AN ALLIANCE FOR THE CLIMATE
AgriDENZ
Dialogue on climate and agriculture between New Zealand and Germany

Qinisa
Strengthening research collaboration in Southern Africa

CHARTING THE COURSE FOR AGRICULTURAL GREENHOUSE GAS RESEARCH IN AFRICA

Report on the Regional Science-Policy Dialogue on Agricultural Greenhouse Gas Research Priorities in Southern Africa

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Abbreviations

AGHG	Agricultural Greenhouse Gases
CCARDESA	Centre for Coordination of Agricultural Research and Development for Southern Africa
CGIAR	Consultative Group for International Agricultural Research
DALRRD	Department of Agriculture, Land Reform and Rural Development, South Africa
GHG	Greenhouse Gas
GRA	Global Research Alliance
MPI	New Zealand Ministry of Primary Industries
MRV	Monitoring, Reporting and Verification
NDCs	National Determined Contributions
NGOs	Non-Governmental Organisations
NZAGRC	New Zealand Agricultural Greenhouse gas Research Centre
SADC	Southern Africa Development Community
SDGs	Sustainable Development Goals
USA	United States of America

Executive Summary

Agriculture is a cornerstone of Southern Africa's economy, providing livelihoods and ensuring food security for millions. At the same time, it is a significant source of greenhouse gas (GHG) emissions, posing challenges to climate resilience and sustainable development. Reducing agricultural GHG emissions is essential to meeting climate adaptation and mitigation goals, and to fulfilling the region's commitments under international frameworks such as the Paris Agreement and the Sustainable Development Goals (SDGs).

To support coordinated action, the Qinisa Initiative, in collaboration with the Alliance for the Climate – Dialogue on Climate and Agriculture between New Zealand and Germany (AgriDENZ) and regional partners, convened a Regional Science-Policy Dialogue on Agricultural GHG Research Priorities in Southern Africa. This dialogue aimed to establish a shared research agenda that aligns with regional priorities and informs critical policy questions, helping guide researchers, funders, and program designers.

The specific objectives were to:

1. Identify and prioritise key agricultural GHG research areas relevant to Southern Africa.
2. Facilitate knowledge exchange and collaboration among regional and international researchers, policymakers, and industry stakeholders.
3. Strengthen partnerships to enhance research capacity and funding opportunities.
4. Inform policy frameworks and regional strategies for climate-smart agriculture and sustainable land management.

The Dialogue discussions reflected a strong consensus that agricultural GHG research and climate action in Africa must be locally driven, inclusive, and impact oriented. Panelists emphasized the urgent need for Africa-led strategies that engage farmers, governments, researchers, industry, and communities as co-creators in the research and innovation process.

To drive transformative progress, participants stressed the importance of moving beyond fragmented, short-term, or donor-driven interventions. A more systemic and coordinated approach is required—anchored in context-specific priorities, science-based solutions, and clear communication strategies—to scale climate-smart practices and reduce emissions across value chains. Achieving this also means balancing immediate farmer needs with long-term sustainability goals, supported by inclusive policies, private sector participation, and investments in grassroots innovation.

A key proposal emerging from the discussions was the establishment of an Africa-led Agricultural GHG Research Endowment Fund. This strategic mechanism would ensure long-term, stable financing and promote equitable, scalable research outcomes.

Overall, the participants called for a decisive shift toward African ownership of the climate agenda—rooted in indigenous knowledge, collaborative partnerships, and strong alignment with national climate targets. Such an approach is essential for delivering just, lasting, and transformative change in the continent's agricultural sector.

The dialogue also identified indicative research priorities across four key areas—soil health, livestock systems, cropping systems, and climate-smart landscapes—as critical entry points for advancing low-emission, climate-resilient agriculture in Southern Africa. These priorities respond to pressing regional challenges, including land degradation, GHG emissions, productivity constraints, and climate variability.

- In soil health, research should focus on managing soil organic matter to improve water regulation, enhance productivity, and strengthen ecosystem resilience—moving beyond a narrow focus on carbon sequestration.
- In livestock systems, priorities include innovations in animal health, nutrition, and genetics that contribute to both adaptation and mitigation outcomes.
- In cropping systems, emphasis should be placed on integrated approaches such as agroforestry, improved crop varieties, and conservation practices that build resilience while reducing emissions.
- In climate-smart landscapes, particularly rangelands and pastures, research must address degradation, promote sustainable grazing, leverage indigenous knowledge, and link mitigation strategies to farmer-relevant outcomes.

These thematic priorities form the foundation for a shared regional research agenda, which will be refined by thematic expert groups. The resulting draft agenda will be circulated for stakeholder input to ensure broad ownership, relevance, and impact.

Several cross-cutting recommendations emerged to support the development and implementation of this regional agenda. These include:

- Adopting an interdisciplinary food systems approach
- Expanding the use of data, digital tools, and modelling
- Strengthening research ecosystems and infrastructure
- Aligning priorities with farmer, industry, and policy needs
- Articulating a clear value proposition that integrates productivity with climate co-benefits

Ongoing collaboration among stakeholders will be essential to generate knowledge, tools, and solutions that are practical, inclusive, and regionally relevant. The regional research agenda must also align with national, regional, and continental frameworks and strategies to gain traction and attract the necessary funding and support.

The Qinisa Initiative's efforts to develop a regional research agenda on agricultural GHG emissions in Southern Africa will help advance these priorities by fostering a coordinated, inclusive, and action-oriented approach. The initiative will focus on strengthening the research ecosystem—recognising the vital role of researchers, institutions, and multi-stakeholder partnerships in driving innovation.

This includes mapping existing infrastructure, identifying capacity needs, and aligning research priorities with the practical realities of farmers, industry, and policymakers. Through this process, Qinisa aims to support the implementation of impactful mitigation strategies that simultaneously enhance agricultural productivity and resilience across the region.

1. Background

Agriculture is a cornerstone of Southern Africa's economy, providing livelihoods and ensuring food security for millions. However, it is also a major contributor to greenhouse gas (GHG) emissions, posing challenges to climate resilience and sustainable development. Addressing agricultural GHG emissions is essential for achieving climate adaptation and mitigation goals, while supporting the region's commitments under international frameworks such as the Paris Agreement and the Sustainable Development Goals (SDGs).

The Qinisa Initiative, launched on 27 August 2024, is a regional collaborative platform hosted by Future Africa at the University of Pretoria, with leadership from the Centre for Coordination of Agricultural Research and Development for Southern Africa (CCARDESA) and its partners. It aims to strengthen coordination in agricultural GHG-related research across Southern Africa. Building on the Global Research Alliance on Agricultural Greenhouse Gases' (GRA) collaborative ethos, Qinisa seeks to enhance communication, facilitate knowledge exchange, and accelerate research on measuring and managing agricultural GHG emissions. By leveraging existing and planned research efforts, Qinisa aims to develop new collaborations and serve as a central platform for fostering low-emission, climate-resilient agricultural food systems.

