Policy Dialogue on Engagement of Regional Economic Communities in Enhancing Regional Agricultural Trade and Early Action for Climate Change in Eastern and Central Africa

Conference Proceedings Report

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AICCRA
Accelerating Impacts of CGIAR Climate Research for Africa

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About AICCRA Reports

Titles in this series aim to disseminate interim research on the scaling of climate services and climate-smart agriculture in Africa, in order to stimulate feedback from the scientific community.

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About AICCRA

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ABBREVIATIONS

AICCRA	Accelerating Impacts of CGIAR Climate Research in Africa
AU	African Union
AUC	African Union Commission
AUDA	African Union Development Agency
BAU	business as usual
CA	conservation agriculture
CAADP	Comprehensive Africa Agriculture Development Programme
CBA	cost-benefit analysis
CCAFS	Climate Change Agriculture and Food Security
CGIAR	Consultative Group of International Agricultural Research Centres
CIS	climate information services
CSA	climate-smart agriculture
CSAIP	climate-smart agriculture investment plan
CSEP	Climate-Smart Agriculture Education and Policy Project
CSV	climate-smart village
FANRPAN	Food, Agriculture and Natural Resources Policy Analysis Network
FAO	Food and Agriculture Organization of the United Nations
FNS	food and nutrition security
GCCASP	Gender Climate Change and Agriculture Support Programme
ICT	information and communications technology
iNGO	international non-governmental organisation
IRR	internal rate of return
MoAMID	Ministries of Agriculture, Mechanisation and Irrigation Development
MSP	multi-stakeholder platform
NDE	National Designated Entity
NEPAD	New Partnership for Africa's Development
NGO	non-governmental organisation
NPV	net present value
PICZ	Professional Insurance Company of Zambia
REC	Regional Economic Community

1 INTRODUCTION

Africa is on the brink of a significant demographic shift, with its population projected to double by 2050. This demographic change poses a tremendous challenge in terms of ensuring food security and sustainability for future generations. The vulnerabilities in Africa's food systems, including climate change, population growth, limited resource access, and inadequate infrastructure, underscore the need for resilient food systems. Resilient food systems are designed to withstand shocks and stresses, ensuring stable food production, distribution, and access. Building resilient food systems enhances Africa's capacity to overcome challenges and provide adequate, nutritious food for its growing population.

Climate change poses a significant threat to agriculture in Africa, necessitating the implementation of climate-smart agriculture techniques is crucial for building resilience. These techniques involve the use of climate information, improved crop varieties, efficient irrigation systems, integrated pest management, and soil conservation practices. Beyond adaptation, climate-smart agriculture reduces greenhouse gas emissions and increases agricultural productivity while maintaining environmental sustainability. Additionally, CSA practices conserve soil fertility, optimize water use, reduce reliance on synthetic inputs, and minimize environmental degradation ensuring the long-term health and viability of the agricultural sector.

Despite the potential for resilient food systems, challenges persist in the integration of agricultural and food markets at local, regional, and international levels. These challenges, often exacerbated by trade barriers, hinder the smooth flow of exports and imports, consequently impeding the development of the entire value chain. The presence of these trade barriers not only affects economic activities but also has repercussions on income generation, overall welfare, and the broader food security landscape. Recognizing the pivotal role of smallholder farmers in Africa's food systems, and empowering them through access to resources, knowledge, and markets is vital. This can be achieved through farmer training programs, access to affordable credit, improved extension services, and farmer cooperatives. Strengthening the capacity and resilience of smallholder farmers ensures inclusive growth, reduces poverty, and enhances food security at the local level. To address these challenges collectively, regional collaboration is essential. Regional organizations and alliances should work together to develop common policies, harmonize regulations, and establish frameworks for addressing regional challenges collaboratively. This collaborative approach promotes trade, market integration, and knowledge exchange. Such efforts can accelerate progress, ensuring that the lessons learned and best practices are shared among nations.

Building resilient food systems in Africa is imperative for ensuring food security for future generations. Through the adoption of sustainable agricultural practices, the implementation of climate-smart agriculture techniques, investment in infrastructure, empowerment of smallholder farmers, and the reinforcement of regional collaboration, Africa can surmount challenges and attain a future characterized by sustainable self-sufficiency in food production. International trade holds the potential to significantly aid climate change adaptation by alleviating global hunger caused by the increased pressure of climate change on agricultural markets. It requires collective efforts from governments, stakeholders, and communities to build a resilient and inclusive food system that will support Africa's growing population and secure its food needs for generations to come.

Linking food systems to regional cooperation and integration is essential for effectively addressing the challenges and opportunities in the agricultural sector. Engaging RECs and promoting regional agricultural trade are key components aimed at enhancing countries' resilience to external shocks, promoting sustainable agricultural practices, and improving food security and nutrition. Additionally, early action for climate change in agriculture is crucial for adapting to climate change and ensuring the long-term viability of food production systems. Integrating climate change adaptation strategies into regional agricultural trade policies and

practices enables countries to develop resilient food systems capable of sustainably feeding Africa for future generations.

At the Ministerial meeting, ASARECA in partnership with AICCRA organized a policy dialogue on the engagement of Regional Economic Communities (RECs) in enhancing regional agricultural trade and early action for climate change in Eastern and Central Africa (ECA). The interconnectedness of markets within these regions presents a unique canvas for collaborative strategies that can amplify the impact of agricultural initiatives. However, this potential is tempered by the reality of climate change, which poses a formidable threat to the agricultural landscapes of Eastern and Central Africa. The vulnerability of these regions to shifting weather patterns, extreme events, and other climate-related challenges necessitates proactive and collective responses. RECs play a crucial role in promoting regional integration, economic cooperation, and policy harmonization among member countries. Focusing on agricultural trade and climate change, this dialogue aimed to foster collaboration, knowledge sharing, and policy coordination among RECs in the region. Some key points that were discussed during the policy dialogue include:

- Regional Agricultural Trade
- Harmonization of Policies and Standards
- Early Action for Climate Change
- Knowledge Sharing and Capacity Building
- Strengthening Regional Cooperation
- Policy Integration and Mainstreaming
- Private Sector Engagement

Through convening this policy dialogue, the aim was to facilitate collaboration, knowledge exchange, and coordinated action among RECs in ECA. Through in-depth discussions and informed deliberations, the outcomes of the dialogue informed the development of regional strategies, programs, and policies that enhance agricultural trade, promote climate resilience, and contribute to sustainable development in the ECA region.

The objective of the policy dialogue was to engage RECs in enhancing regional agricultural trade, promoting the use of digital agricultural tools for climate change and the use of foresight data to aid early action for climate change thereby maximizing benefits for smallholder farmers.

The expected outputs from this session included:

- Strategies and plans by AUC and RECs for a collaborative programme with ASARECA on strengthening sanitary and phytosanitary measures for regional agricultural trade developed.
- Status and gaps for harmonization of agricultural trade policies and standards were discussed and a road map for implementation of key actions developed.
- Status and gaps for operationalization of the African Continental Free Trade Area Agreement were discussed and a road map for implementation of key actions including dealing with non-tariff barriers developed.
- Strategies for the promotion of early action for climate change in Eastern and Central Africa were identified.
- Awareness created on CSA technologies, innovations and digital agriculture tools demonstrated to RECs and scientists for further scaling among smallholder farmers in Eastern and Central Africa by ASARECA and the NARIs.

The session was attended by officials representing: (i) AUC; (ii) RECs including EAC, COMESA, IGAD, SADC and ECCAS; (iii) climate experts; (iv) farmer organizations; (v) private sector; (vi) Ministries of Trade; (vii) National Bureaus of Standards; (viii) National Revenue Authorities; (ix) NGOs; and (x) CGIAR scientists.

2 SYNTHESIS OF ACTION POINTS FROM THE CONFERENCE PRESENTATIONS

2.1 Policy Action for Regional Agricultural Trade

2.1.1 Potential policy actions

The potential policy actions based on the recommendations and action areas can be summarized as follows:

1. Harmonization of Sanitary and Phytosanitary (SPS) standards is a critical aspect of international trade and public health. SPS standards are regulations established by governments to protect human, animal, and plant health from potential risks associated with the importation of food, animal products, and plants. Harmonization efforts aim to streamline these standards across countries and regions to facilitate trade while maintaining essential safety measures. Harmonization of SPS standards includes:
    a. **Policy Measures and Mutual Recognition Agreements (MRAs):** Harmonization efforts involve policies aimed at aligning SPS standards across ASARECA member countries and regions. One strategy for achieving this is through mutual recognition agreements (MRAs). MRAs allow nations to recognize each other's SPS standards, reducing trade barriers and promoting consistency in safety regulations. This helps in facilitating international trade while ensuring the safety of food, animal products, and plants.
    b. **Uniform Inspection Procedures and Certification Schemes:** Harmonization also involves the implementation of uniform inspection procedures and certification schemes. These measures ensure that products meet the required market standards across different countries and regions. Uniformity in inspection and certification processes simplifies trade processes and helps maintain safety standards.
2. Capacity Building and Collaboration:
    c. **Enhancing Capacity and Collaboration:** Policymakers aim to strengthen the capacity of various agricultural stakeholders, including research institutions, extension organizations, and private sector actors. Building capacity ensures that these stakeholders are better equipped to implement and adhere to SPS standards. Collaboration among these stakeholders is crucial for the effective implementation and enforcement of these standards.
    d. **Partnerships with Industry Associations and Private Sector:** Encouraging partnerships with industry associations and private sector stakeholders is essential. These partnerships can lead to the development of functional markets and transformative institutions. Private sector involvement can drive innovation,
3. Knowledge and Information Management:
    e. **Monitoring, Evaluation, and Sharing of Best Practices:** Policies support the continuous monitoring and evaluation of SPS measures and agricultural trade practices. This ensures that best practices are identified and shared among countries and regions, promoting the effective implementation of SPS standards.
    f. **Knowledge Repository:** The establishment of a knowledge repository is essential for storing and disseminating information related to SPS standards, regulations, and successful strategies. This repository serves as a valuable resource for decision-makers, helping them make informed choices to enhance public health and international trade.

2.1.2 Status, gaps, and road map for harmonization of agricultural trade policies and standards

1. **Harmonization of Trade Policies and Standards**:
   a. **Alignment of Trade Regimes, Rules of Origin, and NTBs**:
      - **Status**: The status of harmonizing trade regimes, rules of origin, and non-tariff barriers (NTBs) within and among RECs varies across Africa. Some regions have made significant progress, such as the East African Community (EAC) and the Southern African Development Community (SADC), which have established customs unions and common markets. Others are in the early stages of harmonization.
      - **Gaps**: One of the main gaps is the lack of uniformity and coherence in trade policies, rules of origin, and NTBs across different RECs. This fragmentation can impede intra-African trade and hinder the growth of regional value chains.
      - **Road Map**: The road map for harmonization involves ongoing efforts to align trade policies, simplify rules of origin, and reduce NTBs across RECs. This includes negotiations, agreements, and the gradual adoption of common policies to create a more conducive environment for trade. The African Continental Free Trade Area (AfCFTA) Agreement plays a pivotal role in this process.

   b. **Promotion of AU SPS Policy Framework and Commodity Strategy**:
      - **Status**: The AU has developed the SPS Policy Framework and the Commodity Strategy to promote expanded and competitive intra-African trade. The status of implementation varies among AU member states, with some actively incorporating these policies into their national trade strategies, while others may lag.
      - **Gaps**: Gaps include uneven implementation and awareness of the AU SPS Policy Framework and Commodity Strategy across the continent. Additionally, capacity and resource constraints may hinder some countries from fully embracing these policies.
      - **Road Map**: The road map involves raising awareness, providing technical assistance, and building capacity at the national and regional levels to implement the AU SPS Policy Framework and Commodity Strategy effectively. This includes funding support, training, and policy coordination among AU member states.

2. **Infrastructure and Market Integration**:
   c. **Market Integration through Harmonization**:
      - **Status**: Market integration efforts through harmonization of instruments and mechanisms, including Sanitary and Phytosanitary (SPS) and Technical Barriers to Trade (TBT), are at various stages of development across different RECs. Some RECs have made substantial progress, while others are in the early stages.
      - **Gaps**: Gaps include differences in regulatory frameworks, standards, and certification processes among RECs. These differences can create trade barriers and compliance challenges for businesses.
      - **Road Map**: The road map involves continued efforts to harmonize SPS and TBT standards and regulations across RECs. This includes promoting mutual recognition agreements, aligning certification processes, and building capacity for enforcement and compliance.

   d. **Support for Agro-industrial Parks and Special Economic Zones**:
      - **Status**: Some African countries have made progress in establishing agro-industrial parks and special economic zones (SEZs) for agro-processing. These zones offer incentives to attract investors and exporters, fostering industrialization and value addition.
      - **Gaps**: Gaps may include inadequate infrastructure, limited access to finance, and challenges in ensuring that SEZs are well-integrated into regional and global value chains.
      - **Road Map**: The road map involves expanding the establishment of agro-industrial parks and SEZs, improving infrastructure, providing targeted incentives, and strengthening linkages with

agricultural production and processing activities. Public-private partnerships and investment promotion are key components of this strategy.

2.1.3 Status and gaps for operationalization of the African Continental Free Trade Area Agreement and road map for implementation of key actions, including dealing with non-tariff barriers:

1. **Trade Facilitation and Financing:**

a) **Policies Addressing Trade Finance and Transportation Challenges**:

Status: Efforts have been made to address trade finance and transportation challenges, but the status varies across African countries. Some have made progress in improving logistical arrangements and developing trade financing mechanisms, while others face ongoing challenges.

Gaps: Gaps include inadequate infrastructure, high transportation costs, and limited access to trade finance. These factors can hinder the movement of goods and services within the continent.

Road Map: The road map involves continued investment in infrastructure development, such as roads, ports, and logistics hubs. Additionally, creating and enhancing trade financing mechanisms, both at the national and regional levels, is crucial. Promoting innovative African-tailored solutions can help attract businesses interested in export and import, including through digital trade finance platforms.

b) **Promotion of Innovative African-Tailored Solutions**:

Status: African countries are exploring various innovative solutions to overcome trade barriers, including the use of technology and digital platforms. Progress in this area is ongoing.

Gaps: Gaps may include limited access to technology and digital infrastructure in some regions, as well as the need for greater awareness and adoption of these solutions among businesses.

Road Map: The road map involves promoting digitalization in trade processes, including customs procedures, documentation, and payments. It also includes supporting the development and adoption of e-commerce platforms and digital payment systems that facilitate cross-border trade.

2. Non-Tariff Barriers (NTBs) and Quality Infrastructure:

a) Policies Focused on Identifying, Monitoring, and Resolving NTBs:

Status: Efforts to identify, monitor, and resolve NTBs are ongoing, with some progress made in raising awareness about NTBs and their impact on trade.

Gaps: Gaps include the need for more effective information systems and mechanisms for reporting and resolving NTBs promptly. Additionally, the lack of a harmonized approach to addressing NTBs across the continent is a challenge.

Road Map: The road map involves the development of technology-based approaches and effective information systems for tracking and reporting NTBs. This includes creating a centralized platform for reporting and resolving NTBs. Building the capacity of institutions and personnel involved in NTB resolution is essential, and establishing a continental accreditation system based on recognition arrangements can streamline quality standards.

b) Building Capacity for NTB Resolution:

Status: Capacity-building initiatives related to NTB resolution are underway, but the extent of progress varies across countries and regions.

Gaps: Gaps may include limited resources for capacity building, including training programs, and the need for more extensive collaboration among state parties and regional organizations.

Road Map: The road map involves providing support for capacity-building programs and knowledge sharing to enhance institutional capabilities in trade facilitation. This includes training programs for personnel involved in NTB resolution and fostering collaboration among state parties, regional organizations, and the private sector to ensure a coordinated approach to addressing NTBs.

3. Collaboration and Capacity Building:

Policies Focused on Collaboration among Stakeholders:

Status: Collaboration among state parties, regional organizations, and private sector stakeholders is essential, and there have been efforts to foster such collaboration.

Gaps: Gaps include the need for greater coordination and alignment of policies and strategies among different stakeholders. The private sector's engagement in policy implementation can be improved.

Road Map: The road map involves strengthening collaboration mechanisms, such as public-private partnerships, to ensure successful trade policy implementation. This includes creating platforms for dialogue and engagement between governments and the private sector. Additionally, support for capacity-building programs and knowledge sharing is crucial to enhance institutional capabilities in trade facilitation and promote a culture of cooperation.

