dryland economies, food systems, climate resilience, pastoralism, natural resource management, enterprise development, and regional cooperation, while identifying the policy, investment, and partnership actions required to accelerate transformation.

A key outcome of the Dialogue was the recognition that drylands are not constrained by a lack of ideas, innovation, or potential, but by fragmentation across institutions, sectors, financing mechanisms, and implementation approaches. This consensus informed the development and refinement of the Position Paper, Repositioning Africa's Drylands: From Vulnerability to Strategic Investment, Resilience and Inclusive Growth (2026–2030).

The Position Paper serves as a strategic framework for repositioning drylands as investment and resilience frontiers capable of contributing to food security, climate adaptation, enterprise development, environmental restoration, and inclusive economic growth. It articulates a systems-based approach built around water sovereignty, livestock and food systems transformation, blended finance and de-risking mechanisms, regional coordination, and innovation through living labs and implementation ecosystems.

Beyond informing discussions at this Conference, the Position Paper is intended to serve as a reference document for governments, development partners, investors, research institutions, and regional bodies seeking to strengthen policy coherence, mobilize investment, and scale integrated approaches to dryland transformation. It also provides a platform for elevating dryland priorities within regional and global policy processes, including UNCCD COP17.

Together, the Diplomatic and Development Partner Dialogue, the Position Paper, and this Conference represent a continuum of engagement aimed at building partnerships, shaping investment priorities, strengthening policy dialogue, and advancing a shared vision for resilient, productive, and prosperous drylands across Africa.

As delegates engage throughout the Conference, they do so within a process that seeks not only to generate dialogue, but to catalyse coordinated action, strategic investment, and long-term systems transformation for Africa's drylands.

Repositioning Africa's Drylands: From Vulnerability to Strategic Investment, Resilience and Inclusive Growth (2026–2030)

Africa's drylands are among the continent's most significant yet underutilized economic, environmental, and social assets. Supporting millions of livelihoods through livestock production, agriculture, natural resource management, trade, and ecosystem services, these regions hold immense potential to drive food systems transformation, climate resilience, enterprise development, and inclusive economic growth. Yet despite decades of investment and intervention, drylands continue to be characterized by recurring vulnerability, underinvestment, and fragmented development approaches.

This Position Paper argues that the central challenge facing Africa's drylands is not a lack of solutions, resources, or potential, but the fragmentation of systems, institutions, financing mechanisms, and implementation frameworks. Water, agriculture, livestock, climate adaptation, enterprise development, financing, governance, and regional coordination continue to operate largely in isolation, limiting the effectiveness and scalability of investments. As a result, many initiatives achieve localized success but fail to deliver the integrated, long-term transformation required to build resilient and prosperous dryland economies.

The paper calls for a paradigm shift from viewing drylands primarily through the lens of vulnerability and humanitarian need to recognizing them as strategic investment frontiers capable of contributing significantly to economic development, climate adaptation, food security, employment creation, and regional integration.

To achieve this transformation between 2026 and 2030, the paper proposes five interconnected strategic pillars:

1. Water Sovereignty: From Scarcity to Reliability
Water must be repositioned from a humanitarian concern to a productive economic asset. Investments should focus on integrated water systems that strengthen landscape buffering, groundwater recharge, water harvesting, catchment restoration, climate-resilient infrastructure, and productive use systems that support agriculture, livestock, enterprise development, and ecosystem restoration.

2. Livestock, Food Systems and Agri-Enterprise Ecosystems
Drylands possess substantial opportunities within livestock, agriculture, processing, value addition, and regional trade. Strengthening climate-smart production systems, market access, aggregation, processing infrastructure, and enterprise development can transform dryland economies from subsistence-oriented systems into competitive and commercially viable economic ecosystems. Particular emphasis is placed on expanding opportunities for youth and women across value chains.

3. De-risking and Blended Finance Ecosystems
Unlocking large-scale investment requires moving beyond traditional financing approaches toward blended finance models that combine public, private, and climate capital. The paper advocates for stronger project preparation systems, risk-sharing mechanisms, climate insurance products, carbon financing, and investment platforms capable of attracting long-term capital into dryland economies.

4. Regional Coordination and Policy Coherence
Dryland systems are inherently transboundary. Livestock mobility, water resources, rangelands, trade corridors, and climate risks extend beyond administrative boundaries, requiring stronger regional cooperation, harmonized policies, coordinated governance systems, and integrated planning across counties, countries, and regional institutions.

5. Living Labs and Systems Testing Ecosystems
Transformation requires practical demonstration and learning platforms where integrated solutions can be tested, refined, and scaled. Universities, research institutions, governments, communities, development partners, and the private sector should collaborate to create Living Labs that bridge the gap between policy, research, innovation, and implementation.

The paper further identifies strategic investment opportunities across climate-smart livestock systems, water infrastructure, landscape restoration, natural capital, renewable energy, enterprise development, carbon markets, digital technologies, and climate resilience financing. It highlights the growing importance of adaptation finance, nature-based solutions, and regional trade frameworks in unlocking dryland potential.

Ultimately, the Position Paper presents a vision of Africa's drylands as strategic frontiers for resilience, investment, enterprise, and inclusive growth. It calls upon governments, development partners, private sector actors, financial institutions, research organizations, and communities to move beyond fragmented projects and short-term responses toward coordinated, long-term systems that unlock the full economic, environmental, and social potential of dryland regions.

Repositioning Africa's drylands is not simply a resilience imperative it is a strategic opportunity to accelerate sustainable development, strengthen food systems, create jobs, build climate resilience, and drive inclusive economic transformation across the continent.

Highlights from the Diplomatic & Development Partner Dialogue on Dryland Agriculture & Food Systems

Framing Regional Investment and Policy Priorities for Dryland Resilience

The Diplomatic and Development Partner Dialogue on Dryland Agriculture & Food Systems brought together senior representatives from government, diplomatic missions, development partners, research institutions, the private sector, financial institutions, civil society, and regional organizations to discuss strategic priorities for transforming drylands across Eastern Africa.

