AgMIP

The Agricultural Model Intercomparison and Improvement Project

IMPROVING SCIENCE-TO-POLICY INFORMATION PATHWAYS TO SUPPORT PLANNING AND ACTION ON CLIMATE CHANGE IN AFRICAN AGRICULTURE

WORKSHOP REPORT

MAY 21-22, 2025
ISSER CONFERENCE FACILITY
UNIVERSITY OF GHANA
ACCRA, GHANA

Foreign, Commonwealth & Development Office

AgMIP | UNIVERSITY OF GHANA | ipar Think Tank | COLUMBIA UNIVERSITY

Alliance Bioversity & CIAT | ILRI INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE | Oregon State University | SYNERGOS | IFPRI

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ACKNOWLEDGEMENTS

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EXECUTIVE SUMMARY

Climate change threatens to worsen already pervasive food insecurity across Sub-Saharan Africa (SSA). To successfully advance climate-resilient agriculture, scientists, policy, and decision makers must improve efforts to bridge the gap between research, policy, and practice. Success requires coordinating extensive research on adaptation and mitigation strategies with the planning, policy, funding, and implementation processes that can leverage scientific insights to improve food security and nutrition outcomes. Improving food security requires, for example: research into which crop varieties and livestock breeds can thrive under the changing conditions in the variety of agro-climatic, socio-economic, and governance contexts present in SSA; identifying what inputs these resilient varieties need; understanding farmers' capacity to select and cultivate appropriate varieties; and determining which agricultural outputs can meet both nutritional requirements and consumer preferences.

The Agricultural Model Intercomparison and Improvement Project (AgMIP), University of Ghana (UG), and Initiative Prospective Agricole et Rural (IPAR), co-led a workshop titled "Improving Science-to-Policy Information Pathways to Support Planning and Action on Climate Change in African Agriculture," as part of a project titled "AgMIP Demand-Scoping Study in Sub-Saharan Africa." AgMIP is a global network of climate, crop, livestock, economics, nutrition, and policy experts who co-develop with stakeholders model-based evidence that can inform adaptation and mitigation planning and action in agriculture. The AgMIP approach employs integrated climate, crop, livestock, and economic models to assess vulnerabilities and adaptation strategies under different climate and socioeconomic scenarios. UG and IPAR are members of the AgMIP network in Ghana and Senegal, respectively.
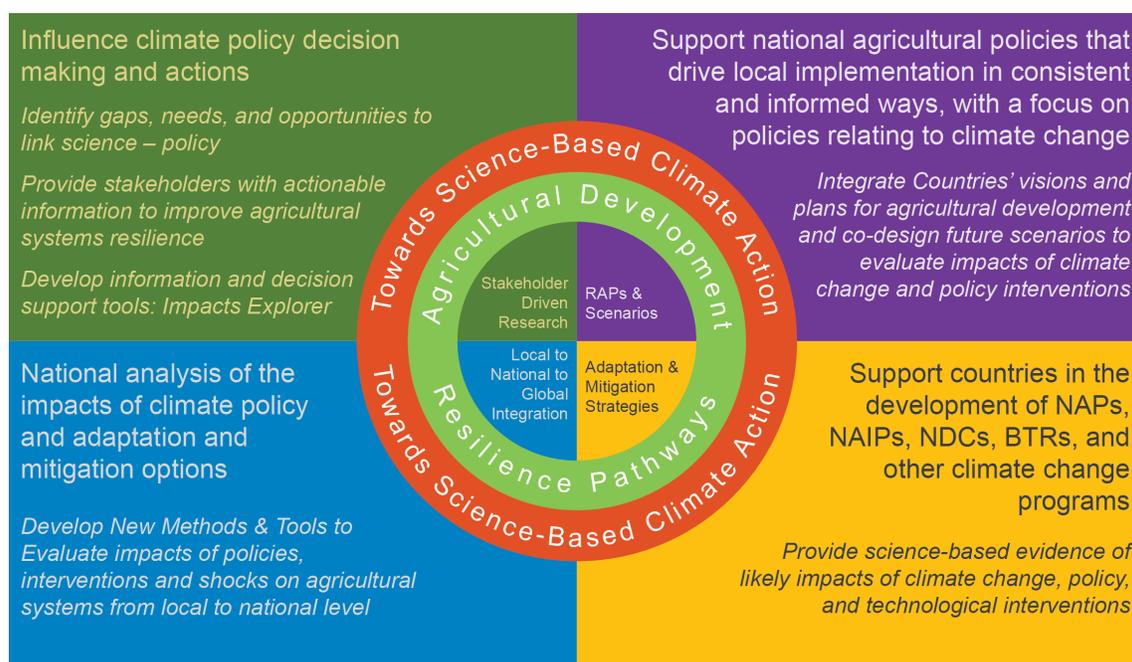

Figure 1. AgMIP Framework for science-based climate action (Mutter and Valdivia, 2021). RAPs = Representative Agricultural Pathways.

The goal of the workshop was to strengthen the science-policy interface for planning climate adaptation and mitigation in agriculture in SSA. Policymakers and researchers representing Ethiopia, Ghana, Kenya, Nigeria, Senegal, Zimbabwe, and the United States participated in the workshop. The workshop was generously supported by the Foreign, Commonwealth and Development Office of the United Kingdom (FCDO). It was hosted by the University of Ghana, Accra, Ghana on May 21st to 22nd, 2025.

This report documents the discussions and main insights from the workshop, which had three main objectives:

1) To assess the highest priority needs for science-based information to support national planning, policy, and decision-making processes related to climate resilience in agriculture
2) To collaboratively develop elements of a decision support framework that can strengthen the utilization of science-based information in policy and decision making
3) To shape future efforts that can enhance the links between research, policy, and practice in each of the participating countries

Key Takeaways: Research Needs Prioritized by Participants

1) *Criteria that scientific evidence should meet* in order to effectively support policy and decision making for climate-resilient agriculture:
   - **Co-created, decision- and policy-relevant.** Participants emphasized that effective application of scientific evidence to advance climate resilience in agriculture requires much closer collaboration between researchers, policymakers, and decision makers, including farmers than is common practice. Research should start with specific policy and decision problems.
   - **Impact-oriented.** Research should deliver impact-oriented results focused on outcomes critical for policy and decision makers, such as jobs and poverty alleviation, in addition to food security and nutrition.
   - **Forward-looking.** Stakeholders need policy and decision support that remains valid under a range of possible climate futures.
   - **Evaluative.** Research should assess effectiveness of alternative adaptation strategies, including tradeoffs between strategies in terms of impacts on productivity, incomes, food security, and nutrition; returns on investment; and co-benefits for mitigation interventions, under various climate change scenarios.
   - **Context-specific.** Information should be specific to agro-ecological and socio-economic sub-national contexts, and aggregated to provide national-level guidance that is consistent with diverse local needs and outcomes.
   - **Farmer-Centric, inclusive.** Co-creation of information ultimately has to benefit farmers, and the co-development process should clarify the pathways through which farmers will benefit, and support inclusive adaptation outcomes. Research should integrate indigenous and local knowledge.

2) The *highest priority topics that require co-created research* were:
- Decision support systems
    - More effective, real-time guidance for farmers' management decisions
- Crop and livestock systems
    - Identifying more climate-resilient crop varieties and livestock breeds, as well as appropriate management techniques under different conditions.
- Water management
    - Approaches to conserving water and/or disseminating irrigation technologies
- Land degradation
    - Assessing the impacts of climate change and land management practices on soil health (e.g., structure, water retention capacity, biodiversity)
- Pests and diseases
    - Understanding and forecasting how pests and diseases are likely to evolve with the changing climate
- Post-harvest losses
    - Causes and solutions to post-harvest losses across the supply chain
- Adoption of adaptation strategies
    - What are the barriers to adoption, how and why rates of adoption vary, and how to increase adoption
- Program and policy evaluation
    - Understanding the effectiveness of implemented programs and policies before developing new ones

3) *Investment in more accessible, timely, context-specific, and high-resolution data*. Lack of appropriate data is a major obstacle to policy-specific research. Co-creation initiatives should invest in developing tailored datasets. Coordinated data repositories that contain open-access, well-documented data in widely used formats would vastly improve data accessibility. The participants mentioned the need for much higher spatial and temporal resolution weather data; data on agro-ecological conditions such as soil moisture, nutrient content, land degradation, pests and diseases; and socio-economic data.

Key Takeaways: Improving Capacity to Co-Create and Utilize Science-based Information

1) *Expansion of Capacity to Co-Create Science-based Information.* Participants discussed capacity building efforts required to improve collaboration between researchers, policymakers, and decision makers such as:
    - Improved coordination and leadership from national ministries
        - To align co-creation efforts with national priorities and produce information on timescales that match policy and decision-making processes
    - Participation by local level stakeholders, including farmers, is critical for producing information that is relevant, trusted, and ultimately utilized by farming communities
    - Strengthening existing institutions and networks
        - Co-created research should work through and strengthen existing institutions and networks, such as agricultural extension services, which often bridge the gap between scientific information, political priorities, and agricultural practice
        - Restructuring incentives in academic and research institutions to support co-created research
    - Training programs for researchers and policymakers in disciplines related to climate action in agriculture
        - For policymakers to understand research processes and responsible use of model outputs
        - For scientists to produce research outputs and communication materials that are tailored to decision and policymakers' needs
    - Organizational development for scientists and decision makers
        - Training in planning, budgeting, proposal writing and development, management, and organizing and maintaining data repositories

2) *Innovative Communication Strategies and Mechanisms:*
    - Establishing science-policy-practice dialogue forums to create spaces where researchers, practitioners, and policymakers can jointly deliberate and co-create solutions, thereby enhancing the relevance, usability, and uptake of co-produced knowledge
    - Establishing the position of science translator in government ministries
    - Developing farmer-centered planning and communication mechanisms that effectively share information on integrated solutions with extension agents and farmers, including platforms for peer-to-peer learning between farmers, such as farmer field schools
    - Establishing processes to conduct more monitoring, evaluation, and iterative learning

Next Steps: Designing a High-Impact, Policy-Relevant Research Agenda

1) *Linking Sub-National to National Scale Climate Change Assessments.* A major research priority is the assessment of the effectiveness of climate adaptation strategies in agriculture, as well as potential co-benefits for mitigation, tailored to diverse agro-ecological and socio-economic conditions. Participants emphasized the importance of conducting these assessments at the sub-national level, in all regions that exhibit different conditions, and aggregating the results to the national level to guide sub-national to national policy formulation. In order to expand the research capacity to co-create these assessments, AgMIP and IFPRI have strengthened the linkage between sub-national and national-level models to integrate sub-national analyses into national-level policy assessments.

2) *Collaborative and Iterative Research Design.* Another opportunity for AgMIP's approach is to refine and expand its already well-developed stakeholder engagement process to more directly target specific policy or planning windows or decision processes. The stakeholder engagement could then iteratively involve stakeholders who influence or are affected by those policies and decisions. The collaborative research design will help to define research objectives that support specific policy and decision needs, aligned with national priorities, determine relevant outputs communicated in ways that are relevant for each of the participating stakeholder types, and build ownership and uptake.

Figure 2. AgMIP Decision Support Framework

The participatory co-development of research can help improve capacity, addressing institutional and technical constraints identified during the workshop.
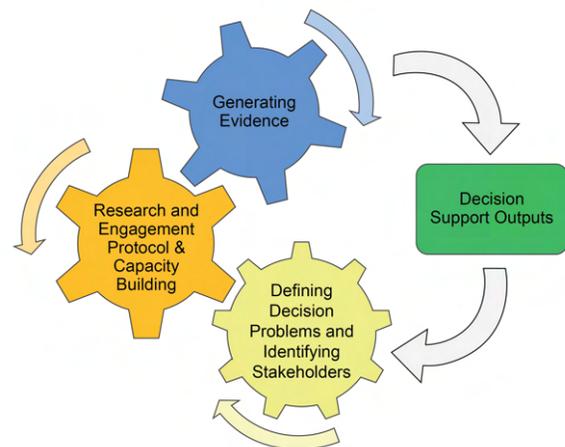
3) *Program and Policy Evaluation.* Another critical research priority identified during the workshop is the systematic evaluation of existing climate and agricultural policies before developing new interventions. Supporting research would co-develop methodologies for evaluating policy effectiveness and best practices for program and policy planning, design, and implementation. The research should support policy design that coordinates national and sub-national plans and addresses the needs of diverse agro-ecological and socio-economic regions.

Conclusion

The workshop revealed both the urgency and complexity of strengthening the science-policy interface for climate-resilient agriculture in Sub-Saharan Africa. While the challenges are substantial - from data gaps and capacity constraints to misaligned incentives - the workshop demonstrated a clear pathway forward through collaborative, farmer-centered approaches to co-creating actionable scientific information.

The workshop's findings highlight that addressing climate change in African agriculture is not merely a technical challenge requiring better crops or technologies, but a systems challenge requiring better coordination between knowledge producers and knowledge users. The collaborative framework outlined in this report provides a roadmap for leveraging agricultural research efforts for more effective policy and decision making around climate change, agriculture and food security. The success of such efforts depends on sustained commitment from research institutions, government ministries, development partners, and farming communities working together toward shared goals of climate adaptation.

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1. INTRODUCTION

Climate change threatens to worsen already pervasive food insecurity across Sub-Saharan Africa (SSA) (Sultan, et al., 2019; Dasgupta &Robinson, 2022). The multi-dimensional challenge to growing food includes changing temperature and rainfall patterns and extreme weather events, and the ways in which these interact with human land use and farm management decisions to influence soil moisture, soil quality, and pests and diseases. Improving food security requires understanding what crop varieties and animal breeds can thrive under the changing conditions in the variety of agro-climatic, socio-economic, and governance contexts present in SSA, what inputs they require, and how to improve capacity to select and grow the varieties and breeds that meet needs for quantity and nutritional quality of food and satisfy consumers' preferences. The speed and accuracy with which countries can assemble the complex puzzle of climate-resilient agriculture depends in large part on coordination between progress with respect to a wide-ranging research agenda and the planning, policy, funding, and implementation processes that produce the food security outcomes.