The AgriDENZ Project (Alliance for the Climate – Dialogue on Climate and Agriculture between New Zealand and Germany) focuses on advancing low-emission, climate-resilient food systems through intensified cooperation between New Zealand and Germany. The project aims to develop global solutions to address the climate impacts of agricultural production, guided by international agreements such as the UNFCCC, the Kyoto Protocol, and the Paris Agreement. Additionally, the project aims to establish a platform for exchanging insights on climate policy action plans and sharing research findings with third-party countries in the Global South.

To advance coordinated action on agricultural GHG emissions, the Qinisa Initiative, in collaboration with AgriDENZ, related Future Africa programs (UKUDLA, Future Earth), South Africa's Department of Agriculture, Land Reform and Rural Development (DALRRD) and CCARDESA, convened a Regional Dialogue on Agricultural GHG Research Priorities. This Dialogue served as a platform for aligning research efforts, enhancing collaboration, and identifying key investment areas for agricultural GHG mitigation and adaptation in Southern Africa.

By bringing together key regional and international stakeholders, the Dialogue facilitated discussions on strategic research priorities, fostered multi-sectoral collaboration, and advocated for evidence-based policymaking to drive sustainable agricultural transformation in Southern Africa. This Regional Dialogue presented a unique opportunity to align research efforts, foster collaboration, and drive policy action to address agricultural GHG emissions in Southern Africa. By bringing together key stakeholders, the event contributed to a more coordinated and impactful research agenda, supporting the region's transition towards climate-resilient and low-emission agriculture.

2. Dialogue Objectives and Expected Outcomes

The Science-Policy Dialogue aimed to establish a shared, mutually beneficial research agenda on agricultural GHG emissions in Southern Africa. This dialogue served as a platform for researchers, policymakers, and practitioners to collaboratively address key research and policy challenges related to

agricultural GHG emissions. It contributed to the development of a unified research and application agenda that aligns with regional priorities. This agenda will provide researchers and funders with clear guidance on critical policy questions and corresponding research needs, fostering more effective program design.

The specific objectives of the Dialogue were:

1. Identify and prioritize key agricultural GHG research areas relevant to Southern Africa.
2. Facilitate knowledge exchange and collaboration among regional and international research institutions, policymakers and industry stakeholders.
3. Strengthen partnerships to enhance research capacity and funding opportunities.
4. Inform policy frameworks and regional strategies for climate-smart agriculture and sustainable land management.

Expected outcomes:

1. A consolidated research agenda outlining key agricultural GHG research priorities for Southern Africa. This will enable the development of a shared vision and the formulation of a strategic action
2. Strengthened multi-stakeholder collaboration and partnerships for joint research and capacity building.
3. Policy recommendations to guide national and regional climate action in the agricultural sector.
4. Report/Policy briefs on key agricultural GHG mitigation research priorities.

The dialogue was planned for one-and-a-half days. It was structured as follows: an opening session, a keynote presentation to set the scene, panel discussions, break out and report back sessions and a final plenary session to consolidate key outcomes of the dialogue. The following sections highlight the key messages from each part of the dialogue.

3. Summary of Dialogue Proceedings

The dialogue commenced with an opening session during which representatives from the Qinisa Initiative and the AgriDENZ project expressed their support for the Qinisa Initiative and emphasized the importance of fostering dialogue on GHG emissions in agriculture among diverse stakeholders in the region. One of the key messages from the opening remarks was the agreed view that Qinisa is a strategic entity to amplify AGHG emission reduction in Southern Africa. The dialogue was therefore a moment for all stakeholders to collectively chart the way forward for AGHG research. The key stakeholders mentioned as key role players include governments, researchers, private sector, farmers and development partners. There was also emphasis on promoting science-based innovations that are data driven to promote adoption by the users. The unfortunate reality that Africa contributes very little to global greenhouse gas emissions but suffers disproportionate consequences of climate change was also noted. Farmers who face these consequences firsthand should therefore contribute to setting the research agenda for the region. Evidence-driven climate smart initiatives that demonstrate livelihoods improvement were noted as enablers to attaining sustainable food systems. In addition, digital platforms that provide information to farmers were seen as necessary ingredients for successful food systems transformation to occur.

4. Official Opening Remarks

The Regional Science-Policy Dialogue opened with a welcome by Dr Ackim Mwape (NZAGRC), who highlighted the goal of advancing a common AGHG research agenda aligned with regional priorities to support sustainable, low-emission food systems in Africa. Dr Mwape acknowledged the support of the Qinisa Initiative, AgriDENZ, the University of Pretoria, New Zealand's Ministry for Primary Industries (MPI), and Germany's Federal Ministry of Agriculture, Food and Regional Identity (BMLEH).

Dr Nherera-Chokuda (Qinisa Secretariat) thanked delegates for their commitment to sustainability, stressing the importance of collective action from grassroots to policy level. She also acknowledged the University of Pretoria for hosting the Qinisa initiative. Dr Craig Chibanda (Thünen Institute and AgriDENZ) emphasised the timeliness of the dialogue in addressing the drivers of GHG emissions in agriculture, while reaffirming AgriDENZ's support.

Professor Lindiwe Majele-Sibanda, Chair of the CGIAR Board, expressed gratitude for the opportunity to represent the CGIAR community at the dialogue. She emphasised the importance of exploring how CGIAR can contribute to and collaborate with the Qinisa Initiative and underscored the need to intensify efforts to close critical data gaps in Southern Africa—a long-standing CGIAR priority—to provide strong, locally relevant evidence that informs policy and drives sustainable change. She affirmed CGIAR's readiness to deepen partnerships, including with Qinisa, to help realize this shared vision.

His Excellency Mr. Philip Hewitt, New Zealand High Commissioner, expressed appreciation to fellow presenters and noted the privilege of addressing attendees at the inaugural Regional Science-Policy Dialogue. He reflected on the theme of unity and highlighted New Zealand's pride in supporting the dialogue through Qinisa and AgriDENZ. He emphasised the value of collaboration and expressed gratitude for the opportunity to work with such dedicated partners. He added that the dialogue laid a strong foundation for reinvigorating AGHG research in Southern Africa, aligning efforts, fostering collaboration, and driving policy action towards climate-resilient, low-emission agriculture in the region. Additionally, he emphasized the importance of networking and continuous engagement for partners to act on the shared vision of mitigating GHG emission.

5. Keynote Presentation

Professor Bruce Campbell, Senior Advisor at the Global Centre on Adaptation and Chief Innovation Strategist at Clim-Eat, delivered the keynote presentation titled *"Shaping a Relevant and Transformative Agricultural GHG Research Agenda for Africa."*

The purpose of the presentation was to frame the dialogue's discussions, setting out key principles to guide Africa's approach to agricultural GHG emissions research and proposing a structured method for identifying priorities and developing the research agenda. The presentation addressed key themes of the dialogue, offering broad insights while integrating policy considerations.