2.2 Strategies for Promoting Early Warning for Early Action

2.2.1 Developing resilience through Climate disaster risk reduction with early warning systems

The ongoing process of building resilience in ASARECA partner countries requires dedication and commitment to safeguard lives, both present and future. This involves fostering a culture of disaster preparedness and climate resilience. Early Warning Systems (EWS) play a pivotal role in managing climate-related risks, particularly floods and droughts. Beyond predicting disasters, EWS facilitate the development of resilience and adaptation strategies, such as crop diversification, conservation agriculture, and water management practices. These systems also generate knowledge for decision-making on suitable practices and technologies to enhance food production and reduce vulnerability to climate change. ASARECA partner countries face various climate change-related challenges, making EWS crucial tools in their efforts. These systems are customized to each country's agroecological zones and settings.

Recommendations:

1. **Establish Comprehensive Frameworks for Weather, Water, and Climate Services:**
    - Develop regional and national policies and strategies for weather, water, and climate services that are clear and comprehensive.
    - Outline objectives, responsibilities, and funding mechanisms in these frameworks.
    - Utilize an integrated approach involving various government agencies, meteorological departments, and environmental ministries.
    - Engage a wide range of stakeholders, including government and non-state organizations, in framework development.
    - Attract funding through public-private partnerships, international cooperation, and climate finance for financial stability.
2. **Strengthen Multi-Hazard Early Warning Systems (EWS):**
    - Improve the detection, monitoring, analysis, and prediction of risks within EWS.
3. **Invest in Data Collection and Monitoring:**
    - Invest in modern data collection systems, including weather stations, river gauges, seismic sensors, and remote sensing technologies.
    - Ensure real-time data collection covering various parameters relevant to climate-related hazards.
4. **Promote an Enabling Environment for Co-Production of Climate Services:**
    - Develop interagency coordination frameworks with defined roles, responsibilities, and communication protocols for hazard management agencies.
    - Designate a lead agency or coordinating body responsible for multi-hazard coordination.
    - Facilitate collaboration, hazard monitoring, and stakeholder engagement.
    - Establish standardized protocols for data sharing among agencies, ensuring sensitive information is handled appropriately.

5. Focus on Capacity Development and Operational Research:

- Prioritize capacity development, training, and operational research to enhance response capabilities and build climate-resilient communities.

Action Areas:

1. Develop and enhance climate monitoring services, including climate prediction and climate change projections.
2. Implement effective warning dissemination and communication strategies using various channels like websites, social media, and press conferences.
3. Strengthen user interface platforms and engagement with stakeholders to ensure the relevance and effectiveness of climate services.
4. Conduct research and pilot projects to test innovative approaches and advance the understanding of climate risks and early action.
5. Advocate for increased investment in anticipatory or early action measures and support the establishment of regional and national frameworks for climate services.

2.2.2 Improving the relevance and accuracy of climate forecasts/services at the national level

Recommendations:

These recommendations and action areas provide a comprehensive approach to improving climate forecasts and services, conducting climate risk assessments, and implementing adaptation strategies in the agriculture sector. Here is a summary of the key points for ASARECA's roles, possible policy actions, and considerations:

1. Conduct climate risk assessments for different sectors, including agriculture, water management, health, disaster risk reduction, and energy.
2. Improve the reliability of climate models by comparing them to observations and analyzing projected changes.
3. Develop climate indices and indicators to measure heat stress, extreme precipitation, and drought risks.
4. Conduct suitability assessments for crops and livestock based on agro-climatic, socioeconomic, and other constraints.
5. Use future climate data to study water availability and assess its impact on different time scales and regions.

Action Areas:

1. Enhance collaboration between climate scientists, researchers, and stakeholders to ensure the relevance and accuracy of climate forecasts and services.
2. Utilize observational and reanalysis datasets, climate model simulations, and crop-relevant indices to assess climate risks.
3. Conduct spatial analysis and hot-spot detection to identify suitable areas for crops and livestock production.
4. Integrate agro-climatic, socioeconomic, and other constraints to develop comprehensive indicators for crop suitability.
5. Explore the impact of climate change on water availability and assess future water resources to inform water management strategies.

Key Roles:

The key roles and responsibilities of ASARECA in the implementation of the above recommendations and action areas would include:

1. Research and Development: Conduct research to generate knowledge and understanding of climate risks, early warning systems, and agricultural resilience. This involves studying climate patterns, developing

climate models, assessing the impact of climate change on agriculture, and exploring innovative approaches and technologies.

2. Capacity Building: Provide capacity-building initiatives to stakeholders in mandated countries. This can include training programs, workshops, and knowledge exchange platforms to enhance understanding of climate risks, early warning systems, and the implementation of resilience strategies. It also involves strengthening the technical skills and capabilities of researchers, policymakers, and practitioners.
3. Technical Assistance and Support: Offer technical assistance and support to mandated countries in the implementation of early warning systems and climate services. This includes providing guidance on data collection, analysis, and interpretation, developing and deploying climate monitoring and prediction tools, and assisting in the establishment of effective early warning dissemination mechanisms.
4. Collaboration and Partnerships: Facilitate collaboration and partnerships among stakeholders, including governments, national research institutions, local communities, and international organizations. This involves establishing networks, platforms, and forums for information sharing, joint research, and implementation of climate resilience strategies. Collaborative efforts can enhance the exchange of best practices and lessons learned.
5. Policy Advice and Advocacy: Provide evidence-based policy advice to governments and decision-makers in mandated countries. This includes contributing to the development and implementation of regional and national frameworks for weather, water, and climate services. The organization can advocate for the integration of climate resilience considerations into agricultural policies and strategies.
6. Knowledge Dissemination and Communication: Disseminate research findings, technical reports, policy briefs, and other relevant information to stakeholders. Utilize various communication channels such as websites, newsletters, workshops, and conferences to share knowledge, raise awareness, and foster understanding of climate risks, early warning systems, and resilience-building practices.
7. Monitoring and Evaluation: Support monitoring and evaluation efforts to assess the effectiveness and impact of implemented strategies and actions. Develop indicators and assessment frameworks to measure progress, identify gaps, and provide feedback for continuous improvement. This helps ensure that the implemented measures align with the desired outcomes.
8. Resource Mobilization: Engage in resource mobilization efforts to secure funding and support for research projects, capacity-building activities, and the implementation of recommended strategies. This involves seeking partnerships with donors, international development agencies, and other relevant stakeholders to enhance the financial and technical resources available for implementation.

The key points for possible policy action by ASARECA:

1. Policy Framework Development: Establish and implement national and regional frameworks for weather, water, and climate services. These frameworks should outline the goals, objectives, and strategies for integrating climate risk reduction, early warning systems, and resilience-building into agricultural policies and practices.
2. Institutional Strengthening: Enhance the capacity and effectiveness of national and regional institutions responsible for climate monitoring, prediction, and early warning dissemination. Provide adequate resources, technical support, and training to ensure these institutions can fulfil their roles in providing timely and accurate climate information to stakeholders.
3. Multi-Sectoral Coordination: Promote coordination and collaboration among different sectors, including agriculture, disaster management, health, water resources, and energy. Develop mechanisms for sharing data, information, and expertise to enhance the understanding and management of climate risks and to ensure a coordinated response to early warnings.
4. Stakeholder Engagement: Encourage active participation and engagement of stakeholders, including farmers, local communities, researchers, policymakers, and civil society organizations. Foster inclusive processes for involving stakeholders in decision-making, policy development, and the design of early warning systems. This ensures that policies and actions are context-specific, responsive to local needs, and supported by relevant actors.

5. Capacity Building and Awareness: Invest in capacity-building initiatives to enhance the skills and knowledge of stakeholders involved in climate resilience, early warning systems, and agricultural practices. Provide training programs, workshops, and educational campaigns to raise awareness and build capacity at various levels, from farmers and local communities to policymakers and researchers.
6. Data and Information Management: Strengthen data collection, management, and sharing systems to support climate monitoring, prediction, and early warning dissemination. Develop standardized protocols for data collection and establish mechanisms for sharing and accessing climate data and information among relevant stakeholders.
7. Financing and Resource Allocation: Allocate adequate financial resources for implementing climate resilience measures, early warning systems, and capacity-building activities. Explore innovative financing mechanisms, such as climate funds, public-private partnerships, and international cooperation, to secure funding for climate-related initiatives.
8. Policy Integration and Coherence: Ensure that climate resilience, early warning systems, and agricultural practices are integrated into national and regional policies and strategies. Promote coherence between climate change adaptation, disaster risk reduction, and sustainable agriculture policies to maximize synergies and avoid duplication of efforts.
9. Monitoring, Evaluation, and Learning: Establish monitoring and evaluation mechanisms to assess the effectiveness and impact of implemented policies and actions. Regularly review and update policies based on lessons learned and emerging scientific knowledge to ensure their relevance and effectiveness in addressing climate risks and supporting early action.
10. International Cooperation and Knowledge Exchange: Foster collaboration and knowledge exchange at the regional and international levels. Engage in partnerships with international organizations, research institutions, and development agencies to leverage expertise, share best practices, and access global knowledge and resources.

By implementing these recommendations and policy actions, ASARECA can play a crucial role in strengthening climate resilience, supporting early warning systems, and promoting sustainable agriculture practices in the region.

2.3 Strategies for Promoting Early Warning for Early Action

2.3.1 Improving the relevance and accuracy of climate forecasts/services at the national level

By implementing these suggested key policy actions within each action area, ASARECA can play a vital role in advocating for the integration of digital climate agro-advisory services into national agricultural extension policies, fostering partnerships, ensuring equitable access, and promoting capacity building. These policy actions will help create an enabling environment for the successful delivery of digital climate advisory services to smallholder farmers, ultimately contributing to their resilience and adaptation to climate change.

1. Research to develop robust digital climate agro-advisory services

   Key Policy Actions:

   a. Allocate funding and resources to support research initiatives focused on developing and improving digital climate agro-advisory services.
   b. Establish partnerships with research institutions, agricultural universities, and technology companies to collaborate on research and development efforts.
   c. Promote knowledge sharing and collaboration among researchers and practitioners working on digital climate advisory services through workshops, conferences, and networking platforms.

2. Collaborate with public and private sector partners to establish partnerships for service delivery
   Key Policy Actions:
   a. Advocate for the establishment of public-private partnerships to deliver digital climate agro-advisory services, involving government agencies, technology companies, NGOs, and farmer organizations.
   b. Facilitate the creation of platforms or forums where public and private stakeholders can engage in dialogue, share best practices, and identify areas for collaboration.
   c. Encourage the private sector to invest in the development and scaling of digital climate agro-advisory services by providing incentives, tax breaks, or other forms of support.
3. Customize and adapt climate advisories for smallholder contexts
   Key Policy Actions:
   a. Support the development of localized climate agro-advisory content that considers the specific needs, languages, and cultural practices of smallholder farmers.
   b. Advocate for the inclusion of indigenous knowledge and practices in the design and delivery of climate agro-advisory services.
   c. Encourage collaboration between extension services, farmer organizations, and local communities to ensure the relevance and effectiveness of advisory content.
4. Support capacity building for stakeholders involved in delivering climate agro-advisory services
   Key Policy Actions:
   a. Develop training programs and workshops to enhance the capacity of extension workers, agricultural researchers, and technology providers in delivering climate agro-advisory services.
   b. Advocate for the integration of climate-smart agriculture and digital literacy training into agricultural education curricula.
   c. Support the development of training materials and resources that can be easily accessed and utilized by stakeholders involved in delivering advisory services.
   d. Monitor and evaluate the effectiveness of digital climate advisory services and iterate improvements
   e. Establish monitoring and evaluation frameworks to assess the impact and effectiveness of digital climate agro-advisory services.
   f. Encourage the collection of feedback and data from smallholder farmers to measure the adoption and impact of advisory services on their agricultural practices.
   g. Use the findings from monitoring and evaluation processes to identify areas for improvement, refine advisory content, and enhance service delivery strategies.

2.3.2 Developing site-specific digital fertilizer recommendations

Action Areas for ASARECA: Developing site-specific digital fertilizer recommendations

By actively engaging in these action areas and implementing the suggested policy actions, ASARECA can play a crucial role in advancing site-specific digital fertilizer recommendations and promoting their adoption at regional and national levels, ultimately contributing to improved agricultural productivity, resource efficiency, and farmer livelihoods.

Roles and Responsibilities

1. Conduct research and develop tools for generating site-specific fertilizer recommendations:
   a) ASARECA should allocate resources and engage in research to develop robust methodologies and tools for generating site-specific fertilizer recommendations. This may involve conducting field trials, data analysis, and modelling approaches.

b) Collaborate with research institutions and agronomy experts to ensure the scientific validity and accuracy of the developed tools.

2. Collaborate with national agricultural agencies to promote and adopt the use of site-specific fertilizer recommendations:
    a) Establish partnerships and collaborative relationships with national agricultural agencies, such as ministries of agriculture or extension services, to advocate for and support the adoption of site-specific fertilizer recommendations.
    b) Provide technical assistance and knowledge transfer to national agencies in implementing and utilizing the developed tools.
3. Provide training and capacity building on the use of digital fertilizer recommendation tools:
    a) Develop training programs and workshops to educate agronomists, extension workers, and farmers on the use and interpretation of site-specific fertilizer recommendation tools.
    b) Collaborate with national agricultural training institutes and extension services to integrate the training modules into their existing programs.
4. Support the scaling out of the site-specific fertilizer recommendation tool to other countries:
    a) Share best practices and lessons learned from the implementation of site-specific fertilizer recommendations within the ASARECA region.
    b) Collaborate with regional and international organizations to facilitate the adaptation and adoption of the developed tools in other countries, considering the specific agro-ecological contexts.
5. Monitor and evaluate the adoption and impact of site-specific fertilizer recommendations:
    a) Establish a monitoring and evaluation framework to assess the adoption rates and impact of site-specific fertilizer recommendations on crop productivity, soil health, and farmer income.
    b) Collaborate with national agencies and research institutions to collect data and conduct evaluations, using both qualitative and quantitative methods.

Key Policy Actions:

1. Advocate for the inclusion of site-specific fertilizer recommendation approaches in national fertilizer policies and guidelines:
    a) Engage with policymakers and stakeholders to highlight the importance and benefits of site-specific fertilizer recommendations in improving agricultural productivity and sustainability.
    b) Provide evidence-based recommendations and policy briefs to support the integration of site-specific approaches into national fertilizer policies and guidelines.
2. Collaborate with governments to develop regulatory frameworks for the generation and use of site-specific fertilizer recommendations:
    a) Work with governments to develop regulations and guidelines that ensure the quality and accuracy of site-specific fertilizer recommendation tools and services.
    b) Advocate for policies that encourage public-private partnerships and collaboration in the development and dissemination of these tools.
3. Promote the adoption of digital tools for fertilizer recommendations by providing evidence of their effectiveness and benefits:
    a) Conduct studies and case studies to demonstrate the effectiveness and economic benefits of using digital tools for site-specific fertilizer recommendations.
    b) Engage with stakeholders, including farmers, extension workers, and policymakers, to raise awareness about the advantages of adopting digital tools for fertilizer recommendations.
4. Advocate for policies that incentivize farmers to adopt site-specific fertilizer recommendations through subsidies or other support mechanisms:

a) Advocate for the inclusion of incentives, such as subsidies or grants, to encourage farmers to adopt site-specific fertilizer recommendations.
b) Collaborate with governments and financial institutions to develop mechanisms that facilitate access to finance for farmers to invest in the recommended fertilizer application practices.

2.3.3 Evolution of Ethiopian Digital Agro Climate Advisory Platform (EDACaP) and lessons learned

Suggested Action Areas for ASARECA in relation to the evolution of the EDACaP and lessons learned include:

1. Contribute its technical expertise and support to enhance the database, API, web portal visualization, and model engine integration of the EDACaP platform. This can involve sharing knowledge, best practices, and resources to strengthen the technological infrastructure of EDACaP and improve its functionality.
2. Collaborate with national partners in Ethiopia to enhance the dissemination and feedback mechanisms of climate advisories through EDACaP. This collaboration can involve joint efforts in developing effective communication channels, incorporating user feedback mechanisms, and ensuring the widespread dissemination of climate information to farmers and stakeholders.
3. Organize capacity-building activities to empower relevant stakeholders in accessing and utilizing climate information from EDACaP. Training programs, workshops, and awareness campaigns can be conducted to enhance the understanding and skills of agricultural extension workers, policymakers, and farmers in effectively utilizing climate information for decision-making.
4. Share the lessons learned from the evolution of EDACaP with other organizations working on similar platforms or initiatives. By sharing experiences, challenges, and successes, ASARECA can contribute to the broader knowledge base and promote the adoption of best practices in developing and implementing climate information platforms in the agricultural sector.
5. Serve as a facilitator for knowledge exchange and collaboration between EDACaP and other relevant initiatives in the region. This can involve organizing forums, workshops, or conferences to bring together stakeholders, share experiences, and foster collaboration for mutual learning and improvement.