Held as part of the preparatory process for the 3rd Dryland Agriculture & Food Systems Conference and within the context of the International Year of Rangelands and Pastoralists 2026, the Dialogue sought to reposition drylands from being viewed primarily through the lens of vulnerability and humanitarian need to being recognized as strategic frontiers for investment, resilience, enterprise development, and economic transformation.

A key consensus emerging from the discussions was that drylands are not constrained by a lack of solutions or opportunities, but by fragmentation across institutions, sectors, financing mechanisms, and implementation frameworks. Participants emphasized the need to move beyond isolated projects toward integrated systems that connect water management, livestock production, food systems, climate adaptation, enterprise development, financing, governance, and regional coordination.

The Dialogue identified several priority areas for action:

- Strengthening water reliability through integrated hydrological systems, landscape restoration, water harvesting, and productive water infrastructure.
- Building climate-smart livestock and agricultural systems that support commercialization, value addition, nutrition, and market integration.
- Developing enterprise ecosystems that create opportunities for youth and women through skills development, innovation, financing, and market access.
- Expanding blended finance, climate finance, insurance, and de-risking mechanisms to attract greater public and private investment into dryland economies.
- Enhancing regional and cross-border coordination on livestock mobility, trade, rangeland governance, climate information systems, and shared natural resources.
- Investing in data systems, innovation, research, and localized implementation models that support evidence-based decision-making and scalable solutions.

Participants also stressed the importance of repositioning youth and women as central drivers of transformation rather than beneficiaries, recognizing their critical role in enterprise development, innovation, food systems, and economic growth.

The Dialogue significantly strengthened the Dryland Policy & Investment Position Paper by incorporating recommendations on water systems transformation, integrated landscape management, nutrition-sensitive food systems, enterprise development, regional cooperation, blended finance, and cross-border governance.

The roundtable further strengthened alignment among governments, development partners, diplomatic missions, research institutions, financial institutions, and the private sector around a shared agenda for dryland transformation. It identified catalytic investment opportunities in water infrastructure, livestock commercialization, climate-smart agriculture, landscape restoration, enterprise ecosystems, and digital and climate information systems.

The Dialogue concluded with a commitment to continue collaboration beyond the Conference, supporting the refinement and implementation of the Position Paper, mobilizing strategic partnerships and investments, and elevating dryland priorities within regional and global policy platforms, including UNCCD COP17.

The shared message emerging from the Dialogue was clear: Africa's drylands are not peripheral zones of crisis, but strategic frontiers for resilience, climate adaptation, enterprise development, regional integration, and long-term economic transformation.

Abstracts and Research Highlights

3RD DRYLAND AGRICULTURE BOOK OF ABSTRACT

Title: EVALUATION OF CASSAVA FARMING AS A CLIMATE SMART TECHNOLOGY IN MURANG'A COUNTY KENYA.

NAME: Antony Kamau Ngaruiya
INSTITUTION: Murang'a University of Technology

PHONE NUMBER: 0793630612

ABSTRACT

Climate change is a global main challenge of the 21st century which impacts various sectors in the economy. The impact of climate change greatly increases vulnerability of small holder's farmers who depends mainly on rain fed agriculture. Recent prolonged drought episodes associated with climate change have negatively affected crop production in Murang'a County, threatening food and nutrition security. Adopting climate smart drought tolerant cassava technology offers a sustainable solution. Cassava produces good yield even under low water and input conditions. The crop's immensely beneficial as human food, livestock feed and raw industrial materials. Despite these benefits, cassava farming in Murang'a is still low due to negative attitude and perceptions, inadequate knowledge and skills among farmers in Murang'a County. This study evaluated the cassava farming as a climate-smart technology in Murang'a County, Kenya by assessing its contribution to climate change adaptation while enhancing food security. The study employed descriptive cross-sectional design. The study utilized both quantitative and qualitative data.

Purposive and snowball sampling technique was employed to select the cassava farmers, traders and processors. Data collection utilized both closed and open structured interviews to gather insights of the farmers. Sample size of 245 was selected from the target population of 15581 cassava farmers. Data was analyzed using Python. Knowledge was assessed using five climate–cassava management items (4-point scale), attitudes using eight statements (5-point Likert), and practices using nine CSA practice indicators. Domain scores were normalized to 0–100%, and an overall KAP score was computed as the mean of domain scores. Overall, 62.3% of farmers reported awareness of CSA practices for cassava, but only 9.6% had received formal training or extension services on cassava production. Mean domain scores were 55.4% for knowledge, 78.2% for attitudes, and 29.2% for practices, yielding a mean overall KAP score of 54.3%. Intercropping was the most frequently reported CSA practice (91.2%), while water management interventions such as irrigation and water harvesting were least common (1.3%). The predominant barriers to CSA implementation were lack of knowledge (91.2%), limited availability of inputs (32.0%), and high initial costs (26.8%). Poisson regression showed that higher knowledge and attitude scores were positively associated with CSA adoption intensity, while older age (55+ years) was associated with reduced adoption intensity. These findings demonstrate a pronounced gap between favorable attitudes and actionable CSA practice, highlighting the importance of targeted extension, input access, and context-appropriate training to translate cassava's climate-resilience potential into sustained productivity and livelihood gains.

Keys words: Arid and Semi-Arid Land (ASAL), Climate Smart Agriculture (CSA), Cassava, Climate, Climate change, Murang'a County, Kenya.

Biotechnological and Regenerative Approaches for Resilient Cassava Systems in Drylands: A review

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Abstract
Cassava (Manihot esculenta Crantz) is a climate-resilient root crop with immense potential to support food security and rural livelihoods in dryland regions. However, its productivity is constrained by climate variability, poor soils, and recurrent viral diseases such as Cassava Brown Streak Disease and Cassava Mosaic Disease. This review paper explores an integrated strategy combining modern biotechnological innovations with regenerative agricultural practices to enhance the sustainability and resilience of cassava systems. Genetic tools such as CRISPR/Cas9 and RNA interference have enabled the development of cassava varieties with improved disease resistance, reduced cyanide levels, and enhanced tolerance to abiotic stress. In parallel, regenerative approaches including conservation agriculture, legume intercropping, and the application of organic amendments are restoring soil health, boosting water retention, and improving nutrient cycling. Field-based evidence demonstrates that these synergistic innovations contribute to increased yields, climate adaptation, and reduced input dependency. The success of these interventions depends not only on technical efficacy but also on inclusive extension systems, gender equity, and supportive policy frameworks. This work emphasizes the need for holistic, systems-based approaches to drive climate-smart cassava transformation in dryland agro-ecosystems.