The Agricultural Model Intercomparison and Improvement Project (AgMIP), University of Ghana (UG), and Initiative Prospective Agricole et Rural (IPAR), co-led a workshop that focused on strengthening the science-policy interface for planning climate adaptation and mitigation in agriculture in SSA. Policymakers and researchers representing Ethiopia, Ghana, Kenya, Nigeria, Senegal, Zimbabwe, and the United States participated in the workshop. The policymakers mostly represented national ministries responsible for planning climate action in agriculture as well as several national level policy research institutes. The research team affiliations include the International Food Policy Research Institute (IFPRI), Alliance Bioversity-CIAT, the International Livestock Research Institute (ILRI), Oregon State University (OSU), Columbia University (CU), Synergos, and AKADEMIYA2063 (A2063) in addition to UG and IPAR. The workshop was generously supported by

Figure 3. ISSER Conference Facility

the Foreign, Commonwealth and Development Office of the United Kingdom (FCDO). It was hosted by the University of Ghana, Accra, Ghana on May 21st to 22nd, 2025 at the Institute of Statistical Social and Economic Research (ISSER)conference facility. A full list of workshop participants can be found in Appendix A.

AgMIP is a global network of climate, crop, livestock, economics, nutrition, and policy experts who co-develop with stakeholders model-based evidence that can inform

adaptation and mitigation planning and action in agriculture. The AgMIP approach employs integrated climate, crop, livestock, and economic models to assess evolving agricultural vulnerabilities and risk under different climate and socioeconomic scenarios. The teams use the models to evaluate co-developed adaptation and mitigation strategies for different climate futures. The AgMIP assessments are based on a decades-long, robust track record of model intercomparison and improvement. An important component of the network are team members in over 15 African countries, who include researchers with expertise relevant to that country and connections to the stakeholders established through many years of conducting decision-relevant research. UG and IPAR are members of the AgMIP network in Ghana and Senegal, respectively.

This report documents the discussions and main insights from the workshop, which focused on prioritizing needs for science-based information as well as identifying other components of the decision support system that policy and decision makers need to successfully apply evidence to the development of policies and to decision making. The workshop is part of a project titled "AgMIP Demand-Scoping Study in Sub-Saharan Africa," which aims to document the gaps in science-based information needed for policy and decision making and develop a methodology for delivering actionable information that responds to the needs, with an in-depth focus on two SSA countries, Ghana and Senegal.

Prior to conducting the workshop, the project team carried out interviews with policy and decision makers and researchers in Ghana and Senegal that gathered data on science-based information needs that are aligned with priorities for climate action in agriculture in each country, what science-based information has been used, and how the capacities of researchers and policy and decision makers should be strengthened to improve the use of evidence. The workshop included participants from a broader set of countries in order to discuss how accurately the information gathered through interviews in Ghana and Senegal reflects the needs in other countries.

The workshop had three main objectives:

1) To assess the highest priority needs for science-based information needed for the national planning and decision processes related to climate resilience of the agricultural sector, building on interviews conducted in Ghana and Senegal and comparing the needs across the six participating countries.
2) To collaboratively develop elements of a decision support framework that can strengthen the utilization of science-based information in policy and decision making. The workshop aimed to identify what the AgMIP research network can contribute to improving the capacity to co-produce and apply evidence under the different conditions in the six participating countries.
3) To identify what future co-production efforts that link research, policy, and practice should focus on in each of the participating countries.

The first day, we set the agenda for the workshop, we focused on prioritizing science-based information needs, and we discussed how model-based research methodologies can provide relevant information. On the second day, we discussed lessons from past collaborations between researchers and policymakers in each of the participating countries, the needs for improving capacities to apply science to policy and decision making, and next steps. The full workshop agenda is in Appendix B.

2. THE AFRICAN UNION CONTEXT

The workshop began with a discussion of the pan-African goals and policy framework for improving food security and advancing the development of the agricultural sector in Africa. Dr. Hamady Diop, the Senior Advisor to the African Union Special Envoy on Food Systems, gave a virtual presentation on the Comprehensive Africa Agriculture Development Programme (CAADP) Strategy and Action Plan: 2026-2035. This presentation described the CAADP process, which is a continental initiative led by the African Union with the goal to help African countries achieve the objectives of the Malabo Declaration, eliminating hunger and reducing poverty through growth in agriculture. The CAADP achievements to date include raising agriculture's significance and profile in national, regional, and continental agendas; increasing investment in agriculture across African countries; and strengthening African ownership and leadership in agricultural development. The

Figure 4. Dr. Hamady Diop's presentation

presentation described the consultative process used to develop the 2026-2035 plan, and presented the key objectives of the plan, including: intensifying sustainable food production, agro-industrialization, and trade; boosting investment and financing in transforming agrifood systems; ensuring food and nutrition security across the continent; advancing inclusivity and equitable livelihoods; building resilient agrifood systems that can withstand and adapt to various shocks and stressors; and strengthening agrifood systems governance.
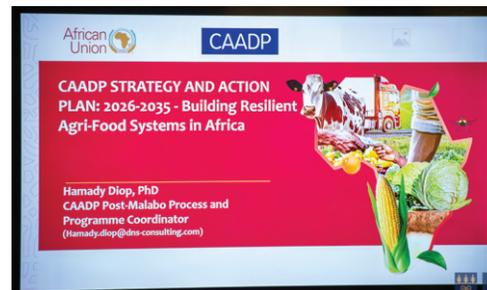

Figure 5. Dr. Racine Ly

The second presentation, given by Dr. Racine Ly from AKADEMIYA 2063, was titled "Twenty Years of CAADP Implementation: Lessons from the New Kampala Agenda." The presentation began with a description of historic food system development investments across Africa, including an exploration of the consequences of investments targeted towards rural communities, urban communities, and via private sector or public sector mechanisms. Dr. Ly argued that food system investments are most impactful, for example for reducing poverty, when they target rural communities via a mix of both public and private mechanisms. This approach is the focus of CAADP investments. The presentation then discussed progress seen via CAADP since the Kampala Declaration in 2005, for example an increase in labor productivity and agricultural exports for countries who adopted the declaration, as well as significant warning signs, such as stagnation in agricultural value added growth rates, and in intra-African trade. The presentation concluded with a list of lessons learned, emphasizing the need for better tracking and monitoring systems, the need for establishing processes to advance CAADP priorities within countries and the need to improve data quality, for example the consistency, rigor and completeness of national data available for tracking progress toward CAADP priorities.

3. ASSESSING DEMAND FOR SCIENCE-BASED INFORMATION

The next session focused the discussion on the science-based evidence that countries in SSA need to develop policies in pursuit of the food security and agricultural development goals discussed in the first session. The objective was to establish a basis for the conversations planned for the remainder of the workshop about strengthening the link between research, policy, and practice to improve productivity in the agricultural sector in SSA.

3.1 Preliminary Results from Ghana and Senegal

Dr. Malgosia Madajewicz (CU) presented preliminary results from interviews that AgMIP teams from UG and IPAR conducted with policy and decision makers in Ghana and Senegal to collect the following categories of information:

- Priority issues on which planning and policy making for climate action in agriculture is focusing
- Science-based information that is already being used for policies and planning
- Challenges to using existing science-based information
- Science-based information that is needed for planning and policies for climate action in agriculture and is not available or not available in the right form
- Needs for improved capacities to use science-based information for planning, policies, and decisions
- Integration of gender, inclusion, and nutrition issues in planning and policies for climate action in agriculture

The main point that emerges from the interviews in both countries is that there continues to be a substantial gap between policy and decision-making processes and research on climate issues in agriculture. While there is a lot of available data and information, much of the available material does not provide information that is directly applicable to policy development and adaptation planning efforts that are underway. Respondents report that data and information are either too general, such as climate projections at national, multi-country, or continental scales, or specific to localities without guidance as to the applicability of the results beyond the location, such as local of vulnerability or adaptation interventions. Some information is available from studies of other countries or regions but the studies do not assess under what conditions the results apply. The other common source of results that are difficult to apply are studies that use models developed for different contexts than are the subject of the research without appropriate reconfiguration of the model using local data.

Priority Issues for Climate Planning and Policy Making
The interview respondents in both Ghana and Senegal discuss a range of issues related to adaptation of crop production and livestock to climate change as a focus of

national planning and policy efforts. Respondents in both countries discuss improving climate resilience of crops and expanding the use of climate smart practices, such as inter-cropping, mulching, in-field water harvesting, crop rotation, and conservation tillage. The respondents in the two countries focus on different specific actions in these more general categories. For example, in Senegal there is more focus on planning informed by sea level rise and combating desalinization. Respondents from both countries discuss countering land degradation and improving soils. In this context, interviews from Senegal mention nurseries and reforestation, while in Ghana they mention compost. In Ghana, respondents mention agroforestry and incorporation of tree crops in the context of reducing emissions from the soil.

Improving climate resilience of livestock receives attention in both countries, with development of heat-resistant breeds and drought and heat-resistant fodder crops being common elements. Respondents in Senegal mention developing early warning systems for livestock disease due to meteorological conditions and fodder scarcity. In Ghana, they point to integrating crop and livestock systems, identifying alternative feed such as agro-industrial byproducts, and reducing emissions from manure. Ghana focused on both adaptation and mitigation measures including mitigation of enteric methane emissions while in Senegal the climate action priorities in the livestock sector primarily centered around adaptation.

Interviews from Senegal emphasized a focus on strengthening connections between decision makers and policymakers and researchers and integrating scientific data into strategy documents. They also report a focus on improving coordination and capacity building for climate action.

The policy and institutional efforts that appear as foci in interviews from Ghana include development of national Climate Smart Agriculture (CSA) action plans, integrating both scientific and indigenous knowledge in policy development, improving collaboration between national and district governments for local-level vulnerability assessments and NAPs, and involving the private sector in promoting climate information uptake and innovation.

Respondents from Ghana also report a focus on innovation in infrastructure and tools for climate action such as water harvesting and climate-smart irrigation, storage and processing to reduce post-harvest losses, weather index insurance, digital platforms for advisories, and real time monitoring of agricultural indicators.

Table 1. Summary Comparison of Priority Issues

Thematic Area	Ghana	Senegal	Shared Priorities
Crop production and climate smart practices	Composting as major soil improvement strategy Agroforestry and the integration of tree crops, particularly in relation to reducing soil-based emissions, showing a co-benefit approach to adaptation and mitigation	Adaptation efforts shaped by coastal vulnerabilities, with stronger focus on planning for sea level rise and addressing soil salinization Reforestation and establishment of nurseries as key soil restoration strategies	Improving climate resilience of crops and promoting climate-smart agricultural practices such as intercropping, mulching, in-field water harvesting, crop rotation, and conservation tillage
Land degradation and soil improvement	Compost application and agroforestry to enhance soil health and reduce emissions	Reforestation and establishing plant nurseries to restore degraded lands	Combating land degradation and improving soil fertility are shared concerns
Livestock adaptation and mitigation strategies	Crop-livestock integration, alternative feed sources from agro-industrial by-products, and specific mitigation strategies such as reducing methane emissions from manure and enteric fermentation	Adaptation, through early warning systems for livestock diseases linked to changing weather conditions and fodder shortages Focus remains primarily on adaptation rather than mitigation	Addressing need for climate-resilient livestock systems, including development of heat- and drought-tolerant breeds and fodder crops
Institutional and policy integration	Broader integration of both adaptation and mitigation actions, indicating potential alignment with national climate planning processes	Strengthening connections between policymakers and researchers Integration of scientific data into national strategies, along with improved coordination and capacity building	

Needs for New or Improved Science-Based Information and Capacity to Co-Develop and Use the Information

The demands that emerged from the interviews are twofold. One is demand for studies that are embedded in the decision-making and policy-making processes, with researchers working closely with decision and policymakers to co-develop the information that a given policy or decision problem requires. The second, implied need is for comparative studies that assess how different characteristics of context influence the outcomes of a given study and therefore if and how the study results apply to different contexts. Respondents recommend that studies should be done at the local level, and their results aggregated to the national level for application to both national planning and local decision making. Respondents add a point about temporal scale that both vulnerability assessments and studies of effectiveness of approaches to adaptation should be forward-looking, demonstrating how conditions will change over time.

Conducting locally specific studies that are then aggregated at the national level requires data at the local level and models that are configured to local conditions. Multiple interviews discuss the scarcity of appropriate data, recommending improved data collection as a high priority for investment. Several also include the importance of integrating local and indigenous knowledge to improve the take-up of results at the local level.

Interviews in both countries express a demand for studies of approaches to adaptation that can help to prioritize investments. The need is for studies that show the full range of benefits and conduct a benefit cost or return on investment assessment, showing how that assessment differs across contexts, in order to support evidence-based allocation of resources to adaptation interventions and in order to justify requests for funding. Respondents also say that the studies should examine co-benefits for adaptation and mitigation in order to support national planning processes.

All research outputs should be translated into information that policy and decision makers can use. The outputs should be tailored to different types of stakeholders, including the local level.

The remaining elements in the interviews are applications of the above points to specific types of information that are needed.

Climate-informed farm management: In both countries, respondents express the need for better farm management guidance for farmers, based on seasonal forecasts. Co-developing such guidance requires weather data at finer spatial and temporal resolution than are currently available in order to produce higher resolution forecasts that are locally specific. It also requires forecasts for decision-relevant variables, such as the start of the rainy season and extent and timing of dry spells rather than just rainfall totals, and translation of the forecasts into locally specific management advice. Both countries emphasized that the data from existing weather stations alone is insufficient because of their sparse locations.