Suggested key policy actions by ASARECA for each of the action areas related to the evolution of the EDACaP and lessons learned are as follows:

1. Advocate for the integration of climate advisory platforms like EDACaP into national climate change adaptation strategies and policies. This can help ensure that the importance of climate information services and their contribution to climate resilience and agricultural development is recognized and prioritized at the policy level.
2. Collaborate with governments to establish institutional frameworks that support the sustainability and scalability of climate advisory platforms. This can involve working together to define roles and responsibilities, secure funding, and establish governance structures to ensure the long-term functioning and impact of platforms like EDACaP.
3. Promote policies that support the use of climate information in agricultural planning, resource allocation, and risk management at both national and local levels. This can include advocating for the inclusion of climate information in national agricultural policies, encouraging the integration of climate considerations in land-use planning, and promoting the use of climate data for crop selection, irrigation planning, and other agricultural practices.

Advocate for the inclusion of farmer feedback mechanisms in climate advisory platforms. This ensures that the platforms are user-centric and responsive to the needs of farmers. By incorporating mechanisms for farmers to provide feedback, such as surveys or community engagement sessions, the platforms can continuously improve their services and better serve the farming community.

2.3.4 The Kenya Agricultural Observatory Platform (KAOP)

The roles and responsibilities of ASARECA in promoting and supporting the KAOP platform:

1. Expand the coverage of KAOP and ensure data collection from diverse agro-ecological zones. ASARECA is responsible for facilitating the expansion of KAOP to benefit more farmers and stakeholders. This includes ensuring the platform's coverage extends to different agro-ecological zones across Kenya. By collecting data from diverse regions, ASARECA helps provide a comprehensive view of agricultural conditions throughout the country.
2. Collaborate with meteorological agencies and research institutions to collect and update local weather data. To enable accurate weather forecasting, ASARECA collaborates with meteorological agencies and research institutions to collect and update local weather data. By establishing partnerships and coordinating data collection efforts, ASARECA ensures that KAOP has access to up-to-date and reliable weather information, enhancing the accuracy of its forecasts and agro-advisories.
3. Develop and maintain the KAOP platform. ASARECA is responsible for the development and maintenance of the KAOP platform. This includes managing the technological aspects, ensuring data integration, and implementing updates and improvements to enhance the platform's functionality. By continuously improving the platform, ASARECA ensures that farmers and stakeholders have access to a reliable and user-friendly tool for real-time weather information and crop-specific recommendations.
4. Conduct training programs for farmers and extension workers. ASARECA organizes training programs to educate farmers and extension workers on effectively utilizing the KAOP platform. These training programs help users understand how to access and interpret the information provided by KAOP, enabling them to make informed decisions regarding crop management, pest control, irrigation, and other aspects of agricultural practices.
5. Collaborate with policymakers for integration into agricultural planning and decision-making. ASARECA collaborates with policymakers to advocate for the integration of KAOP data into agricultural planning and decision-making processes. By highlighting the value and relevance of the platform, ASARECA encourages policymakers to consider the insights provided by KAOP when formulating agricultural policies and strategies. This integration ensures that evidence-based information from KAOP is leveraged to enhance agricultural productivity and sustainability at the policy level.

Some suggested key policy actions for each of the action areas related to the KAOP by ASARECA

1. Expand the coverage of the Kenya Agricultural Observatory Platform to benefit more farmers and stakeholders
    a) Collaborate with governments to develop policies that promote data sharing and interoperability among different agricultural data platforms. This would enable the integration of data from various sources, expanding the coverage and usefulness of KAOP.
    b) Advocate for the integration of weather and climate data from KAOP into national meteorological and agricultural information systems. This would ensure that the valuable insights provided by KAOP are utilized at the national level for effective planning and decision-making.
2. Continuously collect and update local data for accurate weather forecasting and location-specific agro-advisories

a) Promote policies that support the use of KAOP data in agricultural research, development planning, and climate change adaptation strategies. This would emphasize the importance of data collection and updating processes and provide the necessary resources for regular data collection and maintenance.
b) Collaborate with governments and research institutions to establish mechanisms for ongoing data collection and updates, ensuring the availability of accurate and up-to-date information for weather forecasting and agro-advisories.

3. Provide real-time weather information, crop-specific recommendations, and actionable insights to farmers based on KAOP data
   a) Advocate for policies that facilitate farmers' access to real-time weather information and crop-specific recommendations through user-friendly platforms. This could involve initiatives to improve internet connectivity in rural areas and the development of mobile applications or SMS-based services to disseminate information effectively.
   b) Collaborate with governments and extension services to integrate KAOP data into existing farmer advisory services, ensuring that the information reaches farmers in a timely and accessible manner.
4. Develop and deploy additional use cases and innovations through the KAOP platform
   a) Collaborate with governments, research institutions, and private sector stakeholders to promote innovation and investment in agri-tech solutions that leverage the data and capabilities of KAOP.

Advocate for policies that encourage public-private partnerships in the development and deployment of additional use cases and innovations through the KAOP platform. This could involve incentives for companies and organizations to develop and implement innovative solutions that leverage KAOP data for the benefit of farmers and the agricultural sector.

2.3.5 Community-based small ruminant breeding programs

Suggested action areas for ASARECA

ASARECA can play a significant role in supporting and advancing community-based small ruminant breeding programs (CBBPs) by focusing on the following action areas:

1. Technical Expertise and Support
   Provide technical expertise and guidance to communities in establishing CBBPs. This includes sharing knowledge on breeding methodologies, genetic selection, and management practices that are suitable for low-input systems. ASARECA can also assist in identifying appropriate breeds or genetic resources that are well-adapted to the local environment.

2. Breeding Strategies and Guidelines
   Develop breeding strategies and guidelines specifically tailored for CBBPs. These strategies should consider the unique objectives and needs of different communities, taking into account factors such as local production systems, market demands, and farmers' preferences. ASARECA can collaborate with researchers and experts to develop these guidelines and ensure they are practical and applicable at the community level.

3. Training and Capacity-Building
   Support the training and capacity-building of community members and local stakeholders involved in
   CBBPs. This can include organizing workshops, training programs, and knowledge-sharing events to enhance farmers' understanding of breeding practices, data collection, and record-keeping. Building the skills and knowledge of community members is crucial for the sustainable implementation and success of CBBPs.

4. Market Linkages and Value Chains
   Facilitate the establishment of market linkages and value chains for small ruminant products. This involves connecting communities with buyers, processors, and other market actors. ASARECA can also assist in promoting value addition and marketing strategies to enhance the economic benefits for farmers engaged in CBBPs. Supporting market access and value chain development helps ensure the sustainability of CBBPs and improves the income and livelihoods of participating farmers.

5. Monitoring, Evaluation, and Feedback
   ASARECA can play a vital role in monitoring and evaluating the performance and impact of CBBPs. This includes collecting data on genetic progress, productivity, and socio-economic indicators. ASARECA can collaborate with local partners and communities to establish monitoring systems and develop indicators to assess the effectiveness and sustainability of CBBPs. Based on the findings, feedback and recommendations can be provided to continuously improve and refine the breeding programs.

Suggested key policy actions

ASARECA can actively engage with governments and advocate for these policy actions. This will create an enabling environment for the successful implementation and scaling up of community-based small ruminant breeding programs. These policy actions can help secure government support, resources, and institutional backing, ensuring the long-term sustainability and impact of CBBPs in Eastern and Central Africa. To support community-based small ruminant breeding programs (CBBPs) through policy actions, ASARECA can focus on the following key steps:

1. **Collaboration with Governments**
   Collaborate with governments to develop policies and strategies that promote and institutionalize CBBPs. This collaboration can involve engaging with relevant ministries, departments, and agencies responsible for livestock development and rural development. ASARECA can provide technical expertise and evidence-based recommendations to inform the development of supportive policies.

2. **Inclusion in National Livestock Development Policies**
   Advocate for the inclusion of CBBPs in national livestock development policies and programs. This can be done through active participation in policy dialogues, policy briefings, and consultations with policymakers. ASARECA can highlight the importance of CBBPs in improving smallholder livelihoods, enhancing genetic diversity, and promoting sustainable livestock production systems.

3. **Access to Breeding Stock and Support Services**
   Promote policies that facilitate access to quality breeding stock, genetic resources, and breeding support services for community-based programs. This can include advocating for the establishment of breeding centres or networks that provide improved genetics to communities. Policies can also address issues such as the availability of artificial insemination services, training on breeding techniques, and the provision of veterinary support to ensure the health and productivity of the breeding stock.

4. **Recognition and Protection of Indigenous Breeds**
   Advocate for policies that recognize and protect indigenous and local breeds. This can involve advocating for breed registration programs that officially recognize these breeds and their unique genetic traits. Additionally, ASARECA can support the development and implementation of breed conservation programs that promote the sustainable

management and utilization of indigenous breeds, ensuring their long-term viability and contribution to community-based breeding programs.

2.3.6 Scaling of Livestock Feed and Forage Innovations

Based on the discussions, here are key action areas for scaling climate-smart livestock feed and forage innovations:

1. **Engage Development Partners (DPs)**
   Collaborate with government extension offices, NGOs, cooperatives, unions, farmers, media outlets, universities, and research institutions. Involve them in scaling initiatives and leverage their expertise, resources, and networks to support the adoption and dissemination of feed and forage innovations.

2. **Training and Capacity Development for DPs**
   Provide training and capacity-building programs for DPs on scalable feed and forage practices. Enhance their knowledge and skills in implementing and promoting climate-smart feed and forage interventions, enabling them to effectively support scaling efforts.

3. **Media Engagement and Knowledge Sharing**
   Engage with mass media, including community radio, smartphones, television, and joint training workshops for journalists, extension experts, and scientists. Utilize these platforms to create awareness, share information, and disseminate knowledge about climate-smart feed and forage practices, reaching a wider audience.

4. **Resource Securing and Continuous Supply**
   Ensure the availability of resources, both financial and technical, to sustain scaling efforts. Secure long-term funding, commitment from all actors, and a continuous supply of proven innovations. This includes supporting seed production, varietal release, and seed certification processes to address challenges related to seed quality and affordability.

5. **Advocacy for Policies and Certifications**
   Advocate for the development and implementation of proper varietal release policies and seed certification systems. This helps ensure the availability of high-quality and certified seeds, addressing challenges related to seed quality, availability, and affordability in scaling feed and forage innovations.

2.3.7 Participatory rangeland management (PRM) initiatives

Some of the proposed action areas that ASARECA can take up to advance PRM initiatives can include the following:

1. Conducting Research:

a. **Research on PRM Approaches and Techniques**: - ASARECA should actively support and research PRM approaches and techniques. This research should be focused on understanding the local context, ecosystem dynamics, and the needs of pastoralist communities. It should aim to generate evidence-based knowledge and best practices that can guide PRM efforts.

b. **Exploration of Innovative PRM Tools and Technologies**: - ASARECA should invest in exploring innovative tools and technologies that can enhance rangeland management and sustainability. This includes researching and promoting techniques such as remote sensing for monitoring rangelands, GPS-based livestock tracking, and mobile apps for information sharing among pastoralists.

c. **Assessment of Social, Economic, and Environmental Impacts**: - ASARECA should fund studies to assess the social, economic, and environmental impacts of PRM initiatives. These

assessments should evaluate changes in livelihoods, rangeland health, biodiversity conservation, and resilience to climate change. Findings should inform future interventions and policy recommendations.

2. Engagement and Facilitation:

a. **Engagement with Local Communities and Stakeholders**: - ASARECA should actively engage with local communities, pastoralists, and other stakeholders to facilitate the implementation of PRM initiatives. This engagement should involve community consultations, needs assessments, and the co-design of interventions to ensure that PRM aligns with local priorities and practices.

b. **Fostering Dialogue and Collaboration**: - ASARECA should play a role in fostering dialogue and collaboration among different actors involved in rangeland management. This includes government agencies, NGOs, community-based organizations, and traditional leaders. Promoting inclusivity in decision-making processes can lead to more effective PRM outcomes.

c. **Supporting Multi-Stakeholder Platforms**: - ASARECA should support the establishment of multi-stakeholder platforms for knowledge sharing and coordination. These platforms can serve as spaces for stakeholders to exchange ideas, share experiences, and collectively plan and implement rangeland management strategies. ASARECA can facilitate the formation of these platforms and provide technical support.

3. Technical Support and Capacity Building:

a. **Providing Technical Support**: - ASARECA should provide technical support and capacity building for local communities in rangeland management practices. This support should include training and guidance on sustainable grazing, water conservation, ecosystem restoration, and land-use planning.

b. **Training Programs and Workshops**: - ASARECA should organize training programs and workshops to enhance the skills and knowledge of communities in PRM approaches. These programs should be tailored to the specific needs and challenges of each community and should involve hands-on learning experiences.

c. **Community-Led Monitoring and Evaluation Systems**: - ASARECA should support the development of community-led monitoring and evaluation systems for rangeland management. This empowers communities to track progress, identify challenges, and make informed decisions about adaptive management practices.

4. Collaboration with Policymakers:

a. **Integration into Policies and Guidelines**: - ASARECA should collaborate with policymakers at the national and regional levels to integrate PRM approaches into rangeland management policies and guidelines. This may involve advocating for policy reforms that align with PRM principles and practices.

b. **Advocacy for Recognition of Customary Practices**: - ASARECA can advocate for the recognition and protection of customary rangeland management practices through policy measures. This recognition can help preserve traditional knowledge and practices that contribute to sustainable rangeland management.

c. **Promotion of Inclusive Decision-Making**: - ASARECA should promote policies that encourage the involvement of local communities and stakeholders in rangeland decision-making processes. This can include mechanisms for participatory governance and resource allocation, ensuring that the voices of pastoralists are heard and considered.

5. Monitoring, Evaluation, and Knowledge Sharing:

a. **Establishing Monitoring and Evaluation Frameworks**: - ASARECA should establish monitoring and evaluation frameworks to assess the outcomes and impacts of PRM initiatives. Regular assessments are essential for tracking progress, identifying challenges, and adapting strategies as needed.

b. **Documenting and Sharing Findings**: - ASARECA should document and share the findings and lessons learned from PRM projects with relevant stakeholders. This knowledge sharing can take the form of reports, publications, and case studies, ensuring that valuable experiences are disseminated widely.

c. **Organizing Knowledge-Sharing Platforms**: - ASARECA can organize workshops, conferences, and knowledge-sharing platforms to disseminate information and promote learning on PRM approaches. These events provide opportunities for stakeholders to exchange experiences, build networks, and collaborate on future initiatives.

Suggested key policy actions for ASARECA in the context of participatory rangeland management (PRM):

1. Collaborate with governments in the region to develop policies and guidelines specifically focused on PRM approaches. This collaboration can involve providing technical expertise, sharing research findings, and participating in policy dialogues to ensure that PRM principles and practices are integrated into national and regional policies.
2. Advocate for the recognition and protection of customary rangeland management practices through policy measures. This can include raising awareness about the importance of traditional knowledge and practices in rangeland management, promoting the inclusion of customary practices in legal frameworks, and advocating for the rights of local communities to manage and benefit from rangeland resources.
3. Promote policies that encourage the active involvement of local communities and stakeholders in rangeland decision-making processes. This can include advocating for participatory approaches in policy formulation, creating platforms for dialogue and consultation, and ensuring that the voices and perspectives of local communities are represented in decision-making forums.

Advocate for the integration of PRM approaches into broader land and natural resource management policies and strategies. This can involve highlighting the interconnectedness of rangelands with other ecosystems, advocating for the consideration of rangeland management in national land use planning processes, and promoting the integration of PRM principles into climate change adaptation and mitigation strategies.

3 ENHANCING REGIONAL AGRICULTURAL TRADE

3.1 Strategies for Collaboration with ASARECA in Strengthening Sanitary and Phytosanitary Measures for Regional Agricultural Trade

International Institute of Tropical Agriculture (IITA) - Jane Kamau

Collaboration between African countries is essential for building resilient food systems. Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) is a regional organization focused on promoting agricultural research for development (AR4D) in Eastern and Central Africa. ASARECA was established in 1994 and operates within the context of agricultural development and food security in the region. It operates in 14 countries that share boundaries, have various common languages, and trade with each other primarily on cereals. ASARECA partners with several stakeholders namely farmers; national, regional, and international research institutions; extension, and training organizations; public and private sector actors; international and local NGOs, Regional Economic Communities, and development agencies.

Outlook of regional agricultural trade

In Eastern and Central Africa (ECA), agriculture plays a crucial role in ensuring food security and driving economic growth. The typical dietary pattern in this region revolves around staple foods like grains, tubers, and roots. Among these staples, maize stands out as the most widely produced and traded crop, followed by rice and beans (Fig. 1) Sorghum and other crops also contribute significantly to production and trade, while wheat is the least traded commodity in the ECA region.