Keywords: Cassava, Genome editing, Climate resilience, Drylands, Food security, Sustainable intensification

INFLUENCE OF WEATHER AND CLIMATE INFORMATION SERVICES ON THE ADOPTION OF CLIMATE-SMART TECHNOLOGIES AMONG BEAN FARMERS IN HOMA BAY COUNTY, KENYA

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ABSTRACT

Climate variability increasingly threatens smallholder farming systems in Sub-Saharan Africa, particularly in rain-fed cropping systems such as common bean production. Weather and Climate Information Services (WCIS) are promoted to support farm decision-making and enhance the adoption of climate-smart technologies (CSTs). However, empirical evidence linking the use of climate information to technology adoption at the local level remains limited.

This study examined the influence of WCIS on the adoption of climate-smart technologies among bean farmers in Homa Bay Town Sub-County, Kenya. A cross-sectional survey of 157 bean farmers who had received training on climate information services was conducted using structured questionnaires. Descriptive statistics were used to summarize access, sources, and use of climate information, while binary logistic regression was applied to assess the influence of WCIS utilization on the adoption of climate-smart technologies, controlling for socio-economic characteristics.

Results showed that all farmers had access to weather and climate information, with radio (94.9%) and SMS services (86.0%) being the most dominant sources. Overall, 59.2% of farmers had adopted at least one climate-smart technology. Farmers who actively used weather information to guide farm decisions were over five times more likely to adopt climate-smart technologies (OR = 5.34, p = 0.0067) compared to those who did not. Socio-demographic factors such as gender, education, ward, and age were not statistically significant predictors.

The findings suggest that the effectiveness of climate services lies not merely in access but in the active use of information in farm decision-making. Strengthening localized and timely climate advisories could significantly enhance the adaptive capacity of smallholder farmers and promote the uptake of climate-smart agriculture.

Keywords: Adoption, Bean farmers, Climate-smart technologies, Climate variability, and Weather and climate information services.

ADOPTION AND IMPACT OF CLIMATE SMART AGRICULTURE PRACTICES IN KIGUMO SUB-COUNTY MURANG'A COUNTY, KENYA

A RESEARCH PROPOSAL SUBMITTED TO:
DEPARTMENT OF AGRICULTURE

SCHOOL OF AGRICULTURE AND ENVIRONMENTAL SCIENCES
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MAS- TER OF SCIENCE DEGREE IN CLIMATE SMART AGRICULTURE MURANG'A UNIVERSITY.

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MSC OF SCIENCE IN CLIMATE SMART AGRICULTURE
THEME: CLIMATE-RESILIENT DRYLAND FOOD SYSTEMS

ABSTRACT

The increasing environmental concerns, such as climate variability and rising greenhouse gas (GHG) emissions, necessitated the adoption of sustainable agricultural approaches like Climate-Smart Agriculture (CSA). This study assessed the uptake and utilization of CSA practices in Kigumo Sub-County, Murang'a County, Kenya. The research aimed to identify implemented CSA technologies, evaluate factors affecting their adoption, and determine the impact of these practices on livestock and crop productivity. A quantitative research design based on the descriptive research design was used. A sample size of 277 smallholders was used to collect the data through the use of structured questionnaires and observation guides. Python programming was used to analyze the data that was collected. The results showed that crop diversification (82%), application of organic manure (78%), and crop rotation (74%), were the most effective CSA technologies. On the other hand, less technical practices like conservation tillage (35%) and water harvesting systems (28%) had lower rates of adoption. Other factors that had a significant impact on the adoption of these technologies were education levels with 65% of the adoption reported persons having at least secondary education and access to extension services which respondents claimed was only reported in 40 %. The biggest limitation was financial and 70% of farmers complained that initial high investment cost was a hindrance towards the use of renewable power and smart irrigation. In the area of impact, the research established positive correlation between CSA adoption and productivity in that there was a significant positive relationship. The farmers who combined at least three CSA activities experienced a 38 % growth in the crop yields and a 46 percent growth in household incomes as compared to the conventional farmers. In addition, 85 per cent of the respondents responded that CSA has increased their resistance to climate shocks like unpredictable rainfall and long spells of droughts. Conclusively, although CSA practices have greatly enhanced the agricultural production and the resilience of households in Kigumo Sub-County, the utilization was crippled by the lack of technical knowledge and financial resources. The research suggested that the government and agricultural stakeholders should improve the extension services delivery and make credit facilities accessible in order to upgrade the implementation of more intensive CSA technologies.

THEME: Climate-Resilient Dryland Food Systems

Climate-Resilient Household Food Systems: The Role of Kitchen Gardens and Drought-Tolerant Crops in ASAL Kenya

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Abstract

Arid and Semi-Arid Lands (ASALs) constitute nearly 80% of Kenya's landmass and are characterized by low and erratic rainfall (generally 250–600 mm annually), high evapotranspiration rates, fragile soils, and recurrent droughts. These dryland ecosystems support predominantly smallholder and agro-pastoral farming communities whose livelihoods depend largely on rain-fed agriculture and livestock production. Counties such as Makueni, Kitui, and Kajiado typify the socio-ecological conditions of ASAL regions, where households face persistent climate variability, limited water availability, and declining agricultural productivity. Increasing frequency of droughts and unpredictable rainfall patterns associated with climate change and stress have intensified food insecurity, reducing crop yields and limiting access to nutritionally diverse diets among vulnerable rural households.

This study examines how drought-tolerant crops (DTCs) and nutritionally balanced kitchen gardens contribute to strengthening climate-resilient household food systems in selected ASAL counties of Kenya. Drought-tolerant crops—including sorghum, millet, pigeon peas, cowpeas and a select variety of beans,''Nyota bean''—are well adapted to low-moisture conditions and provide reliable yields under climatic stress. Complementing these crops, household kitchen gardens can provide a continuous supply of micronutrient-rich vegetables and small quantities of calorie- and carbohydrate-supplying crops such as sweet potatoes, pumpkins, and legumes. Even when produced in modest quantities, these kitchen gardens contribute to dietary fortification and diversification by improving access to vegetables, vitamins, and complementary food groups throughout the year.

