WORLD RESOURCES INSTITUTE

CONFERENCE PROCEEDINGS

The Two Degree Initiative Listening Sessions:
CONFERENCE PROCEEDINGS

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1. Introduction

The Two Degree Initiative (2DI) has been proposed as the flagship effort within the Consultative Group on International Agricultural Research (CGIAR) to address the risks of climate change and enable the world's food systems and small-scale agricultural producers to adapt at the speed and scale that the climate crisis requires**.** The 2DI seeks to leverage the breadth and depth of CGIAR's considerable assets—including gene banks, laboratories, field sites, expertise in numerous disciplines, and hundreds of partners—to address the impacts of climate change. Its goal is to help 200 million small-scale agricultural producers across the globe adapt their agro-ecological systems, livelihoods, and landscapes by 2030 to better withstand climate extremes and variability and be more resilient to climate change, as well as put food systems on a low-emissions development pathway. (Note that this target is to be confirmed through further analysis by the CGIAR Secretariat.)

As part of the Global Commission on Adaptation's Year of Action, WRI and the Global Center on Adaptation partnered with CGIAR to conduct over 50 listening sessions in nine of out ten of the CGIAR's regional challenges between March and October 2020. These conference proceedings summarize emerging findings from the listening sessions.

Over a thousand stakeholders in more than 60 countries participated. In addition to CGIAR staff, participants included representatives from national research agencies, government, communities, and the private sector, as well as members of nongovernmental organizations (NGOs) including farmers,' women's, youth, and environmental organizations, and staff of donor and UN agencies.

Contents

Abbreviations

2DI	Two Degree Initiative
AFOLU	Agriculture, Forestry, and Other Land Use
AGRF	African Green Revolution Forum
AGRHYMET	Centre régional de formation et d'application en agrométéorologie et hydrologie opérationnelle (AGRHYMET Regional Centre)
AICCRA	Accelerating Impacts of CGIAR Climate Research in Africa
CCAFS	CGIAR Research Program on Climate Change, Agriculture and Food Security
CGIAR	Consultative Group on International Agricultural Research
CIFOR-ICRAF	Center for World Agroforestry Research-World Agroforestry
CILSS	Comité Permanent Inter-Etats de Lutte contre la Sécheresse dans le Sahel (Permanent Interstate Committee for Drought Control in the Sahel)
CIRAD	Centre de coopération internationale en recherche agronomique pour le développement (Agricultural Research Centre for International Development)
CORAF	West and Central Africa Council for Agriculture Research and Development
ECOWAS	Economic Community of West African States
FAO	Food and Agriculture Organization of the United Nations
FSRP	Food System Resilience Program
GCA	Global Commission on Adaptation
GHG	greenhouse gases
GRA	Global Research Alliance
ICARDA	International Centre for Agricultural Research in Dry Areas
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFPRI	International Food Policy Research Institute
IITA	International Institute of Tropical Agriculture
ILRI	International Livestock Research Institute
IRD	Institut de recherche pour le développement (French National Research Institute for Sustainable Development)
IWMI	International Water Management Institute
MRV	monitoring, reporting, and verification
NAP	National Adaptation Plan
NDC	Nationally Determined Contribution
R4D	research for development
USAID	U.S. Agency for International Development

The listening sessions were structured to address the following six global themes of the 2DI that were developed by the CGIAR before the listening sessions began:

- Forging a new partnership model for the CGIAR where it is a key knowledge partner in coalitions of change agents, let by change agents;
- Research and action on sustainable finance for small-scale agricultural producers, bringing in hundreds of millions of U.S. dollars to foster climate action, implying a strong private sector focus;
- Research and action to empower small-scale agricultural producers, women, youth, and marginalized communities as groups that are most vulnerable to climate change;
- Climate-informed digital advisories, services, and decision support to ensure that small-scale agricultural producers and their service providers and value chain actors are getting the appropriate information and services to manage risks, grow farmer incomes, and expand employment opportunities;
- Attention to research and action on policy and institutional reforms, as the policy and institutional context is crucial to achieve scale and transformation; and
- Mainstreaming low-emissions value chains, including attention to the necessary changes in consumption and food loss and waste. (While much of the work will be on adaptation, the intention is to put development on a low emissions pathway.)

The goal of these sessions was to develop a common vision of climate resilient agriculture and food systems for each of the nine participating regional challenge hotspots identified by the 2DI, as illustrated in Figure 1.

Figure 1 | 2DI Regional Challenges that Conducted Listening Sessions

Source: WRI authors.

Achieving this goal required building a shared understanding of the current landscape, identifying barriers and challenges, pinpointing key knowledge gaps, and refining approaches to fill those gaps. The result for each regional challenge was an initial road map of the actions and partnerships required to achieve the common vision articulated by each hotspot.

At a meeting in 2018, the CGIAR deputy directors general for research agreed to designate the lead CGIAR center for each regional challenge. Each lead was expected to engage co-hosts, preferably drawn from key non-research implementation agencies (e.g., national government departments, international development agencies, NGOs and CSOs and others) in their region. For example, the 2DI sessions in the Sahel Regional Challenge were co-hosted with the World Bank; the Dutch Ministry co-hosted the Middle East and North Africa listening sessions; the U.S. Agency for International Development (USAID) Resilient Waters Program co-hosted the Southern Africa challenge; and the West Africa One-Health Platform engaged government partners.

The regional challenge leads and their co-hosts organized the listening sessions for their regions and invited participants. Most locations engaged external facilitators. While these meetings were initially planned as in-person events, the COVID-19 pandemic required that all be conducted online. In its capacity as a managing partner of the Global Commission on Adaptation, World Resources Institute (WRI) was asked to pull together conference proceedings to summarize the 50+ listening sessions. As such, WRI staff participated in each regional challenge's planning meetings, shared information on best practices among locations, and observed or participated in the online meetings. WRI staff also provided a reporting template to each location to facilitate collecting the information for these proceedings. Most locations also provided more extensive reports on their sessions. All content and conclusions included in these proceedings are those of the CGIAR focal points or taken from background documents provided by the CGIAR Secretariat, rather than the results of WRI analysis.

As depicted in Figure 2, engagement from nine regional challenges that participated in the listening sessions followed a general pattern. Most locations chose to start with an online survey to begin gathering information on participants' perspectives and backgrounds and to give them a clearer sense of the issues that would be discussed in the listening sessions. This was generally followed by a kick-off event, and then smaller discussions focused on particular groups of participants, themes or subregions. Final stakeholder webinars were used to validate findings and fill in any gaps in the discussions.

Figure 2 | Generalized 2DI Listening Session Process

Source: WRI authors.

Challenge locations were able to tailor this general process to meet their needs. Some held smaller numbers of sessions or combined them with similar efforts for other initiatives, while others expanded their engagement to include more stakeholders from different groups, such as national governments, the private sector, and civil society organizations. Figure 3 illustrates the range of engagement processes that the challenges engaged in over the six-month period.

Figure 3 | Snapshot of 2DI Listening Sessions across Regional Challenges

Source: WRI authors.

2. Global Highlights

The listening sessions engaged a broad range of stakeholders, as illustrated in Figure 4.

Figure 4 | Broad Range of Stakeholder Engagement across Regional Challenges

NGOs/CSOs

119 participants across 9 challenges

EXAMPLES: Shushilan (Bangladesh), CARE, WWF, Agnes Africa, Aqua Farms Organization (Tanzania), Fundación Alma (Colombia), ASORECH (Guatemala)

Private Sector

117 participants across 8 challenges

EXAMPLES: INKA CROPS, ClimateAi, Lake Victoria Fisheries Organization, Turkish Seed Producers Union, and more.

Government

281 participants across 9 challenges

EXAMPLES: Ministries/agencies of agriculture, environment/forestry, meteorology, water resources, planning, seed administrations, and public gene banks

Research

592 participants across 9 challenges

EXAMPLES: CGIAR, National and international institutes (Cuu Long Delta Rice Research Institute, African Agricultural Technology Foundation...), Universities.

Donors

76 participants across 8 challenges

EXAMPLES: GIZ, DFID, USAID, Islamic Development Bank, Dutch Ministry of Foreign Affairs...and more.

Note: Other types of organization represented in the listening sessions but not depicted in this figure include: international and regional organizations/networks, development banks, and media, among others.
Source: WRI authors.

The great diversity of stakeholders, locations, and contexts included in the listening sessions made it a challenge to summarize points that were common across the challenges. However, the following findings emerged as key points for the CGIAR to take forward as it develops its new research agenda:

- **Reform research-development-deployment pathways toward climate resilience and strengthen co-creation** so that a broader range of stakeholders receives solutions that are beneficial. This will require new ways of working, including more co-production of knowledge, as well as faster, more inclusive, and more climate-informed and risk-tolerant innovation systems.
- **Employ an interdisciplinary, intersectional food, land, and water systems approach to building climate resilience** by working across silos and together with under-engaged groups, from the regional to the national to the local level. This will require addressing in a coordinated manner climate-related vulnerabilities and opportunities that may occur across value chains, policy and institutional innovations, and ecosystem-based approaches to address systemic bottlenecks that reinforce vulnerabilities.

- **Improve tools for and communications with** policymakers, civil society, and advocacy groups so that they have the climate-related data they need and are motivated, incentivized, and held accountable to enact change. This requires collaborating with decision-makers at local to national levels to understand and address their information needs and incentives.
- **Strengthen collaborations and innovative partnerships** with the aim of unlocking private and public finance to enable sustainable investments to strengthen resilience and adaptive capacity. Such partnerships are key to increasing impact by accelerating innovation, deploying solutions more quickly and equitably, and improving finance and information delivery for greater climate resilience at scale, while making the case for higher returns on investment.
- **Engage with policymakers, regional bodies, and global processes** in the design of new policies and frameworks to ensure that regionally led action is well aligned with global efforts and yet reflects local contexts and priorities.
- **Leverage the power and expansion of climate-informed digital technologies** to provide real-time and context-specific advisories and critical market services to growing numbers of small-scale producers. These advisories and services should also contribute to livelihoods, job creation, conservation of agrobiodiversity, and food and nutrition security.
- **Prioritize transformative approaches** (e.g., shifting value chains, transitioning livelihoods, gender and social inclusion) where the impacts of climate change are the most severe, especially for the most vulnerable. This requires understanding where and when potential transition opportunities are likely to arise and how these transitions can be made efficiently, effectively, and equitably. Additionally, this requires assessment and prioritization of actions that encourage producers, business owners, researchers, investors, and policymakers to innovate in ways that promote gender equality and opportunities for youth.

3. Background: The Climate Change Imperative and CGIAR's Response

As the CGIAR seeks to integrate climate resilience for water and food security into its new research agenda, it was important for the institution to establish the climate change imperative at the start of each listening session. The following information is a summary of key points from opening remarks at the various sessions and background documents.

The impacts of climate change threaten the world's food, land, and water systems. Small-scale farmers, fishers, and livestock producers in tropical and subtropical regions are among the most vulnerable. The weather and climate patterns on which these producers have relied for decades are becoming less reliable as extreme events like floods and droughts grow more frequent and intense. Sea level rise, coastal inundation, and salinization imperil the major river deltas of Asia and the Pacific small island states, while growing seasons in southern Africa and areas of eastern Africa are becoming shorter, and new pests and diseases are arising around the world. In all these cases, the costs of inaction are rising along with risks.

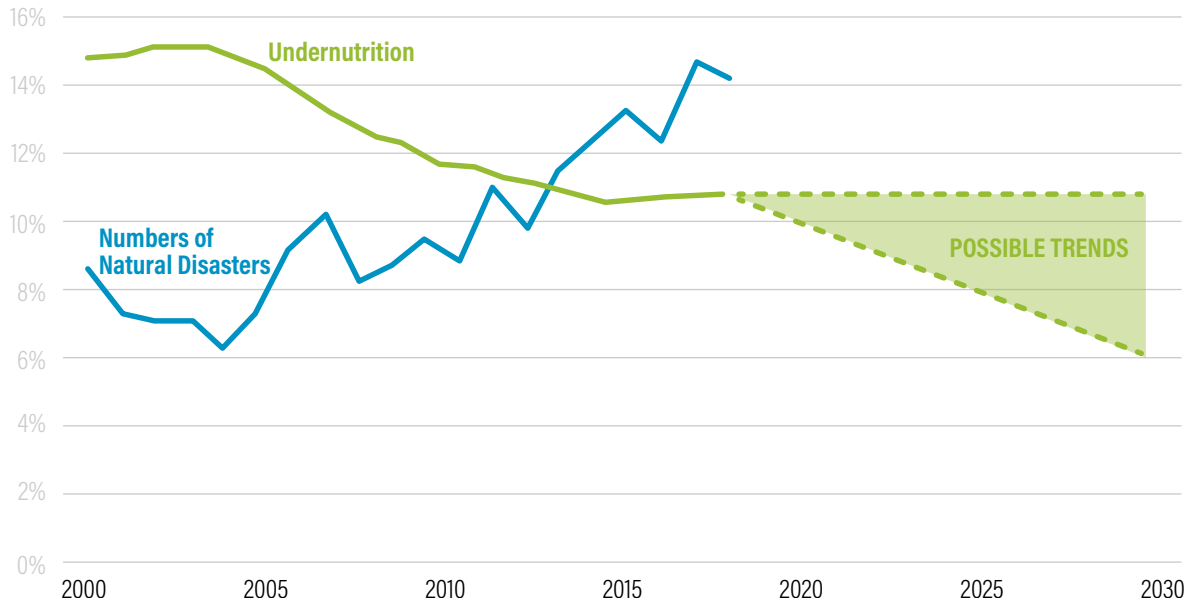
Best estimates suggest that climate change will reduce global yields by 5 to 30 percent by 2050, if urgent action is not taken in the next 10 years to curb global emissions (Porter et al. 2014). Food security is also being undermined by reductions in the nutritional content of a wide range of crops (Zhu et al. 2018). Agriculture contributes significantly to greenhouse gas (GHG) emissions, so there is a strong need to include low-carbon pathways in food systems so that they can contribute to mitigation solutions as well.

Adaptation to the impacts of climate change will therefore be crucial. As highlighted in the Global Commission on Adaptation's Flagship report, *Adapt Now*, research, development, and deployment of new technologies and improved practices could dramatically improve smallholder productivity and support systemic climate risk management for small-scale producers.

Agricultural research for development (R4D) systems have already been shown to deliver significant returns on investment for small-scale producers. Examples of the benefits of new technologies and practices are coming to light. For instance, in Zimbabwe, farmers who used drought-tolerant maize harvested up to 600 kilograms more maize per hectare than farmers who used conventional maize (Lunduka et al. 2019).

But the future is uncertain, and the magnitude and urgency of the climate crisis requires urgent action. As Figure 4 illustrates, while global undernutrition rates declined from 2005 to 2015, this trend began to stall around 2015. It is not yet clear when and whether improvement will continue, or how Sustainable Development Goal (SDG) 2 of ending hunger and all forms of malnutrition by 2030 will be met. At the same time, the number of natural disasters has been increasing.

Figure 5 | Undernutrition vs. Natural Catastrophes



Note: Reprinted with permission from CGIAR.
Source: CCAFS/CGIAR, based on data from FAO 2020a (undernutrition) and MunichRe 2019 (natural catastrophes).

A dramatic increase in the pace and scale of innovation and improved research across food, land, and water systems, as well as development and deployment systems, are all urgently needed to address these challenges. For this reason, the Global Commission on Adaptation has called for doubling the scale of agricultural research through the CGIAR system.

The CGIAR is the preeminent agricultural R4D network globally and the leading source of global public goods research on agriculture and food security. Rooted in the Green Revolution, this worldwide research partnership for a food-secure future is dedicated to reducing poverty, enhancing food and nutrition security, and improving the natural resource management and ecosystem services on which food systems are based. Work is carried out through 15 international research

centers, which collaborate with partners from national and regional research institutes, civil society organizations, academia, development organizations, and the private sector on themes such as climate-smart agriculture, genetic improvement, natural resource management, ecosystem services, nutrition and health, and enabling policies and institutions, among others (CGIAR 2020).

The CGIAR has undoubtedly played a crucial role in increasing agricultural yields and improving the livelihoods of many farmers, fishers and livestock producers. However, governments, intended beneficiaries, donors, and others have raised questions regarding whether CGIAR and other agricultural research programs are prepared to meet the climate change challenge. The R4D system has been called fragmented, inefficient, prone to duplication of efforts, and overly supply-based, with siloed research agendas that prevent the type of cross-sectoral collaboration needed to address the complex impacts of climate change and the systems transformations required. CGIAR researchers are said to be hampered by a fear of failure, unable to take innovative risks due to short and uncertain funding modalities, applying their skills to short-term projects rather than solving long-term problems, and focusing on "publishing or perishing" rather than on achieving societal impacts. This has made it difficult for the R4D community to deliver end-to-end, sustainable, and scalable solutions. Questions have also been raised regarding whether R4D's focus is sufficiently on meeting the needs of farmers, fishers, youth, and marginalized ethnic groups.

The CGIAR is currently undergoing reforms to improve integration across its centers and programs to increase its ability to meet the interdependent challenges facing the world, and it is putting the climate crisis squarely at the center of its mission. The proposed OneCGIAR system-wide reform strategy recognizes that delivering innovations to address the climate crisis will require not only improved technologies, but, rather, integrated systems-based solutions developed for specific contexts and delivered at scale and at an accelerated pace. CGIAR also recognizes that these improvements must better serve the needs of the most vulnerable farmers, fishers and livestock producers. This will require new partnerships, finance, knowledge, tools, and policies (CGIAR 2020).