5.1 Key Messages

- **Transformation of food systems:**
  The global food system must undergo a fundamental transformation in what food is produced and how it is consumed. This transformation is essential to address overconsumption and reduce environmental impacts.

- **Urban growth in Sub-Saharan Africa:**
  Rapid urbanisation is expected to add around 230 million people to African cities by 2030, creating major opportunities for African agriculture due to evolving diets and expanding markets. The focus should be on empowering African farmers rather than increasing reliance on imports.
- **Climate justice and GHG emissions:**
  Africa's total GHG emissions remain low compared to major emitters such as the USA, China, and Europe. While mitigation is important, Africa's priority should be on climate adaptation and food security, with mitigation pursued as a co-benefit.
- **Growth in emission sources:**
  Africa has some of the world's highest growth rates in emission sources, including land cover change, enteric fermentation, rice methane production, and nitrous oxide emissions from soils and pastures. Fertiliser use, though currently low, will need to increase to improve productivity.
- **Livestock sector:**
  Livestock is a major contributor to GHG emissions in Africa, but progress on mitigation in this sector has been limited.
- **Emerging mitigation technologies:**
  While new mitigation technologies may become available within the next decade, immediate efforts should focus on applied research and practical solutions rather than waiting for breakthroughs.
- **Data and research gaps:**
  Emission data and mitigation potential estimates in Africa are limited and uncertain. Improving inventories, understanding emission sinks, and tracking land cover change are critical. Some early Nationally Determined Contributions (NDCs) include unrealistic targets, such as large fertiliser reductions.
- **Forestry and land use change:**
  Deforestation—particularly in countries like Tanzania, Mozambique, and Zambia—is a major emissions source. Agriculture is the primary driver of land cover change. Sustainable intensification is essential to prevent further agricultural expansion into forests.
- **Policy and research priorities for sustainable intensification:**
  Research should address barriers to sustainable intensification and its mitigation potential. Policies must support food security and agricultural development, with mitigation integrated into these priorities.
- **Cropping systems and soil emissions:**
  There is limited empirical data on nitrous oxide emissions from smallholder systems across Africa's diverse agroecological zones. Key research areas include integrated nutrient management, reduced tillage, cover crops, manure and biofertilizers, soil testing, fertiliser timing and types, and use of nitrification inhibitors.
- **Rice cultivation:**
  Demand for rice is growing rapidly due to urbanisation, but production is not keeping pace. Governments are expanding rice cultivation areas. Research is needed to understand the trade-offs between increasing rice production, GHG mitigation, and food security.

5.2 Key Research Gaps

- Improving estimates of mitigation potential

- Addressing emission uncertainties within the Agriculture, Forestry, and Other Land Use (AFOLU) sector
- Advancing sustainable intensification
- Investigating dietary shifts
- Reducing food waste
- Understanding barriers to sustainable intensification and its effects on land cover change

5.3 Proposed Research Focus Areas

- Integrated nutrient management
- Fertiliser management
- Rice production management
- Carbon finance
- Addressing the carbon-nitrogen nexus
- Exploring the mitigation potential of soil carbon sequestration
- Tackling Monitoring, Reporting and Verification (MRV) challenges

5.4 Key Discussion Points from Keynote Presentation

- Research must be farmer-centred, context-relevant, and needs-driven, with co-designed priorities that reflect farmers' realities.
- Communication of results should be simple and practical, enabling farmers' understanding and adoption.
- Quantifying the costs of low-emission transitions at farm level is vital to support decision-making.
- Farmer field schools are effective for knowledge transfer, with success stories in conservation agriculture and land care.
- Awareness-creation and adoption of proven low-emission innovations should deliver livelihood benefits, improved well-being, and a reduced carbon footprint.

6. Panel Discussion 1: Bridging Stakeholders' Perspectives in AGHG Research

The first panel discussion featured a moderated dialogue led by Dr. Elizabeth Mkandawire, followed by open engagement with participants from across the region. The session provided a valuable platform for sharing perspectives, exchanging experiences, and identifying pathways for coordinated action across sectors. Discussions focused on how agricultural GHG research can better align with stakeholder priorities, drive meaningful climate action, and support the development of a common research agenda that is relevant, scalable, and impactful.

The panel discussions emphasised that agricultural GHG research and climate action in Africa must be co-created with farmers, governments, researchers, and communities to ensure relevance, equity, and impact. Priorities should balance short-term farmer needs with long-term sustainability, supported by inclusive policies, capital investment, and practical, science-based solutions. Transforming food systems requires addressing systemic inequities, integrating indigenous knowledge, and tackling GHG emissions across entire value chains. Clear communication, farmer-centred innovation, and grassroots funding are essential for scaling climate-smart practices. Ultimately, locally owned, context-specific strategies aligned with national climate commitments are vital for delivering just, effective, and lasting change.

6.1 Key Themes from Panel Discussion One

- **Collaborative Research Prioritisation**: Research agendas must be co-created with farmers, researchers, government, and other stakeholders to ensure relevance, ownership, and impact. Scientific evidence should guide priority-setting, with resource allocation justified by potential for meaningful results.
- **Balancing Short-Term Needs and Long-Term Goals**: Farmers often prioritise immediate returns over long-term benefits of sustainable practices, highlighting the need for capital investment, practical solutions, and clear cost-benefit analyses of climate-smart agriculture.
- **Inclusive Policy Development and Governance**: Effective policies, MRV systems, and climate action require inclusive, multistakeholder processes. Indigenous knowledge, farmer-led innovations, and equitable value chains should be mainstreamed into climate strategies.
- **Food System Transformation**: The current food system exacerbates food insecurity, malnutrition, and poverty. Transformative change must address systemic inequities, with climate justice requiring equal representation and shared responsibility among all actors.
- **Bridging Science and Practice**: Research must translate complex concepts like GHG emissions into simple, actionable knowledge for farmers. Locally relevant, evidence-based data is critical, and farmer field schools are valuable for scaling proven solutions.
- **Value Chain and System-Level Action**: GHG emissions should be addressed holistically along entire value chains, with governments playing a central role in enabling and scaling integrated solutions that support both mitigation and sustainable livelihoods.
- **Scaling Success and Funding**: Scaling climate-smart practices horizontally (across communities) and vertically (from farms to policy) is key. Greater direct funding at the grassroots level is needed to support impactful, integrated solutions.
- **Culture, Communication, and Learning**: Traditional communication methods like storytelling can enhance engagement on climate issues. Building interdisciplinary, inclusive research teams will foster innovation and ensure solutions are practical and just.
- **Locally Owned, Long-Term Strategies**: Moving beyond donor-driven solutions, stakeholders must co-create locally meaningful strategies aligned with national commitments (e.g. NDCs) and designed for long-term resilience and equity.