The study employed a mixed-methods approach in selected communities in Makueni and Machakos counties. Primary data were collected through household surveys, focus group discussions, and key informant interviews with farmers and extension actors. A purposive sampling strategy targeted smallholder households engaged in drought-tolerant crop production and kitchen gardening initiatives supported by development programs. Quantitative data were analysed using descriptive statistics and household dietary diversity indicators, while qualitative information was examined through thematic analysis to capture farmer perceptions of climate stress and adaptive strategies.

Findings indicate that households integrating drought-tolerant crops with small-scale kitchen gardens experienced improved food availability, greater crop diversity, and enhanced dietary diversity compared to households relying solely on rain-fed staple crops. Kitchen gardens were particularly important for improving access to vegetables and micronutrient-rich foods, while drought-tolerant crops ensured staple food stability during dry periods. Together, these practices strengthened household resilience by diversifying production systems, stabilizing food supply, and reducing vulnerability to climate shocks.

The study highlights the importance of promoting climate-resilient agricultural practices that integrate drought-adapted crops with nutrition-sensitive kitchen gardening in dryland farming systems. Policy and development efforts should prioritize farmer training, access to drought-tolerant seeds, water-efficient gardening technologies, and nutrition education within agricultural extension services. Strengthening such integrated household food systems offers a practical pathway toward climate change adaptation, improved dietary diversity, and sustainable livelihoods in Kenya's ASAL regions.

ADOPTION RATE AND IMPACTS OF CLIMATE SMART AGRICULTURE TECHNOLOGIES ON PRODUCTIVITY AND ADAPTATION IN KITUI AND THARAKA NITHI COUNTIES

JOYCE NYANAGAO

Abstract

Agriculture constitutes Kenya's economic foundation, yet climate change severely threatens productivity across Arid and Semi-Arid Lands (ASALs), comprising 89% of country's landmass. Climate variability and declining soil fertility present critical challenges to food security and rural livelihoods, with smallholder farmers representing 80% of the agricultural population-bearing disproportionate impacts from these environmental stressors. While CSA has been identified as a sustainable solution to agricultural production in ASALs, available data on awareness levels, adoption rates, and impacts of CSA technologies in Kitui and Tharaka Nithi counties are scanty. This study sought to examine the uptake and impacts of CSA technologies in the two counties. The specific objectives were; to determine adoption rate of CSA technologies among smallholder farmers, identify and document factors affecting adoption, evaluate effects of adoption on productivity, adaptation and mitigation. Descriptive research design was adopted incorporating mixed method approaches. Quantitative data were collected from 384 systematically sampled smallholder farmers from six sub-counties in Kitui and Tharaka Nithi using semi-structured questionnaire. Qualitative data were also gathered from selected Key Informants using KII guides. Additionally, information were collected from mixed FGDs. Quantitative data were analyzed using SPSS while qualitative data analyzed thematically and aggregated in line with objectives. Findings show that 97% have adopted CSA technologies; mixed farming (79%), crop rotation (55%), agroforestry and drought resistant varieties (42%), and crop diversification (39%) even though only 24% felt they were affordable mainly due to the initial cost of establishing irrigation systems. Motivation factors highlighted were; increased yield (80%), improved resilience to drought and climate change (50%), advice from extension service providers (47%), government subsidies recorded 13%. Positive impacts of practicing CSA technologies including increased crop production (89%), improved food security (38%), improved water and soil use (33%), increased livestock production (38%), decreased farm input costs, increased farm productivity and income. For full impacts of CSA farmers suggested improved extension services (72%) to increase technical guidance and support, financial support (65%) infrastructure development (68%) including irrigation systems, road networks, market facilities and access to increase agricultural productivity and climate resilience. This study reveals positive CSA adoption outcomes while identifying critical policy gaps requiring intervention. Key recommendations include: (i) strengthening extension services through farmer field schools and weather-integrated programming to address knowledge deficits and promote underutilized CSA practices; (ii) implementing targeted subsidies for high-cost technologies such as efficient irrigation systems to incentivize sustainable agricultural investments. The findings emphasize the necessity of context-specific, holistic CSA implementation frameworks that accommodate diverse farmer constraints and capabilities across both counties. By addressing identified barriers and leveraging motivating factors, policymakers can facilitate the development of resilient, sustainable agricultural systems that enhance food security, rural livelihoods, and environmental sustainability. Keywords: Climate Smart Agriculture (CSA), Arid and Semi Arid Land (ASAL), Policy

Title: Climate Smart Agriculture Impact of Weather and Climate Information Services on Bean Productivity Among Smallholder Farmers in Elgeyo Marakwet County

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ABSTRACT

This study investigated the impact of Weather and Climate Information Services (WCIS) on bean productivity among smallholder farmers in Elgeyo Marakwet County, Kenya. Increasing climatic variability in the region threatened rain-fed agriculture and household food security. The primary objective of the study was to evaluate the effects of WCIS utilization on farm-level productivity and to identify the socio-economic factors influencing its access across the county's diverse topographical zones, including the Highlands, Escarpment, and Kerio Valley, and to compare the agricultural productivity of trained and untrained farmers in relation to climate and weather information services access. The study employed a mixed-methods research design, integrating household surveys and field observations to compare outcomes between farmers who utilized formal agro-advisories and those who relied on traditional knowledge. The findings revealed that 78% of the smallholder farmers had access to at least one form of WCIS, with radio (65%) and mobile SMS alerts (42%) serving as the primary dissemination channels. However, a significant digital divide was observed, as only 30% of female-headed households possessed the mobile devices necessary for real-time alerts compared to 72% of male-headed households. In terms of comprehension, 85% of farmers reported that downscaled, ward-level forecasts were highly useful, whereas only 22% found regional-scale forecasts applicable to their specific farm operations. Regarding productivity, the data indicated that farmers who strictly adhered to agro-advisories achieved a 25% increase in bean yields compared to those relying on traditional climate cues. Furthermore, 68% of the participants who used seasonal climate forecasts reported a reduction in post-harvest losses by at least 15% due to better-timed harvesting. The study found that 55% of the variation in WCIS uptake was explained by socio-economic factors, and ultimately, 82% of the surveyed farmers expressed that the integration of WCIS significantly improved their economic resilience against drought-induced crop failure. The study recommended that the Kenya Meteorological Department and county authorities prioritize the downscaling of climate information to the ward level to ensure local relevance. There was a highlighted need for gender-sensitive dissemination strategies to bridge the digital divide, ensuring that women farmers attained equal access to real-time alerts. Key words: Arid and Semi-Arid Land (ASAL), Climate Smart Agriculture (CSA), Weather and Climate Information, Climate, Climate change, Adaptation and Mitigation, Elgeyo Marakwet County Kenya