The 2DI constitutes an effort to transform the way that the CGIAR has done research in the past, focusing on understanding and addressing the demands of a broad range of stakeholders in order to use strategic partnerships to deliver end-to-end solutions to the climate emergency. This initiative will advance the CGIAR's focus on building more resilient food systems and improving livelihoods for small-scale agricultural producers through the following six themes:

- Situating CGIAR as a key knowledge partner in coalitions led by change agents, through its new partnership model;
- Enhancing sustainable finance for small-scale agricultural producers, drawing in hundreds of millions of dollars of private-sector investment to foster climate action;
- Empowering the groups most vulnerable to climate change—that is, small-scale agricultural producers, women, youth, and marginalized communities—to have a larger role in decision-making about how best to manage the risks they face;
- Improving climate-informed digitally-enabled (digital+) advisories, services, and decision support to ensure that small-scale agricultural producers and other value-chain actors get the information and services they need to manage risks, increase incomes, and expand employment opportunities;
- Supporting policy and institutional reforms required to achieve scale and transformation; and
- Mainstreaming low-emissions value chains, including attention to the necessary changes in consumption and food loss and waste. While much of the 2DI's focus will be on adaptation, putting development on a low emissions pathway is also an important goal.

These themes are grounded across the nine initial regional or subregional hotspots with specific challenges, selected to represent the primary threats posed by climate change for food systems, in order to maximize learning opportunities and scaling of solutions.

The next section summarizes the outcomes of each regional challenge's listening sessions.

4. 2DI Regional Challenge Listening Sessions Highlights

The next sections summarize the following set of key points from the listening sessions conducted in each of the nine regional challenge locations.

- The local CG center host and a list of partner organizations that co-hosted the listening sessions, which were determined by the lead CG center for each regional challenge.
- A summary of the climate change context and key related challenges based on reports from each regional challenge, which were shared at each listening session.
- The regional challenge's vision and desired 2030 outcomes related to climate resilience. The CGIAR Secretariat initially proposed the vision and outcomes in consultation with staff in the regional challenge locations and discussed in a series of internal meetings and e-mail exchanges in 2018 and 2019, before the listening sessions were organized. The CGIAR Secretariat garnered external input from two meetings that it hosted in Europe—one with the French agencies active in the Global South (CIRAD and IRD) and one involving Wageningen University and Research staff. Organizers of each listening session shared the vision and desired outcomes. Each regional challenge's overall objectives and vision will be updated to integrate the results of the listening sessions, although this had not been finalized for most locations as of publication of these conference proceedings.
- An outline of the consultation process.
- Tallies of listening session participants, including the countries and types of organizations they represented.
- High-level synopsis of emerging themes and focus areas from the listening sessions, which built on broad themes that the CGIAR Secretariat identified in collaboration with the regional challenge leads before the listening sessions took place.
- Perspectives from each regional challenge focal point on how the CGIAR's existing research agenda for its challenge is expected to change in light of the 2DI.
- Next steps in each location's 2DI planning process as determined through the listening sessions based on guidance from the CGIAR Secretariat.

4.1 Southern African Drylands: Climate resilient and Water-Secure Livelihoods

LEAD ORGANIZATION

LEAD: International Water Management Institute (IWMI)

PARTNER ORGANIZATIONS: USAID Resilient Waters Program, CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)

CONTEXT AND CHALLENGES

As summarized during its kick-off workshop and post-workshop report, the Southern African Drylands face rising temperatures, erratic rainfall, and recurring droughts and floods. By affecting water supply and demand, as well as the agriculture and energy sectors, these climate change impacts are undermining farmers' livelihoods and threatening crop and livestock systems. The COVID-19 pandemic has placed further stress on food and water security in the region, with both crises affecting the workforce, transportation systems, and supply chains from field to fork.

More specifically, stakeholders participating in the 2DI Southern African Drylands Challenge noted the following challenges:

1. **CLIMATE CHANGE AND OTHER NEGATIVE HUMAN ACTIVITY IMPACTS** include degradation of soil, siltation of rivers and dams, deforestation, loss of biodiversity, and saline intrusion. There are also recurring droughts and floods, prolonged dry spells, and incidences of wildfires, as well as an increase in cyclones and pest outbreaks.

2. **RESPONSE CAPACITY:** Communities' response capacities are insufficient to absorb these impacts and limit adverse effects. There is a lack of institutional and monitoring capacity and area-specific early warning systems, as well as inadequate infrastructure and water storage capacity. Farmers have limited access to climate information, adapted varieties, breeds, water harvesting technologies, and other management practices to absorb climate shocks and stresses. Cultural norms of existing farming practices may be difficult to change.

3. **SOCIOECONOMIC CHALLENGES:** There is reduced income due to diminishing agricultural productivity. Agricultural value chains are becoming dysfunctional and unsustainable and supply chains are unpredictable. Increased poverty and unemployment are compounded by increased risk of water and food insecurity and forced migration.

4. **GOVERNANCE AND COORDINATION:** There is insufficient inter-sectoral coordination, a lack of a shared vision for water and food security, resulting in a siloed management paradigm. Policies that support food or water security are often diametrically opposed in outcomes and actions. Given that water resources are often transboundary, the ability to manage impacts internationally is limited by current political systems.

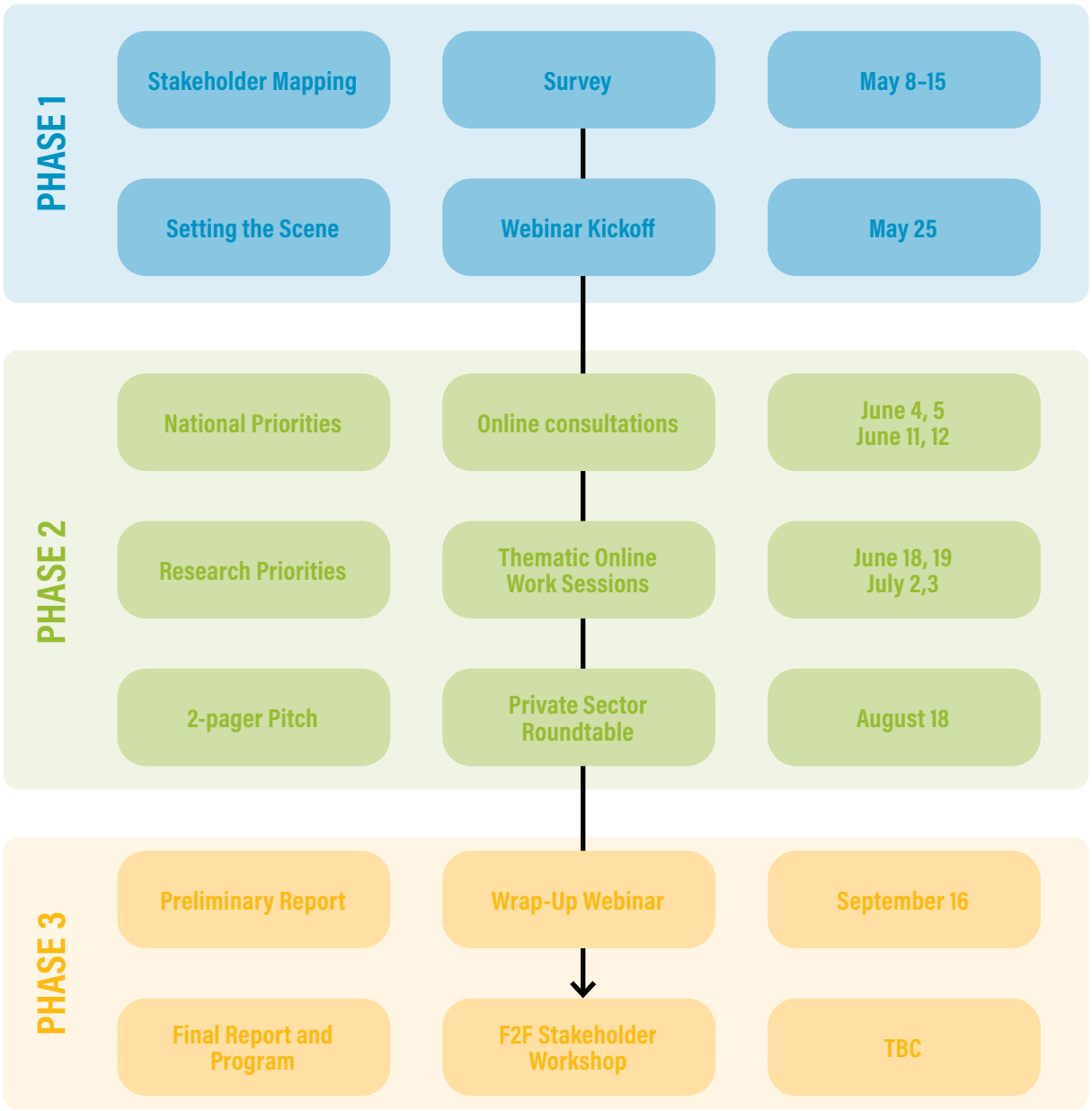
VISION AND 2030 OUTCOMES

VISION: By 2030, 10.5 million small-scale agricultural producers and water users in Southern Africa have adapted their agro-ecological systems, livelihoods, and landscapes to weather extremes and climate variability, are more climate change resilient, and have put food systems on a low-emissions development pathway.

2030 OUTCOMES: Climate-risk management technologies, agro-ecological practices, business models, and market development for enhanced water productivity reach 15 million agricultural producers across key basins. Seven countries have the capacity to enhance implementation of their National Adaptation Plans (NAPs) and Nationally Determined Contributions (NDCs).

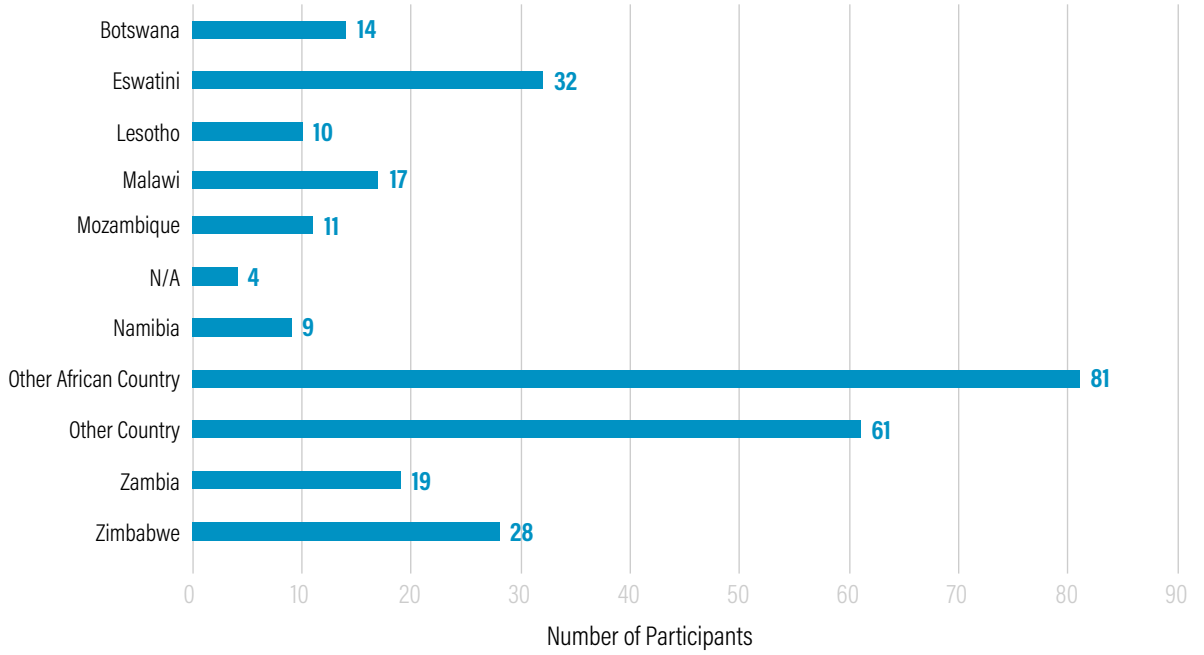
CONSULTATION PROCESS

Figure 6 | 2DI Consultation Process for Southern African Drylands Challenge



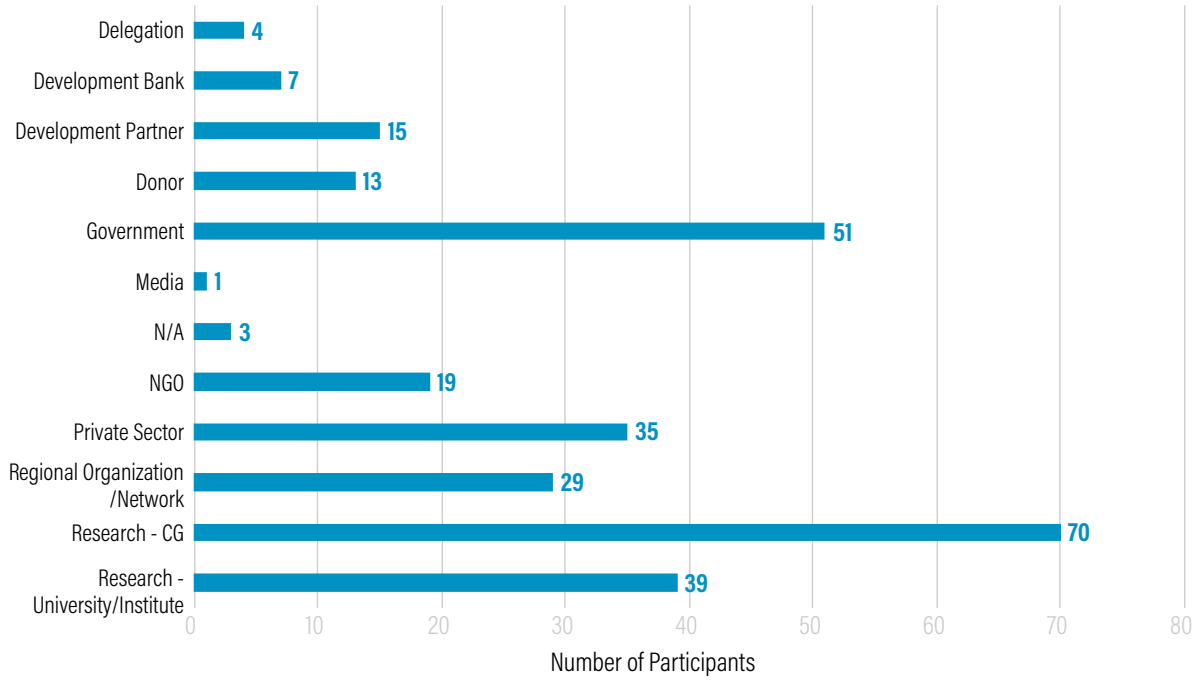
Source: IWMI and Korumo (facilitator).

Figure 7 | Stakeholders Engaged by Country



Source: WRI authors based on information provided by IWMI and Korumo (facilitator).

Figure 8 | Stakeholders Engaged by Type of Organization



Source: WRI authors based on information provided by IWMI and Korumo (facilitator).

Table 1 | Emerging Themes and Focus Areas for Building Climate Resilience as Identified by Listening Session Participants

THEMES	FOCUS AREAS
Climate-Smart Technologies and Practices	
Technologies and Practices	▪ Prioritize water management and nature-based solutions. ▪ Transition to new and adapted production systems. ▪ Ensure that appropriate and indigenous crop varieties, livestock breeds, and management practices are in place to effectively respond to rising temperatures, rainfall variability, pests, and diseases. ▪ Promote behavioral shifts to better manage climate impacts. ▪ Promote multidisciplinary and socioeconomic research. ▪ Provide advisory support services to build the resilience of small-scale producers across agro-ecological zones.
Data and Information Management	▪ Help actors in the agro-food system co-create climate resilient landscapes and livelihoods by providing area-specific climate data, early warning systems, and climate risk management. ▪ Invest in infrastructure for data generation, early warning systems, and seasonal forecasting. ▪ Generate added value, fit-for-purpose service products. ▪ Address the tension between public good and private data. ▪ Strengthen observational and modeling data on climate impacts and solutions; integrate indigenous technologies and practices. ▪ Build capacity of nonresearch stakeholders, including government entities, to use science for policy and data generation.
Policy Coherence and Institutional Coordination	
Institutional Coordination	▪ Build consensus on a shared vision and theory of change for water and food security. ▪ Stimulate intersectoral collaboration, transboundary management, and institutional collaboration between public and private partners in the region. ▪ Create an enabling environment that fosters new alliances for change and attracts funders, investors, and co-investments in transformative pathways for climate resilience, GHG emissions reduction, and water security. ▪ Frame an R4D agenda in sociopolitical and economic contexts. ▪ Promote policy alignment on adaptive actions across sectors. ▪ Emphasize food sovereignty, justice, and equity. ▪ Strengthen and diversify R4D partnerships. ▪ Apply a systems approach, including inter-institutional, transboundary, and regional perspectives.
Policy Coherence	▪ Provide incentives for data-driven policy reform and collective climate and environmental stewardship. ▪ Build stronger innovation systems with multiple partners, as well as the capacity of nonresearch stakeholders to use science, including government entities for policy and data generation (e.g., hydromet departments). ▪ Focus on partnerships that have last-mile reach capabilities for strengthening climate resilience, including inclusive social protection systems.
Sustainable Finance to Enhance Low-Emissions and Resilient Supply Chains Locally to Globally	
Advisory Services	▪ Focus on improved advisory services supporting investments to achieve sustainable development impact and cutting-edge research for sustainable finance investment at scale. ▪ Foster matchmaking between investors and prospective investment opportunities. ▪ Strengthen advisory services for monitoring and evaluation of development impacts with an attribution-based approach to increase availability of climate finance at the local level. ▪ Finance climate resilient value chains. ▪ Foster innovative mechanisms for the economic empowerment of women and youth. ▪ Conduct cutting-edge research for sustainable finance investment.
Sustainable Private-Public Partnerships	▪ Strengthen private engagement in adaptation solutions. ▪ Link public-private investment priorities and interests. ▪ Promote impact investing and access to long-term, more patient capital.
Empowerment and Inclusion	
Empowerment	▪ Empower women and youth through visualization of power structures and root causes that hinder youth or women's empowerment and identification of leverage points and self-defined goals for transformation. ▪ Address the persistent digital divide. ▪ Identify distribution of costs and benefits. ▪ Build on bottom-up scenarios to feed into a joint theory of change. ▪ Link to food sovereignty movements grounded in justice and equity. ▪ Implement gender-transformative approaches in blended finance at scale.