Climate resilient crop and livestock systems: Respondents in both countries report the need for better understanding of climate-resilient crops, which crops are appropriate for different conditions, what input applications these crops need under different conditions, and how their productivity and input needs are likely to evolve over time. They discuss the need for co-developing climate-adapted livestock breeds for different conditions, together with an assessment of effective approaches to ensuring sufficient fodder, whether by cultivation, mapping of migration routes based on projections for availability of fodder along the route, and or introduction of alternative feed, as well as how all of these are likely to evolve over time. Co-developing effective approaches to reducing post-harvest losses should be a component of research on crop productivity.

Water, Soil, Pests and Disease Management: Studies of both crops and livestock require evidence on effective approaches to water management, management of soil quality, and prediction of pests and disease. For all three, research should address how the management should vary across local conditions, and how it will need to evolve over time. The objective for water management should be to progressively reduce reliance on rainfall. Research should address how the changing climate is likely to affect land degradation and how changing land use and adaptation practices can be designed and managed to reduce degradation and maintain soil quality, for example examining the effect of organic fertilization practices on soil health and yield in changing climate

conditions. In Senegal, the issue of predicting the change in salinization with sea level rise and managing salinization arose in many interviews. Policy and decision makers need a better understanding of how pests and disease will evolve with climate change in different locations, and the extent to which outbreaks can be predicted and managed.

Early Warning Systems and Monitoring: Interviewees in both countries expressed the need for data and research that can support the co-development of early warning systems for multiple uses: for predicting yield shortfalls that indicate threats to food security; for impacts on livestock such as shortage of fodder and changes in migration routes that may result in conflicts; and for predicting pests and disease that may impact crops or livestock. Early warning as well as management of changing conditions to reduce shortfalls requires the capacity to monitor a range of soil, crop, and livestock outcomes, for example using satellite imagery to assess crop health, yields, and pasture availability.

Nutrition: Research on climate resilient crops should focus not only on productivity but also on the effect that large scale introduction of new crop varieties would have on nutrition and the extent to which the new crops meet growers' and consumers' expectations and therefore how to improve their adoption. Linking crop production to nutrition is still a gap in research as well as in policy. The research should investigate what is the full range of uses of those crops, e.g. oil, fodder, etc.

Improving the Success of Funding Proposals - Climate Attribution and Predictive Modeling: Research may improve the availability of funding for adaptation and mitigation measures by showing how climate is a causal factor in producing impacts, by co-producing tools and indicators to track progress toward climate resilience, and by showing the effectiveness of specific adaptation and mitigation approaches. Respondents in both countries emphasize the value of models in attracting investment for climate action in agriculture. Interviewees in Senegal place particular importance on climate attribution studies, i.e., linking observed agricultural impacts directly to climate change, as a critical tool for justifying funding proposals and developing risk maps. In Ghana, they underscore the need for predictive models that can compare the results of different agricultural practices, for instance comparing mono-cropping and mixed farming systems and assessing their respective economic returns.

Data Accessibility and Integration: In addition to the types of information needed, multiple interviewees raise issues related to accessibility of data and information. Information and data are scattered across organizations and platforms in a variety of formats, difficult to find and use, and often expensive to access. There is a need for collaboration on coordinated, standardized platforms for accessing data and information.

Capacity Strengthening: Interviewees discuss the need to strengthen capacity to co-develop and use information. Both countries need better training and more

specialized expertise in topic areas related to climate action in agriculture at all levels (researchers, extension agents, policymakers) in order to strengthen research, uptake and application. Capacity is particularly weak at the local level, leading to low engagement by local actors and limiting capacity for collection of essential data. There is a recommendation to expand training programs and improve inter-institutional collaboration to coordinate research, share expertise and results, and better connect research to policy and decision-making cycles. Expansion of training is especially needed at local levels, including to improve farmers' capacity to use seasonal forecasts and other climate information.

Gender, Equity, and Inclusion: Multiple interviewees suggest that significant gender disparities remain in planning, decision making, and research related to climate action in agriculture and there is limited attention to disadvantaged populations. Furthermore, tracking progress on improving attention to gender inequities and inclusion is limited by lack of disaggregated data in both countries. Interviewees recommend improving the capacity to collect disaggregated data, expanding diversity in training programs, making progress toward more participatory planning, including farmers at the local level, and tying gender, nutrition, and equity more explicitly into climate-smart agriculture research, planning, and policy processes – especially at the subnational level.

3.2 Synergos Experience Supporting Policymaking in Nigeria and Ethiopia

Victor Adejoh, Nuredin Kemal and Roben Nedasa presented the Synergos approach to improving policymaking in African countries at the national level in Nigeria and Ethiopia respectively. They described Synergos' unique approach to strengthening capacities and operational efficiency in government. Synergos analyzes the policy processes and identifies entry points for strengthening the evidence base for policy development; coordination between stakeholders in the agricultural sector, including government and business, civil society, philanthropy, and farmers' organizations to create innovative solutions to urgent challenges; policy implementation for increased public and private sector investment

Figure 6. Mr. Victor Adejoh (left) and Mr. Roben Nedasa (right)

and job creation; and monitoring and evaluation. Synergos has been supporting the development of comprehensive state investment plans and strategies, and has launched new cross-ministerial coordination institutions, such as the Ethiopia Agricultural Transformation Institute, to improve the efficiency of policy processes.

In Nigeria, the priorities for policy making that Synergos has been focusing on include promoting access to affordable agro-inputs, developing agricultural markets, developing value chains, increasing job availability for youth, improving climate resilience in agriculture, and promoting on-farm research. In Ethiopia, Synergos has been

supporting the development of the Climate Resilient Green Economy National Adaptation Plan; developing the Agricultural Commercialization Cluster Initiative to accelerate commercialization of small farms through value chain development; promoting institutional transformation through leadership coaching and structural changes in human resource management systems; advancing horticultural commercialization; and developing an irrigation policy, strategy, and regulatory framework for Ethiopia with private sector engagement.

3.3 Ranking Science-Based Information Needs

The third component of the session consisted of two breakout groups, both of which had the same two objectives:

1. Discuss to what extent needs for science-based information to support policies and decisions for adaptation and mitigation in agriculture identified in Ghana and Senegal are similar in all participating countries, and what additional needs arise in the countries in which we did not conduct interviews with stakeholders
2. Assess the information needs to determine which may be the most urgent to address in future research and on which the discussion of capacities needed to co-develop and use the information should focus during Day 2 of the workshop

The West Africa breakout group consisted of Ghana, Senegal, and Nigeria. The East Africa breakout group consisted of Ethiopia, Kenya, and Zimbabwe.

3.3.1 Science-Based Information Needs in all Six Countries

Several commonalities emerged across the six countries regarding information priorities for climate action in agriculture. Most notably, participants consistently emphasized the urgent need for more accessible, timely, context-specific, and high-resolution data. The participants mentioned the need for much higher spatial and temporal resolution weather data; data on soil moisture, nutrient content and land degradation; data on co-benefits and trade-offs between adaptation and mitigation; and socio-economic data. The data are needed to develop more locally relevant real-time weather and seasonal forecasts; develop early warning systems for drought, flood, crop and livestock losses; guide farm management decisions; provide accurate input for vulnerability and adaptation assessments; and improve the effectiveness of policy and project implementation. All agree on the need for a coordinated, easily accessible data platform.

Representatives agreed on the need for better vulnerability assessments, and assessments of benefits and co-benefits of adaptation and mitigation strategies, including analyses of return on investment to guide investment decisions. The assessments should examine not only current conditions but also future change under different climate scenarios, provide information at the sub-national level, for different agro-ecological and socio-economic conditions in each country, and aggregate results from the sub-national to the national level to guide national planning and policy. All

discuss the need for monitoring indicators that can track how vulnerability and adaptation are evolving over time.

There was a consensus that communication of science-based information to policy and decision makers, especially extension agents and farmers, needs improvement.

Ethiopia
Participants underscored the importance of continuous research on the effectiveness of adaptation measures and called for tools to evaluate the real-world impact of policies. They emphasized the challenge posed by investment of funds in policies without mechanisms to audit or assess the effectiveness of adopted policies and a process for revising ineffective policies. Another key information priority highlighted was conducting trade-off and benefit cost analyses of adaptation and mitigation technologies. These information gaps were discussed in the broader context of ongoing climate-related planning issues, including inadequate data availability and poor knowledge management systems within ministries. Much of the existing data is siloed in academic institutions, limiting its usability by policymakers. Institutional fragmentation constrains coordinated planning and response - with the need for improving institutional coordination between the Ministry of Agriculture and the Ministry of Irrigation and Lowlands. A key concern was the absence of farmer-centered communication systems and limited clarity on which channels are most effective for disseminating climate-related information. Participants emphasized the need for integration of indigenous knowledge into information-sharing systems. The loss of local biodiversity, including traditional crop varieties and breeds, was also identified as an emerging risk linked to climate change.

Ghana
Participants highlighted a range of climate-related challenges impacting agriculture, including increasing temperatures, uneven rainfall patterns across the six agroecological zones, dry spells, and a rise in pest and disease outbreaks. These issues are compounded by systemic challenges such as limited irrigation infrastructure; lack of reliable, affordable and accessible farm inputs for smallholder farmers; security of land tenure; shortage of extension officers; and low youth engagement in agriculture. Concerns were also raised about the overuse of agrochemicals, often driven by poor access to extension guidance, and the destructive impact of illegal small-scale mining on farmland.

Science-based information priorities reflected these climate action concerns, with a strong emphasis on the need for data on changing soil characteristics within each agroecological zone to guide crop suitability and soil restoration. Participants called for up-to-date information on preferred crop and livestock species suited to different zones, and improved dissemination of research findings, particularly on recently developed planting materials and approved agrochemicals. The importance of regularly sharing this information with farmers through extension services and in collaboration with

relevant agencies like the Environmental Protection Authority (EPA) was highlighted by multiple participants from Ghana, as a way to enhance resilience at the farm level.

Kenya

Participants from Kenya emphasized that policy and decision makers need evidence of effectiveness of adaptation approaches over time, under different climate scenarios, to guide investments in adaptation. They need assessments of trade-offs and co-benefits associated with adaptation and mitigation measures. Participants highlighted the importance of evaluating the effectiveness of adopted policies. They noted the need for improved data systems to support assessments of risk and vulnerability in agriculture, especially in the context of drought. They highlighted the need to better understand the determinants of adoption of adaptation strategies, including barriers and enabling factors. Better communication strategies were also identified, particularly in terms of reaching farmers with timely and context-specific information and climate-smart agricultural technologies.

These priorities are closely linked to ongoing efforts within Kenya's planning process, which is focused on strengthening coordination across ministries, such as the Ministry of Agriculture and Livestock Development and the Ministry of Water, Sanitation, and Irrigation, and improving the connection between research institutions and the solutions they produce and field-level implementation. Participants discussed that coordination challenges, including mandate overlaps, pose barriers to effective data use and technology dissemination for climate risk management. Participants cited crop and livestock insurance schemes, currently covering millions of households, as existing mechanisms for resilience building.

Nigeria

Participants highlighted several climate action priorities including flooding in southern Nigeria, drought and desertification in the north, land degradation, water scarcity, pest outbreaks, and post-harvest losses. These concerns motivated adaptation initiatives such as the System of Rice Intensification (SRI), agroforestry-rice integration, and check dams for rainwater harvesting and conflict mitigation between farmers and pastoralists. Participants emphasized the need for improved productivity among smallholders through climate-informed extension advice, tailoring fertilizers to crop varieties, and strengthened coordination across ministries.

The adaptation priorities imply demands for science-based information, particularly in the form of precise, location-specific extension guidance on crop and livestock management. Soil testing and mapping were seen as essential for informing fertilizer practices and addressing soil degradation. Participants noted that inadequate sharing limits access to data and information. Participants called for more integrated information systems - such as the Food Systems Dashboard (FSD), to bridge data silos and improve accessibility of data and information for policymakers and extension agents.

Senegal

The Senegalese participants emphasized the need for context-specific and timely data to support climate action in agriculture, particularly in relation to land degradation, water scarcity, transhumance, and flooding. Participants noted that land degradation may have varying ecological and socio-economic drivers across the country's regions, requiring frequently updated and localized data to inform policy responses. Declining rainfall and changing surface and groundwater dynamics were noted, with concerns over attributing these changes accurately - whether to climate change or to other factors like urbanization. Participants stressed that such attribution is critical for assigning responsibility across ministries and coordinating effective responses. Climate impacts on livestock migration, especially shifts in transhumance routes and durations, raised concerns about disease, conflict, and ecological impacts, underlining the need for integrated hydrological, ecological, and socio-economic information.

Figure 7. Workshop participants from Senegal

Corresponding information priorities included updated soil and land degradation maps, surface water and groundwater flow data, crop suitability maps, livestock migration pathways, pest and disease risk mapping, and economic impact assessments of floods. Additionally, participants pointed to the need for better project monitoring and evaluation tools, and comprehensive climate and socioeconomic datasets for proposal development. They also advocated for centralized, cross-cutting data systems to reduce redundancy and support more coherent planning across sectors. Participants called for improved cross-sectoral coordination to ensure better integration of cross-cutting issues such as nutrition, gender, and equity.

Zimbabwe

Participants from Zimbabwe highlighted a complex set of climate-related challenges including increased rainfall variability, recurrent droughts, severe soil degradation, reduced responsiveness of soils to farming inputs, and livestock dry season feed shortages. These environmental stresses are intensified by the country's heavy dependence on rain-fed farming, limited irrigation and mechanization infrastructure, and underperforming market systems, particularly during recurrent droughts. Institutional fragmentation and coordination issues, exacerbated by lack of funding and economic instability, further hinder effective planning.