6.2 Stakeholder Contributions and Reflections

The stakeholder dialogue highlighted the need for agricultural GHG research to be grounded in farmers' realities, with solutions co-developed rather than imposed. Effective research must start by understanding farmers' perspectives and addressing the challenges they identify, ensuring relevance and impact. Government involvement is critical for sustained support, and research proposals must align with national priorities to secure funding. Participants stressed the importance of integrating GHG education into school curricula and ensuring that research panels and agendas are shaped by a broad range of stakeholders, including farmers and key government departments. Ultimately, research must move beyond academic exercises to deliver practical outcomes that reflect farmer priorities and inform responsive policy.

7. Breakout Sessions (Soil Health, Livestock, Crops, Climate Smart Landscapes)

This section outlines the outcomes of the breakout sessions across the key thematic areas: soil health and carbon sequestration; livestock production; cropping systems; and climate smart landscapes. All the themes are inter-related and synergistic and will address crosscutting challenges such as innovation and the translation of research; the provision of skills; infrastructure for research; international collaboration and cooperation; and user engagement and communication.

The primary objective of the breakout sessions was to identify priority research areas that together form the foundation of an AGHG research agenda. This agenda is intended as a strategic tool to help prioritize AGHG-related research, guide and catalyse investment, and inform research activities and planning efforts by countries and funding bodies. In addition, it provides a framework through which the Southern African Development Community (SADC) can support policymakers, researchers, and the wider scientific community in collaboratively developing solutions to mitigate AGHG emissions at both national and regional levels.

Each breakout session included at least eight participants, with a designated moderator and rapporteur (list attached). The moderators facilitated discussions by posing key questions and guiding the conversation to ensure meaningful engagement, while the rapporteurs captured key discussion points and summarized outcomes for presentation during the plenary. The outcomes from each breakout group are presented below, following the framework and guiding questions used to identify AGHG research priorities:

- What are the priority research needs within the context of existing challenges/opportunities and knowledge/data gaps? What are the key issues, ideas and areas in need of attention, and that may have utility across the many stakeholders and disciplines that have potential to impact on AGHG mitigation research?
- What are some of the emerging research outputs/innovations proving to be impactful in GHG emission reduction? And/or common strategic areas to guide future AGHG research

7.1 Soil Health and Carbon Sequestration

A broader focus on soil functions that underpin agricultural resilience and food security emerged as a key priority in the discussions of the Soil Health and Carbon Sequestration Group. Participants emphasized that, in the Southern African context, the value of Soil Organic Carbon (SOC) management lies not solely in its role in carbon sequestration, but more critically in its contribution to sustaining soil productivity and supporting farming systems under climate stress. While global narratives often frame SOC through the lens of climate mitigation, workshop participants called for a recalibration of the research agenda—shifting away from a narrow emphasis on the carbon storage–atmospheric CO_2 nexus toward an integrated approach that prioritizes the essential functions soils perform in delivering food, livelihoods, and ecosystem resilience.

In light of projected climatic changes—particularly the occurrence of less frequent but more intense rainfall events—there is growing urgency to develop SOC management strategies that strengthen soil water regulation and mitigate risks of flooding, erosion, and crop failure.

The following observations emerged as especially important from the group discussion:

- **Aligning SOC Research with Farmer Priorities and Value Chain Pressures**
  Farmers in Southern Africa make decisions under the influence of commercial pressures and immediate productivity concerns. SOC research must therefore deliver practical solutions that provide tangible benefits at the farm level, rather than focusing solely on technical or environmental metrics.
- **Prioritizing Food Security as a Central Outcome**
  Rather than positioning SOC solely as a climate mitigation strategy, research should emphasize its role in supporting sustainable food production and agricultural resilience, aligning more closely with national development goals and farmer needs.
- **Shifting the Focus from Carbon Sequestration to Soil Functionality under Climate Change**
  The connection between SOC and atmospheric GHG concentrations is complex and contested. Research should instead emphasize how climate change is already affecting key soil functions—such as nutrient cycling, structure, and microbial health—and how SOC management can mitigate these impacts.
- **Enhancing Soil Water Regulation through Organic Matter**
  Increasing soil organic matter is essential to improve water infiltration and retention. This is particularly important in light of projected more intense but less frequent rainfall events, which heighten risks of erosion, flooding, and crop failure.
- **Addressing Land Degradation and Stagnant Yields**
  SOC research should contribute to reversing land degradation and improving productivity, particularly on smallholder farms. This includes understanding how different land management practices influence long-term soil health and fertility.
- **Developing Locally Relevant and Scalable Solutions**
  There is a need for practical, context-specific guidance on land management practices that can increase SOC levels. These solutions must be tailored to local conditions and scalable across different farming systems and ecological zones in Southern Africa.

The indicative research priorities and expected outputs that emerged from the discussion are summarised in Table 1.

TABLE 1 INDICATIVE PRIORITY RESEARCH AREAS FOR SOIL HEALTH AND CARBON SEQUESTRATION

Primary research focus areas	Expected outputs
Frontier research in SOC: *to improve knowledge on the biology, ecology and physio-chemistry of agricultural soils soil. Investigating the role of SOM in supporting soil biological activity, nutrient cycling, and overall soil health.* **Soil Organic Matter (SOM) and SOC Characterization** • **SOM Characterization:** Investigating the chemical and physical characteristics of SOM,	• Insights on carbon-sequestration of different farming systems, soil organic carbon data and information on GHGs emissions per system • Comprehensive databases of SOM composition and structure across key agroecological zones. • Laboratory protocols and standard methods for SOM analysis and long-term monitoring. • Decision-support tools to guide land managers on SOM improvement strategies based on soil type and condition.

including its composition, structure, and long-term stability. • **SOM Dynamics:** Studying the formation, decomposition, and transformation processes of SOM to inform strategies for enhancing soil carbon retention. • **SOC distribution and changes** under different management practices and environmental conditions • **SOM and Soil Health:** Examining the role of SOM in supporting biological activity, nutrient cycling, and the overall health and productivity of soils.	• Datasets on the influence of temperature, moisture, and microbial activity on SOM dynamics. • High-resolution spatial maps of SOC distribution across different land uses and agroecological zones. • Empirical evidence linking SOM levels to soil biological activity, nutrient cycling efficiency, and crop performance. • Indicators and thresholds of SOM required to maintain or improve soil health.
Soil Water Regulation through Organic Matter Management	• Quantified relationships between SOM content and water infiltration, retention, and erosion control. • Hydrological models incorporating SOM-related soil functions under projected climate scenarios.
Land Management and Climate Interactions • **Impact of Land Management Practices:** Evaluating the effects of conservation agriculture, agroforestry, wetland restoration, and other land use practices on SOC sequestration and soil health. • **SOC and Climate Change Mitigation:** Understanding the potential of SOC to contribute to climate mitigation through improved land management. Understanding the role of SOC in regulating GHG emissions from soils, including carbon dioxide, methane, and nitrous oxide • **GHG Balances in Integrated Systems:** Analysing greenhouse gas emissions and sequestration across integrated land management systems in various agricultural subsectors. • **CO2 tipping points and thresholds:** Research on tipping points and threshold levels of carbon dioxide on crop performance per Agroecological zone (AEZ) in Southern Africa	• Comparative analysis of SOC stocks and soil health indicators under different land management practices (e.g., CA, agroforestry). • Empirical data on SOC's contribution to net GHG reductions under various management systems. • Metrics and tools for including SOC benefits in national mitigation accounting frameworks (e.g., NDCs). • Emissions baselines and GHG balance sheets for major integrated land management systems (e.g., crop-livestock, agro-silvopastoral). • Emissions factors for key practices to support Tier 2/3 MRV systems. • Methodologies for evaluating both carbon sequestration and non-CO_2 emissions (methane, nitrous oxide). • Threshold values of atmospheric CO_2 concentrations beyond which crop performance declines in specific AEZs. • Experimental data on plant-soil-carbon responses to CO_2 enrichment under variable temperature and moisture conditions. • Risk maps showing vulnerability of cropping systems to future CO_2-induced stress.