Table 1 | Emerging Themes and Focus Areas for Building Climate Resilience as Identified by Listening Session Participants (Cont'd)

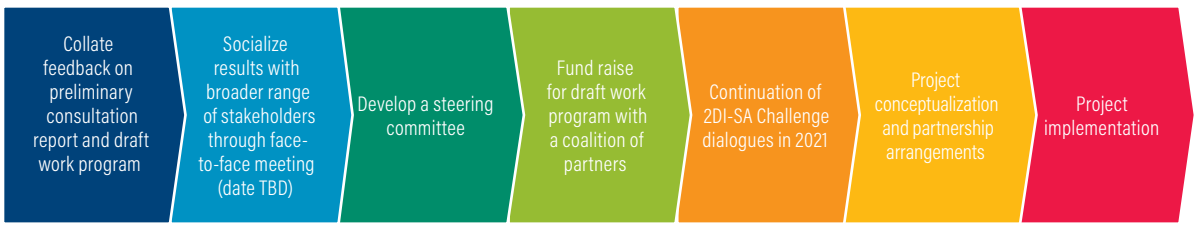
THEMES	FOCUS AREAS
Empowerment and Inclusion	
Inclusion	▪ Understand transformative change through an intersectional approach. ▪ Emphasize inclusion in knowledge services or ag-advisory support services. ▪ Use vulnerability criteria and gender analyses to guide investments and incentives. ▪ Facilitate effective mobilization and organization of farmers and community groups and promote coordination with the private sector, inter-institutional collaboration, and other efforts. ▪ Develop a collective vision, associated pathways, and co-developed principles for inclusion in climate resilience R4D work and implement pilots or innovation hubs to strengthen social networks and capacity by breaking down barriers and working toward self-defined goals.

Source: WRI authors based on information provided by IWMI and Korumo (facilitator).

HOW THE EXISTING RESEARCH AGENDA FOR THIS CHALLENGE IS EXPECTED TO CHANGE IN LIGHT OF 2DI AND POINTS RAISED THROUGH LISTENING SESSIONS

- Codeveloped vision with more ambitious R4D targets to strengthen resilience in Southern Africa, and locally determined solutions for 10.5 million farmers and water users
- R4D agenda is more aligned with stakeholder needs and priorities and better embedded in local contexts
- Improved collaborative partnerships for delivery of climate information services and climate-smart agricultural technologies
- More coordinated OneCGIAR system-wide R4D reform effort for Southern Africa builds on the strengths of each CGIAR center in the region
- The 2DI Southern African Drylands Challenge is recognized as the ideal multistakeholder engagement platform for negotiating cobenefits or synergies (and trade-offs) that involve intersections with other pathway initiatives, for example, water for sanitation or health (waterborne diseases, communicable diseases)
- Rural energy transition or SE4All, digital divide (bandwidth or skills) to reach last mile with digital advisories

Figure 9 | Next Steps for Southern African Drylands Challenge



Source: WRI authors based on information provided by IWMI and Korumo (facilitator).

4.2 Latin America: Transitioning to Low-Emissions Sustainable Meat and Dairy Production Landscapes

LEAD ORGANIZATION

LEAD: Center for World Agroforestry Research-World Agroforestry (CIFOR-ICRAF)

PARTNER ORGANIZATIONS: Global Research Alliance; Alliance of Biodiversity International and International Center for Tropical Agriculture

CONTEXT AND CHALLENGES

The "Greening Livestock Landscapes in Latin America and the Caribbean" Challenge aims to mitigate climate change from the largest source of land-use emissions in the region and achieves adaptation, land restoration, food security, and poverty reduction as cobenefits in line with the Intergovernmental Panel on Climate Change (IPCC)'s Special Report on Land (IPCC 2019). The livestock sector contributes 46 percent of the region's agricultural GDP, meeting slightly less than a third of the global meat supply (FAO 2020b). In the Latin America and the Caribbean (LAC) region, emissions from agriculture, forestry, and land use amount to 40 percent (Calvin et al. 2016), mainly due to deforestation. At the same time, the dairy and meat value chains are threatened by climate change due to heat stress on animals and pasture and changing hydrology. These put the resilience of rural LAC at risk.

VISION AND 2030 OUTCOMES

VISION:

- *Vision for the sector*: Stewardship of landscapes in ways that meet the needs of livelihoods and landscapes.
- *Vision for the Grand Challenge*: Deliver cutting-edge science to inspire and support public and private-sector solutions for a sustainable livestock sector.

2030 OUTCOMES: 11 million smallholder and medium-scale agricultural producers increase resource efficiency and reduce GHG emissions intensity. At least four countries strengthen their capacity to deliver science-based technical packages. At least 10 value chains develop sustainable business models and innovative finance mechanisms.

Proposed Targets for LAC

BUSINESS MODELS: Low emissions and deforestation-free value chains developed or strengthened in five countries by 2027, thereby catalyzing private-sector investment at a ratio of at least 5:1.

PUBLIC AND PRIVATE-SECTOR STRATEGIES: Low-emissions development strategies for the livestock sector developed and implemented in five countries in the Amazon, Central America, and the Caribbean regions by 2025 to accelerate adoption of improved livestock practices and support the transition toward low emissions development.

REDUCED EMISSIONS: Emissions due to livestock sectors decrease by 10 percent without compromising production due to improvements in diets and management practices. 50 million hectares under improved pastures and silvopastoral systems, land restoration, and reduced deforestation by 2027, helping achieve NDCs.

IMPROVED MRV: Five countries use Tier 2 approaches for monitoring, reporting and verification (MRV) of land use and enteric fermentation emissions associated with livestock by 2025, which enables better quantification of emissions reductions and catalyzes finance.

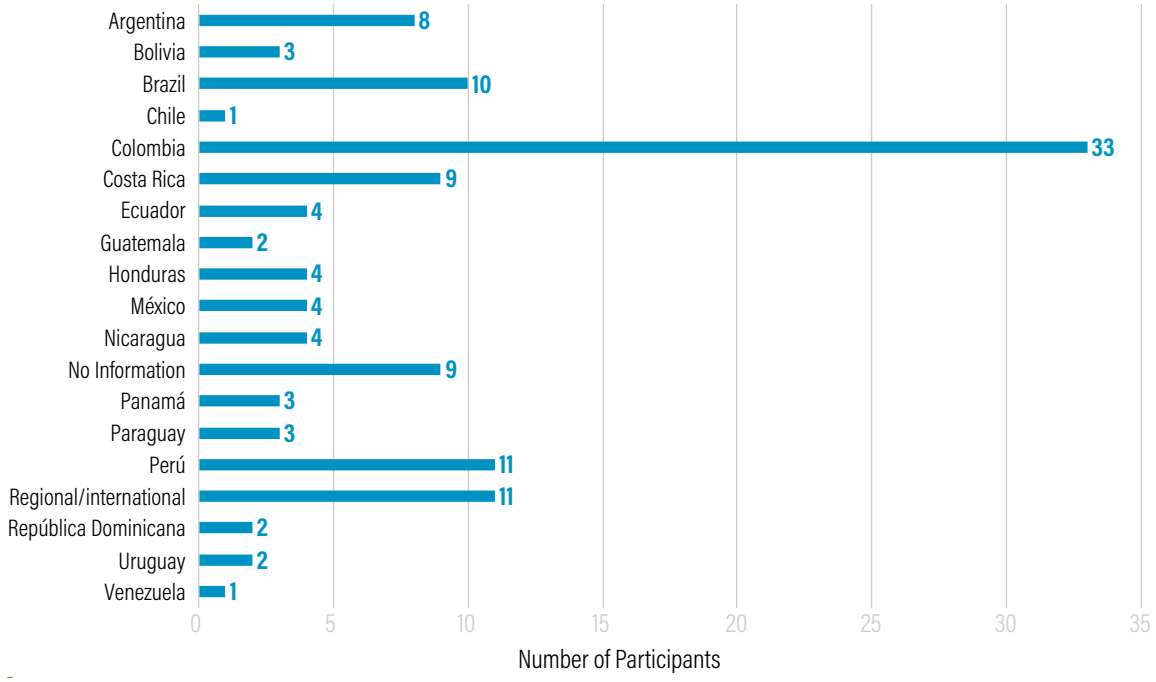
Source: CIFOR-ICRAF.

Figure 10 | Consultation Process for Sustainable Livestock Landscapes Challenge

Source: WRI authors based on information provided by CIFOR-ICRAF.

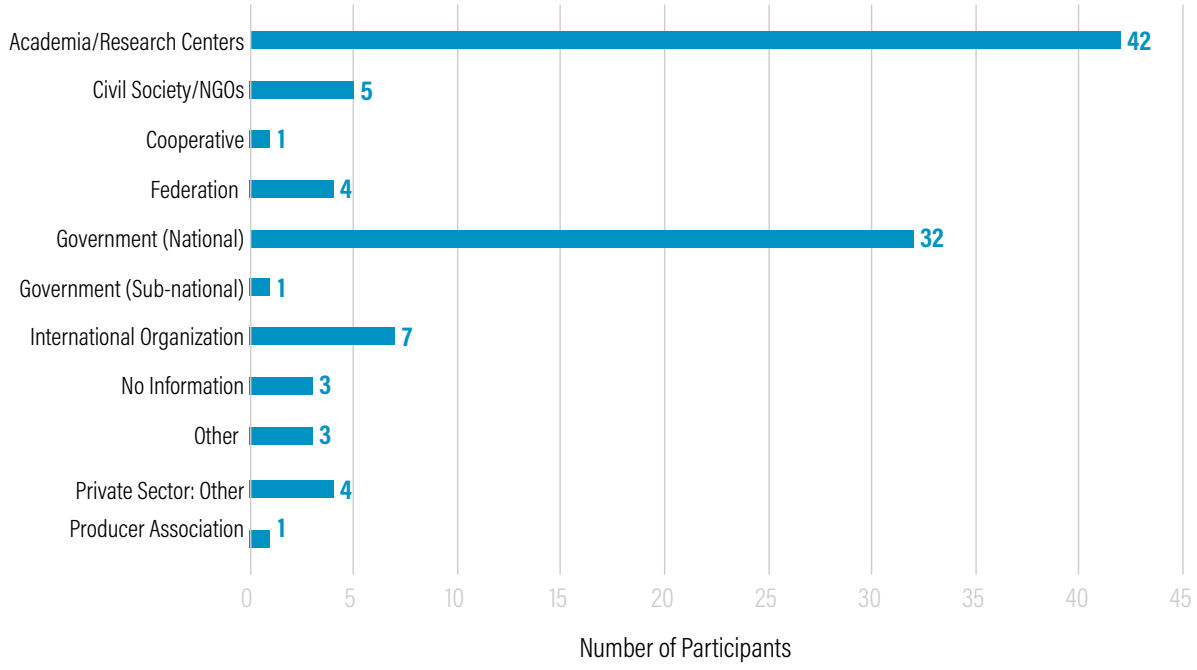
STAKEHOLDERS ENGAGED

Figure 11 | Stakeholders Engaged by Country



Source: WRI authors based on information provided by CIFOR-ICRAF.

Figure 12 | Stakeholders Engaged by Type of Organization



Source: WRI authors based on information provided by CIFOR-ICRAF.

Table 2 | Emerging Themes and Focus Areas for Building Climate Resilience as Identified by Listening Session Participants

THEMES	FOCUS AREAS
Value Chains and Private Sector	
Inclusive and Fair Value Chains	▪ Conduct regional and value chain-level stakeholder analyses that incorporate climate resilience.
Traceability	▪ Build goods and information flow maps.
Impact Evaluation	▪ Conduct studies evaluating losses from climate events for each value-chain stage. ▪ Create inventories of sustainable value-chain practices and their social, economic, environmental, and climate change impact indicators.
Policies and Governance	
Knowledge Management	▪ Co-develop knowledge with local communities and producers for solutions that are both technically and socially fit for purpose in changing climate conditions. ▪ Promote effective communication channels between research, policy, and local communities on climate impacts and solutions.
Impact Evaluation	▪ Conduct social, environmental, and climate impact assessments of policies promoting silvopastoral systems.
Policies, Strategies, and Action Plans	▪ Support guidance for development of long-term adaptation strategies, Nationally Appropriate Mitigation Actions, and NDCs. ▪ Assess policy implementation bottlenecks to design appropriate adaptation incentive mechanisms.
Finance	▪ Conduct case studies of long-term, blended financing schemes (green bonds, credits) to support adaptive pathways. ▪ Support monitoring and evaluation of payment for environmental services and other incentive schemes.
Farm and Landscape Management	
Knowledge and Information Management	▪ Promote improved climate and primary production information systems and tools. ▪ Undertake participatory research in land restoration and intensive pasture management to better understand climate impacts and evaluate potential solutions. ▪ Develop sustainable solutions with a multidisciplinary, systemic approach.
Capacity-Building and Strengthening	▪ Strengthen technical and financial support to farmers adapting to climate change. ▪ Leverage demonstration farms and farmer field schools to incorporate climate-adaptation measures. ▪ Foster strategies for enhancing farmer associativity for improved access to markets and knowledge.
Practices and Technologies	▪ Create inventories of good livestock management practices adapted to different contexts and climatic conditions. ▪ Identify and promote strategies for pasture establishment or renovation and resilient agroforestry models.
Impact Evaluation	▪ Conduct impact evaluations of traditional and new farm practices on local and global emissions and in response to climate impacts. ▪ Conduct socioeconomic impact assessments of climate resilient livestock practices. ▪ Support participatory evaluations of farm practice outcomes.
Monitoring, Reporting, and Verification (MRV)	
Methodologies	▪ Promote access to simple and easy-to-use MRV methodologies and guidance to quantify carbon sequestration in grasslands.
Activity Data and Emissions Factors	▪ Identify indicators that can be measured with existing resources, to enable transitioning from Tier 1 to Tier 2–3. ▪ Support improved baselines at the farm level. ▪ Foster use of remote sensing tools and new information technologies for data collection.
Finance	▪ Foster access to programmatic funds to support long-term investigations, calling attention to the need for more consistent economic and political support.

Table 2 | Emerging Themes and Focus Areas for Building Climate Resilience as Identified by Listening Session Participants (Cont'd)

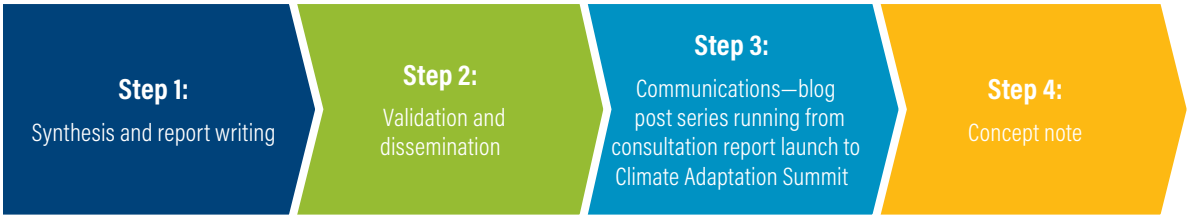
THEMES	FOCUS AREAS
Cobenefits	
Knowledge Management	▪ Strengthen evaluation and communication of cobenefits for ecosystem services, climate vulnerability reduction, human health, and incomes or employment. ▪ Focus on participatory evaluations of cobenefits, farmer field schools and demonstration farms.

Source: WRI authors based on information provided by CIFOR-ICRAF.

HOW THE EXISTING RESEARCH AGENDA FOR THIS CHALLENGE IS EXPECTED TO CHANGE IN LIGHT OF THE 2DI AND POINTS RAISED THROUGH LISTENING SESSIONS

- The R4D agenda on livestock and climate change in Latin America was already fairly well-developed. The Global Research Alliance, FONTAGRO, and the Centro Agronómico Tropical de Investigación y Enseñanza (Tropical Agronomy Center for Research and Teaching) (co-host and participant in these listening sessions) mapped out the key questions in 2018. These listening sessions helped to update and fill in gaps that have surfaced since then.
- The 2DI listening sessions provided an opportunity for the CGIAR and co-hosts to re-engage with stakeholders in countries where they had worked in the past as well as establish new links across the region while showing leadership and partnership.
- Although participation was extensive and diverse, it also highlighted gaps in these networks where additional effort is needed to gather broader perspectives and participation.
- At the same time, the value of nurturing existing partnerships and building new ones cannot be overstated. They will be critical to the type of transformation that the Grand Challenge aims to support.
- A key value add for these listening sessions was the visibility for this Grand Challenge in which many people worked in various capacities.
- One specific issue that came up is about how to counter the negative reputation of livestock in the media. Many participants believed that misguided early communications efforts had caused livestock to often be demonized, unrightfully so in many cases. In fact, livestock production has been satirized and not discussed with the necessary nuance, as with the recent announcement by Burger King for its reduced methane burgers (see https://rb.gy/lc2ars) or a UN tweet (now deleted) claiming that GHG emissions from livestock were higher than those from fossil fuel emissions. Therefore, key research questions, behavior change, messaging, and scientific communication must be tackled.

Figure 13 | Next Steps for Sustainable Livestock Landscapes Challenge



Source: WRI authors based on information provided by CIFOR-ICRAF.

4.3 Securing the Asian Mega-Deltas against Sea-Level Rise, Flooding, and Salinization

LEAD ORGANIZATION

LEAD: International Rice Research Institute

PARTNER ORGANIZATIONS: World Fish, International Water Management Institute (IWMI)

CONTEXT AND CHALLENGES

Asian Mega-Deltas are some of the most densely populated regions in the world. These highly productive food baskets face a number of climate threats, including changing weather patterns, more intense and frequent extreme floods, droughts, cyclones, pest outbreaks, and sea level rise. Climate-related migration is well advanced in the Asian Mega-Deltas and is expected to increase, which poses additional challenges to local and regional food systems. Climate change impacts are exacerbated by human activities, such as unsustainable and high-emissions land use and natural resource management practices, which can lower resilience. In light of future uncertainty and more intense and frequent extreme events, the limited adaptive capacity of communities and institutions is an important challenge. For example, farmers receive too little support to effectively cope with climate change impacts in a timely fashion. The result is loss of productivity, income, and overall livelihood opportunities, all of which directly threaten communities' food and nutrition security.