Based Themes Food Systems & Value Addition for Jobs: Private Sector Engagement& Local Manufacturing

Presented by:
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Introduction

Chyulu Development Foundation is an Entrepreneur Support Organization based in Nthongoni, Chyulu Division, working to advance sustainable development through climate action, food security, and education in Kenya's semi-arid drylands. The organization focuses on strengthening community capacity, promoting social inclusion, and supporting locally driven climate adaptation strategies within vulnerable ecosystems adjacent to the Chyulu and Tsavo landscape.

Over the past decade, communities in this region have experienced persistent marginalization characterized by recurrent human–wildlife conflict, infrastructural limitations, environmental degradation, and limited livelihood diversification. These structural constraints have contributed to high levels of poverty, unemployment, school dropout rates, and low agricultural productivity, conditions further intensified by climate variability and prolonged dry spells. Despite these challenges, baseline assessments conducted by the organization identified significant untapped potential for climate-resilient production if supported through community-led, context-responsive approaches.

In response, the Foundation has prioritized transitioning smallholder farmers from routine, low-productivity practices toward climate-smart, resilient, and market-oriented systems. The current strategy under the Bee Blessing project integrates decent employment creation, clean energy adoption, digital communication tools, and improved market access. Priority value chains include apiculture, fruit production especially mangoes and solar-powered small-scale irrigation utilizing household shallow wells.

A central pillar of this approach is the upgrading of traditional beekeeping practices and their integration with fruit farming and agroforestry systems. By linking apiculture to diversified farm production, the model aims to enhance household income stability while simultaneously promoting pollination services, ecological restoration, and sustainable land-use management. This integrated pathway positions climate-resilient apiculture not only as an income-generating activity but also as a catalyst for dryland food system transformation.

Project Name: Restore Chyulu, Bee Blessing Project

Lead Research Organization: Chyulu Development Foundation

Dryland communities adjacent to the Chyulu Tsavo ecosystem in southern Kenya face persistent vulnerabilities linked to climate variability, environmental degradation, human wildlife conflict, and limited livelihood diversification. Despite increasing tree cover through farmer-managed natural regeneration (FMNR) and greening initiatives, transitions toward climate-smart and market-oriented agricultural systems remain limited.

This paper presents findings from a baseline study conducted under the Ukulima Bora Project (2025), involving 520 respondents (400 women, 100 youth, and 20 persons with disabilities) across Chyulu Division. Using mixed methods including focus group discussions, household interviews, and structured questionnaires the study examined the viability of apiculture as a climate-resilient value chain within an integrated dryland food system.

Findings indicate that while 14% of households practiced traditional beekeeping, only 0.9% had adopted modern hive technologies. Key barriers included limited technical knowledge, low youth and women participation (5% hive ownership), reliance on middlemen markets, and cultural perceptions discouraging modern hive adoption. However, ecological analysis revealed strong apicultural potential due to expanding indigenous tree cover and suitable forage diversity.

In response, the Chyulu Bee Blessing Project introduces a locally adapted innovation: the Chyulu Integrated Hive Model, combining traditional log hive features with modern Langstroth design to improve colonization rates and farmer acceptance. The intervention integrates youth-led hive fabrication, solar-powered honey processing, digital farmer monitoring, and brand development for organic honey marketing.

The model positions apiculture as both an ecological restoration strategy and an income diversification mechanism within dryland systems. By strengthening pollination services, linking honey production with agroforestry and fruit value chains, and enhancing inclusive participation of youth and women, the project demonstrates how localized innovation can enhance climate resilience and livelihood stability.

Nutrition and Indigenous Food Systems

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Gender Dynamics in Access to Indigenous Foods and Household Nutrition in Kenya's ASALs

Indigenous food systems remain critical to nutrition security in Kenya's Arid and Semi-Arid Lands (ASALs), where communities rely on locally adapted crops, livestock products, and wild foods to withstand recurrent climate shocks. These foods are often nutrient-dense, culturally appropriate, and resilient to harsh environmental conditions, making them essential for addressing persistent malnutrition. However, access to and control over indigenous food resources is deeply shaped by gender dynamics, which influence production, decision-making and intra-household food distribution.

Despite growing recognition of indigenous foods in improving dietary diversity, there remains a significant gap in understanding how gendered roles and power relations affect access, utilization, and nutritional outcomes in ASAL households. This study aims to examine the influence of gender dynamics on access to indigenous foods and their implications for household nutrition in selected ASAL counties in Kenya.

A mixed-methods approach was employed, combining household surveys, dietary diversity assessments, and key informant interviews with men and women across pastoral and agro-pastoral communities. Quantitative data were analyzed using descriptive and regression techniques, while qualitative data provided contextual insights into cultural norms and decision-making processes.

Findings indicate that while women play a central role in sourcing, processing, and preparing indigenous foods, their limited control over productive resources and income constrains their ability to influence food choices and nutrition outcomes. Male-dominated decision-making structures often prioritize market-oriented foods over traditional diets, contributing to reduced consumption of nutrient-rich indigenous foods. Additionally, cultural norms restrict women's access to certain high-value foods, further exacerbating intra-household nutritional inequalities.

The study underscores the need for gender-responsive policies and interventions that empower women, enhance equitable access to resources, and promote indigenous food systems. Strengthening women's agency and integrating gender considerations into nutrition and food security programs can significantly improve dietary diversity and resilience in Kenya's ASALs.