Managing and monitoring SOC: to develop and scale up rapid cost-effective assessment systems for SOC monitoring, reporting and verification. • Quantification of climate change mitigation potential through net carbon sequestration • research on indicators of what constitutes proper management, and their data requirements to achieve effective agri-environmental management. • Integrating remote sensing data (e.g., satellite imagery, drone imagery) with ground-based measurements to map SOC at larger spatial scales and monitor changes over time. • Field/ farm level trials in different AEZ	• Standardized protocols and models for calculating net SOC sequestration across different land use types and farming systems. • Emission factors and carbon accounting methodologies tailored to Southern African contexts. • Datasets and case studies demonstrating SOC contributions to national GHG inventories and mitigation targets. • Integration frameworks to include SOC mitigation potential in Nationally Determined Contributions (NDCs) and climate finance mechanisms. • A validated set of agronomic, ecological, and socio-economic indicators that define effective SOC management. • Decision-support tools linking indicator values with SOC outcomes under different land uses. • High-resolution SOC distribution maps for selected agroecological zones (AEZs). • A network of long-term SOC monitoring trial sites across representative AEZs in Southern Africa.

7.2 Livestock Systems

The Livestock Systems Group discussions centred on advancing climate-smart livestock production systems through targeted innovations that support both adaptation and mitigation. Participants emphasized that achieving resilient, low-emission livestock systems in Southern Africa will require integrated research and innovation across multiple disciplines, tailored to the diversity of production systems in the region. Developing comprehensive, accurate databases with representative activity data across diverse African production systems was also identified as a critical need.

The following observations emerged as especially important from the group discussion:

- **Integrated and Interdisciplinary Research Approaches**
  Participants highlighted the need to accelerate research across animal health, livestock genetics, animal nutrition, environmental sciences, and the political economy of agriculture. These domains must collectively contribute to designing and implementing adaptation–mitigation strategies for livestock systems including semi-intensive, crop-livestock, and pastoral systems.

- **System-Specific Innovation Pathways**
  A differentiated approach is required, recognizing the unique needs and entry points of various production systems:
  - In semi-intensive peri-urban systems, the focus should be on productivity-oriented solutions such as improved genetics, feed additives, and efficient extension services to reduce emissions per unit of product.
  - In pastoralist systems, priority should be given to market and technology innovations, combined with social safety mechanisms to reduce vulnerability to climate shocks and enhance livelihoods.

- **Animal Health and Emissions Reduction**
  Improved animal health was recognized as a high-impact intervention. Evidence shows that reducing disease burden through effective veterinary services and parasite control can enhance productivity and cut GHG emissions by over 30%. Participants called for expanded research and data collection to further validate and scale these impacts across systems.

- **Genetic Improvement for Climate Resilience and Mitigation**
  Livestock populations in Africa possess valuable adaptive traits—such as heat tolerance and efficient feed conversion—that can support climate resilience and reduce emissions intensity. Research is needed to develop and promote breeding values that enhance both productivity and environmental sustainability, including traits linked to lower methane emissions.

- **Feed and Nutrition Innovation**
  Animal nutrition was underscored as one of the most effective mitigation strategies available. Key areas for research include:
  - Development of climate-resilient forages with higher productivity and lower emissions potential.
  - Conversion of crop residues into high-quality feeds, especially for use during drought periods.
  - Selection of forage germplasm with anti-methanogenic traits, to support more efficient and climate-friendly feeding systems.

- **Monitoring, Reporting and Verification (MRV) and Policy Support**
  Supporting countries to transition toward climate-smart livestock systems requires:
  - Robust MRV systems and locally relevant emissions data across different breeds and systems.
  - Enabling policies that guide and incentivize the adoption of climate-smart practices at scale.

- **Cost-Benefit Analysis and Socio-cultural Acceptability**
  While some mitigation measures are well-supported by data, others lack validation or economic assessment. Participants recommended that future research include comprehensive cost-benefit analyses and assessments of socio-cultural acceptability to facilitate widespread adoption and implementation.

TABLE 2 INDICATIVE PRIORITY RESEARCH AREAS FOR LIVESTOCK SYSTEMS

Primary research area	Expected outputs
Animal Health Innovations • Linkages between animal health and ghg emissions • Innovations in Veterinary Service Delivery Models • **Climate-responsive disease surveillance and forecasting**	• Evidence-based justification for integrating animal health into climate mitigation strategies**.** • Timely identification and control of emerging and re-emerging livestock diseases. • Enhanced regional capacity for proactive animal health management. •

Feed and Nutrition Innovation • Development of climate-resilient forages • Conversion of crop residues into high-quality feeds • Selection of forage germplasm with anti-methanogenic traits • Evaluate practical and economical locally available feed additives • Identification of low methane yield locally available (indigenous) forages	• A portfolio of forage varieties with proven drought tolerance, heat resilience, and adaptability to local agroecological zones. • Field-tested performance data on biomass yield, nutritional value, and persistence under climate stress. • Protocols and cost-effective technologies (e.g., urea treatment, fermentation methods) for upgrading crop residues into nutritious livestock feed. • Demonstration plots and case studies on the use of improved crop residue feeds in different livestock systems. • Inventory of locally available additives (e.g., oils, seaweed, minerals) with mitigation potential and nutritional benefits. • Performance data on productivity, animal health, and GHG emission reduction from additive use.
Livestock Genetic Improvement • Evaluate the resilience of climate change adaptive breeds	• Comparative performance data on heat tolerance, disease resistance, and productivity of local and introduced breeds under climate stress. • Breeding value assessments for traits related to adaptation and emissions intensity (e.g., feed efficiency, methane yield).
Monitoring, Reporting and Verification (MRV) • Develop comprehensive AGHG inventories	• Improved and new databases that have improved accuracy and reduced uncertainties to help governments in planning and report e.g., in NDCs • National and subnational AGHG inventories tailored to livestock production systems, with disaggregated data by species, breed, feeding system, and region. • Emission factors for key practices and animal types based on local empirical data.