VISION AND 2030 OUTCOMES

VISION: Transform the Asian Mega-Deltas into sustainable food baskets with resilient and inclusive agricultural landscapes and low-emissions supply chains.

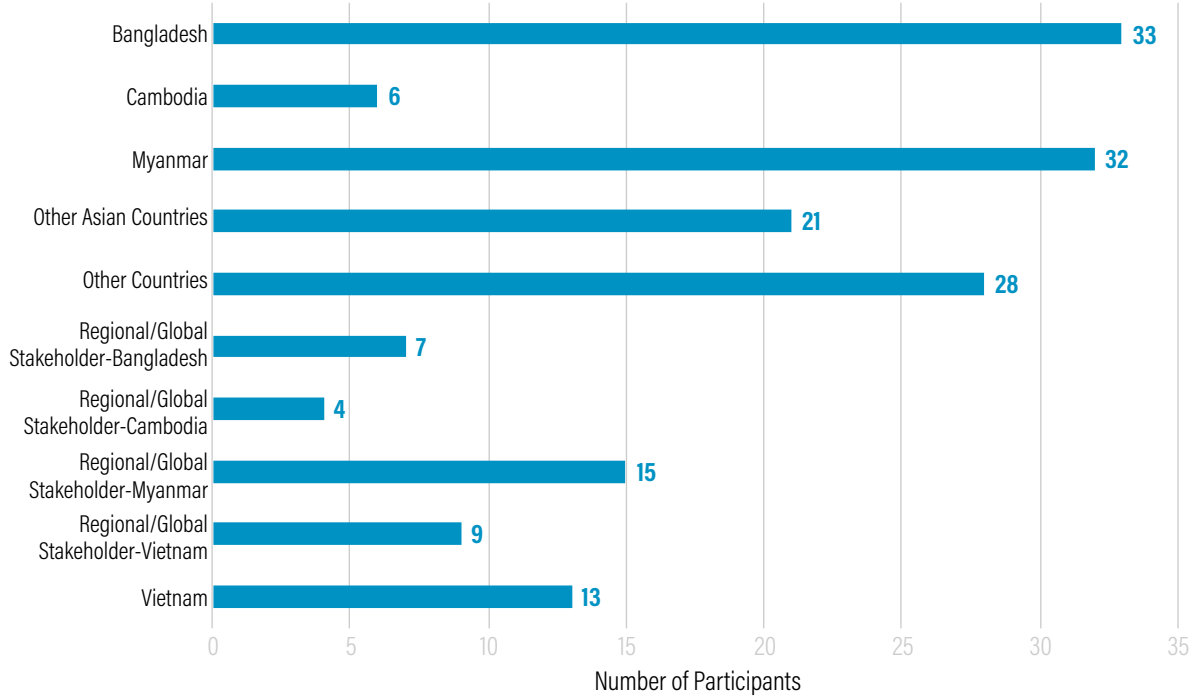
2030 OUTCOMES: Integrated climate-adapted, low-emissions crop-livestock-fisheries systems adopted by 30 million agricultural producers; tens of millions of agricultural producers benefit from real-time climate advisories and heat or water or salinity management. Five countries are capacitated to implement their NAPs and NDCs.

Figure 14 | Consultation Process for Asian Mega-Deltas Challenge

Source: IRRI.

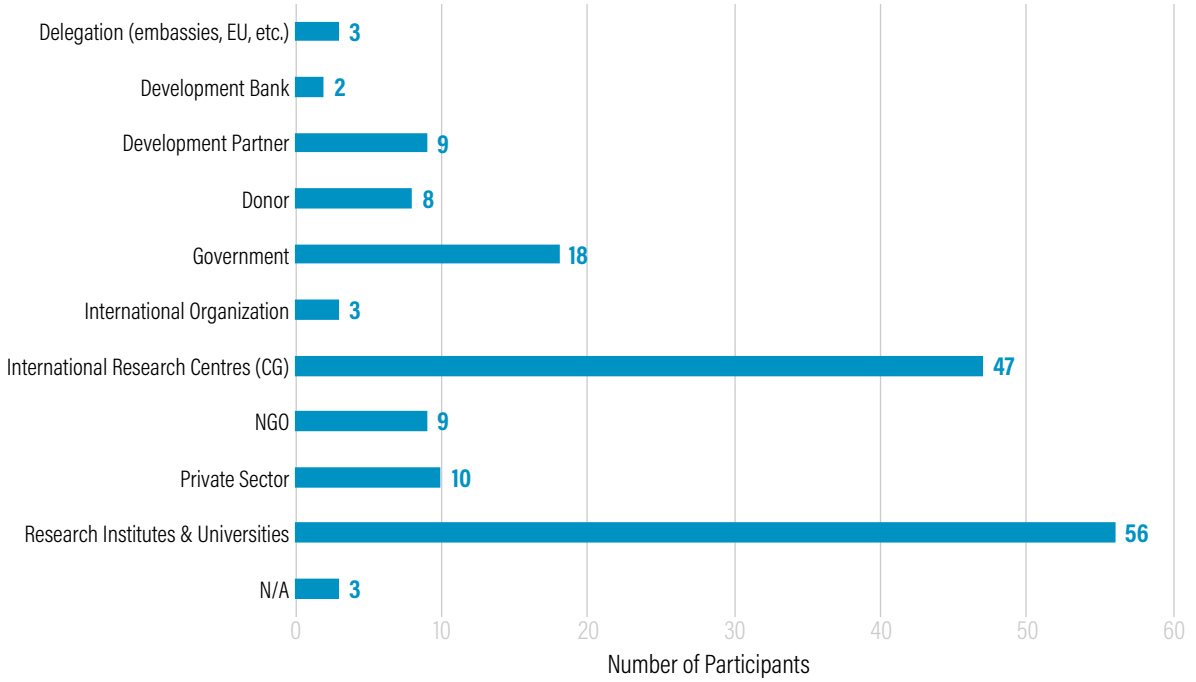
STAKEHOLDERS ENGAGED

Figure 15 | Stakeholders Engaged by Country



Source: WRI authors based on information provided by IRRI.

Figure 16 | Stakeholders Engaged by Type of Organization



Source: WRI authors based on information provided by IRRI.

Table 3 | Emerging Themes and Focus Areas for Building Climate Resilience as Identified by Listening Session Participants

THEMES	FOCUS AREAS
Climate-Informed (Digital) Advisory Support Services	
Governance and Participation	▪ Create dialogues on climate change issues that connect farmers and researchers. ▪ Co-design interdisciplinary research programs that emphasize climate impacts and solutions with end users. ▪ Build partnerships for cooperation, coordination, co-ownership, and coherence.
Data and Information Management	▪ Increase capacity of national partners and local communities to codevelop, use, and react appropriately to advisory support services.
Technologies and Practices	
Interdisciplinary Methods and Partnerships	▪ Design interdisciplinary research programs with a strong focus on the social dimensions of climate change. ▪ Build partnerships with farmers and the private sector to develop innovative adaptation technologies and practices. ▪ Promote youth engagement and research capacity in climate change issues. ▪ Use GIS, remote sensing technologies, and modeling approaches to identify hotspot areas and target appropriate response packages.
Transformative Approaches	▪ Codevelop a vision for transformative adaptation pathways. ▪ Identify and use evidence-based participatory processes to assess climate change impacts and identify transformative solutions.
Empowerment and Inclusion	
Guiding Principles for Equity and Inclusion	▪ Co-create guiding principles of inclusivity and empowerment for adaptation and honor the vision by applying these principles. ▪ Accept migration as part of a comprehensive response plan and foster positive migration experiences for both those leaving and those staying. ▪ Identify power structures that exclude and disempower those most vulnerable to climate change impacts and work to change them.
Local Ownership and Participation	▪ Develop inclusive technological literacy. ▪ Decentralize project management to include local communities.

Source: WRI authors based on information provided by IRRI and Korumo (facilitator).

HOW THE CGIAR'S EXISTING RESEARCH AGENDA FOR THE ASIAN MEGA-DELTAS IS EXPECTED TO CHANGE IN LIGHT OF THE 2DI

- **PURPOSEFUL INCLUSIVITY.** Ensure greater inclusion of local communities and marginalized groups to guide the R4D agenda to achieve lasting impacts.
- **EMPOWERMENT.** Identify ways to empower local agents of change, such as young researchers and entrepreneurs, and direct research endeavors toward actualizing empowerment.
- **INTERDISCIPLINARY AND SYSTEM RESEARCH PROGRAMS.** Ensure interdisciplinary and systemic research programs with a strong social science connection so that social aspects of climate change are adequately addressed.
- **INNOVATIVE TECHNOLOGIES AND PRACTICES.** Replace those technologies and practices that climate change makes unsustainable; for example, the development of climate resilient crop varieties, alternatives to groundwater pumping, and more commercially feasible production systems.

- **LOCAL AND INDIGENOUS KNOWLEDGE.** Take advantage of existing knowledge. Make sure all relevant knowledge is identified and used to inform adaptation measures. Central to this will be indigenous knowledge.
- **BOTTOM-UP INNOVATION OF PRACTICES AND TECHNOLOGIES.** Investigate resilience and sustainability of existing practices and technologies to better understand why unsustainable technologies prevail and how to change them. Ensure, together with the community and the private sector, that unsustainable practices and technologies are effectively replaced with more resilient and sustainable ones.
- **RESOURCE MANAGEMENT.** Identify ways to improve natural resource management. Determine strategies for sustainable, resilient and low-emissions management in the context of climate change, increasing volatility, and growing uncertainty. Be pragmatic; identify what is successful but also what fails and why.
- **INFORMATION MANAGEMENT.** Ensure local ownership of information management systems and make end-users' needs central to information production and dissemination. End users must receive sufficient, timely, and relevant information.
- **PRIVATE-SECTOR ENGAGEMENT.** Incorporate private-sector actors in new research programs. This will include ensuring understanding and adapting to relevant incentive structures. Evidence and de-risking might be valuable in this context.
- **TARGET POLICY AND INSTITUTIONAL REFORMS.** Help build agile institutions with clear mandates and responsibilities to meet needs on the ground.
- **COHERENCE.** Cooperate and synchronize with myriad parties to ensure coherent policies and interventions.

NEXT STEPS

- Additional stakeholder engagement on topics that could not be discussed during the initial phase (e.g., sustainable finance, value chains, and markets)
- Development of an R4D agenda for 2022–30, including projected impacts of climate change and sea level rise in the Asian Mega-Deltas, as well as regionally
- Drafting of a preparedness and response plan to include well-suited technologies and practices, investment, and institutional and policy dimensions at country and regional levels
- Development of proposals for initial urgent activities and studies in order to achieve quick 'no-regrets' gains to kick-start the initiative
- Identification and development of effective partnerships with key development partners to coordinate support and investments

4.4 Building Food System Resilience to Climate Shocks in the Sahel

LEAD ORGANIZATION

LEAD: International Crops Research Institute for the Semi-Arid Tropics

PARTNER ORGANIZATIONS: International Water Management Institute, International Institute of Tropical Agriculture, International Livestock Research Institute, World Agroforestry Center

CONTEXT AND CHALLENGES

The Sahel West Africa region is the semi-arid area located between the Sahara Desert and humid Savannas, with annual average rainfall between 400 mm and 700 mm. The region is characterized by complex, multifaceted challenges that threaten the natural resources capability to sustain agrarian livelihoods. Participants repeatedly noted that climate change exacerbates the rate and magnitude of ongoing degradation and desertification processes. Human pressures, such as extreme violence, civil strife, political violence, and diverse conflicts, contribute to increased seasonal youth migration and internal displacement at unprecedented levels in some parts of the Sahel. All these factors limit productivity and overall food and nutrition security as well as the required investment for improvement. The recent Covid-19 pandemic, like previous epidemics, puts additional pressure on an already fragile and stressed socioecological system, making achieving food and nutrition security and environmental sustainability more challenging.

VISION AND 2030 OUTCOMES

VISION: In line with the broader World Bank-led *Climate Investment Plan for the Sahel*, the goal of the 2DI Sahel Challenge is to build the capacity of agricultural producers, women, and youth and enhance institutional resilience to shocks and vulnerabilities of climate change. This will include better access to climate services and agro-ecological technologies, sustainable management of productive assets, development of resilient agro-silvo-pastoral value chains linked to youth entrepreneurship, and enhanced governance of land and water resources to prevent and manage conflicts around natural resources.

2030 OUTCOMES: Climate-risk management technologies and agro-ecological practices adopted by 15 million agricultural producers, with 50 million other beneficiaries achieving food, water, and nutrition security. One hundred fifty climate resilient communal development plans; six countries capacitated to enhance implementation of their NAPs and NDCs.

CONSULTATION PROCESS

The 2DI-Sahel listening session was nested within the four-day (July 6–9, 2020) virtual stakeholder conference, "Under the Palaver Tree: Unpacking Food System Resilience in West Africa," which was jointly organized with the World Bank for the preparation of the Food System Resilience Program (FSRP). The FSRP is a regional flagship investment project led by the Economic Community of West African States (ECOWAS), Comité Permanent Inter-Etats de Lutte contre la Sécheresse dans le Sahel (Permanent Interstate Committee for Drought Control in the Sahel) (CILSS), the West and Central Africa Council for Agriculture Research and Development (CORAF), and cofinanced by the World Bank. The project will be implemented in two phases of five years each, with an investment of $500 million each. Ministries of agriculture and rural development of all 15 member countries of ECOWAS are engaged in the FSRP. This alignment provided an excellent opportunity to link the efforts of 2DI-Sahel to engage with and listen to stakeholder needs and identify ways to link 2DI with the political weight and resources of the FSRP program.

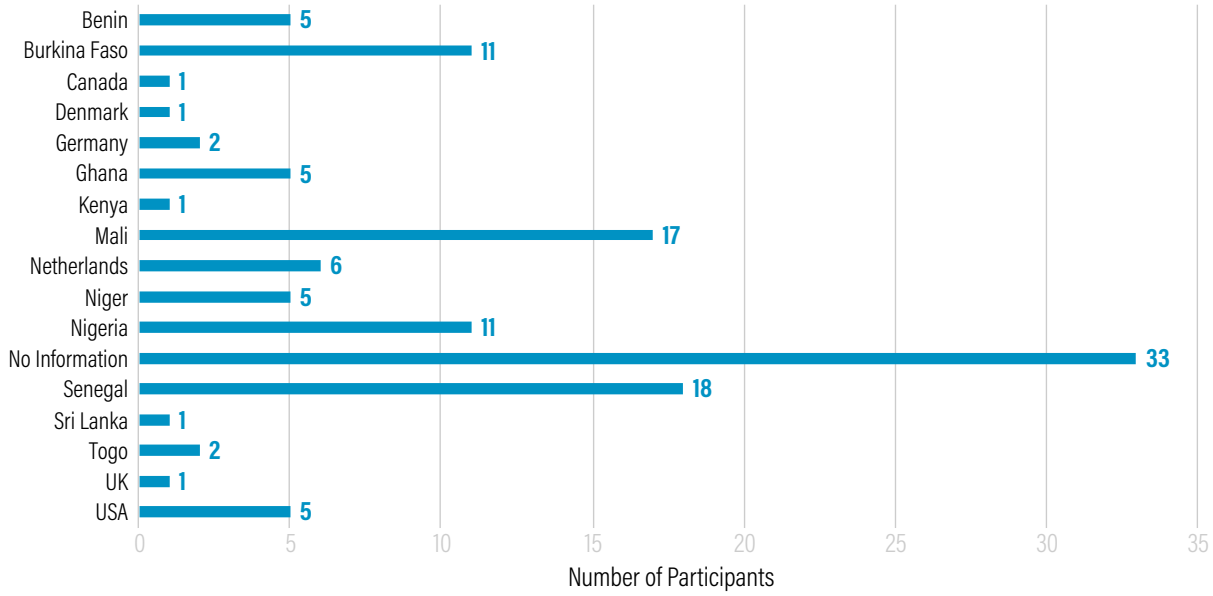
Figure 17 | Consultation Process for Sahel Food System Resilience Challenge

Source: Food System Resilience Program and Ouishare (facilitator).

STAKEHOLDER ENGAGEMENT

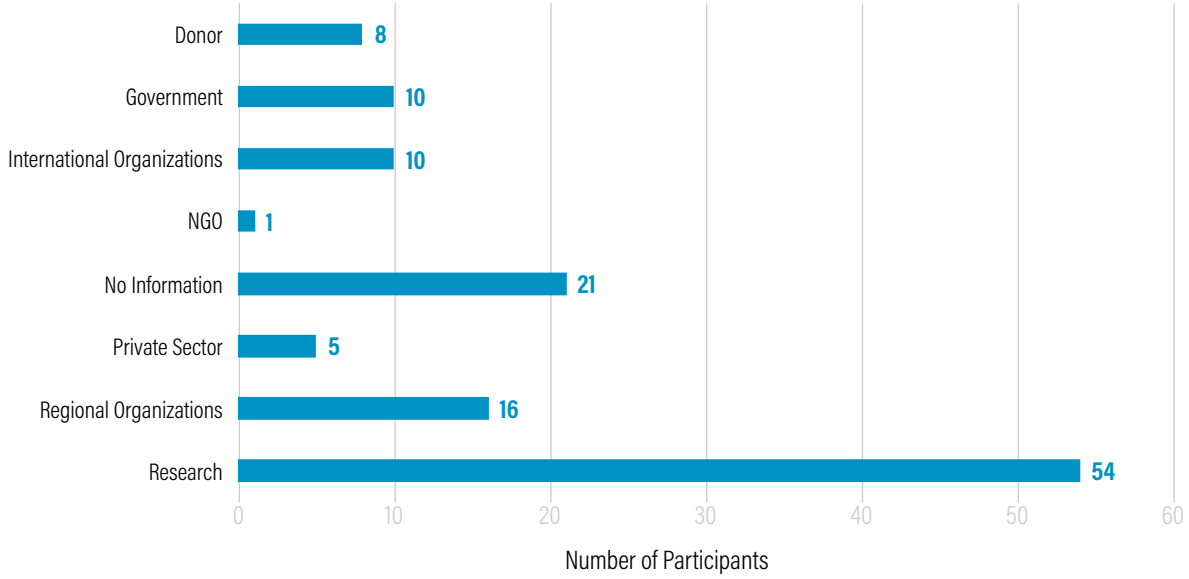
The bilingual (French and English) "Under the Palaver Tree" virtual stakeholder consultation offered an opportunity for 400 participants from West African countries, regional bodies, development partners, and representatives from the private sector, academia, and civil society to engage on how to tackle challenges of the West African food system. Of these, 150 attended the 2DI-Sahel listening session, held on the fourth day. The linkages between the 2DI and the FSRP initiative enabled productive discussions of how the CGIAR expertise in research and development could be incorporated into the design of the FSRP while engaging actors from the broadest community possible through the 2DI-Sahel process. Because the targeted topics of the 2DI-Sahel are aligned with those of the FSRP, this synergistic approach was beneficial to both sides.