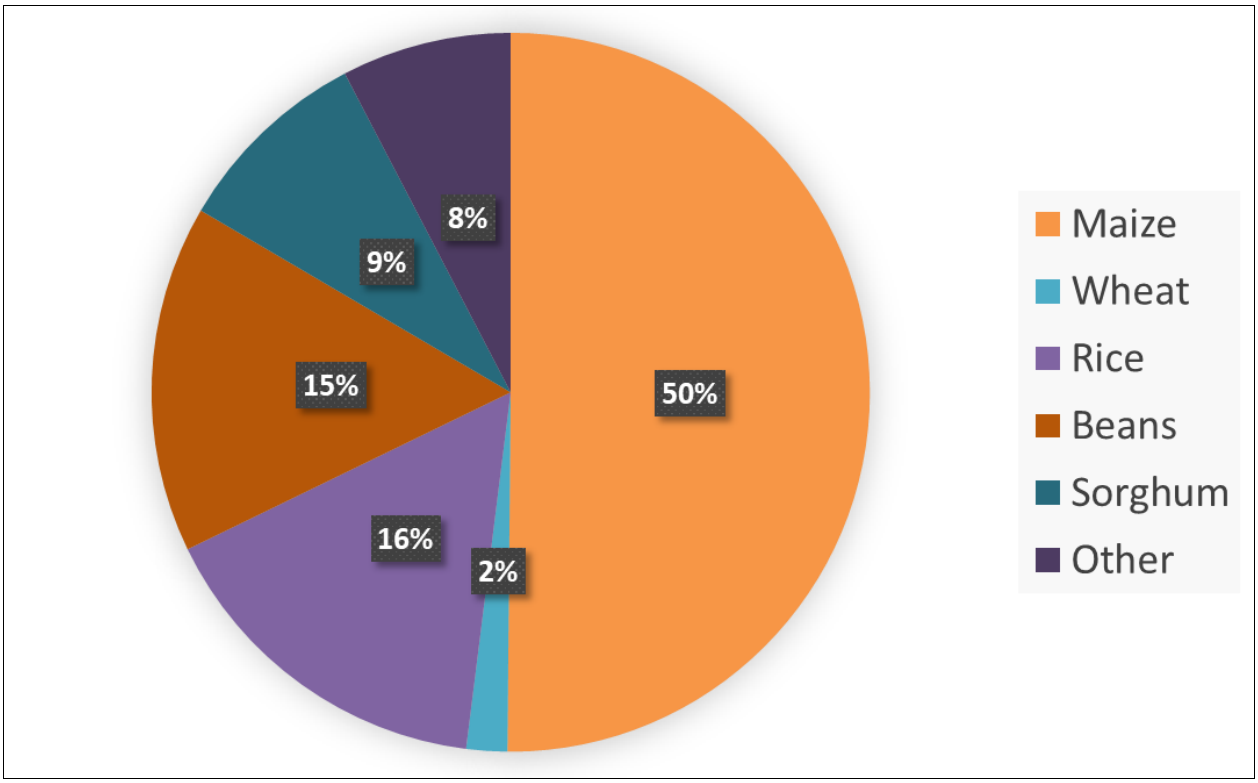

Figure 1*: Most commonly produced and traded crops in the ECA region.*

Climate change presents substantial risks to agriculture in Eastern and Central Africa (ECA), with erratic rainfall, prolonged droughts, and extreme weather events causing crop failures and reduced yields. This necessitates a shift to climate-smart agricultural practices.
ECA's regional agricultural trade is vital for its economies but faces various barriers. These include unharmonized sanitary and phytosanitary (SPS) measures, leading to problems like aflatoxin contamination and pesticide residue exposure in staple crops. Additionally, differences in inspection procedures and limited technical capacity complicate trade, while transboundary animal diseases result in significant economic losses for farmers and governments.

Examples

1. **Crop Pests and Diseases**: The ECA region faces threats from devastating crop pests and diseases like the African Fall Army Worm (FAW), Maize Lethal Necrosis Disease (MLND), and Tuta absoluta, which impact various crops, including maize and tomatoes.
2. **Fresh Produce Concerns**: Consumers of fresh fruits and vegetables in the region are troubled by issues related to pesticide residues and toxins. Non-compliance with recommended post-harvest intervals and the use of unregulated pesticides lead to pesticide residues in fresh produce, resulting in market rejections and health risks.
3. **Transboundary Animal Diseases**: Transboundary animal diseases (TADs) and zoonoses, such as Foot and Mouth Disease (FMD), Contagious Bovine Pleuro-Pneumonia (CBPP), Lumpy Skin Disease (LSD), Anthrax, and Rabies, have cross-border impacts, causing economic losses and public health risks.

Aflatoxin contamination in staple crops is also a significant concern, posing threats to human and animal health and regional trade.

To address the agricultural challenges in the ECA region, strategies encompass strengthening multi-stakeholder partnerships, harmonizing policies, improving surveillance and monitoring, promoting good agricultural practices, capacity building and awareness, fostering research and innovation, and facilitating market access. While there have been regional and national efforts to enhance sanitary and phytosanitary measures, collaborating with ASARECA offers opportunities to achieve more significant results. This collaboration entails supporting procedural harmonization, promoting Pest Risk Analysis (PRA) standardization, strengthening capacity and integration, advocating for favourable policies, engaging with industry associations and the private sector, managing knowledge and information, and coordinating regional research priorities and partnerships. (Fig. 2).

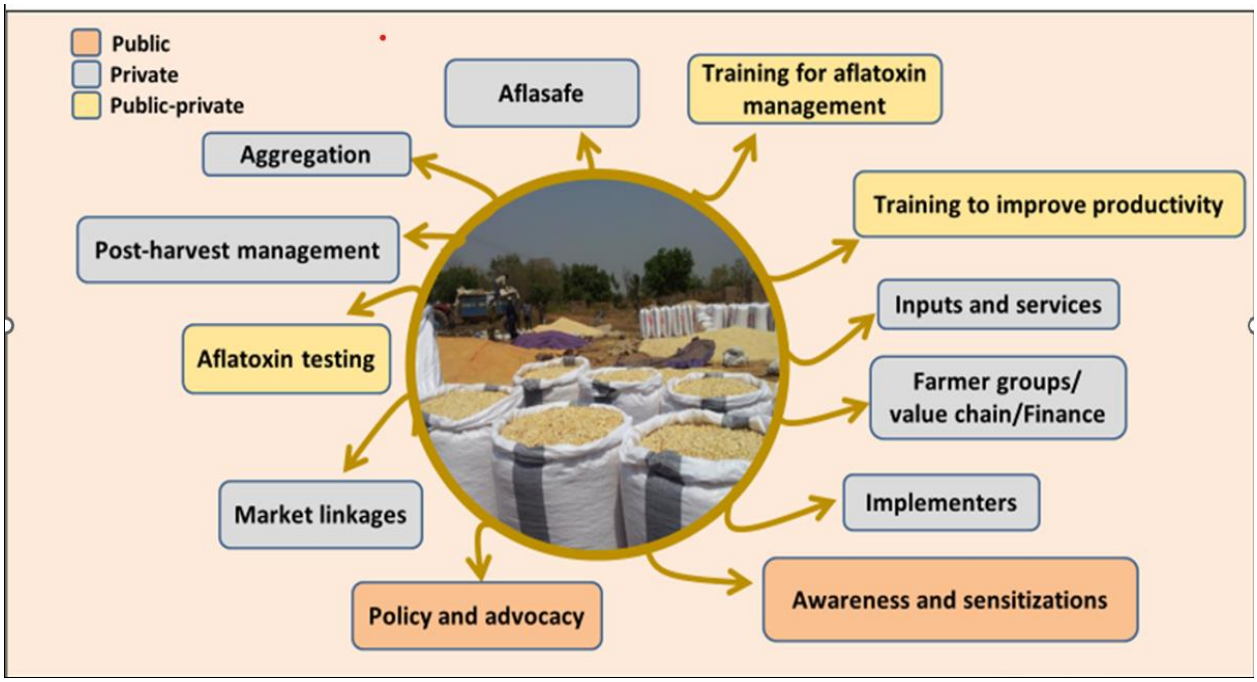

Figure 2: Example of an integrated approach for aflatoxin management

3.2 Status, gaps, and road map for harmonization of agricultural trade policies and standards

Mr. Chiluba Mwape

Africa's agriculture and agribusiness sectors show significant growth potential, with the World Bank forecasting a threefold increase to USD 1 trillion by 2030. The African Continental Free Trade Area (AfCFTA) aims to create a unified market for goods and services within the continent, offering opportunities for increased agricultural trade and food security. However, Africa's global trade involvement is currently limited, representing only 2.7% of global goods trade and 5% of global agricultural trade. To tap into this potential, there's a need for improved infrastructure, regional cooperation, agricultural investments, and supportive policies. Additionally, investing in research, sustainable farming practices, and supporting smallholder farmers is crucial for sector growth and competitiveness.

Challenges to Intra–African Trade

There are several challenges to intra-African trade that need to be addressed to fully exploit the potential of the African agricultural and food market. Some of the key challenges include:

a) Weak productive capacities and limited economic diversification
b) Tariff-related trade costs
c) Non-tariff-related trade costs
d) Sanitary and Phytosanitary (SPS) measures

Roadmap for Harmonization of Agricultural Policies and Standards

The roadmap for harmonization of agricultural policies and standards in Africa includes several initiatives and actions aimed at improving trade performance and enhancing compliance with standards. Some of these initiatives include:

i. The Pan African Quality Infrastructure (PAQI) initiative
ii. The execution of the SPS Policy Framework
iii. The execution of the AU Commodity Strategy as per Assembly/AU/Dec.565 (XXIV)
iv. Aligning trade regimes, rules of origin, and standards/non-tariff barriers (NTBs) (2021-2024)

v. Accelerating the dissemination of information regarding NTBs (2021-2023)
vi. Supporting the implementation of the WTO Trade Facilitation Agreement (2021-2023)
vii. Streamlining customs and transit procedures (2021-2026)
viii. Development of data on agroecology (2021-2023)
ix. Promotion of agro-industrial parks and special economic zones (2021-2024)

3.3 Status and gaps for operationalization of the African Continental Free Trade Area Agreement and road map for implementation of key actions, including dealing with non-tariff barriers

Ms. Diana Oyena Akullo

The African Continental Free Trade Area (AfCFTA) is a groundbreaking initiative aimed at establishing a single market for goods and services across the African continent. Since its launch on January 1, 2021, it has garnered significant support, with 54 out of 55 African countries signing the agreement, and 46 countries ratifying it. This monumental trade agreement is expected to have far-reaching economic implications, given its vast market of over 1 billion consumers and an estimated combined GDP of approximately $3.4 trillion.

d. **Informal Trade and Women Traders**

Informal trade, which constitutes more than 30% of intra-African cross-border trade, is a crucial aspect of African commerce. Often led by small-scale traders, including many women, this informal trade plays a significant role in the continent's economy. The AfCFTA acknowledges the challenges faced by these informal traders and seeks to facilitate their transition into the formal economy. By addressing trade barriers, enhancing market access, and promoting economic integration, the AfCFTA aims to unleash Africa's economic potential, create job opportunities, and improve livelihoods. This underscores its commitment to fostering inclusive and sustainable growth, leveraging the youthful population, supporting SMEs, and empowering women in trade.

The Protocol on Trade in Goods

The AfCFTA encompasses various protocols and areas to facilitate trade and economic integration among member countries, with the Protocol on Trade in Goods being a cornerstone. This protocol addresses key aspects, including schedules of tariff concessions, rules of origin, customs cooperation, trade facilitation, non-tariff barriers (NTBs), technical barriers to trade (TBTs), sanitary and phytosanitary (SPS) measures, transit, and trade remedies. These components are essential for ensuring smooth trade flows and economic cooperation among African nations.

Non-Tariff Barriers – Scope, Objectives, and Mechanism

Non-tariff barriers (NTBs) have long hindered trade within Africa, encompassing a range of measures and obstacles such as excessive regulations, licensing requirements, quotas, and technical trade barriers. Addressing these NTBs is crucial for promoting trade integration within the AfCFTA. The AfCFTA recognizes the importance of this issue and outlines a comprehensive approach, including mechanisms for identification, categorization, and progressive elimination of NTBs, the development of reporting and monitoring tools, and the facilitation of NTB resolution. Furthermore, the establishment of the AfCFTA NTB Online Mechanism allows economic operators to report and address NTBs effectively.

Technical Barriers to Trade – Scope and Objective

Technical barriers to trade (TBTs) encompass technical regulations, standards, and conformity assessment procedures that can impede trade. The AfCFTA aims to harmonize and align these technical regulations and standards among member countries to minimize TBTs. This entails promoting the use of harmonized or internationally recognized standards, encouraging regulatory coherence and transparency, facilitating conformity assessment procedures, and enhancing accreditation and metrology. The overall objective is to foster trade facilitation through cooperation and the elimination of unjustifiable TBTs.

Sanitary and Phytosanitary (SPS) Measures

SPS measures focus on health and safety regulations for agricultural and food products, aiming to protect human, animal, or plant life and health. The AfCFTA aims to promote harmonization and mutual recognition of SPS standards, facilitating the movement of agricultural goods while ensuring consumer health and safety. This involves enhancing cooperation and transparency among member countries in developing and implementing SPS measures, aligning measures with international norms, and improving technical capacity.

The AfCFTA Guided Trade Initiative (GTI)

The AfCFTA Guided Trade Initiative (GTI) is a significant development aimed at guiding and facilitating trade under the AfCFTA. It encompasses various objectives, such as demonstrating the efficiency of the legal framework, obtaining feedback on legal and institutional systems, testing private sector readiness, and identifying future interventions to enhance intra-African trade. The GTI has already yielded promising outcomes, with the involvement of seven state parties, 93 commercial deals conducted, and invitations

extended to other countries. Requirements for participation include achieving State Party status, possessing approved tariff concessions, establishing coordination committees, and demonstrating commitment to business mobilization and connection.

Lessons Learned

The implementation of the AfCFTA has provided valuable lessons that can inform future efforts and enhance the effectiveness of the trade agreement:

1. The AfCFTA's trade legal framework is well-prepared to support actual trade, highlighting the importance of its legal foundation.
2. Establishing dedicated coordination and implementation committees at the national level is essential for effective execution.
3. Addressing logistical challenges, particularly in low-scale trades, underscores the need for infrastructure development to facilitate cross-border movement.
4. Private-sector engagement is crucial for the success of the AfCFTA, necessitating awareness programs to encourage business participation.
5. Tailored solutions are necessary to address trade finance and transportation challenges, considering the unique African context.
6. The GTI has facilitated constructive discussions among State Parties, emphasizing the importance of collaboration.
7. Recognizing the role of trade aggregators can drive economies of scale, benefiting SMEs and mitigating resource constraints.

4. STRATEGIES FOR PROMOTING EARLY WARNING FOR EARLY ACTION

4.1. Developing Resilience Through Climate Disaster Risk Reduction with Early Warning Systems

Climate disaster risk reduction and early warning systems are crucial in building resilience to climate change impacts. Here are key points, recommendations, and action areas to develop resilience through climate disaster risk reduction with early warning systems:

- **Resilience:** Involves coping with and managing climate change impacts, encompassing various capacities.
- **Climate Disaster Risk Reduction (DRR):** Systematic approach to identifying and reducing climate-related risks.
- **Early Warning Systems (EWS):** Provide timely risk information to reduce exposure, involving detection, monitoring, analysis, prediction, and dissemination.
- **ICPAC:** Plays a significant role in building resilience through climate disaster risk reduction.

Recommendations:

1. **Frameworks for Climate Services:** Implement regional and national frameworks for weather, water, and climate services.
2. **Strengthen Early Warning Systems:** Invest in technology, infrastructure, and expertise for multi-hazard EWS.
3. **Data Collection and Monitoring:** Collect comprehensive data on hazards, vulnerabilities, and coping capacities.
4. **Collaborative Approach:** Engage stakeholders for the co-production of climate services.
5. **Capacity Development:** Build skills and knowledge in climate disaster risk reduction.

Action Areas:

- **Climate Monitoring Services:** Develop and enhance climate monitoring services.
- **Warning Dissemination and Communication:** Implement effective warning dissemination strategies.
- **User Interface Platforms:** Strengthen user engagement and two-way communication.
- **Research and Pilot Projects:** Conduct research and pilot projects to advance understanding of climate risks.
- **Advocacy and Investment:** Advocate for increased investment in early action measures and support frameworks for climate services.

4.2. Improving the relevance and accuracy of climate forecasts/services at the national level

Tamirat Bekele (ILRI)

The agricultural sector is vulnerable to climate variability and change. This has affected crop and livestock production, the national economy, and livelihoods. Improving the relevance and accuracy of climate forecasts and services at the national level is crucial for effective planning and decision-making, especially in countries whose economy relies heavily on the agricultural sector. To achieve this goal, several steps can be taken:

1. Climate Risk Assessment:

- Tailored assessment to the region, considering extreme indices for various sectors.
- Evaluate current and future climate-related hazards and risks across climate scenarios.