Key words: Nutrition Food systems Indigenous arid Climate

Projection and Analysis of Spatial Patterns of Urban Expansion in Kitui Town

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ABSTRACT

Kitui Town, a semi-arid secondary urban centre in eastern Kenya, has undergone rapid and largely unplanned spatial expansion over the past two decades. This paper analyses the spatial patterns of urban expansion in Kitui Town between 2005, 2015, and 2025 using multi-temporal Landsat satellite imagery processed in ENVI 4.7 software within a Geographic Information System (GIS) framework. Seven Land Use and Land Cover (LULC) classes were identified: Built-up, Cropland, Bareland, Grassland, Forest, Water Body, and Wetland/Swamp. Change detection analysis and Chi-square goodness-of-fit tests were applied to assess statistical significance of observed changes. Results reveal a dramatic increase in built-up area of 242.69%, expanding from 12.18 km² in 2005 to 41.74 km² in 2025. The most intense urbanization occurred between 2005 and 2015, with built-up land expanding by 166.50% (20.28 km²). This expansion occurred overwhelmingly at the expense of cropland (−29.02%), bareland (−49.53%), and wetland/swamp (−24.31%). Chi-square analysis confirmed that changes in built-up area, cropland, bareland, grassland, and wetland/swamp were statistically significant ($p < 0.05$). Linear trend projections indicate that, if prevailing urbanisation rates continue, built-up area will reach approximately 64.94 km² by 2050, while cropland and bareland face near-exhaustion within the same planning horizon. These spatial transformations have profound implications for climate vulnerability, ecosystem services, and sustainable land management in this semi-arid environment.

Keywords: Urban expansion, land use and land cover change, GIS, LANDSAT imagery, ENVI, change detection, Kitui Town

Impact of Climate-Resilient Crop Adoption on Food Security and Livelihood Sustainability In Kenya's Drylands with Evidence from Sorghum and Teff Cultivation in Isiolo County

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THEMATIC AREA: Climate Resilient Dryland food systems Abstract Dryland areas in Kenya's Arid and Semi-Arid Lands (ASALs) face consistent food insecurity, fragile livelihoods and climate variability.

Climate-resilient crops such as sorghum and teff are promoted as adaptation options because of their drought tolerance and potential to contribute to household food availability and income outcomes. However, evidence on their effectiveness across different dryland contexts remains limited. This study assessed their effects on food security and livelihood sustainability in Isiolo County using a transdisciplinary mixed-methods approach. Household surveys were conducted across Kiina, Burat, and Ngaremara wards, complemented by Focus Group Discussions and Key Informant Interviews. Data were analysed using descriptive statistics and inferential tests, including Chi-square, Kruskal–Wallis, Fisher's Exact tests, and Spearman correlations. Findings showed significant spatial variation in performance. Total grain yield differed strongly across wards (H(2)=57.109, p

Controlling Neltuma juliflora (Sw.) Raf by utilization for climate change resilience: The case of Garissa and Tana River Counties in Kenya

Elyas H, Emily K, Josephine, M & Luvanda, A., Mwalewa, S. & Amina M.

Abstract

Arid and semi-arid lands (ASALs) in Kenya are increasingly affected by climate change, recurrent droughts, land degradation, and declining livestock productivity, thereby threatening food security and rural livelihoods. Neltuma juliflora (formerly known as Prosopis Juliflora (Sw.) DC., is drought tolerant and adaptable to marginal environments. The species was originally introduced in Kenya's dry lands due to its anticipated ecological benefits including carbon sequestration, rehabilitation of degraded lands, soil stabilization, and provision of renewable biomass energy. However, uncontrolled spread of the species continues to threaten biodiversity, grazing lands, and water resources, thus necessitating integrated management approaches that combine utilization, control, and policy interventions. Kenya Forestry Research Institute has been involved in developing strategies for controlling the spread of the invasive species through removal and utilization. This paper therefore examines the potential of managing the species by utilization to enhance livestock feed availability and improve livelihoods through provision of green jobs hence contributing towards climate change mitigation and adaptation in the ASALs. Managing the species by utilization results in rehabilitation of water catchments and other important sites that have been degraded due to its invasion. The species produces nutrient-rich pods and foliage that can be processed into supplementary livestock feed, particularly during dry seasons when conventional forage resources are scarce. Utilization of Neltuma -based feed can help reduce feed deficits, lower production costs, and enhance livestock resilience. In addition, the species supports livelihood diversification through charcoal production, firewood, honey production, timber, pod processing, and other value-added enterprises that generate income and employment opportunities for local communities, especially women and youth groups. The paper recommends sustainable management and commercialization strategies that transform N. juliflora from an invasive challenge into a productive bio resource capable of supporting sustainable livelihoods and climate adaptation while contributing towards rehabilitation of degraded sites in Kenya's ASAL ecosystems.

Keywords: Neltuma juliflora, invasive species, integrated management approaches, livelihood diversification, climate change mitigation, land rehabilitation

KEFRI ABSTRACTS FOR 3RD DRY LAND AGRICULTURE AND FOOD SYSTEMS IN THE FACE OF CLIMATE CHANGE CONFERENCE

Track A: Paper Presentation Themes
Theme1: Building Evidence for Dryland Resilience
Subtheme 1: Climate Resilient dryland food systems – focus on adaptations strategies and CSA practices and ecosystem resilience.