Figure 18 | Stakeholders Engaged by Country



Source: WRI authors based on information provided by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and Ouishare (facilitator).

Figure 19 | Stakeholders Engaged by Type of Organization



Source: WRI authors based on information provided by ICRISAT and Ouishare (facilitator).

Table 4 | Emerging Themes and Focus Areas for Building Climate Resilience as Identified by Listening Session Participants

THEMES	FOCUS AREAS
Digital Advisory Services for Agriculture and Food Crisis Prevention and Management	
Data and Information Management	▪ Generate and disseminate relevant and coherent climate information, considering human-centered design and gender. ▪ Strengthen capacity of climate and weather data providers, especially the national and regional meteorological services, to understand users' information needs and to generate data and make climate-informed advisories available.
Access	▪ Build users' capacity (e.g., technological literacy) and support digital access in rural areas. ▪ Address cost barriers and gender-specific barriers to technology access. ▪ Promote business models with integrative approaches by bundling services to address the many aspects of food-system resilience.
Governance and Participation	▪ Promote ongoing and open dialogue among various public and private-sector actors for holistic, participatory, and iterative service development. ▪ Involve small- and medium-enterprise ecosystem in resilience-building efforts. ▪ Co-create low-cost climate advisory services to ensure equitable and inclusive access.
Impact Evaluation	▪ Assess the effects of existing digital advisory services.
Sustainability and Adaptive Capacity of the Food-System Productive Base	
Technologies and Practices	▪ Explore climate-adapted crop and forage varieties and livestock breeds, as well as new and adaptive systems (e.g., integrated rice and fish farming in floodplains, intensified rice fallows, crop livestock systems). ▪ Integrate socio-cultural dimensions in the design of appropriate technologies. ▪ Address links among agriculture, human health, and climate change.
Natural Resource Management	▪ Promote sustainable and resilient management linked to farmer productivity and profitability.
Policies and Governance	▪ Address challenges to farmers' organization and association (e.g., through multi-actor innovation platforms). ▪ Promote access to long-term finance options to promote systemic adaptation.
Market Integration and Trade	
Coordination	▪ Promote coordination among value-chain actors at the national and regional level, e.g., by strengthening local innovation platforms. ▪ Build greater understanding of commercial policies and regional dynamics.
Risk Management	▪ De-risk value chains in the face of climate and other shocks with a focus on the entire value chain. ▪ Improve access to finance for actors across the value chain.
Knowledge and Information Systems	▪ Strengthen baselines of value-chain information; harmonize the collection and classification of agricultural and commercial data; strengthen regional capacity to conduct market analyses. ▪ Improve access to information by actors across the value chain; strengthen capacities though information sharing.

Source: WRI authors based on information provided by ICRISAT, the Food System Resilience Program, and Ouishare (facilitator).

HOW THE EXISTING RESEARCH AGENDA FOR THIS CHALLENGE IS EXPECTED TO CHANGE IN LIGHT OF THE 2DI AND POINTS RAISED THROUGH LISTENING SESSIONS

- The discussions revealed a number of routes by which R4D can contribute to agricultural transformation in the Sahel to facilitate inclusive and sustainable economic growth, social development, and resilience. These routes include climate-smart agricultural technologies and practices that are appropriate to smallholder farming families.
- Framing the 2DI-Sahel discussion in alignment with the FSRP design will guide the future focus of R4D in the Sahel in three key areas:
  - digital advisory services for agriculture and food crisis prevention and management
  - sustainability and adaptive capacity of the food systems productive base
  - market integration and trade
- Greater focus on potential regional flagship initiatives that seek to mobilize innovative actions at regional levels in ways that capture economies of scale and regional spillovers while fostering collective action on common challenges and opportunities have been identified within the three topic areas above. These will be further analyzed to define needed R4D interventions to support their sound implementation.
- Future discussions will focus on expanding the topics under this framing and building on those presented in the previous section.

NEXT STEPS

- Share the messages of the 2DI-Sahel meetings widely with stakeholders.
- Publish and release publicly a document summarizing state-of-the-art covering technologies and practices that are being promoted by the CGIAR in the Sahel.
- Disseminate messages of 2DI-Sahel to inform the design of the new World Bank-funded Accelerating Impacts of CGIAR Climate Research in Africa project for Senegal, Ghana, and Mali.
- Inform the design of the OneCGIAR system-wide R4D reform processes to embed climate change research in the new agenda and design of the CGIAR.

4.5 Resilient Households in Central and Tropical Andes and Central America

LEAD ORGANIZATION

LEAD: Alliance of Biodiversity International and International Center for Tropical Agriculture (Alliance Biodiversity-CIAT)

PARTNER ORGANIZATIONS: World Food Programme, World Bank, International Potato Center, and International Maize and Wheat Improvement Center

CONTEXT AND CHALLENGES

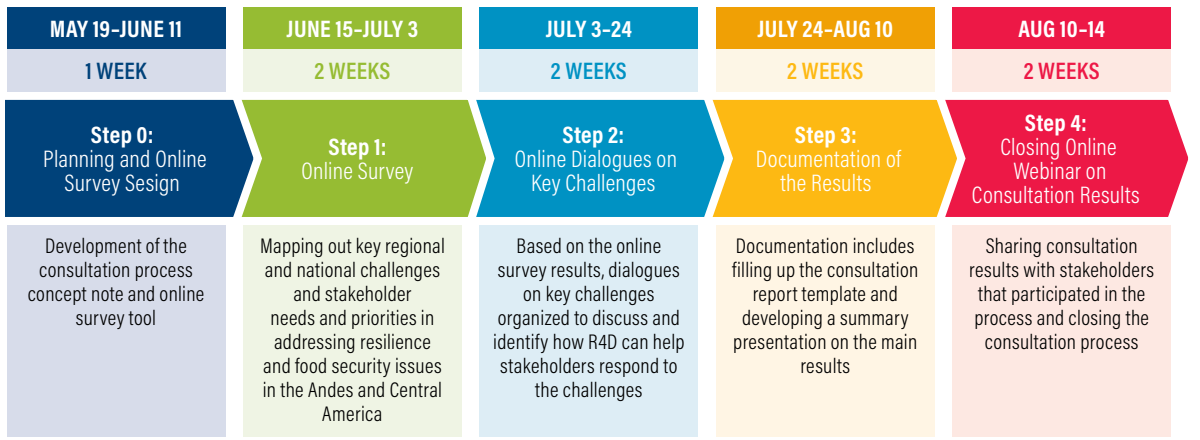
Climate models have projected climate changes in Central America related to increases in air temperature, as well as diminishment of precipitation, intensification of evapotranspiration, and lowering of soil humidity. For the Andes, the most significant effects are associated with rising temperatures and an escalation of precipitation and strong precipitation, combined with a decrease in rainfall during the dry season (Magrin et al. 2014). Additional impacts include the emergence of new pests and diseases, the reduction of pollinating species, and the loss of agrobiodiversity. Because these changes are affecting current irrigation schemes and have concurrent consequences in food security, there is a need to adapt to them quickly. As a priority for the region, participants and organizers also highlighted closing gaps in the production of accurate climate and climate-risk prediction, forecasts, and scenarios for agriculture for increasing preparation of vulnerable farmers in face of these climate threats, as well as the need to expand accessible and equitable finance and credit for smallholder farmers of the region to address and contain impacts of climate disasters. Finally, participants emphasized the differential effect of climate events and climate change on youth outmigration and women-led households' livelihoods, as well as other vulnerable groups, such as indigenous peoples, LGTBI populations, and the physically disabled.

VISION AND 2030 OUTCOMES

- 10 million small-scale agricultural producers increase productivity through the implementation of options that reduce negative effects of climate variability and extreme events, while reducing the climate change footprint.
- At least six countries with strengthened climate risk-management policies and instruments.
- At least 10 value chains have developed sustainable businesses.

CONSULTATION PROCESS

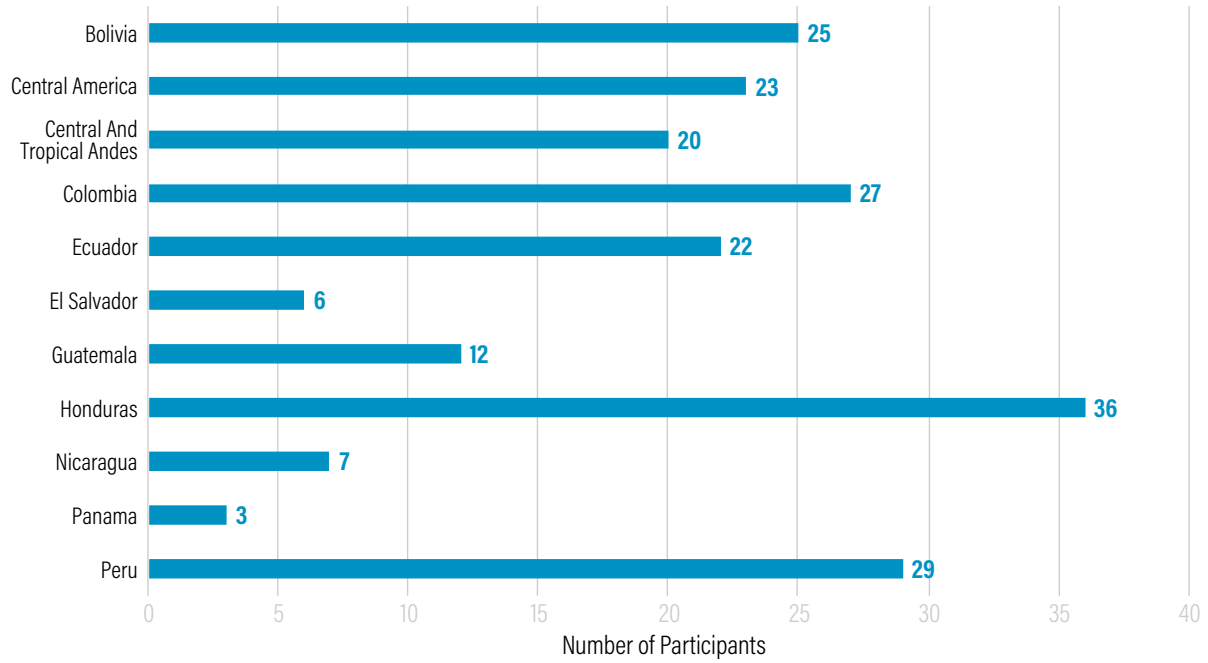
Figure 20 | Consultation Process for the Central America and Central and Tropical Andes Challenge



Source: Alliance Biodiversity-CIAT.

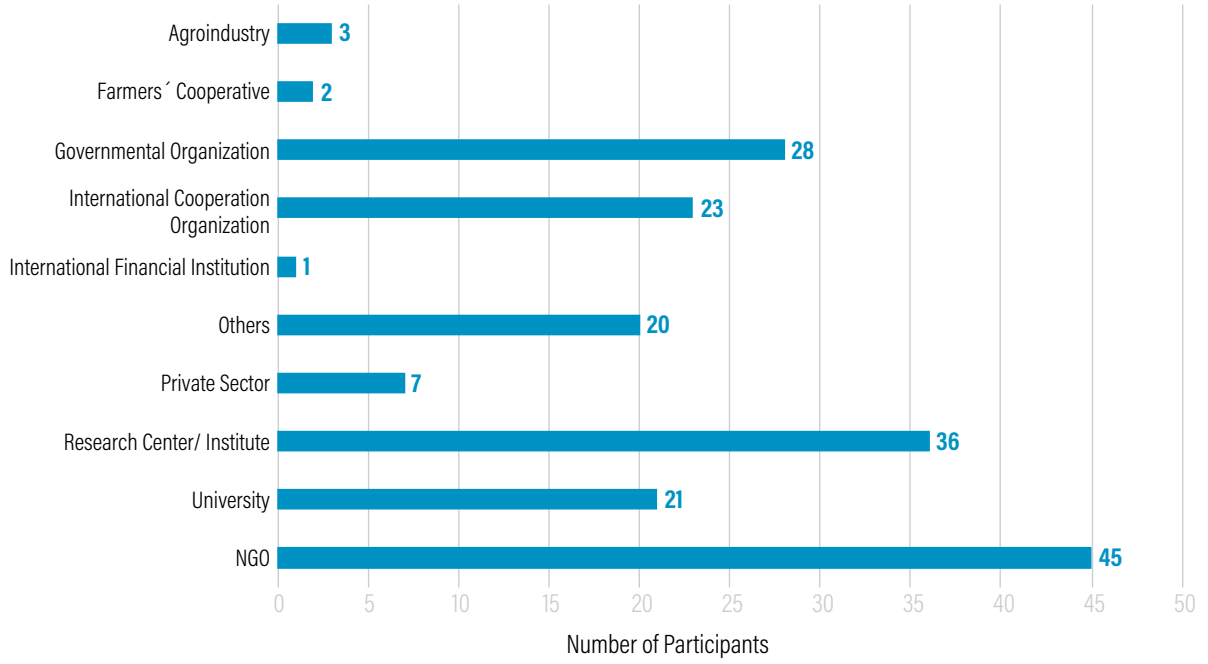
STAKEHOLDER ENGAGEMENT

Figure 21 | Stakeholders Engaged by Country



Source: WRI authors based on information provided by Alliance Biodiversity-CIAT.

Figure 22 | Stakeholders Engaged by Type of Organization



Source: WRI authors based on information provided by Alliance Biodiversity-CIAT.

Table 5 | Emerging Themes and Focus Areas for Building Climate Resilience as Identified by Listening Session Participants

THEMES	FOCUS AREAS
Policy, Institutions, and Sustainable Finance	
Coordination	▪ Promote knowledge-sharing platforms to exchange experiences in relation to climate resilient agricultural research and innovative financial mechanisms. ▪ Promote multi-actor, multilevel, and multisector platforms.
Monitoring and Evaluation	▪ Strengthen monitoring and evaluation of policies and interventions to enable climate resilient investments.
Access and Participation	▪ Promote incentives to enable participation (e.g., public purchases, payment for ecosystem services). ▪ Promote affordable, accessible, and equitable financial mechanisms to de-risk agricultural investments.
Agrobiodiversity, Water, and Energy Nexus	
Enabling Environment	▪ Undertake economic valuation of regional agrobiodiversity to enhance market inclusion. ▪ Integrate knowledge systems (local or traditional vs. global or new) and information from various scales (plot, farm, landscape) to monitor agrobiodiversity shifts and track the adaptive use of agrobiodiversity.
Improved Resource Management	▪ Increase capacity building for water management and promote holistic water governance across landscapes and territories. ▪ Support investments in water harvesting, irrigation, and locally adapted technologies, as well as scalable technologies.
Food and Nutrition Security; Value Chains and Food Systems	
Systemic Approaches	▪ Explore links among health, nutrition, and climate change adaptation. ▪ Adopt a food-systems approach to promote coordination between production and consumption stakeholders.
Markets and Value Chains	▪ Explore and assess effective mechanisms for increasing market incentives, efficiencies, and inclusiveness. ▪ Promote pre- and post-harvest efficiency in the food system.
Food Security under Shocks	▪ Understand traditional resilience and adaptation practices. ▪ Assess food security in times of COVID-19.
Extension, Climate Services, and Integral Risk Management	
Innovative Extension and Advisory Mechanisms	▪ Develop innovative and horizontal mechanisms to support or complement existing extension systems.
Climate Risk Management and Insurance	▪ Increase understanding and awareness of climate risks. ▪ Facilitate development of innovative financial mechanisms to manage risks. ▪ Assess and support informal risk management systems.
Participatory Research; Gender, Youth and Social Inclusion	
Participatory Research	▪ Use existing, profound traditional and community knowledge. ▪ Integrate context-specific multicultural aspects in research agenda. ▪ Build on communities' local visions and needs in regard to climate resilience. ▪ Assess lessons learned from existing participatory research methods.
Understanding Roles, Needs, and Assets	▪ Understand the critical role of women in supporting food and nutrition security and of youth in innovating technologies, practices, and extension systems. Understand how rural-urban dynamics affect these roles.

Source: WRI authors based on information provided by Alliance Biodiversity-CIAT.

HOW THE EXISTING RESEARCH AGENDA FOR THIS CHALLENGE IS EXPECTED TO CHANGE IN LIGHT OF THE 2DI AND POINTS RAISED THROUGH LISTENING SESSIONS

- **Enhanced coordination** to leverage existing knowledge on policies and institutions and increased knowledge on tailored sustainable financial mechanisms and business models.
- Increased research on **enabling actors' networks and linkages** between farmers and consumers that can contribute to climate resilient food systems and value chains.
- **Novel digital tools** for revolutionizing agriculture to reduce food and nutrition insecurity.

- Greater recognition that R4D that promotes **diversified systems** through wide actors' networks and enhances knowledge sharing.
- More attention to adapted and scalable technologies in relation to **water and the nexus with energy in agriculture,** considering territorial approaches for water governance and management.
- Need to strengthen National Agricultural Research System, youth organizations, technology providers, and private-sector **extension systems** on business skills for scaling while supporting the development of **bundling of services for climate risk management** and insurance.
- Support for capacity building on **gender, youth, and social inclusion** to deliver on mechanisms that foster women's empowerment and more equitable rural livelihoods in a context of new rural-urban and migration dynamics.
- Lessons learned and support for the development of innovations, **monitoring and evaluation** for climate-smart agriculture and climate services and **MRV** across scales.