7. 3 Cropping Systems

Discussions in the Cropping Systems Group underscored the importance of aligning research efforts with the urgent need for climate resilience, sustainable intensification, and emissions mitigation in crop production systems. The group identified three interrelated research priorities: enhancing agroforestry efficiency, exploring tree-crop-animal interactions, and developing integrated crop-pathway (nutrient management) systems. Collectively, these areas reflect a systems-based approach to improving the productivity, sustainability, and environmental performance of cropping systems in Southern Africa.

Participants emphasized that agroforestry offers both a targeted research domain and a holistic solution to achieving resilience, soil health, and emissions reduction. Cross-cutting strategies such as the use of cover crops, conservation agriculture, methane reduction techniques, and breeding for drought-

resilient, nitrogen-efficient crop varieties were identified as key components of a climate-smart cropping agenda.

To support data-driven decision-making and guide policy, the discussions called for strengthened research management, the production of policy-relevant knowledge products, and the strategic use of spatial mapping and modelling tools.

Ultimately, achieving sustainable climate-smart agriculture will depend on integrating innovation across crop varietal development, post-harvest processing, renewable energy use, and tighter alignment between research, policy, and practice.

TABLE 3 INDICATIVE PRIORITY RESEARCH AREAS FOR CROPPING SYSTEMS

Primary research area	Expected outputs
Enhancing Agroforestry Efficiency	• Best-bet agroforestry models optimized for soil carbon sequestration, water regulation, and productivity in different agroecological zones. • Decision-support tools for integrating agroforestry into smallholder farming systems. • Socio-economic analysis of farmer incentives, adoption constraints, and ecosystem co-benefits.
Tree–Crop–Animal Interaction Research	• Empirical data and system models quantifying synergies and trade-offs between trees, crops, and livestock. • Guidelines for multi-functional land use that optimizes resource use and resilience. • Case studies demonstrating successful implementation in mixed farming systems.
Integrated Crop-Pathway Systems	• Systems-based blueprints for integrating crops, cover crops, and legume rotations to enhance soil health and reduce inputs. • Impact assessments of integrated cropping pathways on GHG emissions, yields, and input-use efficiency.
Emissions Mitigation through Crop Management	• Field-tested protocols for methane and nitrous oxide reduction via cover crops and conservation agriculture. • Varieties of crops bred for drought tolerance and nitrogen-use efficiency. • Monitoring tools to track mitigation outcomes at farm and landscape scales.
Innovation in Crop Varieties, Processing, and Renewable Energy	• Improved crop cultivars adapted to local climate risks and nutritional needs. • Scalable post-harvest processing solutions that minimize losses and energy use. • Feasibility studies on integrating solar or biogas systems in crop production and processing chains.

7.4 Climate Smart Landscapes (Rangelands and Pastures)

The discussions on rangelands and pasture systems focused on the need to transform these landscapes into climate-smart, resilient ecosystems that support both environmental sustainability and farmer livelihoods. Participants highlighted the complex and interlinked challenges faced by farmers across Southern Africa, including the negative effects of both under- and overgrazing, soil degradation, erosion, and the growing impact of climate variability. These pressures not only compromise the productivity of rangelands but also significantly threaten livelihoods, food security, and ecosystem stability.

It was emphasized that for greenhouse gas (GHG) research and climate mitigation strategies to be effective, they must be directly linked to these on-the-ground challenges and farmer priorities. Research efforts should not be limited to carbon sequestration alone, but should also explore opportunities for improved productivity, sustainable feed systems, and land regeneration.

The group called for a multi-functional approach to rangeland management, incorporating strategies such as drought-resilient forages, tree-based fodder systems, and the integration of Indigenous Knowledge Systems (IKS). Importantly, the need to rethink grazing management plans—especially in communal land areas where past interventions have failed due to lack of fencing, uncontrolled stocking rates, and inadequate policy support—was clearly articulated.

TABLE 4 INDICATIVE PRIORITY RESEARCH AREAS FOR CLIMATE-SMART LANDSCAPES

Primary research area	Expected outputs
Linking GHG Mitigation to Farmer-Relevant Challenges	• Integrated research frameworks aligning GHG mitigation goals with practical land degradation and productivity challenges. • Farmer engagement models that increase adoption of climate-smart rangeland practices.
Management of Overgrazed and Undergrazed Systems	• Decision-support tools for balancing grazing intensity to prevent degradation and optimize pasture use. • Grazing management protocols adapted for communal land contexts. • Participatory rangeland monitoring systems that involve local communities
Promotion of Drought-Resistant Grasses and Legumes	• Identification and field testing of drought-resilient fodder species for dry-season feed supplementation. • Agronomic packages for integration of resilient grasses and legumes into degraded rangelands. • Emissions data showing benefits of improved feed on enteric methane reduction.
Exploring Agroforestry and Nature-Based Solutions	• Comparative analysis of agroforestry systems and their role in enhancing soil carbon and reducing GHG emissions. • Landscape-level assessments of co-benefits such as shade provision, erosion control, and fodder supply.
Enhancing the Use of Trees as Livestock Fodder	• Inventories of tree species with high fodder value and low methane production potential.

	• Guidelines for sustainable tree harvesting and integration into grazing systems. • Nutritional profiling and feeding trials using tree-based diets.
Evaluation of Exotic vs. Indigenous Breeds in Specific Landscapes	• Breed performance comparisons in different rangeland systems under stress (e.g., drought, low-quality forage). • GHG emission profiles by breed, linked to productivity and environmental resilience. • Breeding strategies that support low-emission, climate-adaptive livestock systems.
Landscape-Specific Feeding Regimes and Emission Profiles	• Research on how different feeding systems—shaped by local landscapes—affect enteric methane emissions. • Emissions quantification under seasonal, forage-based, and tree-dominated diets. • Scalable models of climate-smart feeding regimes based on landscape typologies.

7.5 Steps Towards a Regional GHG Research Agenda

The workshop discussions on indicative research priorities for soil health, livestock systems, cropping systems, and climate-smart landscapes have laid a strong foundation for shaping a shared regional agenda on agricultural GHG research in Southern Africa. These initial priorities reflect the region's diverse agroecological and socio-economic contexts, while responding to the urgent need for research that delivers both climate and development co-benefits.

Importantly, the priorities identified represent just one component of the building blocks needed to inform a comprehensive and inclusive regional GHG research agenda. Moving forward, the established thematic expert groups will be supported and expanded to further refine these research areas, ensuring that they are evidence-based, context-specific, and responsive to both policy and farmer needs.

Once finalized, the draft regional research agenda will be circulated for stakeholder input and validation to ensure broad relevance, ownership, and alignment with national and regional priorities. This inclusive process aims to foster a coordinated research and innovation ecosystem capable of supporting Southern Africa's transition to low-emission, climate-resilient food systems.