2. Deepening Comprehension of Climate Hazards: Understand present and future extreme climate hazards linked to climate change's impact on agriculture.
3. Early Warning Information Delivery: Ensure clear, prompt delivery of unambiguous early warning climate data to stakeholders.
4. Conveying Climate Risk Uncertainty: Effectively communicate the dynamic nature of climate risks and heightened uncertainty to support informed decisions.
5. Resource Allocation for Capacity Building: Allocate resources to enhance understanding, utilization of climate forecasts, and collaboration among stakeholders.
6. Feedback Mechanism for Improvement: Establish a mechanism for stakeholders to provide feedback on the quality and relevance of climate forecasts and services.

Data Sources for Climate Risk Assessment and Agriculture Impact Analysis
To conduct a climate risk assessment, several types of data are needed. Here is an overview of the data required:

1. **Observational and Reanalysis Datasets:**
    - **Climate Research Unit (CRU) Datasets:** Historical climate observations, including precipitation and temperature, at a global scale.
    - **Global Precipitation Climatology Project (GPCP) Datasets:** Global precipitation data, including gridded and satellite-based observations.
    - **Fifth generation of the European Centre for Medium-Range Weather Forecasts Reanalysis (ERA5):** Comprehensive atmospheric and surface climate data, covering variables like humidity, temperature, wind, and more.
2. **Climate Model Simulations:**
    - **CMIP6 (Coupled Model Intercomparison Project Phase 6):** Collection of climate model simulations from multiple research institutions. Includes various climate models simulating the Earth's climate system, facilitating the projection of future climate scenarios under different emission scenarios and socioeconomic pathways.
3. **Crop-Relevant Extreme Indices and Indicators:**
    - **Sector-Specific Climate Extreme Indices:** Capture extreme climate events relevant to the agriculture sector (e.g., NHD, HWF, HWA, CDD, R99Ptot, EX1Day).
    - **Crop Relevant Climate Indicators:** Focus on factors directly related to crop growth and management (e.g., crop water demand, irrigation requirements).
    - **Suitability Analysis:** Integration of climate data (temperature, precipitation, etc.) with information on crop suitability to assess the potential impacts of climate change on crop growth and identify regions facing increased risks or opportunities.

Transition to Climate Services:

- Recognize the relevance of different time scales, tailor information, and provide tools for addressing long-term climate projections.

Climate Risk Analysis Data:

- **Observational and Reanalysis Datasets:**
    - CRU datasets for historical climate observations (precipitation, temperature).
    - GPCP datasets for global precipitation data.
    - ERA5 for comprehensive atmospheric and surface climate data.
- **Climate Model Simulations:**
    - CMIP6 model simulations for future climate projections under various scenarios.
- **Crop-Relevant Extreme Indices and Indicators:**
    - Sector-Specific Climate Extreme Indices (e.g., NHD, HWF, HWA).
    - Crop Relevant Climate Indicators (e.g., crop water demand, irrigation requirements).
    - Suitability Analysis for assessing crop suitability.

Climate Risk Analysis Approach

Suitability analysis involves integrating climate data, such as temperature, precipitation, and other relevant factors, to determine the suitability of specific areas for different crops. This analysis helps understand the potential impacts of climate change on crop growth and identify regions that may face increased risks or opportunities. To perform a climate analysis, several key steps can be followed, including evaluating model reliability compared to observations, analysing projected changes, conducting spatially explicit hot-spot detection, and identifying present and future crop-suitable areas. Here's an overview of the approach:

1. **Evaluate Model Reliability:**
    - Compare CMIP6 model simulations with observational data (1985-2014).
    - Assess model performance using statistical metrics.
    - Identify discrepancies and biases.
2. **Analysis of Projected Changes:**
    - Analyze future climate projections (2041-2100) under different emission scenarios (e.g., SSP2-4.5, SSP5-8.5).
    - Evaluate changes in key climate variables at global and regional scales.
    - Assess the magnitude and spatial patterns of projected changes.
3. **Spatially Explicit Hot-Spot Detection:**
    - Identify vulnerable areas or significant changes using spatial analysis.
    - Use statistical methods or indices for hot-spot detection.
    - Consider variables like temperature, precipitation, or combinations.
    - Assess spatial distribution and intensity of hot spots.
4. **Identify Present and Future Crop Suitable Areas:**
    - Integrate climate data with crop suitability information.
    - Determine current suitability based on the reference period (1985-2014).
    - Use projected climate data to assess future changes in crop suitability.
    - Identify areas of increasing or decreasing crop suitability.

5. CLIMATE-SMART AGRICULTURE AND DIGITAL INNOVATIONS FOR SCALING

1.1 Delivery of digital climate advisory services to smallholders through partnership

Dr. Kindie Tefsaye (CIMMYT)

Smallholder agriculture in Africa is facing numerous challenges exacerbated by the impacts of climate change. These challenges include the emergence of new diseases and pests, high and extreme temperatures, increased climate variability, droughts, seasonal shifts, short growing seasons, and loss of crop area. Smallholder farmers, who make up a significant portion of the agricultural workforce, are particularly vulnerable to these climate-related risks due to factors such as low input-output ratios, small plot sizes, land degradation, and limited access to markets, credits, and labour. Addressing these challenges and effectively managing climate variability and change is crucial for the adaptation and transformation of smallholder agriculture. One innovative approach to support smallholders in this regard is the delivery of digital climate advisory services, which provide decision-relevant information to farmers.

Digital Climate Agro Advisories

Digital climate agro advisories provide farmers with valuable information at both seasonal and operational levels, enabling them to make data-driven decisions that enhance agricultural productivity, reduce resource waste, and promote environmentally sustainable practices. These advisories are an essential tool in adapting agriculture to the challenges posed by climate change and ensuring food security for smallholder farmers in ASARECA member states. These advisories provide valuable information to smallholder farmers, enabling them to make informed decisions at different stages of their agricultural activities.

Seasonal Advisories (3-6 months):

Seasonal advisories focus on strategic decisions that smallholder farmers need to make for the upcoming agricultural season. These advisories provide information on crop and variety selection, import of inputs, and overall planning for the season. Here are some key elements of seasonal advisories:

1. **Crop and Variety Choice:**
    - Offer insights for crop and variety selection based on long-term climate forecasts.
    - Empower farmers to choose resilient crops, increasing chances of successful harvests.
2. **Import of Inputs:**
    - Align input importation with climate predictions, optimizing resource allocation.
    - Informed decisions on fertilizers, seeds, and pesticides reduce waste and financial losses.
3. **Climate Risk Assessment:**
    - Provide insights into upcoming climate risks (e.g., droughts, floods, heatwaves).
    - Enable risk mitigation through strategies like crop diversification and water conservation.

Operational Advisories (1-15 days):

Operational advisories focus on tactical decisions that smallholder farmers need to make on a shorter timescale, typically ranging from 1 to 15 days. These advisories provide timely information to guide day-to-day agricultural operations. Here are some key elements of operational advisories:

1. **Fertilizer and Nutrient Management:**
    - Guide timing, dosage, and application methods based on short-term weather and soil data.
    - Optimize nutrient uptake, reduce costs, and minimize environmental impact.
2. **Pesticide Application:**
    - Inform about pest and disease outbreaks and optimal spraying windows.
    - Improve pest control while minimizing environmental impact.
3. **Irrigation Scheduling:**
    - Consider short-term weather forecasts, crop water needs, and soil moisture data.
    - Optimize water use, conserve resources, and enhance crop yields.

Delivery of Digital-Agro-advisory Services through partnership

To ensure the effective delivery of digital-agro-advisory services to smallholders, partnerships between various organizations and stakeholders are crucial. In Ethiopia, the production and translocation of advisory services are handled by organizations the Ethiopian Institute of Agricultural Research (EIAR), the International Maize and Wheat Improvement Center (CIMMYT), the Alliance of Bioversity International and CIAT, and the International Livestock Research Institute (ILRI). These organizations have expertise in generating climate and crop-related data, conducting research, and developing advisory content.

On the other hand, the agro-advisory communication and feedback mechanisms are facilitated by the Livestock and Irrigation Sector Harmonization Agency (LERSHA), the Bureau of Agriculture (BoA), farmer unions, and cooperatives. The communication channels used to deliver the agro-advisories include short messages service (SMS), recorded voice (voice blast), development agents, mobile apps, websites, and mass media. These organizations have direct connections with smallholder farmers and can serve as intermediaries in delivering and collecting feedback on digital-agro-advisory services. They play a crucial role in ensuring that advisory messages reach the intended recipients and are understood and implemented effectively.

The partnerships between these organizations can be structured in the following ways:

1. **Collaborative Content Development:**
    - Collaboration among organizations (EIAR, CIMMYT, Alliance, ILRI) to develop localized advisory content.
    - Integration of scientific research, climate data, and best agricultural practices.
2. **Technical Infrastructure Support:**
    - Partnerships with technology companies and research institutions for technical platform development.
    - Focus on user-friendly interfaces, data accuracy, security, and capacity building.
3. **Extension Services Integration:**
    - Integration of digital-agro-advisory services into existing extension programs.
    - Training of extension workers to effectively deliver advisory messages.
4. **Farmer Engagement and Empowerment:**
    - Involvement of farmer unions and cooperatives to promote technology adoption.
    - Organizing training programs, and workshops, and advocating for smallholders' needs.

Delivering climate agro-advisory services to smallholder farmers is indeed crucial for their adaptation to climate change. To ensure the effectiveness and accessibility of these services, the following factors should be considered:

1. **Customization and Relevance:**
    - Tailor advisories to local conditions, including climate patterns, crops, and practices.
    - Enhance understanding and implementation among farmers.
2. **Appropriate Delivery Channels and Languages:**

- Utilize accessible channels (mobile phones, radio, etc.) for communication.
- Deliver advisories in local languages to ensure effective outreach.

3. **Public-Private Partnership in Digital Agriculture Services:**
    - Collaborate for scaling advisory services, with the public sector providing policy and funding support.
    - Leverage private sector expertise in digital platforms and service delivery.
4. **Bundling with Risk Management Options:**
    - Integrate advisories with risk management options like insurance, credit, and input delivery.
    - Offer comprehensive support, addressing multiple aspects of agricultural risk.
    - Example: Combine planting advisories with weather-indexed insurance for comprehensive protection.

1.2 Developing site-specific digital fertilizer recommendations

Dr. Lulseged Desta (Alliance Bioversity CIAT)

This study explores the development of site-specific digital fertilizer recommendations to address crop yield disparity in Africa, particularly in Ethiopia. The research focuses on soil and agronomy data collected since the 1960s, aiming to enhance crop productivity and address the region's yield disparity. A case study in Ethiopia demonstrated the importance of location-specific and season-smart fertilizer recommendations for wheat crops. The results showed that the location-specific advisory significantly outperformed both local and national recommendations in terms of wheat grain yield and straw yield. The findings highlight the potential benefits of tailoring fertilizer recommendations to specific locations, considering local environmental conditions and crop requirements.

Another piloting of the location-specific fertilizer advisory was carried out, with approximately 3,300 farmers implementing the advisory during the 2021/2022 season. The analysis revealed that grain yield increased by up to 38% for farmers who applied the location-specific advisory compared to those who did not. The next steps involve strengthening various components of agriculture, including organic farming, CSA, and GAPs, and integrating the advisory with pest and disease management and bundling services based on farmers' needs. The study emphasizes the importance of using appropriate channels and timing for disseminating the advisory to different segments of society, ensuring sustainable and inclusive growth.

1.3 Evolution of Ethiopian Digital Agro Climate Advisory Platform (EDACaP) and Lessons Learned

Jemal Seid (EIAR, SSSA, CIMMYT, AB-CIAT)

The Ethiopian Digital Agro-Climate Advisory Platform (EDACaP) aims to provide agroclimate service solutions that enhance the adaptive capacity of small-scale farmers in the face of climate-induced risks. Its primary objectives are to achieve food security and promote sustainable agriculture. The platform achieves these goals through a series of steps:

1. Generate and Translate Climate Knowledge:

- EDACaP collects and analyzes climate data, past and present.
- Uses advanced forecasting techniques to generate comprehensive climate knowledge.
- Translates complex climate data into actionable insights.

2. Transfer and Utilize Translated Knowledge:

- Disseminates translated climate information to relevant stakeholders.
- Targets farmers, policymakers, health officials, and more.
- Facilitates informed decisions, policies, and operational plans.

3. Learn and Improve:

- Constantly evaluates the impact of its climate knowledge.
- Identifies effective strategies and areas for improvement.
- Enables continuous refinement of climate advisory services.

Existing Challenges for Climate Information in the Agricultural Sector

1. Availability of Climate and Weather Data at a Small Scale

One of the key challenges is the limited availability of climate and weather data at a local or small scale. Weather stations are often sparsely distributed, making it difficult to obtain accurate and timely information for specific locations. This lack of data hampers the ability to provide precise and location-specific climate information.

2. Quality of Information

Ensuring the accuracy and reliability of climate information is crucial for effective decision-making. In some cases, the quality of available climate data may be questionable, leading to uncertainties and inaccuracies in the information provided to farmers. The use of outdated or incorrect data can undermine the trust and effectiveness of climate advisory services.

3. Communication with Farmers

Effective communication and understanding of climate information is essential for farmers to make informed decisions. However, communicating complex climate concepts and forecasts to farmers who may have limited scientific knowledge can be challenging. It is important to bridge the gap between technical language and the practical understanding of farmers, ensuring that the information is accessible and actionable.

4. Integration of Local Knowledge

Local knowledge and traditional farming practices play a vital role in agriculture. Integrating local knowledge with scientific climate information can enhance the relevance and effectiveness of agro-advisories. However, striking a balance between scientific expertise and indigenous knowledge can be challenging, requiring collaboration and dialogue between different stakeholders.

Production of Climate Information and Agro-Advisories

1. Understanding Farmers' Needs

To produce climate information that is valuable for decision-making, it is essential to understand the specific needs and requirements of farmers. This can be achieved through engagement and consultation with farmers, agricultural extension workers, and other stakeholders. Surveys, interviews, and participatory approaches can help identify the information gaps and preferences of the target audience.

2. Local Scale or Location-Specific Downscaling

Downscaling is the process of refining climate information from larger-scale models to local or regional scales. This can be done using statistical or dynamical downscaling techniques. Downscaled climate information by considering local topography, land use, and other factors that influence the climate, resulting in more accurate and localized information for decision-making.

3. Translating and Tailoring Climate Information

Climate information needs to be translated into formats and languages that are understandable and relevant to farmers. It should be presented in a user-friendly manner, using visual aids, infographics, or simple language. Agro-advisories should also consider the specific farming practices, crop types, and local conditions to provide tailored recommendations that align with the realities of the local agricultural system.

Rationale of EDACaP

EDACaP was developed to address the poor mismatch between operational seasonal climate forecasts (SCFs) and the climate information needs of farmers. While global, regional, and national

SCFs exist, they often have limitations when it comes to meeting the specific requirements of farmers for decision-making in agriculture. Some of the key reasons for the need for EDACaP are as follows:

1. **Poor Mismatch:** Existing seasonal climate forecasts (SCFs) often don't align with the specific information needs of farmers at the local level. This discrepancy can undermine the confidence and usefulness of these forecasts.
2. **Limitations of Tercile Probabilistic SCFs:** Tercile probabilistic SCFs offer information about the likelihood of above-normal, normal, or below-normal conditions, but they lack the level of detail farmers require. Farmers need more precise data on rainfall amounts, timing, and temperature patterns for effective agricultural planning.
3. **Subjective Consensus Process:** Regional and national SCFs are typically developed through subjective consensus, relying on expert judgment. This approach may lack transparency and robustness, making it challenging for farmers to trust these forecasts. Farmers often prefer objective, data-driven methods that incorporate local knowledge and experiences.
4. **Gap Across the Climate Services Value Chain:** The climate services value chain involves generating, translating, transferring, and utilizing climate information. EDACaP addresses the gap in this chain, ensuring that climate information is tailored to farmers' needs, effectively communicated, and integrated into their decision-making processes. This enhances the usability and value of climate information for farmers.

Pillars of EDACaP

EDACaP operates based on four key pillars, which serve as the foundation for its operations and objectives. These pillars outline the core components and principles of the Ethiopian Digital Agro-Climate Advisory Platform. The pillars of EDACaP are as follows:

1. **Climate Information Generation:** This pillar involves collecting, analyzing, and interpreting climate data from various sources to generate accurate and reliable climate information. This information serves as the foundation for agricultural advisories and decision-making.
2. **Climate Information Translation:** This pillar focuses on translating climate data into practical and understandable formats that are relevant to farmers and stakeholders. It transforms data into actionable insights that can be easily applied in agriculture.
3. **Climate Information Transfer:** The transfer pillar is dedicated to disseminating the translated climate information to the right recipients. It selects appropriate communication channels, formats, and media to reach farmers, policymakers, and others on time.
4. **Climate Information Utilization:** This pillar emphasizes applying climate information in operational decisions, policies, and plans. It involves integrating climate considerations into agricultural practices, risk management, and policymaking to facilitate informed decision-making by various stakeholders in the agricultural sector.