NEXT STEPS

- The Central and Tropical Andes and Central America 2DI listening sessions were designed and carried out by a team representing four CGIAR centers or programs: Alliance of Biodiversity International and the International Center for Tropical Agriculture, CCAFS, the International Maize and Wheat Improvement Center, and CIP. This team was expanded in Session 5 by including the International Food Policy Research Institute (IFPRI) and IWMI, creating a solid foundation for the OneCGIAR system-wide R4D reform.
- This team is working toward the establishment of a community of practice dedicated to sharing knowledge for development. It will serve to solidify key linkages with stakeholders, broaden the alliance's partner network, and explore joint work opportunities for implementation of the 2DI.
- Next steps will capitalize on the positive process and results of the listening sessions through further discussions and sharing of the results of the listening sessions with the partner centers, with a special emphasis on leveraging current initiatives that can contribute to strengthening the 2DI in the region (e.g., the Andean Initiative led by CIP).
- In addition, the team will explore funding opportunities for the prioritized R4D topics in response to survey results wherein the lack of financial resources for research was commonly cited as a main barrier for R4D, including for participatory or bottom-up research.
- The team is also engaging in conversations with key stakeholders in the region to ensure that post-COVID investment takes into account priorities highlighted by the 2DI listening sessions to guarantee sufficient emphasis on R4D for climate resilience of the most vulnerable in Latin America.

Figure 23 | Next Steps for the Central America and Central and Tropical Andes Challenge

Source: WRI authors based on information provided by Alliance Biodiversity-CIAT.

4.6 Horn of Africa

LEAD ORGANIZATION

LEAD: International Livestock Research Institute (ILRI)

PARTNER ORGANIZATIONS: International Centre for Agricultural Research in Dry Areas (ICARDA), International Water Management Institute (IWMI), WorldFish, International Food Policy Research Institute (IFPRI), Dutch Embassy in Egypt, Wageningen University

CONTEXT AND CHALLENGES

Within the Horn of Africa the climate-related challenges are the low rainfall that characterizes the arid and semi-arid regions; the high spatial and temporal variability of the low rainfall, including recurrent droughts every three to five years; and the devastating impact that unusually heavy rainfall can have in terms of flooding and diseases.

VISION AND 2030 OUTCOMES

VISION:
Improve coordination across agencies with mandates and responsibilities for the range of activities that fall under the umbrella category of building resilience to climate change.

- View the drylands as an integrated system that includes more productive areas and take a landscape approach to managing the natural resources.
- Improve capacity to plan for climate change at all levels of decision-making.
- Find solutions that include sustainable long-term financing for climate change adaptation.

2030 OUTCOMES: Improved access to nutrition for 80 million urban poor; increased uptake of climate-risk management technologies and agro-ecological practices, including better water management and risk management, across 60 million agricultural producers; inclusive and efficient value chains streamlined for societal and climate outcomes; seed and water governance improved across several countries. Eighteen countries capacitated to implement their NAPs and NDCs.

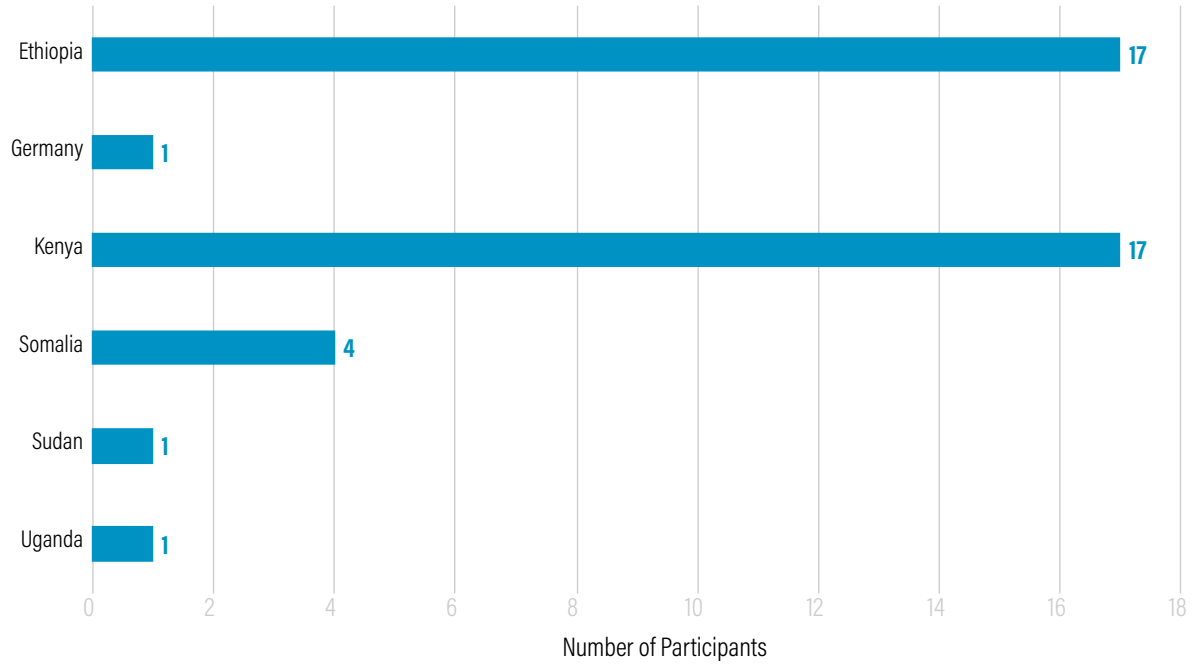
CONSULTATION PROCESS

Figure 24 | Consultation Process for Horn of Africa Challenge

Source: WRI authors based on information provided by ILRI.

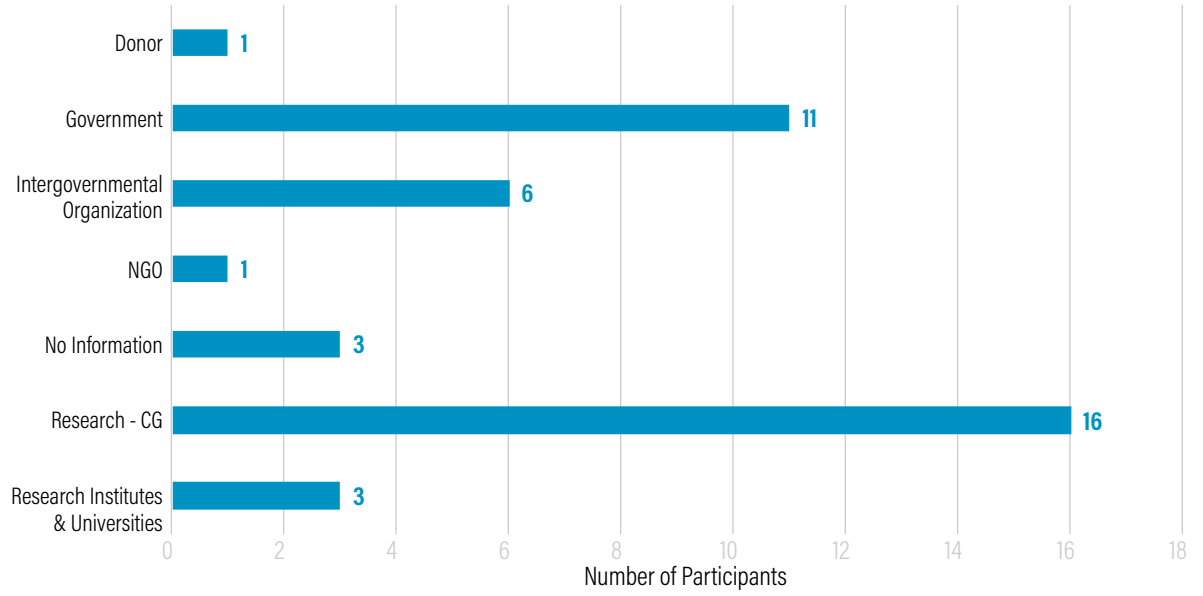
STAKEHOLDER PARTICIPATION

Figure 25 | Stakeholders Engaged by Country



Source: WRI authors based on information provided by ILRI.

Figure 26 | Stakeholders Engaged by Type of Organization



Source: WRI authors based on information provided by ILRI.

Table 6 | Emerging Themes and Focus Areas for Building Climate Resilience as Identified by Listening Session Participants

THEMES	FOCUS AREAS
Partnership Modalities	
Co-creation	▪ Engage national expertise during planning stages to identify and respond to national needs.
Coordination	▪ Improve cross-country coordination with IGAD support and seek ways to strengthen national buy-in.
Sustainable Finance Mechanisms	
Private-Sector Engagement	▪ Support development of viable business models and incentives for private-sector engagement.
Bundling of Services	▪ Leverage emerging efforts to link private input suppliers and microfinance to make adoption of climate-smart practices more feasible and profitable.
Markets	
Access	▪ Address the physical and financial hurdles to market access in dryland systems.
Business Models	▪ Expand emerging efforts to develop business models for climate-smart products.
Climate Advisories and Decision Support	
Focus on Users	▪ Improve the sensitivity of advisories to local situations and needs.
Sustainability of Services	▪ Promote harmonization across climate information platforms to address lack of long-term sustainability.
Institutional Capacity	
Climate change Knowledge and Awareness	▪ Invest in working with technical staff at the national and local levels to strengthen their capacity to use climate information, prioritize adaptation, and plan in a context of uncertainty.
Coordination	▪ Support cross-agency coordination to help build institutional capacity.
Empowerment and Inclusion	
Deliberate Action	▪ Take deliberate action to empower women and youth and increase equity in access to information, market engagement, and adaptive capacity. ▪ Work through and with youth networks. ▪ Support women to have leadership positions.
Understanding Roles, Needs, and Assets	▪ Promote better understanding of the different needs and vulnerabilities of women and youth.
Integrity and Sustainability of the Natural Resource Base	
Improved Resource Management	▪ Ensure sustainability of the natural resource base in the context of ongoing land degradation and high spatial heterogeneity.

Source: WRI authors based on information provided by ILRI.

HOW THE EXISTING RESEARCH AGENDA FOR THIS CHALLENGE IS EXPECTED TO CHANGE IN LIGHT OF THE 2DI AND POINTS RAISED THROUGH LISTENING SESSIONS

- **More demand-driven research to build resilience to climate change** in the drylands of the Horn of Africa developed together with local or national research partners, next users, and key national agencies and institutions.
- **Greater institutional collaboration and cooperation** to advance the regional and national agendas and support resilience to climate change.
- **More work through market mechanisms with the private sector** to make climate-smart agriculture more profitable, as well as to ensure sustainable financial investment for the long term. Climate-smart agriculture does not yet make business sense for many producers, input providers, and commercial partners. We continue to need a number of innovations to provide incentives across value chains.
- **Greater emphasis on developing institutional capacity** of local and national decision-makers to implement strategies and plans to adapt to climate change. Both capacity and the political will are still lacking, especially at more local levels of government.
- **More focus on empowering women and youth**, as well as vulnerable communities and households, to achieve climate resilience. We must be more deliberate in efforts to achieve gender and other social inclusion, including transforming some cultural norms.

NEXT STEPS

- The 2DI consultations have influenced the design of a new project, Accelerating the Impact of CGIAR Climate Research in Africa, which will be implemented in Ethiopia and Kenya. The project is funded by the World Bank.
- As other investors indicate their interest, the results will be used to further develop strategies.

4.7 MENA Grand Challenge

LEAD ORGANIZATION

LEAD: International Center for Agricultural Research in Dry Areas (ICARDA)

PARTNER ORGANIZATIONS: International Water Management Institute (IWMI), WorldFish, International Food Policy Research Institute (IFPRI), Wageningen University and Research

CONTEXT AND CHALLENGES

The MENA region is arid, and with climate change, much of the region is expected to become drier and hotter in the coming years. Modeling estimates indicate that by the end of the century, the mean annual temperature anomalies could reach as high as +5–6°C along with huge uncertainties in rainfall patterns affecting its agricultural sector, which is particularly vulnerable since much of it is rainfed or agropastoral. In addition to climate change impacts, many of the countries in the MENA region have huge income disparities and increasing socioeconomic inequalities. These factors, combined with projected rapid population growth, will make meeting food security needs a formidable challenge. In response, increasing numbers of people are likely to move to urban areas or leave their home country altogether, which will further strain an already stressed food production system.

VISION AND 2030 OUTCOMES

VISION: A food-secure MENA region will be supported by resilient socio-ecological systems for enhanced livelihoods in the face of climate change. This will be supported through enabling environments that bring together integrated policies, public-private partnerships, value-chain perspectives, digitalization, multistakeholder dialogues, climate finance, and gender-sensitive approaches. Climate-Smart Lifts—a term used to describe a set of drivers, technologies, and enabling environment—will be used to leverage adaptation and mitigation at scale to support the MENA region with a climate-smart future.

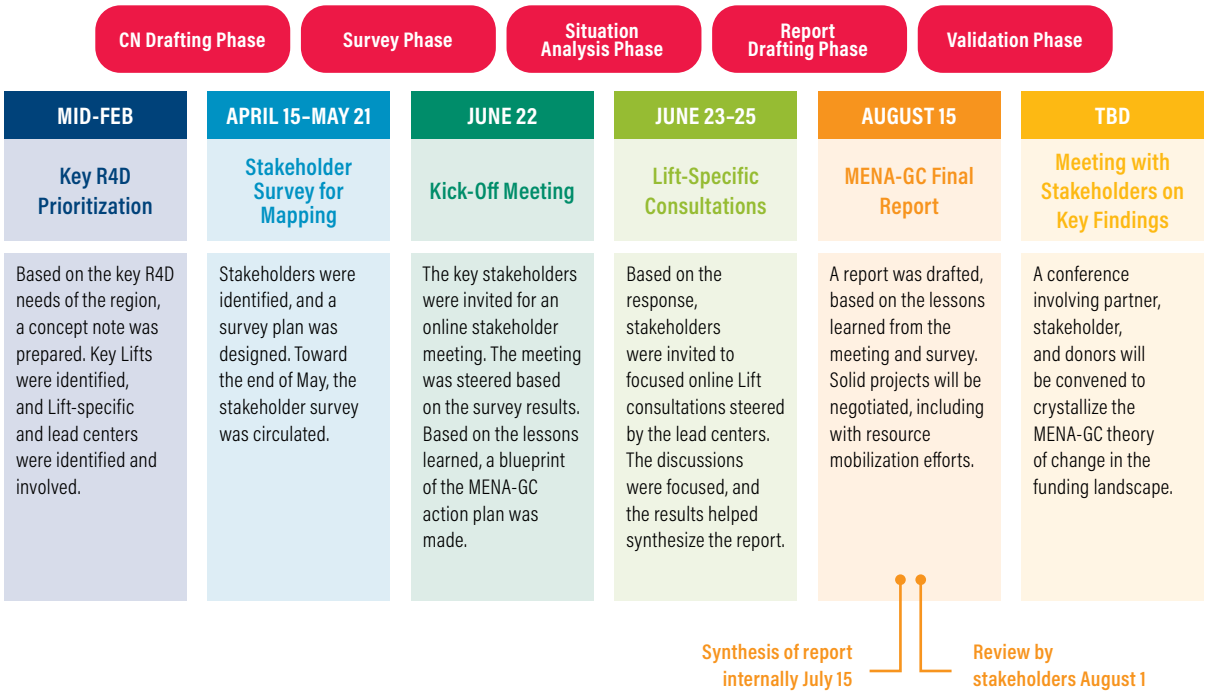
2030 OUTCOMES: Increased uptake of climate-risk management technologies; agro-ecological practices, including better water management and risk management across 60 million agricultural producers; inclusive and efficient value chains streamlined for societal and climate outcomes; seed and water governance improved across several countries. Eighteen countries capacitated to implement their NAPs and NDCs.

CONSULTATION PROCESS

Since September 2018, a series of brainstorming events in the region provided the opportunity for the regional CGIAR centers to discuss how to address the impacts of the MENA region's climate crisis on its agri-food systems. These led to the creation of a meta hypothesis that if specific Climate-Smart Lifts are holistically implemented within strengthened enabling environments, the region can be made climate-smart, and the livelihoods of its people will be rapidly enhanced. The MENA Grand Challenge has four parallel and two cross-cutting R4D Lifts, which are intended to operate in a holistic, multidisciplinary, multiscalar, and tightly coupled manner.

The 2DI stakeholder consultations allowed testing of the meta hypothesis to refine the action plans. Initially, the stakeholders were encouraged to participate in a detailed survey to get an idea of their general perceptions. This was followed by five comprehensive consultations (one general and four thematic), to gather their viewpoints and establish clear pathways to crystallize a solid action plan based on the needs of the region and the current status of the enabling environments and constraints.