Abstract Title: Enhancing Climate Resilience and Livelihoods through the Promotion of Melia volkensii in Kenya's Drylands

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Abstract

Melia volkensii, commonly known as Mukau in Kenya, is a fast-growing, drought-tolerant indigenous hardwood species highly valued for its termite-resistant timber. Its ecological adaptability makes it a vital component of dryland agroforestry systems, where it significantly enhances climate resilience, soil fertility, and rural livelihoods in Arid and Semi-Arid Lands (ASALs). Naturally thriving in hot, dry environments, M. volkensii is increasingly promoted within Kenya's National Agroforestry Strategy to combat desertification and foster sustainable land management practices. The species matures rapidly, within 10 to 15 years, producing high-quality timber that rivals traditional hardwoods like mahogany, thus offering a lucrative opportunity for local communities. Recognizing its importance, a dedicated tree breeding program was initiated in 2012 through a collaboration between the Kenya Forestry Research Institute (KEFRI) and the Forest Tree Breeding Centre (FTBC) in Japan. The project aims to develop climate-resilient germplasm suitable for the challenges posed by climate change. Significant progress has been achieved, including the identification and selection of 100 candidate plus trees across a wide range within the Arid and semi-Arid areas, which were grafted and used to establish the first generation of clonal seed orchards. In 2012, 22 hectares of these orchards were established, followed by an additional 8 hectares of second-generation clonal orchards in 2023, totalling 30 hectares of high-yield, genetically improved M. volkensii seed orchards. To support sustainable commercial forestry and agroforestry, KEFRI has also provided comprehensive guidelines for silviculture and woodlot management, aimed at maximizing productivity and environmental benefits. As global demand for indigenous timber increases and climate change impacts intensify, M. volkensii offers a sustainable solution that balances economic growth with environmental conservation. Its promotion not only enhances climate adaptation and land restoration efforts but also supports rural livelihoods by providing a valuable resource that promotes resilience, ecological stability, and sustainable development in dryland regions of Kenya and similar arid environments worldwide.

Keywords: Drought-tolerant trees, forest conservation, climate change adaptation, dryland forestry

THEME1: BUILDING EVIDENCE FOR DRYLAND RESILIENCE

Subtheme 1: Climate Resilient dryland food systems – focus on adaptations strategies and CSA practices and ecosystem resilience.

Title: Gender Roles and Climate Resilience in the Eastern dry lands of Kenya: Evidence from Kibwezi East Sub County in Makueni County

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Abstract

Climate change poses a major threat to Kenya's sustainable development goals under Vision 2030, with particularly severe effects in arid and semi-arid lands. Since climate change is not gender neutral, men, women, youth, and persons with disabilities (PWDs) experience its impacts differently due to unequal access to resources, decision-making power, and adaptation opportunities. This study examined gender-specific roles, challenges, and opportunities in climate change adaptation and mitigation in Kibwezi East Sub County, Makueni County, Kenya. A mixed-methods approach was employed using semi-structured questionnaires administered to 222 respondents, complemented by focus group discussions and key informant interviews. Findings revealed that awareness of climate change was wide spread and not gender dependent as indicated by 97.8% of the males and 97.0 % females. both gender (97.3%) highlighted climate change indicators including irregular and low rainfall, prolonged droughts, floods, rising temperatures, strong winds, pests, diseases, and invasive weeds. Climate change has intensified existing gender inequalities, especially among women, girls, and PWDs. Vulnerable groups reported increased exposure to abandonment, economic hardship, and gender-based vulnerabilities linked to climate-related stress. However, the community has gradually shifted from rigid gender roles toward more collaborative responsibilities in domestic and economic activities due to environmental pressures, urbanization, and resource scarcity. Climate adaptation and mitigation initiatives identified in the study area included NARIGP, NAVCDP, FIPS-Africa, KCEP-CRAL, and drought-tolerant tree projects. Community members received training on climate-smart agriculture, conservation agriculture, tree nurseries, soil testing, fodder production, solar-powered irrigation, energy-saving technologies, and financial empowerment initiatives such as table banking. Such interventions strengthened local resilience and promoted sustainable livelihoods. However, persistent cultural and social norms are limiting meaningful participation of women, youth, and PWDs. Land ownership was a significant barrier for women, reinforced by traditional beliefs such as the saying "Aka maivandaa makonge" (Women do not plant sisal) discouraging women from claiming land rights. There were notable gender disparities in land ownership rights, with men accounting for 76.7% of full ownership, compared to 14.9% for women and 0.07% for joint ownership. Consequently, many women are unable to independently implement climate-smart practices despite having the necessary skills and training. Implementation of climate change adaptation strategies was higher for both gender (38.9%) and less for women (29.1%) in agricultural activities and higher for men (49%) and less for women (24.8%) in forestry activities. There is need for gender-responsive climate strategies that addresses restrictive cultural norms through education, policy reforms, legal protections, and community engagement. Inclusive climate action can lead to improved resilience, increased household incomes, reduced conflicts, sustainable projects, equitable benefit sharing, job creation, and stronger community development. Proposed strategies included water conservation, inclusive value chains, gender-responsive policies, technological support, financial assistance, capacity building, and enhanced community participation. Therefore, strengthening gender mainstreaming in climate change adaptation and mitigation can significantly enhance resilience, equity, and sustainability in Kenyan drylands and beyond.

Key words: gender neutral, gender inequalities, climate-smart practices, gender-responsive climate strategies, gender mainstreaming, climate change adaptation and mitigation

Integrated Short-Term Vegetable in Maize Farming as a Climate Smart Strategy for Dryland Agriculture in Malindi, Kenya

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Abstract

Dryland agriculture faces increasing pressure from climate variability, prolonged droughts,declining soil fertility, and limited access to irrigation resources. Smallholder farmers in arid and semi-arid regions often depend on maize (Zea mays L.) as a staple crop, yet maize production alone provides delayed income and exposes households to food insecurity during dry seasons.

This study presents a conceptual framework supported by preliminary field observations conducted at Kakoneni, Malindi-Kenya for integrating short-term vegetable crops into maize based farming systems as a strategy to improve farm income, irrigation sustainability and climate resilience under dryland conditions. The proposed farming model involves cultivating fast maturing vegetables, between maize rows to provide early season income while maize continues to mature. Preliminary observations from small scale farmer managed plots indicated that amaranthus matured within 25 days enabaling farmers to generate rapid cash flow before maize harvest. Income obtained from vegetables sales was used to support irrigation fuel cost contributing to continue maize production during moisture stress periods.

The integrated system demonstrated potential agronomic, economic, and environmental benefits. Intercropping vegetables with maize improved soil cover, reduced evaporation losses, suppressed weeds, and enhanced crop diversity within the farming system. Vegetable residues also contributed to improved soil organic matter and moisture retention.

In addition, crop diversification reduced production risks associated with climate variability and market fluctuations while enhancing household nutrition and market participation through multiple harvests. Preliminary economic observations suggested that integrating short-term vegetables into maize farms may improve profitability and household cash liquidity compared with mono cropped maize systems.