In this context, participants pointed to several key science-based information needs. Foremost among them was the need for a nationwide vulnerability assessment, which is critical to identifying who is most at risk and where. Participants also stressed the need for improved monitoring systems to evaluate the effectiveness of adaptation solutions, particularly for informing National Adaptation Plans (NAPs). Since the impact of adaptation strategies can shift over space and time, they emphasized the importance

of developing indicators that allow for real-time data and ongoing assessment, with wider geographical coverage. They emphasized the need for co-creating the science-based information and for better integration of issues related to gender. Addressing these information gaps was seen as necessary for transitioning from reactive to more anticipatory and resilient climate responses.

3.3.2 Ranking of Science-Based Information Needs

East Africa Breakout Group
The need for science-based evidence that was ranked most highly by participants from Ethiopia, Kenya and Zimbabwe was the need for assessments of the effectiveness of approaches to adaptation to support the NAP process as well as documenting trade-offs and co-benefits of adaptation for mitigation and vice versa. They emphasized the need for evidence to guide effective investment, and the importance of implementing adaptation and mitigation options that have co-benefits for both adaptation and mitigation. A related point that arose in the discussion is that a lot of effort is devoted to formulating policies and developing programs but very little to producing evidence about the effectiveness of those policies and programs. Without such evidence, it is unclear where to focus further investment. Thus the need is not just for understanding the potential effectiveness and co-benefits of adaptation and mitigation approaches, but analyzing how policies that support and programs that implement these approaches perform in reality.

The second priority that shared the highest ranking is understanding adoption rates of adaptation strategies. The participants called for evidence regarding who implements adaptation strategies, how quickly, what are the barriers to adoption, how rates of adoption vary across different regions and types of farmers, and what support farmers, extension agents, and local governments need to improve adoption rates. Two types of evidence shared the second priority ranking. The participants identified the need for evidence regarding which communication strategies are effective for different types of decision and policymakers. They also listed

Figure 8. Mrs. Charity Denhere shared the East Africa Breakout Group's rankings

the need for vulnerability assessments that cover all sub-national regions within the country at higher granularity to provide a holistic understanding of how vulnerability differs across conditions in the country and how it is likely to evolve in the future. Understanding vulnerability for the diverse contexts and population groups is critical for prioritizing approaches to adaptation.

The group mentioned two additional issues as high ranking priorities. One was developing farmer centered planning and communication mechanisms that effectively share information on integrated solutions with farmers. The other was the importance of integrating indigenous knowledge into vulnerability and adaptation assessments as well

in designing approaches to communication.

All participants agreed that comprehensive, high resolution, digitized, and easily accessible data is a fundamental requirement to support the needs for evidence listed as highest priority, while available data are sparse and not easy to find or access. Agricultural data, on soil quality, water availability, crops, and livestock, socio-economic data, and local knowledge are basic building blocks for vulnerability and adaptation assessments.

West Africa Breakout Group
The discussion in the West Africa breakout group had a very different focus than in the East Africa breakout group. Representatives from Ghana, Nigeria, and Senegal discussed specific topics related to improving agricultural production under a changing climate. The topics on which there was consensus in the group included understanding changing availability of water, surface and groundwater, and the potential for irrigation, noting the demand for an irrigation potential index; analysis of changing yields and productivity as a result of the changing climate, changing soil conditions, which necessitate mapping and modeling evolving soil quality, and due to the influence of land governance; analysis of changes in suitable crops and livestock breeds and how to manage the crops under changing climate conditions; reducing post-harvest losses due to agricultural practices and storage; understanding how pests and diseases and their effects on crops and livestock are evolving as the climate changes, and how smaller quantities of chemicals can be used more effectively to manage pests and disease; and the potential for aquaculture and fisheries under changing temperature and water availability.

As in the case of the East Africa breakout group, the participants noted the need for better, more granular, downscaled data as a cross-cutting issue, with expanded access and more standardized data collection. They noted specifically meteorological and climate data, crop phenology metrics, data on livestock, and on pests and diseases. Participants also identified the analysis of the role of gender as another cross-cutting issue, which should be included in research on all the ranked priorities.

Ranking in Plenary
All participants came together in plenary to discuss the highest priority information needs. Representatives from each country agreed that the assessment of effectiveness of adaptation strategies and of co-benefits of adaptation and mitigation is among the highest priority needs. They also recognized that assessment of effectiveness is a cross-cutting need, while topics, which the West Africa breakout group identified as needed information, are specific adaptation needs on which adaptation assessments could focus. For example, the assessment of adaptation outcomes and co-benefits could focus on introducing (i) approaches to fertilizing or to cropping that reduce soil degradation, (ii) more climate-resilient crops and appropriate management techniques, and (iii) approaches to conserving water or disseminating irrigation technologies.

There was broad agreement between the countries about the topics that are high priority for adaptation and mitigation assessments. East Africa breakout discussed the same issues as did the West Africa breakout. Specific topics that would emerge as the top priority for a research project within each country are likely to differ between the countries. For example, which specific crops are a more effective approach to climate resilience and therefore should be the focus of a climate-resilient management study will depend on the conditions within the country.

4. LESSONS FROM PAST AgMIP AND IFPRI WORK

The next session offered lessons learned from previous AgMIP and IFPRI projects that can be helpful for future collaborations between researchers and stakeholders to co-produce science-based information that is relevant and usable in policy and decision making. Drs. Roberto Valdivia (OSU), Sabine Homann-Kee Tui (Alliance Bioversity-CIAT), Kelvin Shikuku (ILRI), Dilys MacCarthy (UG), Laure Tall (IPAR), Givious Sisito (Matopos Research Institute), and James Thurlow (IFPRI) presented their experiences with engaging stakeholders in co-creating integrated models for informing adaptation in agriculture.

The AgMIP team presented the AgMIP goals for engaging stakeholders, which include understanding policy and decision makers' information needs in order to co-develop information products that are of value to national and international stakeholders and that can guide development and government programs and related investment in adaptation and mitigation strategies; co-developing the evidence based on co-generation practices in order to ensure relevance of the research products and build trust in the research process; and to improve researchers' and stakeholders' capacity to co-generate information and to apply the research outputs to policies and decisions.

Figure 9. Dr. Sabine Homann-Kee Tui (top left), Dr. Dilys MacCarthy (top right), Mr. Givious Sisito (bottom left) and Dr. James Thurlow (bottom right)

The presenters highlighted the iterative nature of AgMIP stakeholder engagement protocols, such as the National and Regional Representative Agricultural Pathways (RAPs, Valdivia et al., 2021), which co-develop drivers of agricultural systems change in order to parameterize Trade-off Analysis (TOA) model (Antle and Valdivia, 2006; 2021). The simulation results are then validated at national and sub-national levels with stakeholders, in a process that can inform adaptation priorities for specific agro-ecological conditions (e.g., in NAPs and NDCs). The co-development process improves researchers' and stakeholders' capacity to conduct collaborative research, including co-generation of scenarios, models, and evaluation. The presenters provided examples of success such as: policymakers in Zimbabwe engaging with the AgMIP team on assessments of climate change impacts on food security and poverty levels (Homman-Kee Tui, et al., 2023; 2021a; 2021b); co-development of model-based information that was ultimately used in the national climate-smart agriculture plans in Ghana (MacCarthy et al., 2021a; 2021b); co-generation of data and models used in the Senegalese planning process for adaptation (e.g., in regional vulnerability assessments), (Hathie et al., 2021a; 2021b); and AgMIP results being used in Makueni County of Kenya as a case study included in its operationalization of the 2013-2017 County Integrated Development Plan.

James Thurlow (IFPRI) discussed the use of the RIAPA model (Diao and Thurlow, 2012) for strategic planning at the national level, for example for national and agricultural development plans, and climate change vulnerability assessments; for rapid response, for example to droughts, and global shocks; and for impact evaluations, for example value chain comparisons, and investment prioritization. The presentation highlighted examples in which model results had an impact – such as prioritizations of the effectiveness of a variety of interventions in making progress toward higher growth, reduced poverty and undernourishment and improved diets at the national level – and were included in national and agricultural development plans. It also highlighted areas in which model results did not influence policy, such as a series of country vulnerability assessments. Dr. Thurlow emphasized the importance of carefully communicating findings to reduce the likelihood that they will be misinterpreted.

AgMIP has developed a Framework for Science-Based Climate Action to guide the generation of consistent, multi-model, multidisciplinary, and multi-scale assessments of climate change impacts on agriculture and food security. This framework is designed to produce robust, actionable insights through harmonized modeling approaches and characterization of uncertainty and risk across scales necessary to support evidence-based planning and climate-resilient food systems. (Mutter and Valdivia, 2021).

To implement this framework, AgMIP launched the Integrated National and Regional Assessments (INaRA) initiative (Antle et al. 2021), which enables coordination across disciplines and spatial scales through the use of consistent climate scenarios, socioeconomic pathways, and agronomic assumptions (Moss et al., 2010; O'Neill et al., 2014; Valdivia et al., 2015). INaRA's primary goals are to: (1) evaluate national agricultural performance under alternative policy strategies (e.g., NAPs, NAIPs, NDCs, BTRs) using national models and stakeholder-defined indicators; (2) support regional integrated assessments (RIA) of agricultural risks and adaptation at sub-national levels; (3) build national stakeholder capacity for co-developing policy-relevant information; (4) improve methods for linking global, national, and sub-national data and tools to assess vulnerability, adaptation, and mitigation; and (5) increase in-country ability to produce and use information products that are meaningful to both national and international decision makers.

5. APPROACH TO CO-CREATING EVIDENCE-BASED INFORMATION: INTEGRATED MODELING

The project within which we conducted the workshop is expanding the AgMIP INaRA (Integrated National and Regional Assessment) framework for producing ex-ante integrated vulnerability, adaptation, and mitigation assessments through a collaboration between AgMIP and IFPRI. The demand for science-based information expressed in the pre-workshop interviews and in the workshop confirms that the focus of the new work is a high priority for policy and decision-makers. Workshop participants have prioritized the need for conducting assessments of the potential impacts of adaptation strategies at the sub-national level to evaluate the benefits of such adaptation strategies across agro-ecological and socio-economic conditions for different production systems within each country, and for aggregating the implications of sub-national studies to the national level to inform national planning.

AgMIP and IFPRI are developing a methodology to integrate IFPRI's national-level RIAPA model within the INaRA framework. Within this integrated approach, RIAPA's national assessments are designed and implemented using a set of Representative Agricultural Pathways (RAPs) and Regional Integrated Assessments (RIAs) for each major region and agricultural system in the country. The RIAs, which use the TOA-MD economic impact assessment model, provide region- and system-specific analyses to support the design and implementation of national policies. A key feature of the RIAs is its focus on regional and agricultural system-level specificity, which is essential for designing and evaluating farm-level adaptation strategies effectively.

Team members organized a pre-workshop session to outline a practical roadmap for using this integrated modeling suite to inform national policy processes based on evaluations of potential impacts at the subnational level. By linking regional- and national-level analyses, the session aimed to ensure that model outputs are relevant to stakeholder needs at different scales.

Participants discussed the conceptual and operational design of a coherent modeling system that allows the co-development and transfer of data between AgMIP's scenario-based national and subnational assessments and IFPRI's RIAPA economy-wide policy analysis model. The discussion focused on aligning Representative Agricultural Pathways (RAPs) at national and sub-national levels to construct consistent, plausible futures for both regional integrated assessments and national economic simulations. The discussions emphasized the iterative flow of data between models, passing information on prices, land use, investment priorities and other key drivers of change from national to sub-national scales. These elements are critical for the design of adaptation and mitigation strategies under different climate, socio-economic and policy scenarios. The outcomes of the session demonstrate how the proposed integrated modeling framework can support cross-scale, evidence-based agricultural policy decisions.

6. EXPERIENCE WITH CO-CREATING SCIENCE-BASED INFORMATION: SUCCESSES, CHALLENGES, AND LESSONS LEARNED

One stakeholder from each country participated in a panel discussion that provided examples of successful collaborations between researchers and stakeholders to inform policies, programs, and decisions with science-based evidence. Each panelist presented examples of success, reasons why the example collaborations were successful, challenges that the collaborations faced, and lessons for planning and implementing successful collaborations between researchers and stakeholders in the future.

A number of shared factors that enable success, challenges, and lessons for future work emerged from the panel. Common challenges include lack of coordination and agreement between government ministries on priority policies and actions that research should inform, the difficulty of implementing true co-creation with good communication and consistent goals between researchers and multiple levels of policy and decision makers (national, sub-national, local, public, and private), career incentives in academia

Figure 10. Stakeholder panel

that discourage research focused on policy and decision applications, lack of resources for sustained efforts that go beyond pilot projects to support evidence-based scale up and impacts, and inadequate availability of and access to data needed for research.

The element that stood out as a shared characteristic in all the examples of success that the participants presented was collaboration across different types of agents with different sets of knowledge and expertise, and open sharing of information and data. The lessons for future collaborations build on this and other factors that enabled success. Participants emphasized the importance of alignment among government ministries and strong leadership in order to generate research outputs that support national priorities, and therefore are more likely to be used. The suggestion emerged to link NAP and NDC processes more closely. Including local-level decision makers is critical to carrying out research and producing outputs that are relevant and usable. These outputs need to be tailored to the needs of different decision makers and presented in ways that are accessible to users with different backgrounds and expertise. Both researchers and users of information need better training in producing and using decision relevant information in the context of climate action in agriculture. The co-creation process requires investment in relevant data that are easily accessible, well documented, and use standardized formats that facilitate use. Long-term, concessionary funding is necessary to support iterative co-creation of evidence to

support initiatives that advance beyond the pilot stage to be scaled up and achieve impacts. Several participants mentioned the need to support full implementation and evaluation of already developed policies, to determine their effectiveness in achieving progress on adaptation and mitigation, before formulating new ones.