These four pillars collectively work to enhance the adaptive capacity of small-scale farmers, achieve food security, and promote sustainable agriculture in Ethiopia. They guide the activities and efforts of EDACaP in providing agroclimate service solutions that address climate-induced risks and support the resilience of farmers in the face of changing climatic conditions.

EDACaP Improvement module

The EDACaP Improvement module aims to enhance various aspects of the Ethiopian Digital Agro-Climate Advisory Platform to improve its functionality, usability, and effectiveness. The module focuses on several key areas for improvement, including:

1. **Database and API Improvement:** Improving the database infrastructure to efficiently store, manage, and retrieve climate data. Optimizing the Application Programming Interface (API) for seamless data integration with other systems.
2. **Improve Model Engine Integration:** Enhancing the integration of advanced modelling techniques and algorithms to improve the accuracy of climate forecasts and projections.

3. **Web Portal Visualization Improvement:** Enhancing the user interface of the web portal for better visualization of climate information, making it more interactive and user-friendly.
4. **Dissemination and Feedback Mechanism Integration:** Integrating efficient channels for disseminating climate information, such as SMS alerts and mobile apps, and incorporating mechanisms for user feedback.

EDACaP has a multifaceted approach to promoting climate information adoption and improving its platform:

1. **Demonstrating Value:** Through case studies and impact assessments, EDACaP illustrates the benefits of climate information in informed decision-making for agriculture, encouraging its widespread use.
2. **Collaboration and Knowledge Sharing:** EDACaP actively collaborates with other initiatives, fostering knowledge exchange and leveraging expertise to enhance the effectiveness and reach of climate information services.
3. **Continuous Improvement:** The platform is committed to improving functionality, usability, and effectiveness, ultimately contributing to sustainable agriculture and food security in Ethiopia.

By addressing these areas, EDACaP plays a pivotal role in enhancing small-scale farmers' adaptive capacity, ensuring food security, and promoting sustainable agricultural practices in the region.

1.4 The Kenya Agricultural Observatory Platform (KAOP)

Dr. Michael Okoti (KALRO)

The Kenya Agricultural Observatory Platform (KAOP) is an agricultural risk management tool designed to assist farmers in making informed decisions about their farming practices. It addresses various pain points faced by farmers, including what to grow, when to grow, and how to grow. Here's how KAOP helps farmers with each of these aspects:

1. **What to Grow:** KAOP employs remote sensing data and agronomic models to recommend suitable crops based on factors like soil composition, climate, and historical crop performance.
2. **When to Grow:** It uses rainfall and vegetation data along with weather forecasts to advise farmers on the ideal timing for planting and harvesting crops, maximizing yield potential.
3. **How to Grow:** KAOP aids in crop disease management, offering guidance on pest and disease control, crop monitoring, and yield prediction models.

By providing real-time, location-specific information, KAOP empowers farmers to make data-driven decisions and implement climate-smart agricultural practices. It offers weather predictions for the next 15 days and historical weather data for the past seven days, enabling effective farm planning.

1.5 Community-based small ruminant breeding programs

Dr. Aynalem Haile (ICARDA)

Community-based small ruminant breeding programs can be effective options for genetic improvement in low-input systems. These programs involve the active participation of smallholder farmers who collectively work towards improving the genetic potential of their flocks. There are major steps in setting up a CBBP and options for genetic improvement in community-based small ruminant breeding programs:

1. **Decentralized Decision-Making:** Farmers actively participate in planning and decision-making, leading their breeding activities.
2. **Customized Breeding Objectives:** Programs prioritize farmers' objectives, which may include productivity, disease resistance, or local adaptation.

3. **Infrastructure Enhancement:** Adequate infrastructure, including breeding centres and genetic material storage, supports program effectiveness.
4. **Collective Selection and Breeding:** Farmers collectively make breeding decisions and choose superior animals for natural mating or artificial insemination.
5. **Genetic Exchange and Diversity:** These programs encourage genetic material exchange, promoting diversity and reducing inbreeding.
6. **Capacity Building and Sustainability:** Capacity building, participatory monitoring, and local ownership ensure long-term program success and sustainability.

Scaling of SmaRT Pack CBBP:

- Expansion Strategies: Scaling efforts include replicating successful CBBPs and increasing breeding male dissemination.
- Maximizing Genetic Impact: Intense use of CBBP rams in the nucleus and base herds enhances the genetic impact.

Scaling Framework Components:

- Support Elements: Technical assistance, organizational development, capacity building, and market information.
- Input and Service Provisions: Improved feeds and health interventions for enhanced animal productivity.
- Market Linkages: Access to local, urban, and export markets for better prices and expanded reach.
- Genetic Improvement: Dissemination of superior genetics for long-term program success.

Dtreo Database Platform:

- Versatile Data Tool: Dtreo serves as a comprehensive data management and analysis tool for various species.
- Offline Data Gathering: Integration with AniCapture allows data collection in areas with limited connectivity.
- Wide Applicability: Suitable for agriculture, livestock, and wildlife management, accommodating diverse datasets.
- Data Analysis and Reporting: Generates reports, conducts analyses, and provides graphical representations for informed decision-making.

1.6 Scaling of Livestock Feed and Forage Innovations: Experience from Ethiopia

Dr. Kindu Mekonnen (ILRI)

Livestock Production in Ethiopia:

- Livestock plays a vital role in the Ethiopian economy, with a substantial population of cattle, shoats, and equines.
- The total livestock population in Ethiopia in 2020 was about 155.5 million, with cattle accounting for 65.4 million.
- Increasing demand for livestock products highlights the importance of livestock production.

Constraints in Livestock Production:

i. **Feed Availability:**

- Limited availability and quality of feed resources.
- Seasonal fluctuations in forage production due to rain-fed agriculture.
- Year-round access to high-quality feed is critical for sustaining livestock productivity.

ii. **Animal Health:**

- Disease outbreaks and inadequate veterinary services pose challenges.
- Livestock diseases, like tick-borne diseases and trypanosomiasis, lead to productivity losses.
- Limited access to veterinary services and vaccines exacerbates health issues.

iii. **Breed-related Issues:**

- The genetic potential of breeds affects livestock productivity.

- Indigenous breeds are prevalent but often have lower productivity.
- Breeding programs targeting genetic improvement and introducing improved breeds are essential.

Climate-Smart Solutions in Ethiopia:

- Projects like Africa RISING and AICCRA focus on innovative feed and forage technologies, improved animal health, and breed improvement.
- The adoption of climate-smart livestock feed and forage innovations enhances feed availability, animal nutrition, and productivity.

Strengthening Animal Health:

- Veterinary services and disease control measures are improved.
- Interventions include vaccination campaigns, disease surveillance, and capacity building for veterinary professionals.

Breed Improvement:

- Introduction and promotion of improved livestock breeds.
- Crossbreeding and selection within indigenous breeds enhance productivity.

Scaling Climate-Smart Innovations:

- Various institutions, including RARIs, NARIs, CGIAR centres, universities, NGOs, and the private sector, contribute to addressing constraints in livestock production.
- Scaling niche-compatible and demand-driven feed options to wider geographies is a strategy to enhance feed availability and bridge the feed gap.
- Identifying suitable feed options for specific niches and adapting them to different regions and agroecologies is crucial for addressing local livestock producers' needs and preferences.

What is scaling?

Scaling refers to a deliberate and systematic effort to increase the reach and impact of an innovation or intervention. It involves expanding the number of beneficiaries, geographic coverage, and utilization of the innovation. Scaling is a complex process that requires careful consideration of various factors and involves multiple dimensions. There are several types of scaling approaches:

a. Scaling out involves increasing the number of beneficiaries reached by expanding the implementation of the innovation to new areas or communities. It focuses on horizontal expansion and wider dissemination.

b. Scaling up involves institutionalizing mechanisms and processes to sustain and replicate the innovation at a larger scale. It often requires engaging with policymakers, government agencies, and other stakeholders to integrate the innovation into existing systems and policies.

c. The scale-jumping approach aims to expand the decision-making power and authority for scaling to higher levels, such as regional or national levels. It involves influencing policies, regulations, and resource allocation to facilitate the widespread adoption and implementation of the innovation.

d. Scaling down refers to devolving the power and responsibility for scaling to local actors, such as communities, local organizations, or grassroots initiatives. It emphasizes empowering local stakeholders to take ownership of the innovation and adapt it to their specific context.

e. Scale bending involves overcoming or even resisting the constraints and challenges that hinder the scaling process. It requires creative strategies to navigate barriers, adapt to local conditions, and ensure the sustainability and effectiveness of the scaling efforts.

In the pre-scaling and post-scaling processes, various activities are involved:

1. **Diagnosis and Context Assessment:**
   - Assess the context, identify needs and opportunities, and understand scaling potential.
2. **Identification of Interventions:**
   - Create databases of potential interventions for scaling.
   - Select innovations based on effectiveness, feasibility, and local context compatibility.

3. **Testing, Validation, and Refinement:**
    - Test and validate selected interventions for efficacy and suitability.
    - Conduct pilot projects or small-scale implementations to gather evidence.
4. **Synthesizing Evidence:**
    - Synthesize evidence from testing and validation.
    - Communicate evidence to inform decision-making and build a knowledge base.
5. **Understanding Diffusion:**
    - Study how innovations spread among stakeholders.
    - Analyze factors influencing adoption and pathways of diffusion.
6. **Adoption and Impact Assessment:**
    - Assess adoption rates of scaled interventions.
    - Evaluate their impact on beneficiaries and socio-economic outcomes.
7. **Wider Scaling and Dissemination:**
    - Promote further scaling and replication.
    - Share knowledge and experiences with development partners and through various media channels.

Cross-cutting Considerations:

- Capacity development (capdev) for stakeholders.
- Partnerships with implementing partners (IPs).
- Building collaborations and networks to support scaling efforts.

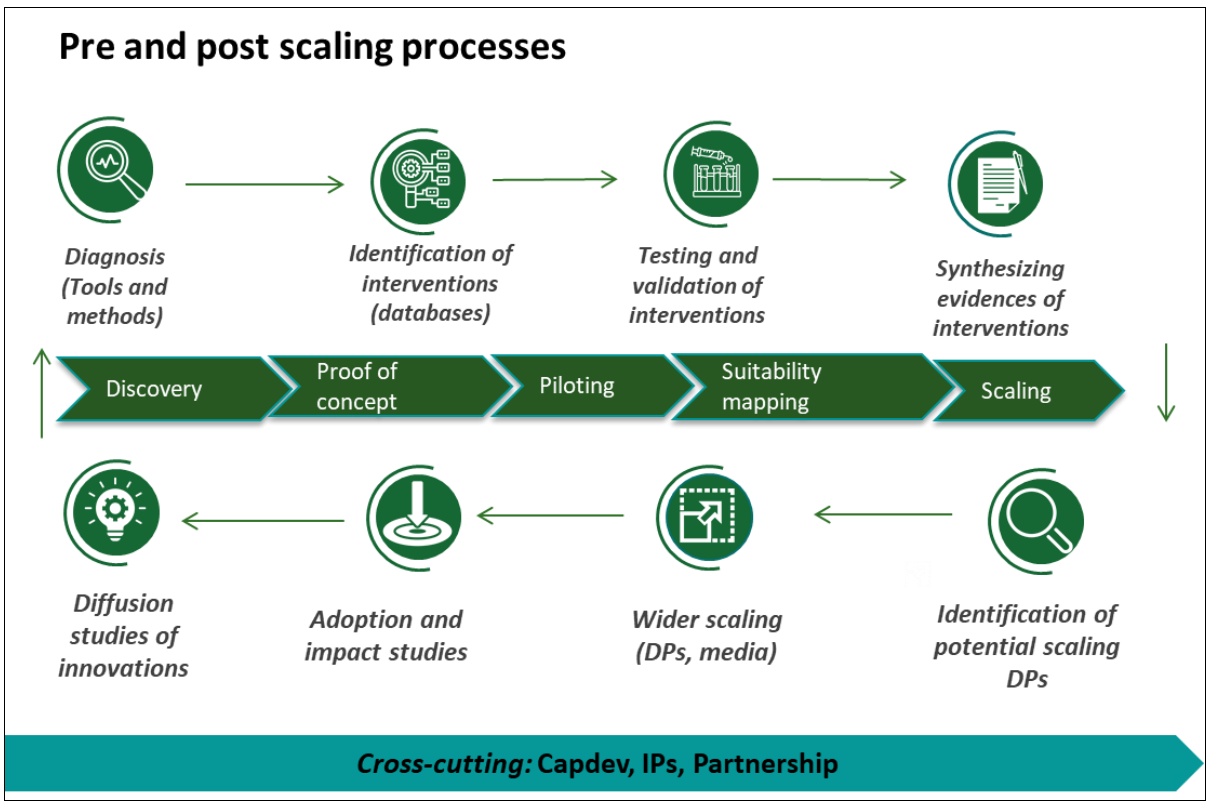

Figure 5: Steps in scaling a project

Climate-smart feed and forage innovations for scaling

Climate-smart feed and forage innovations play a crucial role in scaling up sustainable livestock production systems. Here are some examples of such innovations that can be scaled:

a. **Legume Fodder Trees/Forages:**
- Promote growth of high-protein leguminous trees (e.g., Leucaena leucocephala) for livestock forage.
- Adapted to diverse agroecological zones and drought-tolerant.

b. **Forage Grasses:**
- Cultivate improved forage grasses (e.g., Brachiaria) known for productivity and adaptability.
- Enhance forage availability and quality in various climates.

c. **Herbaceous Legumes and Grass Mixtures:**
- Encourage the use of balanced herbaceous legume-grass mixtures (e.g., Desmodium with Brachiaria).
- Improve livestock nutrition, soil fertility, and forage productivity.

d. **Feed Trough and Storage:**
- Implement efficient feed management with improved troughs.
- Enhance feed quality, minimize wastage, and ensure proper feeding practices.
- Upgrade storage facilities for harvested forage and crop residues.

Scaling these innovations aims to boost livestock nutrition and productivity while mitigating climate-related challenges.

Engagement of development partners for scaling

Engaging development partners (DPs) is crucial for the successful scaling of feed and forage interventions. Here are the steps typically followed to engage DPs in scaling efforts:

1. **DP Mapping and Engagement:**
   - Identify and map potential DPs, including government agencies, NGOs, universities, and farmers' organizations.
   - Establish communication and build relationships based on shared goals.
2. **Capacity Assessment and Training:**
   - Assess the capacity and preferences of DPs for scaling feed and forage interventions.
   - Provide training to empower DPs with the necessary knowledge and skills.
3. **Seed Multiplication Evaluation:**
   - Evaluate seed multiplication approaches for scalability and cost-effectiveness.
   - Determine the best model for large-scale seed production and distribution.
4. **Collaboration and Coordination:**
   - Foster collaboration and coordination among DPs to maximize collective efforts and resources.
   - Facilitate information sharing and joint planning.
5. **Monitoring, Support, and Learning:**
   - Continuously monitor and support DPs throughout the scaling process.
   - Document engagement processes and lessons learned for knowledge sharing and replication.

Media engagement for scaling

The media plays a crucial role in disseminating information, influencing behaviour change, and mobilizing support for sustainable livestock production practices. Engaging the media is an effective strategy for scaling feed and forage innovations. some approaches used in media engagement for scaling efforts:

1. **Media Engagement Strategies:**
   - Leverage mass media, particularly radio, to create awareness about feed and forage innovations in rural communities.
   - Utilize short films and smartphones to share informative videos showcasing the benefits of these practices.
2. **Television and Joint Workshops:**
   - Explore television as a channel to reach farmers with access to electricity and collaborate with local stations for programs on sustainable livestock production.
   - Organize joint training workshops for journalists, experts, and scientists to enhance content development and knowledge exchange.
3. **Media Partnerships:**
   - Establish partnerships with local and national media outlets to develop and disseminate content on sustainable livestock production.

- Collaborate on regular features, interviews, and success stories to amplify the reach and impact of scaling efforts.

4. **Monitoring and Evaluation:**
   - Continuously monitor and evaluate the impact of media engagement activities through audience surveys and feedback mechanisms.
   - Assess changes in awareness, knowledge, and adoption of feed and forage innovations to gauge effectiveness.

Farm households reached and benefitted from scaling

From 2017 to 2021, the Africa RISING project and AICCRA have made significant efforts in scaling livestock feed and forage innovations, reaching a substantial number of farm households. According to the available data, in 2022 alone, over 10,000 beneficiaries were reached through community radio programs supported by AICCRA and Africa RISING.