8. Panel Discussion 2: Innovative Funding Models for Agricultural GHG Research

This panel brought together key voices from government, academia, donor agencies, and the private sector to examine emerging approaches to financing and collaboration for agricultural greenhouse gas (GHG) research in Africa. The discussion, moderated by Ms Minky Groenewald, highlighted both persistent challenges and transformative opportunities for unlocking meaningful impact at scale. This session explored the realities of funding, innovation, alignment, and impact in agricultural greenhouse gas (GHG) research, particularly within the African context.

The panel discussion emphasized that addressing the agricultural GHG challenge in Africa requires more than just new research—it demands innovative, long-term funding models, strong regional coordination, and locally driven agendas. Participants agreed that Africa must lead in defining its priorities, mobilize its own resources, and create enabling environments for collaboration with donors, industry, and policymakers. By strengthening partnerships, aligning research with impact pathways, and establishing sustainable financing mechanisms—such as a proposed African GHG Research Endowment Fund—the continent can shift from fragmented efforts to coordinated action. The call to action is clear: leverage existing successes, scale what works, and invest boldly in Africa-led solutions for climate-resilient agriculture.

8.1 Key Themes from the Panel Discussion Two

- **Urgency for Innovation in Funding**

  Panelists underscored that agricultural GHG research remains severely underfunded, receiving only a fraction of climate finance flows. Africa receives only 3.3% of global climate finance; average climate finance project size is $2 million in Africa versus $24 million in East Asia. Short-term, fragmented project funding is insufficient to meet the scale of transformation required. There is a clear need for:

  - Long-term, flexible funding models that can support innovation and adaptation over time.
  - Blended finance approaches, combining domestic budgets, donor contributions, and private sector investments. South Africa's Climate Resilience Consortium demonstrates successful public-private collaboration: $20–30M from government and over $100M from industry invested in aligned research agendas.
  - Co-funding and co-ownership structures that incentivize aligned, multi-stakeholder participation.

- **African Leadership in Agenda Setting**

  A recurring theme was Africa's need to assert leadership in setting its own research agenda, rather than reacting to externally imposed priorities. This calls for:

  - Better coordination of efforts across institutions, countries, and sectors.
  - Leveraging existing frameworks such as CAADP, ANAPRI, and the Qinisa network to align investments with continental and regional priorities.
  - Showcasing local success stories to strengthen Africa's credibility and attract investment on its terms.

  As one speaker noted, *"If we don't organise ourselves and put resources on the ground, we cannot expect to shape the agenda."*

- **Reframing Research for Impact**

  Panellists stressed the importance of designing research with uptake and societal impact in mind. Institutions like South Africa's National Research Foundation (NRF) are shifting toward impact frameworks that go beyond academic outputs to include socioeconomic outcomes. Examples include:

- Embedding PhD students and postdocs in government departments to strengthen science-policy linkages.
- Co-creating research calls with industry to ensure relevance and facilitate technology adoption.
- Tracking funded students beyond graduation to measure real-world impacts of capacity development.

- **Private Sector Engagement and the Cost of Inaction**
  Private sector investment remains limited, largely due to weak messaging and unclear returns. To improve engagement, panelists recommended:
  - Quantifying the cost of inaction, including future economic losses from climate-related disruptions.
  - Communicating research in business terms, making it relevant to commercial farmers and agribusinesses.
  - Framing investment in GHG mitigation as a strategic risk management tool rather than a compliance obligation.

- **Unlocking Impact Through Collaboration**
  Collaborative approaches were consistently identified as essential. Whether through multi-donor platforms, regional consortia, or knowledge marketplaces, scaling impact requires working across institutional and disciplinary boundaries. This includes:
  - Leveraging programs like Scaling for Impact that bring innovations closer to users.
  - Pooling resources and skills across national and regional partners to address shared priorities.
  - Drawing on Africa's rich portfolio of past research—dusting off shelved innovations and testing them under new conditions.

- **A Bold Proposal: African GHG Research Endowment Fund**
  A transformative idea proposed during the session was the establishment of a Pan-African Agricultural GHG Research Endowment Fund, potentially hosted by a regional body such as SADC or the African Union. This fund would:
  - Provide predictable, long-term financing for high-impact research.
  - Serve as a platform for leveraging donor and private sector co-financing.
  - Support strategic investments in innovations with long-term mitigation and adaptation potential.

8.2 Stakeholder Contributions and Reflections

The panel discussion on innovative funding models for agricultural GHG research provided deep and wide-ranging insights into the structural barriers and strategic opportunities shaping Africa's response to climate change. At the heart of the discussion was a shared recognition that current research and funding systems are misaligned with the urgent, practical needs of farmers. Stakeholders stressed the need for research that delivers actionable, short-term solutions rather than long-horizon academic

outputs that remain disconnected from on-the-ground realities. This disconnect underscored the urgent need to recalibrate how research agendas are set, communicated, and implemented.

A strong call was made for greater African ownership and domestic resource mobilization to reduce overreliance on external donors. Participants advocated for integrating GHG mitigation and climate-smart agriculture into national development and investment plans, thereby unlocking public funding and increasing long-term sustainability. The proposal to establish an African-led Agricultural GHG Research Endowment Fund was highlighted as a potentially transformative step.

The private sector—particularly agribusinesses and farmer cooperatives—was identified as a vital but underutilized partner. Participants emphasized the need for structured engagement with industry stakeholders to co-create credible, demand-driven coalitions capable of financing and accelerating agricultural transformation. Africa's growing food economy, projected to reach USD 1 trillion by 2030, presents a compelling opportunity to harness domestic investment.

Institutional capacity and governance emerged as critical themes. Stakeholders pointed to the limited capacity of farmer organizations and public research institutions to influence funding decisions or effectively scale solutions. Recommendations included empowering producer groups to commission research, strengthening institutional credibility, and ensuring farmers play an active role in defining priorities and allocating resources.

An important takeaway was the need to align the incentives and timelines of key actors. Governments are driven by employment targets, industry by profit, researchers by publication, and communities by food security. A coordinated research-to-impact pipeline—clearly defining roles, deliverables, and transitions from basic to applied research—was deemed essential to maximizing outcomes across the system.

The discussion also highlighted challenges around benefit-sharing and intellectual property rights. As research outputs are commercialized, researchers often lose ownership and recognition, prompting talent to migrate toward industry roles. Creating fair and transparent benefit-sharing mechanisms will be critical to retaining research capacity within public institutions.

Participants stressed the importance of strategic, Africa-led coordination. Fragmented and externally driven efforts must give way to long-term, locally relevant partnerships that engage governments, research institutions, the private sector, and donors in co-designing solutions. Strengthening MRV systems and improving carbon market access—especially for smallholder farmers—was identified as an area requiring urgent attention.