Ethiopia
Dr. Gemedo Dalle delivered notes on Ethiopia's experience in co-creating science-based information to inform agricultural and environmental policy. He highlighted collaborative models that have led to tangible development outcomes across agriculture, natural resources, and institutional transformation. These models demonstrated how close coordination between research institutions, government agencies, and international development partners can effectively support national goals.

Figure 11. Dr. Gemedo Dalle

Dr. Dalle presented several initiatives, in which the research-policy collaboration produced measurable impacts. The LIVES project, led by ILRI and the Ministry of Agriculture, increased milk yields through improved breeds and feed practices. The Livestock Master Plan, informed by ILRI research, guided major investment decisions in the livestock sector. Climate-smart agriculture interventions by FAO and GIZ promoted drought-resistant crops and conservation farming, raising yields by 20–30%. The Sustainable Land Management Program (SLMP) restored over one million hectares through science-based watershed strategies. Additionally, water management efforts supported by IFAD and IWMI introduced effective irrigation and water harvesting systems. Tools like EthioSIS utilized geospatial soil data to improve fertilizer recommendations, boosting productivity by up to 50%. Early warning systems further enabled proactive disaster risk reduction, significantly minimizing livestock losses.

Dr. Dalle identified several enabling factors that contributed to these successes. These included strong government leadership and alignment across institutions such as the Agricultural Transformation Institute (ATI) and the Ethiopian Institute of Agricultural Research (EIAR). Participatory, context-specific interventions; robust data systems; and effective decision-support tools played key roles. Multi-stakeholder engagement – including international research organizations – alongside long-term funding and coordinated donor support also emerged as critical. Continuous capacity building for local actors and extension services, as well as mechanisms for scaling successful pilots into policy, were highlighted as essential components.

Despite these achievements, a number of challenges remained. Priority allocated to productivity rather than sustainability poses a challenge for building resilience. Limited technical capacity at regional and local levels threatens the sustainability of some

initiatives. Scientific data were often complex and difficult to translate into usable formats for policy audiences. External shocks such as droughts and pest outbreaks disrupted progress, while the labor-intensive nature or short-term trade-offs of some innovations hindered adoption of adaptation strategies by farmers. Furthermore, weak science-policy communication and limited access to localized data continued to pose barriers.

The remarks concluded with a set of actionable lessons and recommendations. Government ownership and alignment with national development plans were seen as fundamental for scale and sustainability. Co-designing initiatives with local stakeholders enhanced their relevance and likelihood of uptake. Co-creation requires long-term partnerships. Presenting data in accessible formats – such as briefs and infographics – was critical. Long-term investment in training and institutional platforms was encouraged, along with the development of dedicated knowledge translation mechanisms. Dr. Dalle suggested the need for a data platform designed specifically to support application for policy development and informing decisions. Dr. Dalle emphasized regular dialogue between researchers and policymakers, supported by flexible and adaptive approaches, as essential for managing climate variability and socio-economic shocks.

Ghana
Dr. Antwi-Boasiako Amoah delivered remarks on the successes and challenges of connecting science-based information to decision making in the agricultural sector in Ghana. He noted that a key driver of success in Ghana's climate-smart agriculture efforts has been the presence of a shared national vision, exemplified by the National Climate-Smart Agriculture and Food Security Action Plan (2016–2020). This vision has been supported by the Nationally Determined Contribution (NDC) process, which sets an absolute national emissions target rather than sector-specific ones—allowing the agriculture sector to define its own contributions while ensuring food production goals are met. Success has also stemmed from the active involvement of key research institutions, such as the University of Ghana, and collaborative planning processes that bring together diverse stakeholders. Co-creation and early-stage engagement between policymakers, researchers, and practitioners are seen as essential for long-term impact.

Challenges remain at the science–policy interface, where academic incentive structures often discourage policy-relevant work, limiting the alignment between research outputs and decision-making needs. In addition to institutional disconnects, capacity gaps and the limited accessibility and usability of climate and agricultural data continue to hinder progress. Dr. Amoah emphasized how a centralized data platform could greatly facilitate access to information on climate vulnerability and risk in agriculture.

Future efforts must prioritize cross-ministerial collaboration and the co-development of scientific evidence, ensuring that research is both informed by and useful to policymakers from the outset. Strengthening these connections will be critical to sustaining progress and scaling successful interventions. Dr. Amoah also noted that

efforts should be made, consciously, to provide space for regular dialogues and engagements among researchers, policymakers and other key stakeholders including civil society organizations and food business operators on climate change and agriculture. Such dialogues should aim at providing outputs that will continuously feed into research to support enhanced agricultural delivery in a changing climate.

Kenya

Mr. Bernard Kimoro explained that Kenya is currently developing a Livestock Masterplan (LMP) whose aim is to transform the sector by enhancing productivity that meets the climate action targets of resilience and mitigation of environmental impacts. The process of developing the LMP has entailed extensive use of data and information, most of which is domiciled within the research and academia space in the country and under the National Agricultural Research System (NARS). In this regard the country has collaborated with Kenya Agriculture and Livestock Research Organization (KALRO), the public agriculture research organization that coordinates NARS, and relevant international organizations

Figure 12. Mr. Bernard Kimoro

especially the CGIAR centres in the country such as International Livestock Research Institute (ILRI), Alliance for Bioversity and CIAT (ABC); World Agroforestry Centre and International Centre for Research in Agroforestry (CIFOR-ICRAF); amongst others to provide the necessary evidence that has been used in developing the necessary baselines for productivity parameters and the demand side projections in line with Kenya's socio-economic historic and projected trends. Within the livestock climate action, Kenya is also developing its livestock measurement, reporting and verification (MRV) system that entails application of the advanced IPCC Tier 2 methodology in the quantification of livestock emissions for the key livestock categories of dairy cattle, non-dairy cattle, sheep, and goats. The iteration to the advanced methodology necessitates a disaggregation of the inventory structure and this has an implication on the quantity and quality of data that is required. Working with ILRI, the Government of Kenya (GoK) through State Department for Livestock Development (SDLD) has received the critical livestock activity data and emission factors that have enabled the country to report emissions from these sub-categories using the recommended IPCC Tier 2. This has subsequently been used in the National Inventory Report (NIR) that informed Kenya's third national communication (TNC), and the 1st Biennial Transparent Report (BTR) both submitted in December 2024. The updated livestock sector inventory reports were also used to develop the mitigation assessment and NDC targets for the livestock sector and thus demonstrated the sectoral opportunities for investment.

In the above two cases, the main success factor was the existence of appropriate policy guidance from the policy level and decisions makers. Kenya has put in place the

National Agriculture Research System Policy and the National Agriculture Sector Extension Strategy (NASEP, 2012 revised 2022) that establish the research agenda in the sector. Within the agriculture climate action, the Kenya Climate Smart Agriculture Strategy (KCSAS, 2017-2026) provides this guidance especially on the importance of institutional coordination for research on agriculture climate action. Additionally, at the operational level and for the development of the livestock MRV system, the SDLD has put in place a core team whose membership is technical personnel from ministries, departments and agencies (MDAs) together with relevant public and international research and academic institutions. This multi-sectoral platform is a lever for launching policy-relevant research. Within the team and during data gathering, the gaps identified are the opportunities for new research areas that help in reducing the uncertainties in the GHG inventory work. Policy and decision makers are part of the research teams and, in most cases, the research areas are co-designed to ensure relevance and applicability in policy level work. In Kenya, the Ministry of Agriculture and Livestock Development has also been collaborating with the researchers in responding to calls for proposals in the areas of adaptation and mitigation as part of this co-design process. Once the co-design and research process is finalized, there is joint authorship of scientific publications and policy briefs. ILRI's open access data policy has also been a critical enabling factor.

The main challenge are the restrictive data protection policies instituted in many research organizations. This has often led to delays in acquisition of the data for policy level work. In the Kenyan case, the data required iteration to IPCC Tier 2. Using the emission factors developed by ILRI necessitated formal communication where raw data was required.

There are a few key lessons for future collaboration. First, the existence of enabling policies to guide the research agenda setting is critical. This provides the needed bridge between the policy level and decision makers on one side and the researchers, including academia, on the other. Second, enhanced partnership in the co-design of research and co-generation of knowledge ensures that the collaboration meets the needs of policy and decision makers through actionable and transdisciplinary research. There is a need for more concessionary financing that includes funding to support policy-relevant research, and that extends past the pilot stage of the project to provide continuity, inform scale up, and result in impacts.

Nigeria
Dr. Vincent Aduramigba shared insights on Nigeria's experience linking science and policy in the agricultural sector. He emphasized that while Nigeria has a number of specialized agricultural research institutions, coordination and the effective dissemination of information remain significant challenges. The Federal Ministry of Agriculture and Food Security (FMAFS) plays a central role in driving agricultural projects, working in partnership with agencies, donors, and development partners. To support this, FMAFS has established a centralized database to improve data accessibility.

Despite these efforts, Nigeria continues to face challenges in bridging the gap between research and policy. A key issue is the disconnect between government priorities and donor agendas, which can hinder cohesive action. Additionally, the adoption of scientific research findings into policy remains weak, limiting the impact of innovations in the agricultural sector.

To address these issues, Dr. Aduramigba recommended several forward-looking steps. He called for policy reforms and increased advocacy to strengthen institutional frameworks. He stressed that building partnerships across institutions is critical to advancing science-policy integration. He also emphasized the need for stronger collaboration and innovation across sectors, as well as greater development and accessibility of quality data from research institutions. These efforts are essential to ensuring that science-based evidence effectively informs agricultural and climate-related policies.

Senegal
Mr. Lamine Diatta presented two key examples of successful science–policy collaboration in Senegal. The first was the INFOCLIM project, which unites ANACIM (the national meteorological agency), ISRA (the agricultural research institute), and farmers to utilize climate information for agricultural decision making. The second example was the PAS/PNA initiative, through which vulnerability assessments are jointly conducted by research institutions and government bodies to support the development of National Adaptation Plans (NAPs) and long-term climate strategies.

Several factors contributed to the success of these initiatives. Mr. Diatta highlighted inclusive and participatory processes, high-level political engagement to agree on a way forward, and the involvement of senior researchers as critical elements in bridging the gap between science and policy. These collaborations benefited from multi-level government support and a clear commitment to integrating scientific expertise into planning processes. Connecting the co-creation process clearly to a funding initiative was a critical component, resulting in a request for funding to GEF based on research results. He noted the importance of engaging stakeholders at the sub-regional level to translate research outputs into action. He discussed that accommodating different points of view and ways of speaking in the co-creation process enabled more useful outputs, and those outputs were communicated in a way appropriate for decision-makers.

A key obstacle has been the limited availability of reliable meteorological data, which constrains the ability to develop responsive adaptation strategies. Another challenge is the heavy reliance on short-term project funding, which often undermines the sustainability of collaboration and institutional learning.

Drawing from these experiences, Mr. Diatta offered a set of recommendations to strengthen future science–policy collaboration. He emphasized the need to establish ongoing mechanisms for co-creation and to link these efforts with strategic fundraising.

Making data and results more accessible was seen as crucial, as was ensuring that existing policies are effectively implemented before new ones are introduced. He recommended linking the NAP and NDC processes in order for adaptation initiatives to bring NDC resources to the same sectors. Other priorities included emphasizing co-design with stakeholders, strengthening researchers' communication capacities, using knowledge translation platforms, and improving the coordination of research efforts with clearly defined policy-relevant outputs.

Zimbabwe
Mrs. Charity Denhere, Climate Change Management Department, shared experiences from Zimbabwe. Zimbabwe faces increasing climate-related shocks – including droughts, floods, tropical cyclones, and pest outbreaks – amplified by increasing temperature extremes and land degradation. This vulnerability is heightened by widespread poverty, food insecurity, and heavy dependence on rainfed, cereal-based agriculture. Livestock systems are particularly affected by feed shortages and market constraints. These risks are compounded by fragmented institutions and limited technical and financial capacity, which hinder effective planning and implementation of climate strategies.

A notable example of research-policy collaboration is the ongoing Green Climate Fund (GCF) project titled *Building Climate Resilience of Vulnerable Agricultural Livelihoods in Southern Zimbabwe* (2021–2027), jointly implemented by UNDP and the Climate Change Management Department. With a budget of USD 27.7 million, the project focuses on promoting resilience through the development of irrigation and mechanization, improved agronomic and livestock management practices, and the use of innovation platforms (IPs) to support both extension services and evidence-based policy development.

The project has delivered tangible results. Ten-day weather forecasts are now disseminated via the Meteorological Services Department, and automated weather stations have been installed to strengthen early warning systems. Climate-resilient irrigation schemes and Farmer Field Schools (FFS) have been used to build adaptive farming capacity. A Climate-Smart Agriculture (CSA) Manual was developed, and innovation equipment was deployed to support improved crop and livestock production.

Research played a central role in shaping these outcomes. IPs facilitated collaboration across ministries and tested climate-smart practices at the local level. Research outputs from this project informed national adaptation programmes such as Pfumvudza, including improvements in seed systems, livestock production, and the development of climate-resilient feed. Stakeholder-driven research is being used to address critical data gaps on rainfall, soil moisture, and farming system performance, helping to generate actionable insights. Concept notes were prepared to guide the scaling and sustainability of successful innovations.

Opportunities exist to feed these efforts directly into national policy frameworks. The

2017 National Climate Change Policy was developed with broad stakeholder engagement, including researchers, NGOs, and government departments. The upcoming National Adaptation Plan (NAP), expected in 2025, builds on academic inputs, vulnerability assessments, and climate modeling. Zimbabwe also became the first country to submit its third Nationally Determined Contribution (NDC 3.0) in 2025, using research-based estimates of greenhouse gas emissions to support its target of a 40% reduction by 2030.