Challenges of Scaling

Scaling livestock feed and forage innovations can face several challenges. some specific challenges related to scaling in the context of Ethiopia include:

1. **Seed Quality and Availability:** Limited access to good quality seeds of improved forage options hinders scaling efforts. Challenges include insufficient seed production and affordability issues.
2. **Competing Forage Use:** Farmers may prioritize immediate livestock feeding over seed production, limiting the availability of seeds for scaling.
3. **Sustainability:** Sustaining scaling efforts requires ongoing resources, commitment from stakeholders, and a consistent supply of innovations. Long-term funding and support are essential.
4. **Policy and Certification:** Inadequate varietal release policies and seed certification systems can impede scaling. Clear policy frameworks and robust certification processes are needed.

Successful scaling involves a holistic approach that considers technical, market access, credit, knowledge dissemination, and support service requirements. Continuous learning and knowledge sharing are vital for sharing insights and best practices. Collaboration among stakeholders, including government agencies, research institutions, NGOs, farmers, and media, is crucial to enhancing feed and forage availability, improving livestock productivity, and promoting sustainable agriculture.

1.7 Participatory rangeland management (PRM) initiatives

Irene Mukalo (RECONCILE)

RECONCILE (Resource Conflict Institute) is a regional policy research and advocacy NGO that was established in 1999 and registered in Kenya in May 2001. The organization operates in several countries in East Africa, including Kenya, Uganda, and Tanzania, but has also worked in Southern Sudan, Ethiopia, Sudan, and Eritrea. RECONCILE focuses on various thematic areas related to environmental governance and sustainable livelihoods.

The organization focuses on several thematic areas and addresses challenges in African rangelands:

Thematic Areas:

1. **Land Governance, Tenure Security, and Investment:** Promoting effective land governance, tenure security, and responsible land investment practices.
2. **Climate Change, Livelihoods, and Food Security:** Mitigating the effects of climate change on livelihoods and food security in vulnerable communities.
3. **Rangelands Governance and Management:** Promoting sustainable rangeland management practices to support pastoralist communities and preserve natural resources.
4. **Coordination and Technical Support to Rangelands Initiative Africa:** Coordinating and providing technical support to the Rangelands Initiative Africa, which aims to address rangeland-related challenges in Eastern, Western, and Central Africa.

Challenges:

1. **Climate Change:** Rangelands are vulnerable to climate change impacts, including droughts, erratic rainfall, and rising temperatures.

2. **Land Degradation and Desertification:** Unsustainable practices lead to land degradation, loss of vegetation cover, and soil erosion.
3. **Changes in Land Use:** Encroachment by agriculture, urbanization, and infrastructure development disrupts traditional livelihoods.

Implications:

- **Land-Based Conflicts:** Conflicts over resources, including grazing lands and water sources.
- **Erosion, Drought, and Poverty:** Degraded rangelands lead to soil erosion, reduced water retention, and increased poverty.
- **Human-Wildlife Conflict:** Overlapping habitats result in conflicts between pastoralists and wildlife.
- **Species Loss and Armed Conflict:** Environmental degradation contributes to habitat loss and biodiversity decline, sometimes leading to armed conflicts.

Strategies to Turn Challenges into Opportunities:

1. **Degradation into Restoration:**
    - Implement landscape-based restoration.
    - Utilize restoration techniques like reseeding and agroforestry.
    - Promote sustainable grazing practices.
2. **Disempowered Communities to Empowered People and Institutions:**
    - Facilitate participatory decision-making.
    - Strengthen local institutions.
    - Foster collaborative partnerships.
3. **Enabling Empowerment for People and Nature:**
    - Establish enabling policy and legal frameworks.
    - Strengthen monitoring and enforcement mechanisms.
    - Promote sustainable livelihoods.
4. **Youth Engagement and Awareness:**
    - Invest in youth's interest in rangeland restoration.
    - Raise awareness and advocacy.

Participatory Rangelands Management (PRM):

- **Investigating PRM:** Identify rangeland resources and users.
- **Negotiating PRM:** Set up or strengthen management institutions, define management units, develop management plans, and establish management agreements.
- **Implementing PRM:** Communities take active roles, arresting and reversing declining rangeland productivity, and conducting participatory monitoring and evaluation.

Through PRM, communities become active agents in rangeland management, fostering sustainable practices, ecosystem conservation, and improved livelihoods.

Execution and Implementation of PRM

The execution and implementation of Participatory Rangelands Management (PRM) involve various elements, including policy influencing, institutional development, community engagement, and the application of technology and innovation. Here are some key aspects of PRM execution:

1. Policy Influencing and Institutional Development:

- Advocacy for supportive policies influencing land use planning, land tenure security, and rangeland livestock production.
- Strengthening community-level institutions for land and natural resource management.

2. Alignment with Ecosystem Restoration and Sustainability:

- Focus on rangeland conservation and pastoralism as sustainable livelihoods.
- Aim for tangible results in ecosystem restoration, seen in improved water quality, reduced weed populations, increased plant cover, and restored natural features.

3. Conflict-Sensitive Approach and Dialogue:

- Recognition and mitigation of conflicts related to rangeland resources.
- Promotion of dialogue and agreements among stakeholders to define rights, responsibilities, and rules for rangeland management.

4. Community Engagement and Participatory Processes:

- Active participation in resource identification and mapping.
- Use of technology and innovation to enhance rangeland management, including sustainable grazing practices and data collection through mobile apps.

Key Roles of Participatory Rangelands Management (PRM):

1. Developing a Common Understanding:

- PRM fosters dialogue and knowledge sharing among stakeholders.
- It promotes a shared understanding of the complexities of rangelands.
- This shared understanding informs informed decision-making and effective resource management.

2. Building and Strengthening Management Capacity:

- PRM focuses on capacity-building for rangeland institutions.
- Targeted institutions include community-based organizations and user associations.
- The goal is to enhance management skills, technical knowledge, and governance capacity.

3. Enhancing Productivity and Resilience:

- PRM seeks to improve rangeland productivity and resilience.
- It promotes sustainable land management practices like rotational grazing, water conservation, and soil restoration.
- The aim is to enhance rangeland productivity, restore degraded areas, and bolster ecosystem resilience.

4. Empowering Communities:

- PRM empowers communities by involving them in decision-making.
- It grants communities ownership of rangeland resources.
- Acknowledging local knowledge and traditional practices, PRM promotes sustainable resource use, conservation, and restoration.

5. Strengthening Collaboration:

- PRM encourages collaboration among diverse stakeholders.
- Stakeholders include government agencies, NGOs, researchers, local communities, and others.
- The collaboration aims to create synergies, pool resources, and ensure effective coordination in rangeland management activities.

Example of Impact of Implementation of PRM in Kenya and Tanzania

The implementation of Participatory Rangelands Management (PRM) in Kenya and Tanzania has had a positive impact on the livelihoods and nutrition status of pastoralist communities in East Africa. Some of the key results achieved through PRM implementation include:

- Piloting PRM in multiple sites. It was piloted in 10 sites, covering 6 clusters in Tanzania and 4 sub-counties in Kenya. These pilot sites served as demonstration areas to test and refine PRM approaches and strategies.
- PRM implementation focuses on building the capacities of communities, civil society organizations (CSOs), and government institutions to effectively implement PRM. This capacity development included training programs, workshops, and knowledge-sharing activities.

- Development and implementation of guidelines at the local and national guidelines for PRM were developed and implemented. These guidelines provided a framework for conducting participatory rangeland management activities and ensured standardized approaches across different areas.
- Through PRM, approximately 337,015 hectares of rangelands were secured and managed more effectively. This involved measures to address land degradation, improve grazing practices, and enhance the sustainable utilization of rangeland resources.
- The implementation of PRM emphasized the participation and engagement of women in rangeland management. This inclusion of women in decision-making processes and resource management activities empowered them and contributed to more equitable and sustainable outcomes.

1.8 Seed delivery innovations for effective scaling of improved DTC varieties

Dr. Henry Ojulong (ICRISAT)

ICRISAT is implementing seed delivery innovations to scale improved drought-tolerant crop varieties for six mandate crops, including sorghum, pearl millet, finger millet, chickpea, pigeon pea, and groundnut. These innovations aim to establish inclusive and sustainable seed systems that provide dryland small-scale farmers with access to high-quality seeds at affordable prices and appropriate timing.

ICRISAT collaborates with county governments in Kitui, Makueni, and Taita Taveta to execute the AICCRA Project. The project's primary goal is to enhance access to Climate Information Services (CIS) and promote the adoption of climate-smart agricultural technologies. It achieves this by strengthening technical, institutional, and human capacities. The project comprises three main components: knowledge generation and sharing, forging partnerships for seed delivery of technologies and varieties, and validating climate-smart agricultural practices.

Seed demand and delivery options

ICRISAT is using several strategies to address seed demand and enhance seed delivery options such as:

1. **Demonstration and Awareness:** Establish demonstration plots to showcase the benefits of drought-tolerant crops (DTCs) and raise awareness among farmers, extension workers, and stakeholders.
2. **Affordable Seed Distribution:** Provide small seed packs to resource-limited small-scale farmers, making DTC seeds accessible and affordable.
3. **Farmer-Led Scaling:** Promote farmer-to-farmer scaling by facilitating seed exchange, enabling farmers to access quality seeds and expand DTC cultivation.
4. **Engagement of Lead Farmers:** Identify and engage lead farmers and farmer groups to serve as ambassadors for DTCs, linking them with private sector seed companies for market connections.
5. **Capacity Building for Seed Production:** Strengthen the capacity of national seed producers and small seed companies to produce and distribute high-quality DTC seeds through training, technical support, and quality assurance measures. Collaborate with ICRISAT and NARS to provide Enhanced Germination Services (EGS) to ensure seed quality.

Seed

Quality seed is the cornerstone of successful agriculture, profoundly impacting farmers' yields and influencing their commitment and investment in crop management. In Africa, many smallholder farmers depend on low-quality seeds, often saved from previous harvests. This practice, coupled with poor soil conditions, leads to substantially lower crop yields, with African farmers achieving only about one-quarter of the global average yield.

Seed Systems

The production of drought-tolerant crops (DTCs) in dryland regions primarily relies on small-scale producers using traditional varieties, resulting in low adoption rates of improved DTC varieties. Limited access to improved seeds is a key factor, attributed to the absence of a sustainable seed multiplication and delivery system and a lack of seed production skills among farmers. To address this issue, there is a need to empower farmers and informal seed sectors to produce "Quality Declared Seed" (QDS) and

gradually transition towards a semi-informal and formal seed system, thereby expanding access to improved DTC seeds for a wider range of farmers.

Pathways for delivery

1. **Demonstration of Improved Varieties:** This approach involves establishing demonstration plots where improved DTC varieties are grown along with appropriate agronomic practices. Farmers can visit these plots to witness the performance of these varieties firsthand. This not only exposes them to new technologies but also encourages seed sharing within the community.
2. **Provision of Small Seed Packs (SSP):** Providing affordable SSPs containing small quantities (0.5 to 1kg) of improved DTC seeds allows farmers to experiment with these varieties on a small 100m2 plot. These packs come with informative labels and contact details of seed producers, making it easy for farmers, including women, to access and use them, reducing the risk of trying new varieties.
3. **Farmer Field Days:** Farmer field days serve as educational forums where the performance of improved DTC varieties is showcased. These events also impart knowledge about Good Agronomic Practices (GAPs) associated with these varieties. Farmers get the opportunity to evaluate different options and choose their preferred varieties, which are then distributed for planting in the upcoming season. These events often involve collaboration with various stakeholders, attracting a diverse range of participants.
4. **Capacity Building on Seed Production:** This approach involves training farmers and agro-dealers in seed production techniques specific to DTC crops. Farmers learn about isolation distances, proper spacing, weed and pest control, detecting and removing off-types, and appropriate harvesting practices. Extension staff are trained as Trainers of Trainers (ToTs) to disseminate this knowledge to farmers, with a specific focus on women and youth groups. Demonstration seed production plots in lead farmer gardens serve as training centers, covering aspects of post-harvest handling, drying, storage, community seed banks, and basic seed business plans. Small seed company staff also receive formal seed production training, and foundation seed is provided by ICRISAT to ensure the availability of quality seeds.

Scaling up in ASARECA region

In order to scale up the adoption of drought-tolerant crop (DTC) seeds in the ASARECA region, several strategies are being employed:

1. Hybrid System: This approach focuses on promoting hybrid Drought-Tolerant Crop (DTC) varieties known for their superior traits, such as increased yields and resilience to drought. Hybrid seeds are meticulously produced through controlled pollination, resulting in improved performance compared to conventional seeds. By advocating for the use of hybrid DTC varieties, farmers can enhance their productivity and better withstand the challenges of drought and environmental stress.

2. Community Seed System: The establishment of community seed systems involves creating localized seed banks where farmers can readily access a diverse range of locally adapted seed varieties. This empowers farmers to take on the role of seed stewards within their communities, ensuring a consistent supply of high-quality seeds. Community seed systems not only strengthen seed availability but also promote seed diversity and resilience.

3. Semi-Formal Seed System: In the semi-formal seed system, farmers and farmer groups with expertise in seed production collaborate with seed companies. These farmers are contracted to produce specific DTC seed varieties on behalf of seed companies. The seed companies then market and distribute these seeds. This collaborative arrangement enables farmers to actively participate in seed production while establishing mutually beneficial relationships with seed companies.

4. Community Seed Growers and Open-Pollinated Varieties (OPVs): Community seed growers primarily focus on producing open-pollinated varieties (OPVs) of DTCs. OPVs are non-hybrid varieties that can be saved and replanted by farmers, ensuring a sustainable source of seeds for future planting. Community seed growers play a pivotal role in maintaining seed diversity and providing farmers with locally adapted DTC varieties.

5. Fully Fledged Seed Companies: The establishment of fully-fledged seed companies is essential for the production and distribution of hybrid DTC seeds. These specialized companies focus on producing high-quality hybrid seeds that are marketed and sold directly to farmers. Through collaborations with seed companies, initiatives like the Sorghum and Pearl Millet Hybrid Parents Research Consortium (SPMHPRC) facilitate the sharing of hybrid parent seeds for sorghum and pearl millet. This collaboration ensures that registered seed companies have access to hybrid parent seeds, enabling the large-scale production of hybrid DTC seeds.