Early vegetable income acted as a financial buffer that supported irrigation and farm maintenance during critical maize growth stages.

The approach further promotes efficient resource utilization and supports climate-smart agriculture suitable for water-limited environment.

The study concludes that integrating short-term vegetables within maize farming systems has strong potential as a practical and scalable strategy for improving resilience, food security, and environmental sustainability in dryland agriculture. However, further field experimentation and long-term economic evaluation are needed to quantify productivity gains, optimize crop combinations, and determine irrigation scheduling requirements across diverse dryland agroecological zones.

Support from policymakers, extension services, and development agencies through farmer training, access to quality seed, irrigation technologies, and market linkages will be critical for wider adoption.

Keywords: Dryland agriculture, sustainable farming, short-term vegetables, irrigation financing, intercropping, climate-smart agriculture, smallholder farmers.

Restoring the Palaver Tree: Indigenous African Governance, Post-Colonial Fractures, and the Resolution of Pastoral Resource Conflicts in Dryland Ecosystems

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Abstract

Dryland environments across Africa, covering approximately 43 per cent of the continent's landmass, are experiencing an unprecedented escalation in resource-based conflicts. Traditionally framed by contemporary security apparatuses as isolated outbursts of lawlessness or ethnic friction. These conflicts are deeply rooted in structural, systemic, and overlapping dynamics: climate-induced resource scarcity, acute population pressure, and a profound legal and structural friction between post-colonial state justice systems and indigenous African governance frameworks. This paper deconstructs the dichotomy between modern militarised conflict management and indigenous African governance mechanisms (Ubuntu, the Council of Elders, and the Palaver Tree tradition). It argues that the post-colonial state's monopolisation of justice and its criminalisation of pastoral mobility have eroded the traditional socio-ecological safety nets that historically mitigated resource strain. By examining how modern warfare technologies, such as small arms proliferation have transformed traditional cattle rustling into commercialised, lethal enterprises, the paper illustrates the failure of purely state-centric, punitive interventions.

Ultimately, the paper proposes a structural framework for "Hybrid Governance," a systemic integration where the statutory authority of the post-colonial state backs, rather than replaces, the restorative, community-led, and consensus-driven mechanisms of indigenous institutions. This integration provides a scalable path toward long-term peace, climate adaptation, and inclusive growth within Africa's fragile drylands.

Key words: Pastoral Resource Conflict, Palaver Tree, Post-Colonial Justice, Climate Change Adaptation, Ubuntu Philosophy

Environmental Security: Contemporary Environmental Threats

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Abstract

Environmental security has emerged as one of the most urgent global concerns of the twenty-first century due to the increasing interaction between environmental degradation, human vulnerability, and socio-political instability. Contemporary environmental threats such as climate change, rapid population growth, soil erosion, industrial pollution, and environmental terrorism continue to undermine sustainable development, food systems, and national security across the world. In dryland regions particularly, ecological stress intensifies food insecurity, displacement, poverty, and conflict over diminishing natural resources.

This conference presentation paper examines the multidimensional nature of environmental security by analysing the causes, impacts, and interconnectedness of major environmental threats affecting global and local communities. The paper further explores governance responses, international cooperation mechanisms, sustainable development strategies, and community-based interventions necessary for mitigating environmental risks. Drawing from both global perspectives and the Kenyan context, especially the Arid and Semi-Arid Lands (ASALs), the discussion demonstrates how environmental degradation directly threatens agricultural productivity, livelihoods, and human survival.

The paper concludes that environmental security is no longer merely an ecological concern but a critical component of human security, economic stability, and peacebuilding. Sustainable environmental governance, collective responsibility, technological innovation, and active citizen participation remain essential pathways toward resilient ecosystems and secure societies.

22. Effect of Soil-Water Conservation Technologies on Soil Moisture Retention under Maize Production in Semi-Arid Makueni County, Kenya

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Abstract

Soil moisture stress remains one of the major constraints affecting maize production in Kenya's arid and semi-arid lands (ASALs), particularly under conditions of increasing climate variability and recurrent droughts. Climate-smart agricultural interventions to increase soil moisture retention and to strengthen dryland farming systems have increasingly been promoted with the implementation of integrated soil and water conservation (SWC) technologies. In this study, the impact of the integrated SWC technologies on soil water holding capacity under maize production in Makueni County, Kenya was assessed. A field experiment was carried out in October – December (OND) 2025 cropping season with eighteen treatment combinations arranged in Randomized Complete Block Design with three replications. Integrated combinations of Zai pits, mulching, farmyard manure (FYM), and diammonium phosphate (DAP) fertilizer were used as treatments. The soil moisture measurements were taken on a periodic basis at 0-10 cm and 10-30 cm soil depths during Weeks 2 to 12 after planting. The data were analysed using descriptive statistics, Analysis of Variance (ANOVA), Tukey's Honestly Significant Difference test (HSD), correlation analysis, and regression analysis in R statistical software. The results indicated that there were significant differences in soil moisture among the treatment combinations ($F = 229.509$) with a p value less than 0.001. The soil moisture retention was always greater in integrated treatments (Zai pits, mulching, hydrogel, FYM, and DAP) than in the control based treatments. The mean surface soil moisture content of the treatment Zai pits + Mulch + Hydrogel + FYM + DAP (27.49%) was the highest whereas the treatments without control showed the least moisture (15.8%). Correlation analysis also showed that soil moisture had a high positive correlation with maize grain yield ($r = 0.879$, $p < 0.001$), and regression analysis showed that soil moisture significantly influenced maize productivity with $R^2 = 0.773$. The study shows that SWC technologies integrated in general are much effective for soil moisture conservation and can increase the drought resistance of semi-arid maize production systems. The results indicate that the adoption of physical water-harvesting structures together with moisture retention and soil fertility-enhancing technologies is a sustainable climate-smart approach for enhancing agricultural productivity in the ASAL areas of Kenya. More comprehensive multi-season studies are suggested to assess the long-term performance and sustainability of integrated conservation technologies under different climatic conditions.

Keywords: Soil moisture retention, soil and water conservation technologies, Zai pits, hydrogel, mulching, climate-smart agriculture, maize production, semi-arid agriculture, Makueni County, drought resilience.