Success was enabled by strong political support, active consultation with national universities, and platforms that fostered collaboration between researchers, practitioners and policymakers. However, challenges remain, including limited resources, institutional fragmentation, and uneven policy implementation.

Future collaborations should ensure early engagement of strategic actors, especially at ministerial and provincial levels, supporting the devolution agenda. Aligning with national data systems like ZIMVAC (Zimbabwe Vulnerability Assessment Committee) and CLAFA (Crop, Livestock and Food Security Assessment), contributing to real-time data, enhancing existing tools to improve data relevance and coverage is critical. Gender considerations must be integrated, and outreach tailored to different audiences, from parliamentarians to communities. Co-producing knowledge with decision makers needs to be designed in such a way that it will ensure research translates into coherent planning across national and subnational levels, enhancing ownership and for scalable, inclusive, and context-responsive solutions. Therefore, it is important for researchers to participate in policy review and strategy development, and inform ongoing processes in policy development, coordinating through central units such as the Strategic Policy Planning and Business Development Unit, recognized as policy and feedback interface. Mrs. Denhere emphasized the importance of fully implementing existing policies before developing new ones. She also highlighted the need for communicating the output of co-creation initiatives in ways that are appropriate for users of the information.

7. DECISION SUPPORT FRAMEWORK

The process of informing policies and decisions with science-based evidence extends well beyond conducting the research that generates the evidence. The last session of the workshop consisted of a short presentation and discussion in breakout groups regarding elements of a framework that encompasses all the components of the policy and decision support process. The framework builds on steps for engaging stakeholders presented in the AgMIP Guidelines for Engaging Stakeholders in Integrated Model Efforts v.2.1.

The proposed framework has four components:

1) *Defining policy and decision problems and identifying stakeholders*
The iterative process of identifying the policy and/or decision problem on which the research should focus and the stakeholders who should be involved in co-creating the research to inform the policy or decision should align with the national priorities for climate adaptation in agriculture, and in particular the NAP process. The research should provide information that is directly relevant to one or more high priority challenges in the NAP process or adaptation programs stemming from the NAP process. Policy documents or program plans under development can help guide what the research should focus on as well as the stakeholders who are engaged in or knowledgeable about the planning processes, including policy and decision makers and intermediaries, such as extension agents, technical committees, and parliamentary bodies. The process of identifying issues as well as stakeholders should be iterative because stakeholders help identify the issues, including cross-sectoral influences and collaborations, and at the same time who the relevant stakeholders are depends on the issues on which the research will focus. Research may be most useful if it focuses on issues that have open policy or decision windows, that is there are policy, planning, or implementation decisions being made on a timeline on which the research can deliver outputs.

2) *Research and engagement protocol and capacity building*
The second component is a protocol for engagement between identified stakeholders and researchers in the research process. The AgMIP Guidelines for Engaging Stakeholders in Integrated Model Efforts v.2.1 lay out many of the principles for the collaboration between stakeholders and researchers. Stakeholders should be involved in the entire co-creation process from identifying the issues on which the research will focus and the research objectives, to participating in each stage of the research in order to improve the relevance of the research to policy and decision-making needs, interpreting results, translating and applying the results to actionable planning and decisions. Collaborations should aim to link to relevant and credible multi-stakeholder platforms and expand the participation of stakeholders in the research itself, where stakeholder involvement is typically most limited. In order for stakeholders to participate fully and effectively, researchers need to have adequate capacity in conducting

participatory research and stakeholders require capacity to understand what the research can contribute and how sufficiently to help guide the research. Teams need to identify capacity gaps and approaches to addressing those gaps.

3) *Generating evidence*

The framework should include the protocol for the research that produces the evidence for policy, planning, and decisions. In the case of AgMIP, the research includes integrated climate vulnerability assessments in agriculture and assessments of trade-offs, benefits, and co-benefits of adaptation and mitigation options under different climate and socio-economic scenarios using the integrated modeling framework (INaRA). As part of this project, AgMIP and IFPRI have developed an approach to expanding this framework to integrate national and sub-national economic modeling using the AgMIP TOA model and the IFPRI RIAPA model.

4) *Decision support outputs*

The final element of the framework consists of translating the research results into information that stakeholders can use to design policy, plan, and make decisions. The information outputs need to be tailored to the needs of different types of stakeholders, containing information that is specific to the decisions that they are making, understandable given the users' background and expertise, and delivered in time to be used during the open policy and decision windows. AgMIP Impacts Explorer contains examples of such information outputs from prior AgMIP phases. Stakeholders also need support in using the outputs to make policy, planning, and program decisions.

The elements of the decision support framework represent an iterative process, as presented in Figure 2. In order for the research output to retain relevance to the selected policy, program, or decision issues, which informed the initial research plan, there should be repeated interactions between researchers and stakeholders to clarify objectives, re-evaluate the research steps, potentially involve additional stakeholders whose participation is needed to inform the evolving research, and address new capacity gaps as they emerge. New research questions may emerge as stakeholders apply the co-created outputs to policies, programs, or decisions.

The first day of the workshop focused on identifying needs for science-based information and discussing the research protocols for generating evidence, corresponding to elements (i) and (iii) of the decision support framework. The last breakout session addressed element (ii) in the context of the priority information needs identified on the first day. The discussion included mapping the stakeholders relevant to the selected information needs, identifying the capacity gaps that those stakeholders face, and concluding with a discussion of approaches to addressing those capacity gaps.

Mapping Stakeholders

Representatives from all six countries list a range of government actors as relevant stakeholders for co-creating science-based information who participate in national

planning, policy, and programs for climate adaptation and mitigation in agriculture. The government actors include multiple national government agencies, with ministries of agriculture, environment, and finance playing central roles, as well as bureaus of statistics in most countries. Participants also report sub-national regional government bodies as stakeholders who participate in national planning and who should be engaged.

Differences emerge in local governance structures. Participants from Ghana, Senegal and Zimbabwe indicate that district- and ward-level agricultural departments participate in national planning and should be involved in the co-creation of information, while local level of government is less present in the stakeholder maps in Ethiopia and Kenya.

Non-government stakeholders who should be involved in co-creation of science-based information either as participants in national planning or as those who are affected by national planning include NGOs, civil society, private for-profit sector, and research and academia. Representatives from all countries list NGOs as stakeholders who should be involved. In all stakeholder maps, international development NGOs feature as relevant actors who also participate in national planning, with Ethiopia, Kenya, and Zimbabwe listing many international NGOs. No national NGOs and very few civil society organizations appear on stakeholder maps as participants in national planning processes, suggesting weak integration of national non-profits and civil society in policy formulation and planning.

More national NGOs and civil society organizations, especially farmer organizations, appear on the stakeholder maps as those who are affected by national planning. The stakeholders listed on the maps as affected by national planning tend to be less organized than those who participate in national planning, including farmers and consumers, and including them in co-creation of information is likely to pose challenges where organized representatives do not exist.

Almost all countries include multiple private sector organizations as stakeholders who participate in national planning, as well as stakeholders who are affected by national planning. Similarly to civil society, those who are affected tend to be less organized groups than those who participate in planning.

Representatives from all countries report national universities and most report national agricultural research institutes as partners in the co-creation of information. In all countries, these actors appear as participants in national planning. Only Zimbabwe reports some research institutions as being affected by national planning processes.

We include the full stakeholder maps for each country created during the breakout groups in Appendix C.

Gaps in Stakeholders' Capacities

Strong consensus emerged across all six countries that a critical gap in capacity to co-develop and use science-based information for national planning, policy, and programs is due to lack of coordination and communication between government ministries as well as between government and other relevant actors. Representatives from all countries mentioned challenges such as lack of alignment of priorities and objectives across ministries, lack of collaboration in planning and policy on issues that are connected, which hampers a systems-level approach to addressing climate impacts and adaptation, and lack of communication and sharing of data and information. A common challenge was lack of coordination between national, sub-national, and local levels of government, with sub-national and local levels having insufficient awareness of priorities and goals established at the national level, as well as national level plans and guidance. Participants also cited lack of communication and coordination between different levels of government and NGOs and civil society organizations.

Across the six countries, all reported limited financial and human resources across government tiers, with shortfalls in capacity to formulate and analyze policy, in technical skills to apply research results to planning and policy, in capacity to conduct integrated planning, in policy implementation and project development, and in data management. Participants highlighted the need for better access to and capacity to use tools, such as models, and methods for conducting vulnerability assessments, assessing effectiveness of and co-benefits of adaptation strategies, and evaluating the effectiveness of

Figure 13. Example of capacity gap mapping

policies and programs. These capacity gaps exist at all levels of government, and are especially pronounced at the sub-national and local levels.

Another point of agreement was on limited capacity to collect and to provide access to data needed for vulnerability and adaptation assessments. Issues include insufficient data collection, absence of protocols to collect high-quality, high resolution standardized data that can be compared across sub-national regions, and poor access to existing data, which is difficult to find, without information needed to assess reliability, in a variety of formats, and often expensive. A number of countries, and Ghana in particular, cite an inadequate weather station network.

All participants agreed that capacity gaps in the NGO sector include limited funding, poor technical capacity, lack of awareness of research results, such as regarding CSA practices, poor communication with government and within the sector, and weak connections to the private sector. Similar capacity gaps apply to civil society organizations, including inadequate communication with all levels of government and

and other types of organizations.

Private sector limitations were noted in all countries but varied in nature - from inadequate capacity and resources to develop demand for new products and services and limited access to risk management strategies in Kenya to limited working capital in Zimbabwe and weak leadership and and CSA awareness in Ghana.

Commonly reported capacity gaps in research and academic institutions were inadequate capacity of researchers to determine the research agenda and to engage in interdisciplinary research. The promotion system in academia affects the capacity of researchers to engage in policy and decision relevant research because the applied research often is not recognized as a significant contribution in decisions to grant tenure. Other gaps include funding, technical skills, availability of research tools, and communication of research results to stakeholders outside of academia.

Ethiopia
In Ethiopia, at the national level, both human and structural capacity were identified as significant barriers, alongside national policy-level factors that limit access to agricultural inputs for producers. Sub-national and local governments are faced with limited financial resources, undermining their ability to facilitate or participate in co-creation processes. NGOs face communication challenges with both government bodies and other institutions, compounded by a lack of trust and funding. Civil society groups cite financial and human resource shortages. Research and academia face limitations in finance, technology, and skilled human resources, which reduce their effectiveness in contributing to co-creation and applied research dissemination.

Figure 14. Ethiopia Breakout Group

Figure 15. Ghana Breakout Group reporting their findings

Ghana
At the national government level, the challenges include an inadequate weather station network, absence of a national data repository for CSA practices, and the need for improved forecasting technology. Additional gaps were identified in monitoring, evaluation and reporting, project management, policy formulation and analysis, resource mobilisation, and skill development. At the sub-national level, poor dissemination of research outputs was noted. Local governments face gaps in extension advisory services, communication skills, technical skills, and human resources. Absence of a platform to streamline activities and improve coordination was highlighted for both NGOs and civil society organizations. Civil society organizations

and the private sector have gaps in leadership and advocacy skills, along with limited knowledge of CSA. Research and academia face limited infrastructure for mitigation and adaptation studies, along with the need for enhanced skills in modelling, crop variety improvement, and broader capacity development. Another important challenge identified is the science-policy-practice coordination gap for agriculture in general and CSA in particular.

Kenya
At the national government level, key limitations include policy incoherence, for example resulting from lack of coordination between different ministries and departments who have overlapping mandates, the absence of robust data and knowledge repositories such as Management Information Systems (MIS), and insufficient technical and coordination capacity. These issues cascade down to the sub-national government levels, where limited technical skills and financing remain major constraints. Civil society organizations face challenges in engaging other stakeholders strategically. In the private sector, the delivery of services important for risk management, such as insurance and other financial services, to the end users remains weak, and gaps persist in technical capacity, development of markets and the related problem of growing demand for new products, and mechanisms for managing risk. The challenges with market development are in part the result of policy failures. Research and academia are constrained by inadequate influence in setting relevant research agendas, limiting the alignment of research questions with the needs of relevant stakeholders, further underlining the need for co-creation.

Nigeria
Participants from Nigeria identified capacity gaps primarily at the sub-national government level. These include weaknesses in proposal and report writing, sharing science-based information with extension services to inform agricultural practices, and monitoring and evaluation. Additional challenges include the implementation of NATIP, data generation and harmonisation, leadership capacity, low resource utilisation, allocation inefficiencies, infrastructure deficits, and limitations in modelling and vulnerability assessments. There are also significant constraints in developing concept notes that have a good likelihood of attracting funding.

Senegal
In Senegal, national-level government institutions have inadequate access to and capacity to use planning tools, limited impact assessment mechanisms, and insufficient training in crop breeding. At the sub-national level, there is limited awareness of national climate policy, inadequate platforms and tools for coordination and collaboration across multiple stakeholders, and insufficient communication skills. Local governments struggle with mainstreaming adaptation, inadequate tools for monitoring and evaluation, limited training in project development, along with gaps in communication strategy, and consistent coordination. NGOs face challenges in advocacy and project development skills, while civil society groups reported limited advocacy and communication skills, along with barriers in accessing relevant data.

The private sector faces limited access to both information about policy opportunities and climate finance. Research and academia experience constraints related to accessing climate-related funds.

Zimbabwe

Participants from Zimbabwe highlighted financial constraints, limited implementation capacity, weak coordination mechanisms, and inadequate infrastructure and data systems at the national government level. Communication and negotiation skills are also seen as limiting factors. Some of these challenges extend to sub-national and local governments, where infrastructure deficits, limited market access, and poor financial capacity further restrict engagement in co-development of adaptation policy. NGOs face limited technical knowledge and weak coordination with government bodies. The private sector faces insufficient working capital and underdeveloped marketing strategies. Within the research and academic community, financial constraints, limited access to research tools, and insufficient human capacity constrain meaningful contributions to co-creation and informed policy-making. Limited finances were highlighted as a cross-cutting issue across stakeholders.