ANNEX 1: EVENT PROGRAMME

DAY 1: 17th MAY 2023		
Time	Activity	Responsible
08:10-08:40	Arrival and registration	ASARECA
THEME: INTRODUCTION AND OPENING REMARKS		
08:40-09:00	Self-introductions	ASARECA
09:00-09:15	Remarks by the AICCRA Coordinator, Eastern and Southern Africa Programme	Dr. Solomon Dawit
09:15-09:25	Welcome and Opening Remarks by the Executive Director of ASARECA	Dr. Enock Warinda
09:25-10:00	Remarks by AUC and RECs	
THEME: ENHANCING REGIONAL AGRICULTURAL TRADE		
10:00-10:30	Presentation on feedback from ASARECA member countries on key issues affecting regional agricultural trade	Ms. Julian Barungi
10:30-11:00	**Tea/Coffee Break & Group photo**	**Hotel**
11:00-11:40	Strategies for collaboration with ASARECA in strengthening sanitary and phytosanitary measures for regional agricultural trade.	Dr. Ndabamenye Ms. Jane Kamau
11:40-12:20	Status, gaps and road map for harmonization of agricultural trade policies and standards.	Ms. Providence Mavubi Mr. Fahari Marwa
12:20-13:00	Status and gaps for operationalization of the African Continental Free Trade Area Agreement and road map for implementation of key actions including dealing with non-tariff barriers.	Ms. Diana Oyena Akullo Mr. Andrew Okello
THEME: EARLY WARNING FOR EARLY ACTION		
13:00-13:40	Strategies for promotion of early action for climate change in Eastern and Central Africa. Developing resilience through Climate disaster risk reduction with early warning systems, and climate information services	Dr. Hussen Seid Endris Dr. Teferi Demissie
13:40-14:40	**Lunch**	**Hotel**
THEME: CSA AND DIGITAL INNOVATIONS FOR SCALING		
14:40-15:00	CSA technologies, innovations and digital agriculture tools for scaling: digital agricultural advisory services - LERSHA	Dr. Kindie Tefsaye
15:00-15:20	CSA technologies, innovations and digital agriculture tools for scaling: digital fertilizer recommendations	Dr. Lulseged Desta
15:20-15:40	CSA technologies, innovations and digital agriculture tools for scaling: Ethiopian Digital AgroClimate Advisory Platform (EDACaP)	Jemal Seid
15:40-16:00	CSA technologies, innovations and digital agriculture tools for scaling: The Kenya Agricultural Observatory Platform (KAOP)	Dr. Michael Okoti

16:00-16:20	CSA technologies scaling: Small ruminant breeding	Dr. Aynalem Haile
16:20-16:40	CSA technologies scaling: Scaling forage development	Dr. Kindu Mekonnen
16:40-17:00	CSA technologies scaling: Participatory rangeland management (PRM) initiatives	Dr. Fiona Flintan
THEME: AUC, RECS AND NGOS IN COLLABORATION WITH ASARECA		
17:00-18:00	(i) Strengthening sanitary and phytosanitary measures for regional agricultural trade (ii) harmonization of agricultural trade policies and standards (iii) operationalization of the African Continental Free Trade Area Agreement (iv) promotion of early action for climate change (v) scaling of climate-smart technologies, innovations and digital agriculture tools	AUC COMESA EAC IGAD ECCAS SADC USAID
18:00-18:20	Plenary discussion	
18:20-18:30	Way forward and closing remarks	Dr. Enock Warinda
18:30-19:00	**Tea/Coffee Break**	**Hotel**
DAY 2: 18th MAY 2023		
PARALLEL SESSION 4: PARTNERSHIPS FOR INCLUSIVE AND SUSTAINABLE AGRICULTURAL TRANSFORMATION		
14:00 - 15:00	Enhancing the use of climate information services in agricultural policy and planning for improved livelihoods	
	Accelerating Impacts of CGIAR Climate Research for Africa	John Recha (ILRI)
	Scaling digital climate advisory services for enhancing climate-smart agriculture in the ASARECA region.	Kindie Tesfaye (CIMMYT)
	Seed delivery innovations for effective scaling of improved DTC varieties.	Henry Ojulong (ICRISAT)

ANNEX 2: PARTICIPANT LIST

#	NAME	COUNTRY	GENDER	ORGANISATION / INSTITUTION
1	Nahwera Sheilla	Uganda	F	Glam Ushers
2	Nyamatu Sarah	Uganda	F	Glam Ushers
3	Apio Lillian	Uganda	F	Glam Ushers
4	Biyinzika Elsie	Uganda	F	Glam Ushers
5	Apolot Martha Grace	Uganda	F	Glam Ushers
6	Nuwahereza Racheal	Uganda	F	Glam Ushers
7	Akurut Patience	Uganda	F	Glam Ushers
8	Aloyo Mariah	Uganda	F	Glam Ushers
9	Umuhoya Kaumera	Rwanda	F	University of Rwanda
10	Hillary Agaba	Uganda	M	NARO
11	Charles Kahuthu	Kenya	M	EACCIA
12	Malu Ndavu	Kenya	M	
13	Kalema Musisi Solomon	Uganda	M	MAAIF
14	Telesphon Ndabamente	Rwanda	M	RAB
15	Stephen T. Byantwale	Uganda	M	MAAIF
16	Musisi Tony	Uganda	M	NARO
17	Nsubuga Charles	Uganda	M	MAAIF
18	Henry Okeci	Uganda	M	MAAIF
19	Nsekauleberwe Banabas	Uganda	M	NARO-COUNCIL
20	ADOMATI ROWALD	Uganda	M	NARO
21	Emwoa Dacid	Uganda	M	NARO
22	Musisi Tonny	Uganda	M	NARO-SEC
23	Kimoli Fred	Uganda	M	NARO-SEC
24	Baguma Gerald	Uganda	M	
25	Bazanye Rogers	Uganda	M	
26	Ssenteze Robert	Uganda	M	
27	Daisy Akeoh	Uganda	F	CIP
28	Mahae Kaupita	Uganda	F	CRAFT/SNV
29	Tenywa Millan	Uganda	M	CIP
30	Charles Opiyo	Uganda	M	OXFAM
31	Obel Fred	Uganda	M	NAGRCYAB
32	Nyambi Gwendoline	Cameroon	F	IRAD
33	Maboune Tetaoun Abeleue	Cameroon	F	IRAD
34	Jane Adokoraoh	Uganda	F	NARO
35	Kibiraci Abraham	Uganda	M	NARO-NACRRI
36	Wauoni Samu	Uganda		
37	Normon Kuikiriza	Uganda	M	CIP
37	Niweturuhp Humphrey	Uganda	M	NACORI
39	Adage Hilda	Uganda	F	NACORI
40	Nabwire Joan	Uganda	F	NACORI
41	Ibenu Sharon	Uganda	F	AFAAS
42	Emily Arayo	Uganda	F	NARO
43	Suzannk Bukenya	Uganda	F	NACIRCTAB
44	Edna Yesoah	Uganda	F	FARA
45	Barbara Nambogo	Uganda	F	NARO
46	Alice Endra	Uganda	F	NARO
47	James Kebirungi	Uganda	M	SNV-CRAFT
48	Jabah Mazirwe	Uganda	F	SNU-CRAFT
49	Martin Mutarursuka	Uganda	M	UCU-AIRTEA
50	Kimiero James	Uganda	M	NARO
51	Uwamyia Ashraf	Uganda	F	NARO
52	Owongo Teddym	Uganda	F	NARO
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55	Amos Edison	Uganda	M	NARO
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57	Veronica Najjemba	Uganda	F	UCDA
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59	Wilfred Sanya	Uganda	M	NARO

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63	Agnes Obua Ogwal	Uganda	F	AU
64	Dell Joseph Maulin	Cameroon	M	University of Maoundo
65	Frederik Okiru	Uganda	M	NAADS
66	Andrew Otieno	Uganda	M	UNBS
67	Jospeh Ngabi Ngabi	Uganda	M	MAAIF
68	Eve Kasiuye Alemu	Rwanda	F	ASARECA BOARD
69	Wozemba David	Uganda	M	SASALCAWA
70	Eric Nsabimana	Rwanda	M	RAB
71	Mulumba Nasser	Uganda	M	NARO
72	Lulseged Tamene	Ethiopia	M	ALLIANCE OCIA
73	Tamirat Bekele Jimma	Ethiopia	M	ILRI
74	Stella Kabir	Ethiopia	F	SASAKAWA AFRICA ASSOCIATION
75	Anna Rose Ademun	Uganda	F	MAAIF
76	Abubakar Muhammad	Uganda	M	CM
77	Twinamatsiko Deus	Uganda	M	AAR
78	Aomati Joseph	Uganda	M	MAAIF
79	Kisiiu Meddy	Uganda	M	MAAIF
80	Werere Stephen	Uganda	M	MAAIF
81	Byakatowoa	Uganda	M	MAAIF
82	Tigainya Susan K	Uganda	F	MAAIF
83	Dumba David	Uganda	M	NARO
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100	Beatrice N Egulu	Ethiopia	F	AUC
101	Boune Abeluo	Cameroon	F	IRAD
102	Marie Pauline Voufo	Cameroon	F	SALID
103	Diego King Rekamanyana	Burundi	M	PIRUIT
104	Priver Bwesiaye	Uganda	F	NARO
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107	John Bigomba	Uganda	M	NARO
108	Kwaku Anturi	Ghana	M	FAKA
109	Baitsi Podisi	Botswana	M	ICRAF
110	Njile George Mbanda	Cameroon	M	PIANOPAC
111	Kimilli Fredric	Uganda	M	MAKOSE
112	Gofrey Arinatwe	Uganda	M	NARO
113	Ado Kitwe	Cameroon	F	
114	Jean Claude Rubyogo	Kenya	M	CIAF-PABRA
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116	Joshua Mushwa	Uganda	M	CCIC/SH
117	Boi Andrew	South Sudan	M	FARMERS
118	Omoyo Vhris	Uganda	F	NARO
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122	Ruth Kinghatii	Congo	F	IRA
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125	Felix Oketcho	Uganda	M	FLIX NEWS
126	Brijitte Uwimam	Uganda	F	IITA
127	Reugaw Kunuube	Uganda	F	EAEIITA
128	Byambwenu Peter	Uganda	M	EAE
129	Kennedy Were	Kenya	M	KALRU
130	Isameja Frefon	Uganda	M	HUAHUI

131	Racheal Mussi		F	ASARECA
132	Iralcore willy	Burundi	M	ISABU
133	Juliana Omalia	Uganda	F	PSFU
134	Diana Akula	Ghana	F	AFCFTA
135	Mark Olokodun	Uganda	M	NARO
136	Theusi Aabea	South Africa	F	DE AFACA
137	Julius Bariga	Uganda	M	NATION GROUP MEDIA
138	Ssegawa Rolanda	Uganda	F	MAACP
139	Antony Kimani	Uganda	M	AAR
140	Mugerwa Matia	Uganda	M	UCDA
141	Osoro Aalex Hatola	Uganda	M	UCDA
142	Matisiko Herbert	Uganda	M	UCDA
143	Ngonkeu Eddy	Cameroom	M	IRAD
144	John Caso	South Africa	M	CHHO
145	Bbemba Jospeh	Uganda	M	SASAKAWA AFRICA ASSOCIATION
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148	Charles Opiyo	Uganda	M	OXFAM
149	Bimbou Senega	Congo		MAEP
150	George Mahuku	Uganda	M	IITA
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155	Racheal Ayebale	Uganda	F	MAAIF
156	Bamwito Serelguu	Uganda	F	LIBE
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160	Abdulrashid Mohammed	Somalia	M	MINISTRY OF AGRICULTURE
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162	Chiluba Mwape	Ethiopia	F	ANC
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164	Sylevester Aiukson Bagrame	Uganda	M	NARO
165	Musasiti Janest Kisembo	Uganda	F	NARO
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168	Phindiwe Nkosi	South Africa	F	IWMI
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170	Thaisa van der Woude	The NetherlandS	F	ISRIC
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172	John Recha	Kenya	M	ILRI
173	Tarsis Tunyassiyure	Uganda	F	MOFA
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192	Geresu Tuyi	Ethiopia	M	ASARECA
193	Epram Nuwamanya	Uganda	M	NANOTMAK
194	Sam Namanda	Uganda	F	CIP
195	P. Justin Kouka	Ethiopia	F	AU
196	Karushwa Awwah	Uganda	M	MAAIF
197	Rakotoarisoa Jaequehurie	Madagascar	M	FUFIFA
198	Vicky Ruganzu	Rwanda	M	RAB
199	Baldwin Huuuma	Tanzania	M	TASTA
200	Joshua Okonya	Uganda	F	ASARECA
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204	Sah Bourou	Cameroon	F	PARTICIPANT
205	George Tadu	South Sudan	M	MAFS
206	Murchson Lugulu	Kenya	M	CICIC
207	Elirehema Swai	Tanzania	M	TARI
208	Ntengwa Mdole	Tanzania	F	SUA
209	Deo OTIM	Uganda	M	CICIC
210	Barenye Alex	Uganda	M	NARO
211	Nelson Ojijo	Kenya	M	J..K.U.A.T
212	Theodorle T. kessy	Tanzania	M	TARI
213	Issa I. Mdemu	Tanzania	M	COOPERATIVE SOCIETY
214	Arthure Musingazi	Uganda	M	GCIC
215	Yeini Akinbanyitu	Ghana	M	FARA
216	Bararyenya Aotio	Burundi	M	ISABU
217	Negusse Abraha	Eritrea	M	NARI
218	Irakoke Inei	Burundi	F	PARTICIPANT
219	Leiina Nkuruna	Kenya	F	KALRO
220	Francis Mwaijande	Tanzania	M	MZUMBE UNIVERSITY
221	Aruiatwe Abel	Uganda	M	NARO
222	Robin Burchara	Kenya	M	CGIRR
223	Bereket Tsehaye	Eritrea	F	MOA
224	Carolyne Minayo	Kenya	F	KALRO
225	Imelda N. Nashaija	Uganda	F	NARO
226	TSECAY Berhore	Eritrea	M	NARI
227	Rapamso Hewew	Madagascar	F	SIF
228	Lazard Mwakipesile	Tanzania	M	RAPHAEL GROUP
229	Irene Mwicaw	Kenya	F	RECONCELE
230	Henry Ojulong	Kenya	M	ICRISAT
231	Kindie Tesfaye	Ethiopia	M	CIMMYT
232	Jemal Seid	Ethiopia	M	SSSA
233	Toua Baguma	Uganda	M	NARO
234	Priscilla Mwiruri	Kenya	F	MINISTRY OF AGRIC AND LIVESTOCK
235	Ngaissona Yan Bomesse Eudes Hugues	CAR	F	MINISTRY OF AGRIC AND LIVESTOCK
236	Fahad Guma	Uganda	M	IITA
237	Njimbeke Alfhonrini	Burundi		MIMEAGRIE
238	Wellington M Mulinge	Kenya	M	KALRO
239	Godfrey Ase	Uganda	M	NARO
24	Richard Nngwa	Kenya	M	MOALD
241	Rhoda Tumusiime	Uganda		ASARECA
242	Ganza Justus	Rwanda	M	FARMGATE
243	Kizitu Kwero	Kenya	M	ICALNO
244	Otabo Fzangoise	Republic of Congo	F	IRA
245	Tesfaye Kumsa	Ethiopia	M	PRIVATE SECTOR
246	Egonu Emmanuel	Uganda	M	AFRICAN HEALTH
247	Michael Okoti	Kenya	M	KALRO
248	Anne Miki	Kenya	F	ILRI
249	Nyami Odera	Kenya	M	MINISTRY OF AGRIC-LIV
250	Niyokwishimira Alfred	Burundi	M	ISABU
251	Richard Havyarimanya	Burundi	M	PRIVATE SECOTR

22	Winnie Nanteza	Uganda	F	NARO
253	Victori Mbigiddi	Uganda	M	NARO
254	Kwesu Anarkralu	Ghana	F	CCGIAR
255	Mukondawe Albert	Uganda	M	FOLOW THE SIAR
256	Aynalem Haile	Ethipia	M	ICAROA
257	Jerbu Baasul	Kenya	M	AWARD
258	Kalvince Othenio	Kenya	M	FSPN CA
259	Luka Oceng	South Sudan	M	MINISTRY OF AGRIC AND FOOD SECURITY
260	Musaizi Janet Kisembo	Uganda	F	NARO
261	Beatice Egulu	Ethiopia	F	AUC
262	Moses Marani	Kenya	M	MINISTRY AGRIC-LIVEST
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264	Godfrey Asea	Uganda	M	NARO
265	Vitoria Mbigidde	Uganda	F	NARO
266	Ganza Joshua	Rwanda	M	FARMATE LTD
267	Kalrenice Otieno	Kenya	F	FSPN AFRICA
268	Barekye Alex	Uganda	M	NARO
269	Michael Okoti	Kenya	M	KALRO
270	Irene Mukali	Kenya	F	RECONAICE
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277	Biambuenu Peter	Kenya	M	EDC
278	Robert Mulebeice	Uganda	M	ASARECA
279	Crisoin Meuyeh	DRC Congo	F	EUS DRC
280	Jules Rutebuka	Rwanda	M	IUCN
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287	Azena Nambki	Uganda	F	MOFA
288	William Olaho Mukani	Uganda	M	NARO
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290	Alemayehu Repassa	Ethiopia	M	JIMMA UNIVERSITY
291	Bigirimawa Joseph	Burundi	M	BURUNDI UNIVERSITY
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293	Anshemeza Josheph	Uganda	M	GCIC
294	Abatoumnou Iwe	DRC Congo	F	ICRA
295	Felister Makini	Kenya	F	KALRO
296	Prof Edga Kalonji	DRC Congo	M	UNIVEAMCI DE KIUMBESE
297	Dilla Winnie Shanel	Uganda	F	Gi
298	Sitaraya Faith	Uganda	F	GI
299	Tracy Joan	Uganda	F	GI
300	Alexander Otwono	Uganda	M	MOEMD
301	Vincent Byarugaba	Uganda	M	NARO
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305	Racheal Kembabazi	Uganda		SIGNUM ADVOCATES
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312	Jared F. Mubinu	Uganda	M	NHCLCADS

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317	Mwaura Kyofalimyo	Uganda	M	GAC AFRICA
318	Doughles Indetie	Kenya	M	KALRO
319	Abraham Tadesse	Ethiopia	M	SAA
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324	Mussa Omer	Eritrea	M	MINISTRY OF AGRICULTURE
325	Diana Kirungi	Uganda	F	IITA
326	Girma Mamo Diga	Ethiopia	M	EIAR
327	Yanenesh Efu	Ethiopia	F	MOA
328	Lona IGGRY	South Sudan	F	MAFS
329	Dejene Abera	Ethiopia	M	EIAR
330	Shiferaw Joyesse	Eritrea	M	GGGI
331	Mayanya Sarah	Uganda	F	CIR
332	Noe Woin	Cameroon	F	IRAD
333	Christine Idog	Uganda	F	NARO
334	Charles Wachana	Kenya	M	ICPAC
335	Luka Awato	South Sudan	M	MAFS
336	Ambrose Adeng	South Sudan	M	MINISTRY OF AGRICULTURE

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