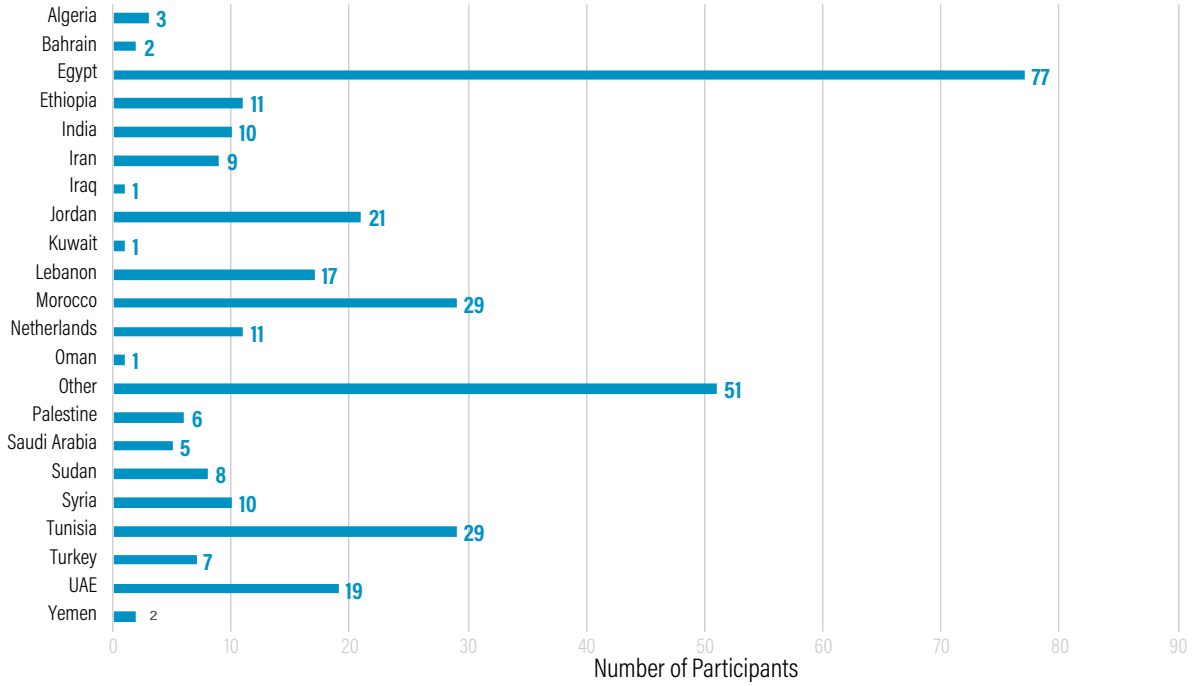
Figure 27 | Consultation Process for the MENA Challenge



Source: ICARDA.

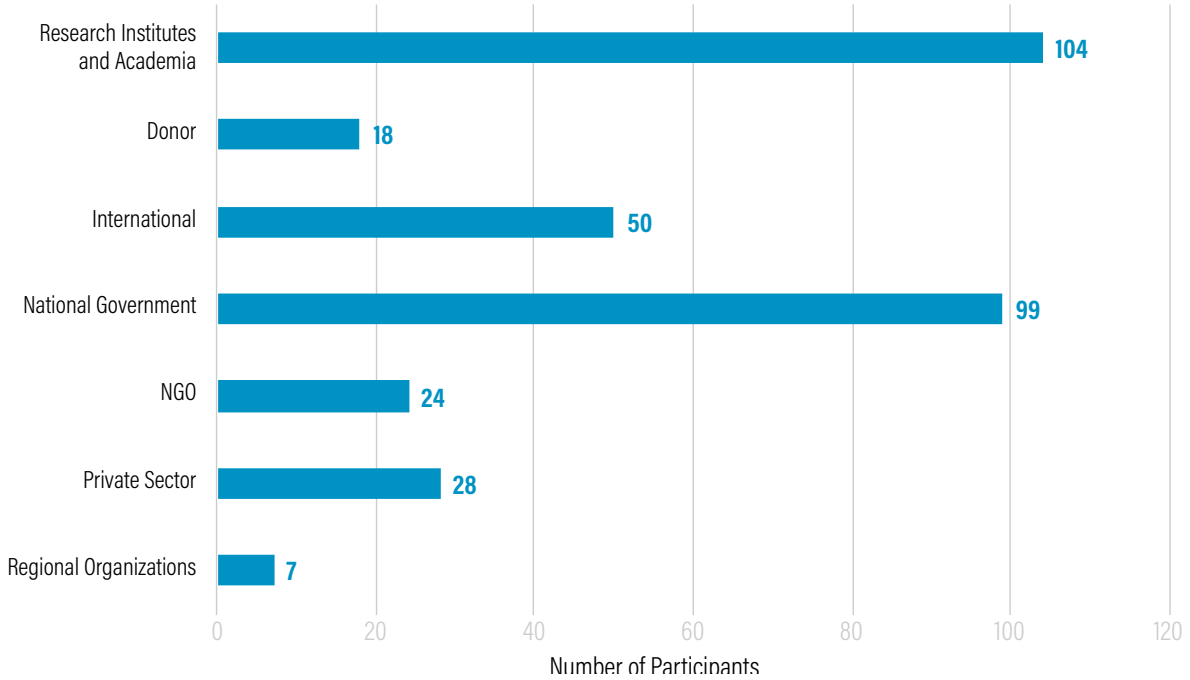
STAKEHOLDER ENGAGEMENT

Figure 28 | Stakeholders Engaged by Country



Source: WRI authors based on information provided by ICARDA.

Figure 29 | Stakeholders Engaged by Type of Organization



Source: WRI authors based on information provided by ICARDA.

Table 7 | Emerging Themes and Focus Areas for Building Climate Resilience as Identified by Listening Session Participants

THEMES	FOCUS AREA
Climate-Smart Value Chains	
Inclusive and Fair Value Chains	▪ Promote inclusive and profitable fish and vegetable value chains. ▪ Promote effective engagement of stakeholders, including producers, agribusiness, and civil society; and facilitate market linkages.
Inclusive Financial Services	▪ Build local capacity and facilitate effective engagement of key stakeholders in specific value chains.
Integrated Farming Systems	▪ Promote sustainable intensification, diversification, and integrated farming systems.
Monitoring and Evaluation	▪ Inform policies to create sustainable and climate-smart value chains.
Integrated Seed Systems	
Enabling Environment	▪ Develop a system to support pluralistic, competitive and integrated, inclusive, and resilient seed delivery systems adapted to diverse regional contexts. ▪ Inform and support policy and regulatory reforms to facilitate movement of varieties and seeds across the region.
Monitoring and Evaluation	▪ Ensure that agricultural technologies and climate-smart crop varieties are deployed for impact at scale.
Capacity-Building	▪ Focus on local solutions and participatory research methods. ▪ Bolster seed delivery systems and scaling through dedicated capacity development actions.

Table 7 | Emerging Themes and Focus Areas for Building Climate Resilience as Identified by Listening Session Participants (Cont'd)

THEMES	FOCUS AREA
Integrated Seed Systems	
Knowledge and Information Systems	▪ Design digital seed information tools (including climate change-relevant traits) and bundle with advisory services.
Digital Advisories and Early Warning Systems (DAEWS)	
Data and Information Management	▪ Develop multifaceted climate-informed DAEWS digital tools (seasonal forecast, crop management decisions, disease and pest control, drought monitoring and early warning systems, choice of technology, irrigation advisories, market intelligence).
Knowledge And information Systems	▪ Integrate value-chain perspectives to link smallholders with large-scale market dynamics via digital tools.
Capacity-Building	▪ Ensure efficient dissemination of climate-informed advisories via digital tools and engaging youth in extension and advisory services. ▪ Train advisory staff on the use of the technologies and ensure that end users make use of them.
Inclusive Financial Services	▪ Bundle solutions with seed systems and index insurance in the value chains and promote policies and partnerships to encourage investments in DAEWS tools.
Water Accounting Assessment and Management (WAAM)	
Improved Natural Resource Management	▪ Co-design a tailored WAAM framework to inform multiscale water governance and management. ▪ Increase partner engagement in water management at the country, region, and farm levels by expanding and replicating models for resolving tensions associated with water.
Knowledge and Information Systems	▪ Assess opportunities for increased water productivity in the context of sustainable, equitable, and accountable management to inform and design the new water resource plan and policy and smart interventions.
Capacity-Building	▪ Develop policies and instruments to improve water productivity and efficiency. ▪ Strengthen capacity of targeted audiences to improve water productivity and efficiency.

Source: WRI authors based on information provided by ICARDA.

HOW THE EXISTING RESEARCH AGENDA FOR THIS CHALLENGE IS EXPECTED TO CHANGE IN LIGHT OF THE 2DI AND POINTS RAISED THROUGH LISTENING SESSIONS

The consultations helped refine and clarify the planned outputs and activities as described below:

- Climate-Smart Value Chains: Explore possibilities to expand value chains to other crops and livestock and to link across different value chains. Access to information and communications technology (ICT) to facilitate market linkages and electronic extension delivery will be key. Strategies for success include access to ICT to facilitate market linkages and e-extension delivery; building local capacity through extension and community-based organizations; and encouraging established agribusinesses' roles as catalysts for change.
- Integrated Seed Systems: Design seed systems for irrigated, rainfed, agropastoral, and desert farming, focusing on priority crops. Develop tools for selection technologies to make climate-smart varieties with other preferable traits available at scale. Strategies for success include public-private partnerships and regional harmonization of regulatory reforms.
- Digital Advisories and Early Warning Systems: Promote capacity development and promotion of start-up companies. Design sound mechanisms to sustain private-sector involvement in DAEWS after a project ends.
- Water Accounting Assessment and Management: Co-design, co-create, and implement partnerships across sectors and boundaries, favoring an interdisciplinary approach that integrates soil and land considerations. Strategies for success include multistakeholder approaches to water governance and water accounting mechanisms to support policy changes.

NEXT STEPS

The future course of action of MENA Grand Challenge is that the multi-centers consortia will continue to work with regional and national organizations and with the Global Commission on Adaptation, WRI, and CCAFS to identify potential projects and funding.

Figure 30 | Next Steps for the MENA Challenge

Source: WRI authors based on information provided by ICARDA.

4.8 West Africa: One-Health

LEAD ORGANIZATION

LEAD: International Institute of Tropical Agriculture (IITA) through the Biorisk Management Facility

PARTNER ORGANIZATIONS: West and Central Africa Council for Agriculture Research and Development (CORAF), International Crops Research Institute for the Semi-Arid Tropics, Norwegian Institute of Bioeconomy Research

CONTEXT AND CHALLENGES

Pests, diseases, and other biotic stresses are major threats to the health of crops, livestock, humans, and ecosystems and are now compounded by the current coronavirus pandemic. Climate change will affect the distribution and dynamics of such pests and diseases. It will also disrupt complex interactions and trade-offs among different ecosystems with huge adverse economic implications. One example: African farmers lose 20 to 40 percent of their harvest to pests, diseases, and spoilage. These crop losses could provide food requirements for approximately 48 million people. Saving this food for human consumption would again help protect rain forests and biodiversity and, hence, directly contribute to climate change mitigation efforts. Another critical example relates to livestock and zoonotic and food-borne diseases worth billions of dollars annually in developing countries. The One-Health Regional Grand Challenge will mainstream efforts to improve plant, soil, livestock, and environmental health in smallholder farmer systems for improved human health, better productivity, and agricultural communities' welfare in the face of climate change.

VISION AND 2030 OUTCOMES

VISION: The Regional Grand Challenge climate-informed one-health approach builds on CGIAR's track records in this area, framing the nexus of crop, livestock, human and ecosystem health, pest and disease epidemiology and control, food production, safety and nutrition, and climate change as a complex public health issue. We are working toward a field-grounded, conceptually refined response to the scale of this global challenge. The holistic one-health approach enables our contributions to plant and soil health for improved agricultural productivity, resilience, and community livelihood. This transformative approach will provide support to agricultural producers' management of biorisks, cross-government approaches to address climate-driven food-health risks, institutionalized capabilities for early detection of emerging threats and rapid response, and new technologies for ecologically sustainable biorisk management. The West Africa region will serve as a model for what can be achieved, prior to scaling to other regions. By joining forces for sustainable management of pests and diseases through a holistic one-health platform, reductions in production and trade losses worth several million dollars would contribute toward feeding a growing population, while loss of agrobiodiversity would be avoided through reduced shifts of forested land into agricultural land.

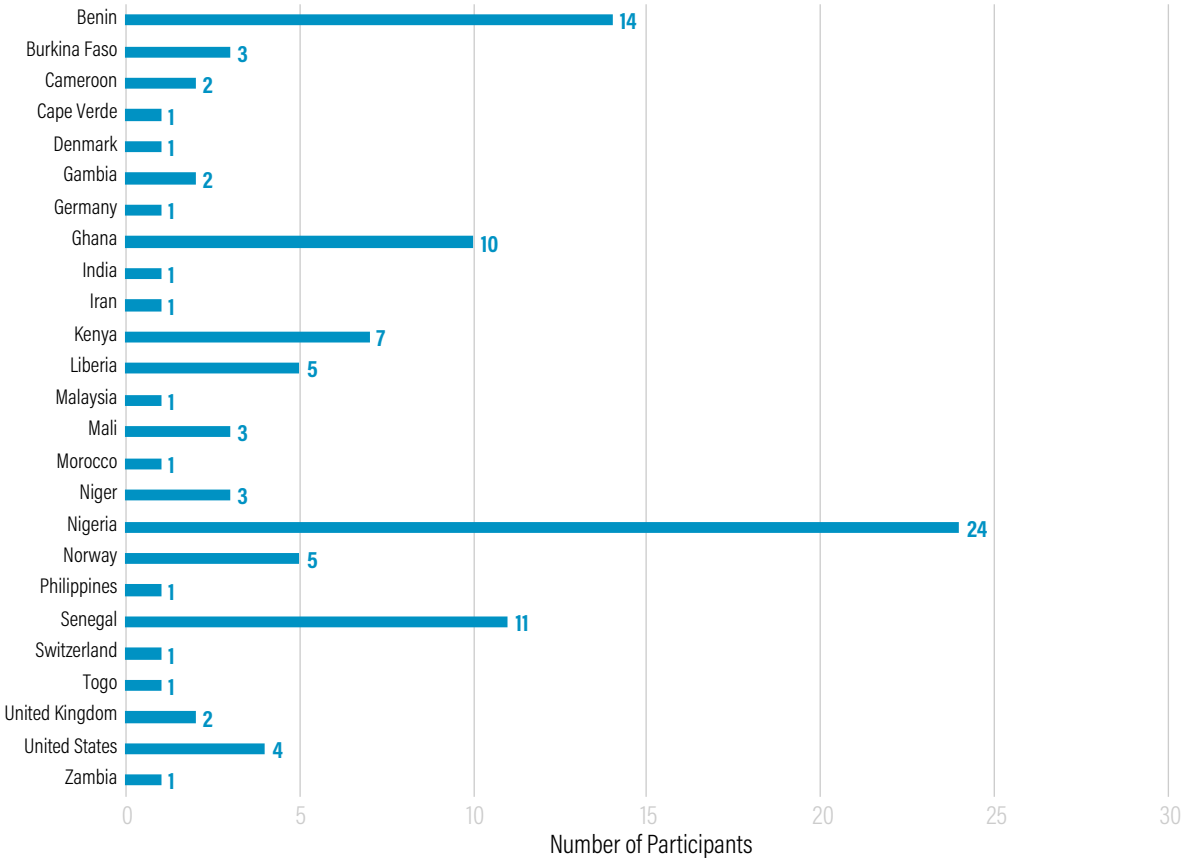
2030 OUTCOMES: Tens of millions of users from agricultural producers to value-chain enterprises using information services to manage climate-driven food and health risks. Climate risk management technologies adopted by 30 million agricultural producers. Pests and disease issues fully captured in implementation plans in NAPs and NDCs in eight countries.

Figure 31 | Consultation Process for West Africa One Health Challenge

Source: WRI authors based on information provided by IITA.

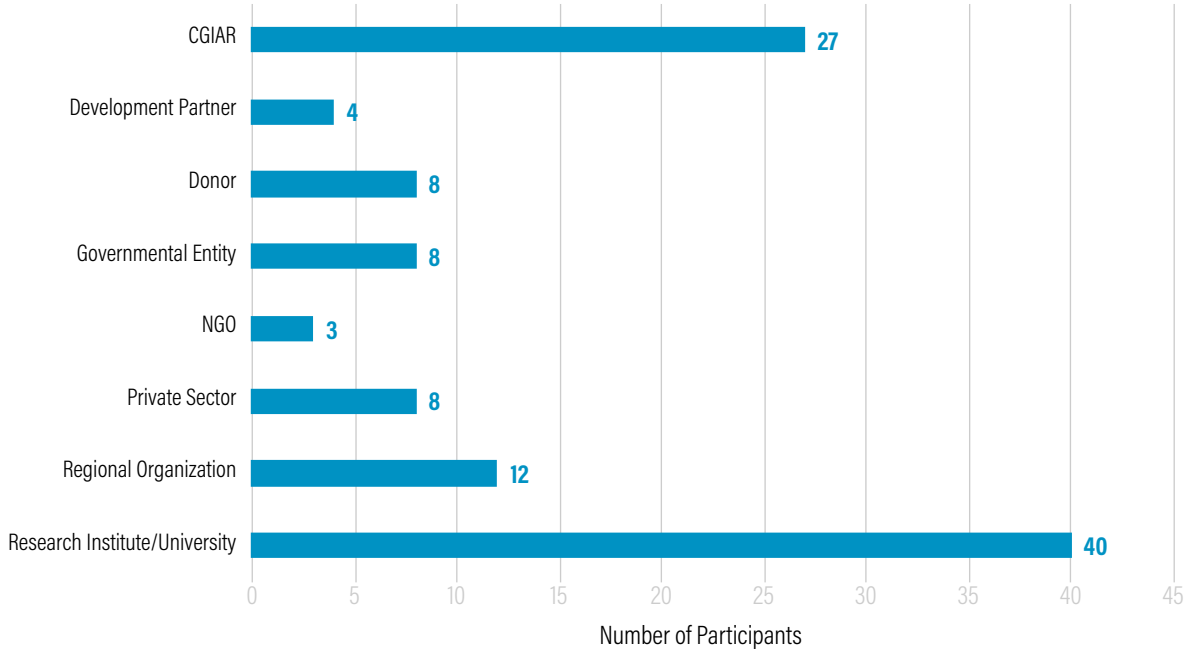
STAKEHOLDER ENGAGEMENT

Figure 32 | Stakeholders Engaged by Country



Source: WRI authors based on information provided by IITA.

Figure 33 | Stakeholders Engaged by Type of Organization



Source: WRI authors based on information provided by IITA.