Figure 16. Zimbabwe Breakout Group

Approaches to Improving Capacities

Representatives from the East African countries (Ethiopia, Kenya, and Zimbabwe) emphasized improving communication and collaboration across sectors and governance levels, with the recognition that many challenges stem from the grassroots level. Participants stressed the need to build or strengthen capacity-building programs that are informed by institutional analysis, ensuring that the unique dynamics and bottlenecks of each organization are addressed. There was a particular focus on understanding and improving communication: who is speaking, what is being said, what barriers exist, and how these can be overcome. To facilitate this, participants proposed establishing platforms for the co-creation of solutions, where different stakeholders can collaboratively develop and apply context-relevant strategies. The establishment of science-policy-practice dialogue forums was also identified as a priority, creating spaces where researchers, practitioners, and policymakers can jointly deliberate and align actions, thereby enhancing the relevance, usability, and uptake of co-produced knowledge. Opportunities exist to leverage ongoing discussions on designing practical and fundable capacity strengthening initiatives, including for regional research-to-policy consortia (e.g. CCARDESA, FARA).

Participants from the West African countries (Ghana, Nigeria, and Senegal) emphasized the need for structured, institutionalized mechanisms to enhance capacities, particularly at the national and sub-national level, with few suggested interventions at the local, NGO or civil society level. Participants suggested the development of protocols for

integrated, holistic national planning established with awareness of and coordination with pan-African processes and policies. At the national government level, they suggested training in leadership, planning, budgeting, proposal writing and development, in organizing and maintaining data repositories, in management, in coordination, in understanding scientific information, and in impact assessment methods and tools for improved learning about effective approaches to policy and planning as well as effective policies and programs. They emphasized the need for more monitoring and evaluation and iterative learning. They suggested that each ministry should have the position of science translator. They expressed the need for innovative communication strategies and much more attention to communication and dialogue. They also suggested improving alignment of science-to-policy processes across scales, from national to sub-national and local government, and to civil society and private sector, and the development of platforms to scale and spread information.

At the local level, participants from West Africa suggested the development of platforms for peer-to-peer learning between farmers. They recommended training in leadership and planning for the private sector to improve the ability to participate in climate-smart initiatives.

In the research and academic sectors, stakeholders from both discussion groups called for improvement in post-graduate training, training in interdisciplinary research and collaboration with decision makers, co-development with policymakers of information tools that policymakers can understand, co-development of manuals to guide the use of information tools, and training in plant and livestock breeding.

While the six countries share many categories of capacity gaps, the specific ways in which the gaps manifest themselves differ across the different agricultural settings. The capacity-building interventions need to be tailored in ways that are sensitive to institutional structures and the specific roles and interactions of stakeholder groups within each country.

8. CONCLUSION

In the concluding discussion, workshop participants emphasized the point that planning and policy processes continue to be divorced from research, and that closing the gap is imperative for progress on climate action in agriculture. The linkages between science, policy, and practice need substantial strengthening. They emphasized that co-creation of science-based information should deliver impact-oriented research focused on outcomes critical for policymakers, such as assessment of impacts of proposed climate adaptation and mitigation policies and actions on jobs, poverty alleviation, food security, and nutrition. Partners should build co-creation efforts around specific policy and decision opportunities, for example targeting policies that are being actively developed or revised, and active planning processes.

Participants reiterated the need for improved coordination between different levels of government as well as government, research, civil society and the private sector. They emphasized the need for more effective, targeted communication, with tools and messages tailored to end users to ensure they understand the information and can apply it in their field of practice. Communication strategies should rely on existing institutions and networks whenever possible, such as the farmer field schools, which are an example of a farmer peer-to-peer learning network, and extension services. However, communication also needs to be expanded beyond existing networks.

Participants made the point that co-creation of information ultimately has to benefit the farmers, and the pathways through which farmers will benefit should be clarified in the process of co-developing the information. Some also made the point that in order to realize those benefits, the co-development of information should work through and strengthen existing institutions and networks, which are responsible for benefiting their constituents. Government ministries that are responsible for progress in agriculture, as well as extension services, which are critical providers of information to farmers, should grow their capacities and become better connected through the co-creation of science-based information needed to advance climate resilience in agriculture. To bolster the flow of information across science, policy and practice, some highlighted the need to include extension services as a key part of the co-creation chain, with extension needing greater capacity to serve the critical boundary organization role, bridging the gap between scientific information, political priorities, and agricultural practice.

Priorities for Future Research

The high-priority research that participants identified in the workshop to support policy and decision making would require innovations in modeling and expanding applications of new directions in modeling. Two research needs emerged most strongly. The first is for forward-looking studies that connect analyses at the local and national levels to examine how results, and therefore decision and policy implications, differ across agro-ecological and socio-economic conditions as well as how those subnational differences influence national-level outcomes. The second is for assessments of the effectiveness of climate adaptation and mitigation strategies in agriculture, including

outcomes of adaptation that are of most importance to decision and policy makers, such as growth, incomes, employment, and food security, as well as guidance for investments in adaptation. The two research directions intersect. According to the participants, the assessments of approaches to adaptation and mitigation should integrate research done across different agro-ecological and socio-economic contexts, which can guide adaptation investments at the local level, and analysis at the national level, which should guide national policy and investment.

The suggested research requires an approach to modeling that integrates climate, agricultural, and economic systems at the local and national levels. This is a relatively new direction in modeling efforts (Cultice et al. 2023, Kruseman et al. 2020). Linking the three systems is challenging in itself and often the analysis is at relatively coarse spatial scales or otherwise at specific local scales. Few efforts systematically analyze how research results differ across conditions and even fewer connect analyses at local and national levels, thereby omitting the feedback effects between the two levels. Who adopts adaptation strategies at the local level and the outcomes that those strategies produce under the local conditions, such as crop yields, farm profits, and consumption, influence national outcomes, such as GDP, supply of agricultural products, prices, employment, and incomes. The national outcomes in turn feed back to influence local outcomes, for example through prices, wages, and supply of commodities.

An example of an approach that can deliver the analyses suggested by workshop participants is AgMIP's INaRA framework. Through the project that funded the workshop, AgMIP has begun a collaboration with IFPRI to strengthen and implement the linkage between sub-national and national-level foresight and modeling tools to enable the integration of sub-national analyses into national-level policy assessments, using the AgMIP foresight methods (i.e., RAPs) as the main approach to connecting the models and different scales. Advancing this integration will require technical coordination and institutional collaboration to ensure that evidence from sub-national analyses can meaningfully inform national decision making, leveraging the evolving capacity of INaRA-linked models.

Another implication for future research emerged from discussions of the need to understand effectiveness of developed policies before introducing new ones. The supporting research should include not only methodologies for evaluating the effectiveness of planned policies through ex ante assessments or implemented policies through ex post assessments, but also deeper understanding of effective planning, design, and implementation processes.

Furthermore, participants identified specific climate adaptation topics in agriculture that require more attention than they are receiving, and on which assessments of approaches to adaptation could focus. Researchers should include nutritional value of food in studies of food security. Studies often focus on quantity of available food, and ignore the nutritional value of diets. Most research attention focuses, understandably, on cultivation of crops. However, policy and decision makers need more information

about climate adaptation of livestock and mixed crop and livestock systems, management of pests and diseases, and reduction of post harvest losses.

Participants emphasized very strongly the challenges with availability and accessibility of data necessary to expand research in the suggested directions. They noted a need for more accessible, timely, context-specific, and high-resolution data, including weather; agro-ecological conditions such as soil moisture, nutrient content, land degradation, pests and diseases; farm management; and socio-economic. Investment in coordinated data repositories that contain open-access, well-documented data in widely used formats would vastly improve data accessibility.

The workshop participants suggested not only directions for needed research but also improvements to the research process. Co-production of scientific information should targetspecific policy or planning windows or decision opportunities. Participants highlighted deeper engagement with stakeholders throughout the entire research cycle, from defining objectives, to conducting analyses, to designing user-friendly tools, as both enabling the development of more useful and usable information and a capacity-building opportunity. Participatory co-design and co-implementation of research can help address institutional and technical constraints identified during the workshop, improving the capacity of researchers, policymakers and decision makers for co-creation as well as capacity for translating the resulting scientific evidence into actionable strategies. Co-production can also help direct efforts to improve availability and accessibility of data to support highest priority research initiatives.

Policy-Relevant Outputs: Policy Briefs
The project team has developed two policy briefs informed by lessons from the workshop and based on the AgMIP and IFPRI approaches to modeling for the two countries on which the project is mainly focusing, Ghana and Senegal. The **Ghana policy brief** focuses on the analysis of cowpea, which recent AgMIP research identifies as a crop that offers increasing yields under changing climate conditions in some parts of Ghana. An analysis of the Navrongo region in Ghana provides the context-specific information about benefits and co-benefits of investing in a climate resilient crop that the stakeholders have been requesting, including expected change in cowpea yields under a range of climate scenarios, resulting changes in farm incomes, effects on poverty, proportion of households that can afford a nutritionally adequate food basket, and potential improvements in nutrition. Prior national-level agricultural value chain analysis that used the RIAPA model shows that cow pea alone cannot achieve progress toward the full range of national-level objectives. National investment should target a portfolio of agricultural products, with a focus on cow pea in Navrongo and potentially other selected regions.

Similarly, the **Senegal policy brief** provides information about a basket of crops, which recent AgMIP analyses suggest may improve climate resilience of yields. The performance of different crops varies across the regions in Senegal, highlighting the need for context-specific information that stakeholders have been requesting. The crops

which promise better yields include pearl millet, sweet potato, cassava, and sesame. The information includes benefits for the Nioro region of Senegal in terms of yields under the changing climate conditions, changes in farm incomes, poverty levels, and potential improvements in nutrition. Insights from prior studies on sustainable land intensification and prioritization of value chains at the national level based on the RIAPA model support the analysis.

Future research should consider aggregating analyses from multiple local contexts to the national level.

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APPENDIX A: LIST OF WORKSHOP PARTICIPANTS

AKADEMIYA2063
Dr. Racine Ly, *Director, Data Management, Digital Products and Technology*

Ethiopia
Dr. Gemedo Dalle, Addis Ababa University, *Director General for Ethiopian Biodiversity Institute, Former Minister for Ministry of Environment*
Mr. Nuredin Kemal, *Lead Agricultural Commercialization Cluster Initiative, Synergos Ethiopia*
Mr. Roben Nedasa, *Program and Finance, Synergos Ethiopia*
Mr. Abera Tola, *Country Director, Synergos Ethiopia*

Ghana
Dr. Nana Antwi-Boasiako Amoah, *Environmental Protection Authority (EPA)*
Mr. Kingsley Amoako, *Ministry of Food and Agriculture, Directorate of Crops Services, Accra, Ghana*
Ms. Edwina Quist, *Ministry of Food and Agriculture, Directorate of Crops Services, Accra, Ghana*
Dr. Portia Adade Williams, *Science and Technology Policy Research Institute (STEPRI), CSIR*
Dr. Andrews Agyei-Holmes, *Institute of Statistical Social and Economic Research (ISSER), University of Ghana*
Prof. Daniel Ankrah, *Department of Agricultural Extension, School of Agriculture, University of Ghana*
Prof. Dilys MacCarthy, *Soil and Irrigation Research Centre, School of Agriculture, University of Ghana*

Kenya
Mr. Bernard Kimoro, *Head of Climate Change and Livestock Sustainability Section, State Department for Livestock Development, Ministry of Agriculture and Livestock Development*
Dr. Kelvin Shikuku, *Livestock, Climate and Environment Program, International Livestock Research Institute*

Nigeria
Dr. Vincent Aduramigba PhD, *Soil Fertility & Modelling Scientist, Regional Coordinator, Obafemi Awolowo University, Ibadan, Nigeria*
Mrs. Iyabo Lawal Mustapha, *Director Federal Ministry of Agriculture and Food Security, Abuja, Nigeria*
Mr. Victor Adejoh, *Country Director, Synergos Nigeria*

Senegal
Mr. Djibril Diagne, *National Committee of Climate Change (COMNACC)*
Mr. Lamine Diatta, *METE - Ministry of Environment and Ecological Transition (METE)*
Mr. Boubacar Dramé, *Ministry of Agriculture, Food Sovereignty, and Livestock (MASAE)*

Senegal (cont.)
Mr. Adama Faye, *Researcher, Senegalese Institute of Agriculture Research (ISRA)*
Mr. Paul Ndiaga Ciss, *Researcher, IPAR*
Dr. Laure Tall, *Research Director, IPAR*
Mrs. Habibatou Ibrahima Thiam, *Researcher, IPAR*

United States
Kevin Karl, *Senior Staff Associate, Center for Climate Systems Research, Columbia University, co-located with NASA Goddard Institute for Space Studies*
Natalie Kozlowski, *Staff Associate, Center for Climate Systems Research, Columbia University, co-located with NASA Goddard Institute for Space Studies*
Dr. Malgosia Madajewicz, *Associate Research Scientist, Center for Climate Systems Research, Columbia University, co-located with NASA Goddard Institute for Space Studies*
Erik Mencos, *Senior Staff Associate, Center for Climate Systems Research, Columbia University, co-located with NASA Goddard Institute for Space Studies*
Dr. James Thurlow, *Director, Foresight and Policy Modeling, IFPRI*
Dr. Roberto Valdivia, *Associate Professor (Senior Researcher), Department of Applied Economics, Oregon State University*