Finally, a thought-provoking contribution challenged the traditional focus on "scaling up," proposing instead a "scaling down" approach that prioritizes localized, inclusive, and equitable innovation pathways. This perspective emphasized the need to adapt solutions to smallholder realities and avoid reinforcing systemic inequalities.

In summary, stakeholders called for a paradigm shift—from reactive, donor-driven approaches to proactive, African-owned strategies. Transforming agricultural GHG research in Africa will require not just technical innovation, but also institutional reform, inclusive governance, and sustained investment.

Research must serve farmers, respond to national priorities, and be embedded within systems that deliver tangible, scalable outcomes for people, policy, and the planet.

8.3 Panel Conclusion and Call to Action

The panel concluded with a unified call for African stakeholders to:

- Organize, coordinate, and co-invest in setting and implementing the agricultural GHG research agenda.
- Strengthen local ownership, supported by strong institutions, committed champions, and regional frameworks.
- Act decisively—not only to generate knowledge, but to ensure that science translates into policy, practice, and measurable societal impact.

As one panelist aptly stated, "We have pockets of success across the continent. It's time to connect them, scale them, and lead from the front."

9. Proposed Actions and Recommendations

Several recommendations were identified to advance Qinisa' s efforts in developing a regional research agenda on agricultural GHG emission in Southern Africa.

To progress a common regional research agenda, it is essential to:

1. **Adopt an interdisciplinary food systems approach**

Prioritize interdisciplinary, whole-system approaches to researching regional and global food supply chains—from production, storage, and processing to distribution, retail, and consumption. This will help ensure that solutions in one area do not lead to unintended consequences in another. A landscape and catchment-scale understanding of food systems is needed, along with greater insight into the interactions between agricultural systems and the wider environment. The agenda should promote holistic methods that integrate diverse forms of knowledge and data, including indigenous practices that have supported communities in adapting to environmental change for generations. Advancing knowledge on societal transformation requires integrating multiple dimensions of the problem to inform more effective climate action and assess the broader implications of interventions.

2. **Leverage data and digital technologies**

Addressing the existing fragmentation and lack of validated GHG activity data is critical for effective planning, financing, implementation, monitoring, and evaluation of adaptation and mitigation efforts. As such, greater use of big data, open data, informatics, artificial intelligence, and advanced modelling to support evidence-based decision-making on farms and within food businesses must be encouraged. These tools can enhance the precision, efficiency, and impact of agricultural GHG mitigation and adaptation strategies.

3. **Strengthen research ecosystem**

The regional research agenda should recognise and strengthen the broader research ecosystem—including the researchers who undertake the work, the infrastructures that enable implementation and capacity development, and the stakeholders who support, use, and benefit

from research outputs—as integral to shaping and sustaining AGHG research and innovation. This will require the continued mapping and assessment of existing infrastructure and equipment across the region, alongside the identification and support of the expertise needed to operate and maintain these facilities.

4. Align research priorities with farmer and industry needs

There is need to ensure AGHG research priorities are closely aligned with the needs of farmers and the agricultural industry. The agenda should foster transformative research that addresses these priorities while promoting inclusive governance. This includes integrating the perspectives of groups often excluded from decision-making—such as women, indigenous peoples, youth, minorities, economically disadvantaged communities, and people with disabilities. Efforts to address mitigation and adaptation at the local or farm level must promote inclusiveness and equity for both current and future generations.

5. Develop a clear value proposition and narrative on production efficiency

Develop and communicate a clear, shared value proposition that positions production efficiency as a central goal for all stakeholders. In parallel, raise awareness of the climate and environmental co-benefits linked to improving production efficiency - including through focused agricultural GHG research and innovation events. Care should be taken to ensure that environmental benefits are not treated merely as secondary outcomes, as doing so may contribute to inequities in how advantages are distributed across communities and sectors.

6. Promote continued collaboration to produce knowledge, data, and information

Strengthen collaboration among stakeholders to generate knowledge, data, and information that directly address farmer needs and are relevant to business priorities. Collaboration should also focus on building stronger links among the various players engaged in delivering the research agenda.

Further recommendations on where the Qinisa Initiative can add value by coordinating, aligning, integrating, influencing, and shaping these activities include:

1. Consolidate and refine the list of priority research topics identified to date and circulate the revised list for stakeholder feedback to ensure broad ownership and relevance.
2. Support and expand established thematic expert groups to strengthen technical leadership, coordination, and cross-country collaboration.
3. Facilitate collaboration and knowledge exchange through virtual meetings and other mechanisms that promote the sharing of experiences, lessons learned, and best practices among organisations and countries.
4. Promote alignment of regional and national research priorities to ensure coherence between the Regional Research Agenda, national strategies, and policy frameworks on agricultural GHG mitigation and adaptation.
5. Continue to develop the inventory of international support and regional research infrastructure, mapping available resources, expertise, and capacity to identify gaps and opportunities for strengthening the research ecosystem.
6. Assess country-level preparedness for AGHG inventory work, including needs related to national communications, strategies, national policy approaches to support agricultural GHG inventory

data, Nationally Determined Contributions (NDCs), and international trade and market access requirements.

7. Influence funding strategies and investment decisions by providing evidence-based recommendations and demonstrating the value and impact of coordinated agricultural GHG research to potential donors, investors, and development partners.
8. Shape regional discourse and advocacy to raise the profile of agricultural GHG mitigation within broader climate action, sustainable development, and economic growth agendas.

These actions provide a robust foundation for the coordinated development of an impactful research agenda that supports climate action, while enhancing agricultural productivity and resilience across the region.

10.Conclusions

The Regional Science-Policy Dialogue marked a pivotal step toward building a unified research agenda to reduce agricultural greenhouse gas (GHG) emissions while strengthening resilience across Southern Africa's agri-food systems. The discussions underscored the urgent need for locally driven, inclusive, and impact-oriented research, rooted in regional priorities and designed to support both climate action and sustainable development.

The indicative research priorities identified—spanning soil health, livestock systems, cropping systems, and climate-smart landscapes—provide a strong foundation for a shared regional agenda. Complemented by cross-cutting recommendations on data, infrastructure, interdisciplinary collaboration, and policy alignment, this agenda offers a roadmap for coordinated action and long-term impact.

Central to this effort is the call for African ownership of the climate research and innovation process, supported by mechanisms such as an Africa-led Agricultural GHG Research Endowment Fund. Through the Qinisa Initiative, this momentum will be carried forward by strengthening research ecosystems, identifying capacity needs, and aligning innovation with the realities of farmers, policymakers, and industry.

As the next step, thematic expert groups will refine these priorities and develop a draft regional research agenda. This will be widely circulated for stakeholder feedback to ensure broad ownership, relevance, and legitimacy. With sustained collaboration and strategic investment, Southern Africa is well positioned to lead in advancing low-emission, climate-resilient agriculture—delivering benefits for people, ecosystems, and the planet.