Zimbabwe
Mrs. Charity Denhere, *Climate Change Adaptation Officer, Climate Change Management Department, Ministry of Environment, Climate and Wildlife, Harare, Zimbabwe*
Dr. Sabine Homann-Kee Tui, *Research Scientist, Alliance Bioversity International — CIAT*
Mr. Givious Sisito, *Chief Research Officer (Statistics & Biometry), Matopos Research Institute, Department of Agriculture, Research, Innovation and Development. Ministry of Agriculture, Fisheries, Water and Rural Development, Bulawayo, Zimbabwe*

Figure 17. Group photo taken after workshop conclusion

APPENDIX B: WORKSHOP AGENDA

May 21, 2025: ISSER Conference Facility, University of Ghana	
8:45 - 9:00	**Arrival**
9:00 – 9:45	**Opening Session** 1) Welcome: Dilys MacCarthy; Eric Nartey, Dean, School of Agriculture, Nancy Quashie, Deputy Director, Research and Innovation Directorate 2) AgMIP and IPAR Perspectives: Cynthia Rosenzweig (remote), Laure Tall 3) Participant Introductions 4) Group Photo 5) Workshop Objectives, Outputs and Agenda: Kevin Karl
9:45 – 10:05	**CAADP Strategy and Action Plan: 2026-2035 - Building Resilient Agri-Food Systems in Africa** *Hamady Diop*
10:05 - 10:25	**The role of data and analytics for Kampala CAADP Implementation** *Racine Ly*
10:25 – 10:45	**Assessments of Demand for and Supply of Science-Based Information: Initial Results** *Malgosia Madajewicz*
10:45 - 11:05	**Synergos Experience with Climate Resilience and Policy Formulation and Implementation** *Roben Nedasa, Victor Adejoh, Nuredin Kemal*
11:05 – 11:20	**Coffee Break**
11:20 – 13:00	**Breakout Session 1: Defining Stakeholders' Science-Based Information Priorities**
	Ghana, Nigeria and Senegal *Lead: Laure Tall* **Ethiopia, Kenya and Zimbabwe** *Lead: Kelvin Shikuku*
13:00 – 14:00	**Lunch**
14:00 – 15:00	**Report Backs and Group Discussion** *Finalize Stakeholder Information Priorities List*
15:00 - 15:45	**Lessons from Past AgMIP and IFPRI Work** *Roberto Valdivia, Sabine Homann-Kee Tui, Kelvin Shikuku, James Thurlow, Dilys MacCarthy, Laure Tall, Givious Sisito*
15:45 - 16:00	**Afternoon Coffee Break**
16:00 - 16:30	**Report back from Model Integration Meeting** *Roberto Valdivia, James Thurlow*
16:30 – 16:45	**Concluding Thoughts of Day 1** *Dilys MacCarthy and Laure Tall*
16:45 – 18:00	**Cocktail Reception**
End of Workshop Day One	

APPENDIX B: WORKSHOP AGENDA

May 22, 2025: ISSER Conference Facility, University of Ghana		
8:45 - 9:00	**Arrival**	
9:00 – 9:45	**Opening Session** 1) Reflections from Day 1: Malgosia Madajewicz 2) Open Floor: Discussion of Day One 3) Review of Agenda for Day 2: Kevin Karl	
9:45 – 10:30	**Lessons from Experiences with Co-Creating Science-Based Information** Moderator: Laure Tall Panelists: Charity Denhere *(Zimbabwe),* Gemedo Dalle *(Ethiopia),* Bernard Kimoro *(Kenya),* Vincent Aduramigba *(Nigeria)*, Lamine Diatta *(Senegal)*, Antwi-Boasiako Amoah *(Ghana)*	
10:30 – 10:45	**Decision Support Framework Objectives** *Malgosia Madajewicz*	
10:45 -11:00	**Morning Coffee Break**	
11:00 - 13:00	**Breakout Session 2:** **Decision Support Frameworks for National Planning**	
	Ghana, Nigeria, Senegal *Lead: Dilys MacCarthy*	**Ethiopia, Kenya, Zimbabwe** *Lead: Sabine Homann-Kee Tui*
13:00 – 14:00	**Lunch**	
14:00 – 15:00	**Report Back from Breakout Session 2 and Discussion**	
15:00 – 15:15	**Afternoon Coffee Break**	
15:15 - 15:30	**Facilitated Group Discussion About Next Steps**	
15:30 – 16:45	**Concluding Thoughts** *Dilys MacCarthy and Laure Tall*	
End of Workshop Day Two		

APPENDIX C: STAKEHOLDER MAPPING EXERCISE

Ethiopia

Stakeholder Type	Participant in National Planning	Affected by National Planning
National Government	• Ministry of Irrigation and Lowland • Ministry of Planning and Development • Ministry of Agriculture • Agricultural Research Institute • Ministry of Finance • Agricultural Transformation Institute • Federal Cooperative Agency • Ethiopia Coffee and Tea Authority	• Environmental Protection Authority • Bio-Development Institute • Wildlife Conservation Authority • Ethiopia Forest Development
Sub-National Government	• Regional President Office • Bureau of Agriculture • Planning and Development Bureau • Regional Cooperatives • Finance Bureau	• Forest Development Bureau • Biodiversity Department
Local Government		
NGO	• Synergos • OXFAM • IFAD • FAO • ILRI • GIZ • ILIR • UNDP • AGRA • World Bank • IFPRI • African Development Bank	• Environmental NGOs
Civil Society	• Cooperatives	• Farmers
Private Sector	• Ethiopian Seed Enterprise Agency • Ag Input Providers • Financial Institutions • Ethiopian Coffee Association • Ethiopian Millers Association • Ethiopian Oilseed Association	
Research & Academia	• Universities Agricultural • Research Institutions	

APPENDIX C: STAKEHOLDER MAPPING EXERCISE

Ghana

Stakeholder Type	Participant in National Planning	Affected by National Planning
National Government	• Ministry of Food and Agriculture (MoFA) • Ministry of Environment, Science and Technology (MEST) • Ministry of Finance (MoF) • Ministry of Local Government and Rural Development • Ministry of Gender and Social Protection • Ministry of Land and Natural Resources (MLNR) • Parliamentary Select Committee on Agriculture and the Environment • National Development Planning Commission (NDPC) • National Disaster Management Organization (NADMO) • Ghana Meteorological Agency (GMet) • Environmental Protection Authority (EPA) • Ghana Irrigation Development Authority • Ghana Statistical Service	• Set priorities, ensure integration into national strategies, allocate resources
Sub-National Government	• Regional Directorate of Agriculture • RCC (Regional Coordination Council)	• Set priorities, ensure integration into national strategies, allocate resources at the subnational level • District, Municipal/Metropolitan Coordinating Council, District Dept of Agriculture
Local Government	• District Department of Agriculture • MMDAs (Metropolitan Municipal and District Assemblies)	• Set priorities, ensure integration into national strategies, allocate resources at the subnational level • District, Municipal/Metropolitan Coordinating Council, District Dept of Agriculture
NGO	• Action Aid • Friends of Earth Ghana • SEND Ghana	• Ensure inclusivity, transparency, equity, and hold stakeholders accountable • Local NGOs
Civil Society	• Climate Change Advocacy Networks (eg. Climate Action Network) • Abibiman Foundation • Peasant Farmers Association of Ghana (PFAG)	• Ensure inclusivity, transparency, equity, and hold stakeholders accountable. • Smallholder farmers • FBOs (Farmer-Based Organisations) • CBOs (Community-Based Organisations) • Households

APPENDIX C: STAKEHOLDER MAPPING EXERCISE

Ghana (cont.)

Stakeholder Type	Participant in National Planning	Affected by National Planning
Private Sector	• Agribusinesses (Agro-processors and exporters) • Financial institutions • Seed distributors • Media • Farmer Based Organizations and Cooperatives • Women and Youth Groups • Community Based Organizations	• Ensure inclusivity, transparency, equity, and hold stakeholders accountable. • Smallholder farmers • FBOs (Farmer-Based Organisations) • CBOs (Community-Based Organisations) • Households
Research & Academia	• Universities • National Research Institution-CSIR - Council for Scientific and Industrial Research • International research institutes: CGIAR Centres	• Generate data, lead modeling, conduct impact assessments, co-design solutions
Development Partners & Multilateral Organizations	• FAO/IFAD/WFP • World Bank/AfDB • FCDO/GiZ • UNDP/UNEP • AGRA • Adaptation Fund/GCF	• Fund research, convene multi-stakeholder processes, promote regional alignment

APPENDIX C: STAKEHOLDER MAPPING EXERCISE

Kenya

Stakeholder Type	Participant in National Planning	Affected by National Planning
National Government	• State Department for Agriculture and Crops • State Department for Livestock Development • National Treasury and Economic Planning • Ministry of Environment, Climate Change and Forestry • Kenya National Bureau of Statistics • Kenya Climate Smart Agriculture Multi-stakeholder Platform • KIPPRA (Kenya Institute for Public Policy Research and Analysis)	• Kenya Revenue Authority
Sub-National Government	• Ministry of Water, Sanitation and Irrigation (State Department of Irrigation) • State Department for Aquaculture and Blue Economy • Kenya Agricultural and Livestock Research Organisation	• County Government Departments
Local Government		
NGO	• SNV • World Vision • GIZ • IFAD • USAID • World Bank • WFP • CONCERN Worldwide	
Civil Society	• KENAFF (Kenya National Farmers Federation) • PACJA (Pan African Climate Justice Alliance) • Water Users Associations	
Private Sector	• KEPSA (Kenya Private Sector Alliance) • Farmers and Livestock Producers Cooperatives • MFIs (Including Insurance Companies) • Agrodealers (Input Supply) • Seed Companies (e.g., KAGRIC)	
Research & Academia	• Kenya Agriculture and Livestock Research Organisation • CGIAR (ILRI) • Agricultural Training Organisations and TVETs	

APPENDIX C: STAKEHOLDER MAPPING EXERCISE

Nigeria

Stakeholder Type	Participant in National Planning	Affected by National Planning
National Government	• Ministry of Agriculture and Food Security - issues related to food security and environmental sustainability • Federal Ministry of Environment • Nigeria Meteorological Agency (NIMET) - provides data on weather forecasts • Federal Ministry of Finance, Budgets and National Planning • National Bureau of Statistics • National Seed Council • Federal Ministry of Water Resources and Sanitation - management of water supply and irrigation	
Sub-National Government	• Ministry of Agriculture • Ministry of Finance - management of state finances • Ministry of Environment • Agriculture Development Program (ADP) ◦ Mandate is providing extension services	
Local Government	• LGA Department of Agriculture • LGA Department of Environment	
NGO	• Synergos • Self Help Africa • Community Action on Climate Change • HEDA Resources • AGRA	
Civil Society	• ActionAid • SWOFON	• Farmers • Consumers • Value chain actors
Private Sector	• Seed companies • PEPSAN • Agriculture cooperatives	• Farmers Groups • Agro Dealers
Research & Academia	• Research institutes • Universities • IITA • ILRI	• Researchers • Experts

APPENDIX C: STAKEHOLDER MAPPING EXERCISE

Senegal

Stakeholder Type	Participant in National Planning	Affected by National Planning
National Government	• METE - Ministry of Environment and Ecological Transition • MASAE - Ministry of Agriculture, Food Sovereignty, and Livestock • MEPM - Ministry of Energy, Petroleum, and Mines • MHA - Ministry of Hydraulics and Sanitation • Elaborate Policies National	• COMNACC • ISRA • ANCAR • CSE
Sub-National Government	• Services Deconcentrate • ARD	• COMRECC • GTP • Société de Développement • Plaidoyer et Appen à la Trise Oeuvre SSE - Advocacy and Appen to the SSE Tribe
Local Government	• Communes (Collectivités locales) • Elaborate politique local • Stratégie de communication • Coordination et mise en cohérence	• CADL • Operation policies locale
NGO		• UICN • ENDA
Civil Society	• CNCR	• CONCAD
Private Sector		• LBA • CNAAS • Production de fertilisants • TOLBI • GEOMATICA • GEONATIX • Semenciers
Research & Academia	• INP • ISRA • IPAR • Universities • ITA	• Experts

APPENDIX C: STAKEHOLDER MAPPING EXERCISE

Zimbabwe

Stakeholder Type	Participant in National Planning	Affected by National Planning
National Government	• Ministry of Finance and Economic Development and Investment Promotion • Ministry of Environment, Climate and Wildlife • Ministry of Lands, Agriculture, Fisheries, Water and Rural Development • Ministry of Women Affairs, Community, Small and Medium Enterprises Development • National Early Warning Steering Committee • Zimbabwe Farmers Unions • Parliamentary Portfolio Committees on Agriculture and Environment	
Sub-National Government	• Agriculture Extension Officers (Agritex, DVS, DLPD) • Provincial Ministers of State for Strategic Planning and Economic Development • Provincial Agricultural Directorate and Strategic Planning • Meteorological Services Department (MSD) • Research Institutes like Chibero and Matopos	
Local Government	• Ward Committees • District Development Committees • District Agriculture Extension Services	• Provincial Agriculture Extension Services • Provincial/District Meteorological Services Department
NGO	• FAO • ORAP • UNDP • Caritas • WFP • WHH - Welthungerhilfe • World Vision • Technoserve	
Civil Society	• CAN (Climate Action Network) • Faith-Based Organizations	• Farmers • Farmer Unions • Women and Youth Groups • Vulnerable groups
Private Sector	• SEEDCO • AGRISEEDS • Women Empowerment Banks • Vet Distributors (Agrodealers) • AFC Holdings (Agricultural Finance Corporation) • Agricultural Finance Banks	• Agrodealers • Seed Companies • Agrodealers Association • Traders and Offtakers
Research & Academia	• University of Zimbabwe, Bindura University, National University of Science and Technology • Department of Research and Support Services • ICRISAT • CIMMYT • ILRI	• Research institutions like Matopos, Chibero