Table 8 | Emerging Themes and Focus Areas for Building Climate Resilience as Identified by Listening Session Participants

THEMES	FOCUS AREAS
Horizon Scanning and Building Early Warning and Rapid Response Systems	
Data and Information Management	▪ Establish and centralize data hubs and strengthen data infrastructure on climate and environmental variables and biorisk characteristics.
Tools and Analysis	▪ Promote availability and interoperability of prevention, surveillance, diagnostics, and information and communications technology tools at the local, national, and regional levels.
Capacity-Building	▪ Strengthen the capacity of national and regional partners in horizon scanning, early warning, diagnostics, and rapid responses.
Managing Climate-Driven Biorisks	
Technologies and Practices	▪ Promote a common tool set for assessing and managing biorisks, integrating agro-ecological principles. ▪ Develop biopesticides, biofertilizers, and biological control agents for current and future high-risk biotic stresses.
Impact Assessment	▪ Catalyze socioeconomic impact studies to facilitate evidence-based discussion on needed investments and policies.
Coordination and Integration	▪ Promote better integration of existing expertise and ongoing efforts.
Interdisciplinary Research Methods (Incorporating Socio-Cultural Dimensions)	▪ Use participatory methods to develop and deploy novel biorisk management tools and technologies, integration of available and new biorisk management approaches with animal, environmental, and human health interventions.
Improved Natural Resource Management	▪ Reduce the application of chemical pesticides to improve soil and environmental health and ecosystem services.

Table 8 | Emerging Themes and Focus Areas for Building Climate Resilience as Identified by Listening Session Participants (Cont'd)

THEMES	FOCUS AREAS
Managing Climate-Driven Biorisks	
Capacity-Building	▪ Strengthen capacity of national and regional partners in the participatory development and deployment of sustainable and efficient biorisk management approaches.
Inclusive and Fair Value Chains	▪ Stimulate the establishment of community-based organization- and private sector-led biopesticide value chains.
Harnessing High Throughput Technologies for Food Safety and Health for Mega-Cities in West Africa	
Technologies and Practices	▪ Promote climate-smart and biorisk-resilient cropping systems and crop varieties.
Systemic Approach	▪ Promote knowledge and action linking human, water, soil, plant, and animal health for sustainable, quality food production. Promote circular bio-economy and better understanding of water-related dimensions (management, quality) shaping the human-plant-animal-ecosystem health interface.
Interdisciplinary Research Methods (Incorporating Socio-Cultural Dimensions)	▪ Use participatory methods to develop, deploy, and assess climate-smart and biorisk-resilient cropping systems.
Improved Natural Resource Management	▪ Improve soil and environmental health and ecosystem services by implementing climate-smart biorisk management approaches.
Capacity-Building	▪ Strengthen capacity of national and regional partners in the participatory development and deployment of climate-smart and biorisk-resilient cropping systems and crop varieties.
Mainstreaming Climate-Related Biorisk Management into National and Regional Development Programs	
Policies and Governance	▪ Establish a platform for sharing information on climate change-related biorisks and promote policy dialogue and advocacy. ▪ Enable an updated regulatory framework on biorisk management.
Capacity-Building	▪ Strengthen capacity of national and regional bodies on the one-health framework.

Source: WRI authors based on information provided by IITA.

HOW THE EXISTING RESEARCH AGENDA FOR THIS CHALLENGE IS EXPECTED TO CHANGE IN LIGHT OF THE 2DI AND POINTS RAISED THROUGH LISTENING SESSIONS

- **More horizon scanning and building early warning and rapid response systems**: Provide seasonal and long-term forecast and management options for biorisks affecting plants, animals, people, and the environment in West and Central Africa.
- **Managing climate-driven biorisks**: Prioritize and manage the most serious existing and emerging biorisks in agriculture.
- **Harnessing high throughput technologies for food safety and health for mega-cities**: Improve food safety and health for mega-cities in West Africa under a climate change context.
- **Mainstreaming biorisk management into national and regional development programs**: Establish a platform for sharing information on climate change-related bio-risks and to influence policy dialogue and advocacy.

- **Better integration of available expertise**: Proactively build innovative partnerships for a better integration of all the existing expertise in West Africa, coalescing efforts and providing an enabling environment for working together.
- **Agroecology and ecosystems health**: Integrate agro-ecological principles in biorisk management and foster greater understanding of the climate-driven elements of environmental health risks.
- **Integration of water-related one-health issues**: Better understanding and integration of water-related dimensions (management, quality) shaping the human-plant-animal-ecosystem health interface and their relationship to climate change.
- **Economic impact of biorisks**: Strengthen monitoring and evaluation of biorisk management efforts to facilitate evidence-based discussion of finance and policy needs and catalyze investments. Identify quick wins to showcase the integrative and transformative approach of the one-health platform.

NEXT STEPS

- The report from the stakeholder consultation (second webinar) to be shared with all stakeholder institutions and webinar participants.
- Building on both the first and the second stakeholder consultation webinar reports, the following next steps will be taken:
  - Continue developing the content of each strategic priority to ensure that it captures the priorities pointed out by different countries during the consultation process. This will be done by inviting respective stakeholders for in-depth online consultations on each of the strategic priorities and their sub-objectives.
  - Engage with the regional bodies, such as CORAF, the Forum for Agricultural Research in Africa and others, to develop the one-health platform in such a way that it takes advantage of already existing expertise in the region, avoids duplication of efforts, and uses available resources in the most sustainable way.
- The outcome of these two steps should be holistic and fundable programs, that is, a one-health platform tailor made for the region.
- Lastly, but equally important, we would like to engage more closely with the development investors and explore with them how the one-health platform can be realized.

4.9 Blue Challenge: Resilient Fisheries and Aquaculture

LEAD ORGANIZATION

LEAD: World Fish

PARTNER ORGANIZATIONS: IWMI, Pacific Community, Environmental Management and Economic Development Organization, University of Hull

CONTEXT AND CHALLENGES

Millions of people across the world are dependent on marine and freshwater ecosystems for nutrition and incomes, as well as the range of critical ecosystem services that they provide. But aquatic ecosystems and those who depend on them are significantly affected by climate change impacts, including warming temperatures, ocean acidification, sea level rise, and more frequent and intense extreme weather events. Coastal and delta lakeside communities, as well as those living alongside rivers and lakes, are especially vulnerable to these changes and often have limited ability to cope with changing ability (or adaptive capacity). On top of this, the Covid-19 pandemic has placed further stress on food and water security in these communities, with both crises affecting workforces, transportation systems, and supply chains.

VISION AND 2030 OUTCOMES

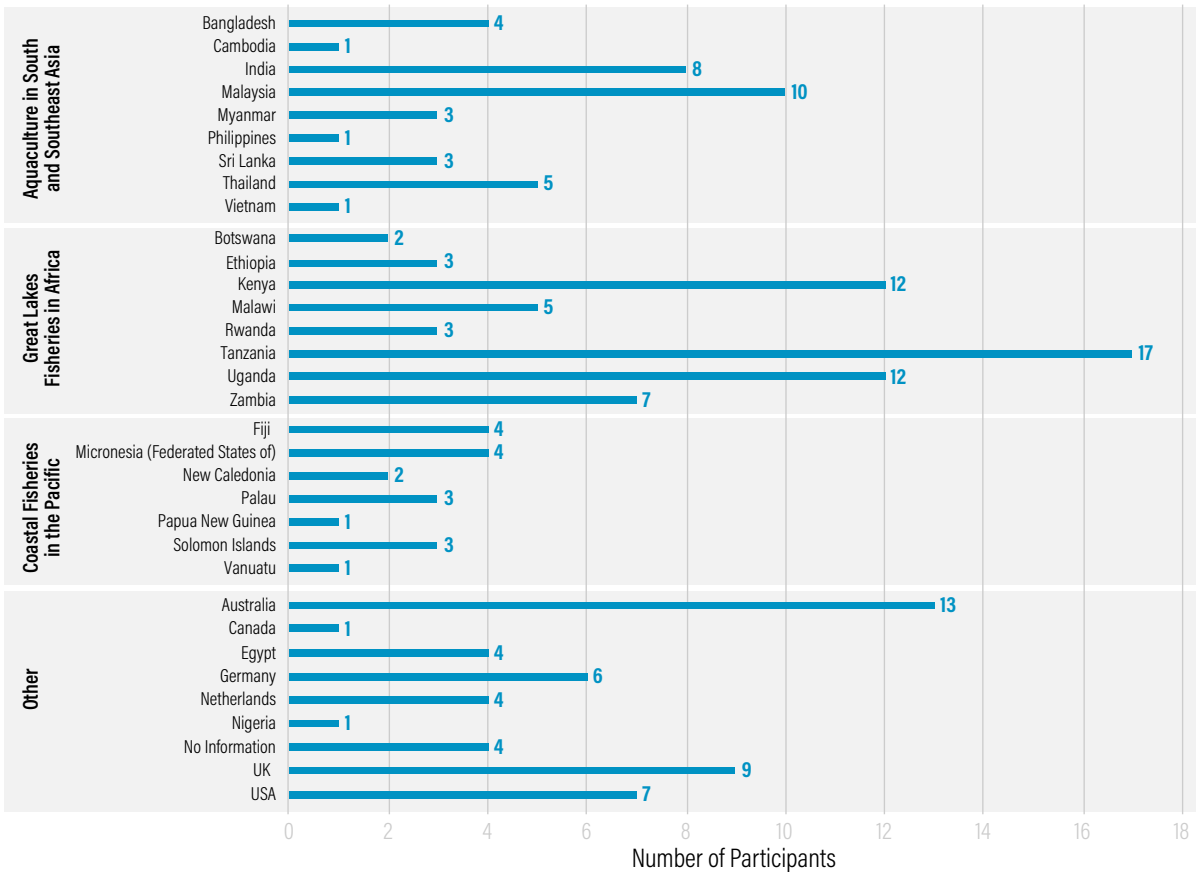
By 2030, aquatic food producers in the Great Lakes Region of Africa, South and Southeast Asia, and the Pacific have increased resilience to the impacts of climate change and variability; have put food systems on a low-emissions development pathway; and are ensuring that investment and policy interventions in climate resilience benefit those who would otherwise be left farthest behind.

Figure 34 | Consultation Process for Blue Challenge

Source: World Fish, Pacific Community, IWMI, and Korumo (facilitator).

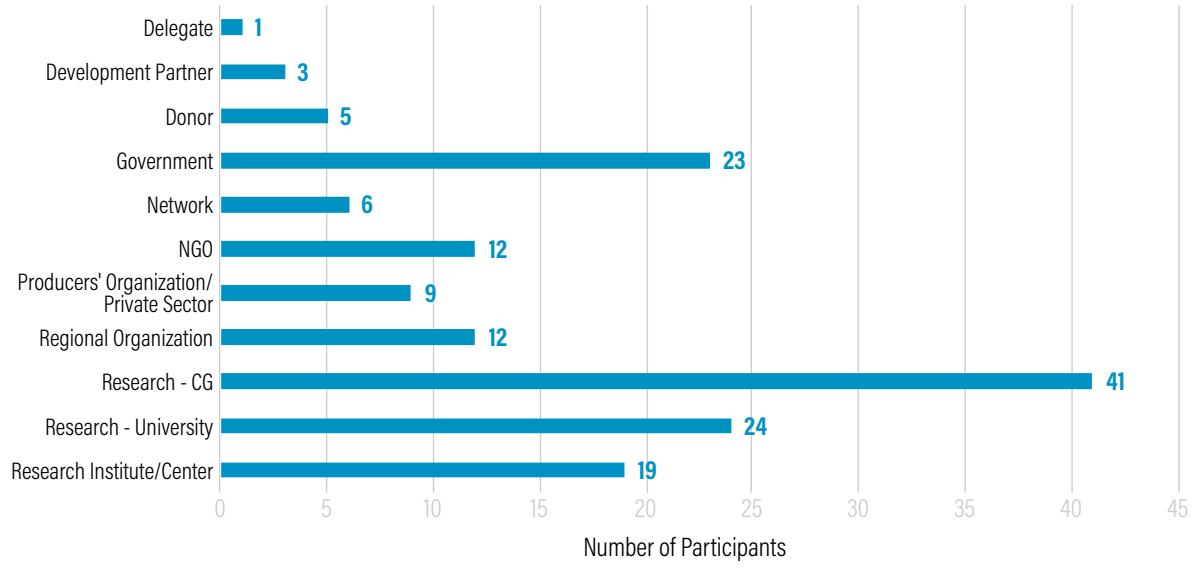
STAKEHOLDER ENGAGEMENT

Figure 35 | Stakeholders Engaged by Country



Source: World Fish, Pacific Community, IWMI, and Korumo (facilitator).

Figure 36 | Stakeholders Engaged by Type of Organization



Source: World Fish, Pacific Community, IWMI, and Korumo (facilitator).

Table 9 | Emerging Themes and Focus Areas for Building Climate Resilience as Identified by Listening Session Participants

THEMES	FOCUS AREAS
Policy Reforms for Equitable Socioeconomic and Ecological Outcomes	
Institutional Knowledge and Capacity	▪ Appraise levels of knowledge and capacity available in relevant institutions and design pathways to strengthen knowledge and capacity.
Coordination	▪ Codevelop a vision and pathway for policy change.
Policy Improvement	▪ Improve the transboundary policy framework. ▪ Improve current resource management systems.
Climate Information Services and Response Systems	
Data and Information Management	▪ Build evidence of climate change impacts on aquatic ecosystems and associated food value chains and interventions that build climate resilience interventions. ▪ Jointly assess information management and response systems with end users to identify opportunities for improvement and to ensure that information is accurate, accessible, intelligible, and relevant.
Governance and Participation	▪ Promote partnerships with media, local end users, and researchers, as well as partnerships between communities, local disaster risk management professionals and researchers.
Climate-Smart Technologies and Low-Emission Supply Chains	
Knowledge and Information	▪ Identify and promote greater understanding of unsustainable practices and technologies. ▪ Identify opportunities for sustainable technologies and practices at various levels, from the household to national and regional levels.
Financial Capital for Transition to Climate Resilience and Inclusive Blue Economies	
Enabling Environment	▪ Identify opportunities to increase financial resources available and accessible to communities, including women, marginalized groups, and youth. ▪ Promote opportunities for financial training and capacity building, especially for marginalized producers. ▪ Promote flexible finance mechanisms that are informed by knowledge of production systems and cycles.
Empowering Vulnerable Small-Scale Food Producers	
Inclusive and Participatory Research	▪ Create guiding principles for interventions to include empowerment, inclusion, and equity.
Deliberate Action	▪ Identify and promote networking opportunities for women and youth related to climate change.
Local Knowledge	▪ Design and implement processes to include local and indigenous knowledge and full local participation.

Source: World Fish, Pacific Community, IWMI, and Korumo (facilitator).

HOW THE EXISTING RESEARCH AGENDA FOR THIS CHALLENGE IS EXPECTED TO CHANGE IN LIGHT OF THE 2DI AND POINTS RAISED THROUGH LISTENING SESSIONS

Table 10 | Suggested Research Priorities for Coastal Fisheries in the Pacific

COASTAL FISHERIES IN THE PACIFIC
Prioritize holistic approaches to support committed policy reforms for equitable socioeconomic and ecological outcomes.
▪ Improve vision and integrated pathways, knowledge, and sustainable capacity in relevant institutions, transboundary or regional policy frameworks, and ecosystem approaches to resource management.
▪ Develop multisectoral initiatives and multistakeholder partnerships that are locally owned and driven.
Advance affordable and accessible **climate-smart technology** and practices to promote low-emission supply chains and build the resilience of blue economy infrastructures.
▪ Increase opportunities to shift to sustainable and climate-smart practices and technologies along the aquatic food supply or value chain.
▪ Scale up innovations.
Understand drivers of large decreases in **coastal fisheries production**.
▪ Enhance efficiency and sustainability in resource utilization and governance to reduce human pressure on aquatic resources.
Increase knowledge and sustain capacity for climate resilience, particularly among vulnerable groups and communities. Promote wide use of climate information services and response systems, particularly for fisheries and aquaculture-dependent communities.
▪ Assess and prioritize knowledge and capacity gaps; enhance evidence base and local knowledge.
▪ Generate better information and response or warning systems.
▪ Support greater investments in education and outreach, including by incorporating climate change knowledge in school curricula.
Empower communities.
▪ Strengthen local ownership and co-management of research initiatives.
▪ Ensure inclusive stakeholder networks to co-create climate resilience-related interventions incorporating local, indigenous, and scientific knowledge.
Close the **financial gap** to transition to climate resilient and inclusive blue economies.
▪ Inform greater investments in climate adaptation projects.
▪ Promote access to financial resources for individuals and groups to bring about valuable changes and climate resilience along the aquatic food value chain.

Source: World Fish, Pacific Community, IWMI, and Korumo (facilitator).

Table 11 | Suggested Research Priorities for Great Lakes Fisheries in Africa

GREAT LAKES FISHERIES IN AFRICA
Increase knowledge, awareness, and understanding about climate change and the environment.
▪ Identify key drivers of climate change and environmental degradation. Although information and technology may exist, it is often not accessible to end users due to both language barriers and subscription fees.
▪ Focus research on the range of issues that arise when climate variability, climate change, and associated policy are considered in parallel with development needs.
▪ Conduct multidimensional vulnerability analyses to identify priorities for action across scales.
Advance **affordable and accessible climate-smart technology** and practices to promote low-emission supply chains and build the resilience of blue economy infrastructure.
▪ Build the evidence base for the development, implementation, and scaling up of technologies and practices that build the resilience of aquatic food production systems and along value chains.
▪ Promote climate advisory services and other forms of risk mitigation and transfer (e.g., insurance).
Build on indigenous knowledge, empower communities, and give voice to the voiceless.
▪ Ensure that research incorporates indigenous knowledge and enhances community engagement, including among those most marginalized.
▪ Enhance understanding of the roles that women play in aquatic food production systems and the disproportionate impacts of climate change that they experience. Future policy and investment decisions must aim to address the gender prosperity gap.
Ensure **policy harmonisation and coherence.**
▪ Ensure that fisheries and other relevant policies are climate proof so that they are able to respond to the impacts of climate change.
Embed research within alliances for change.
▪ Work with partners before, during, and after research to ensure that research activities address the most critical priorities and deliver appropriate solutions at scale.
▪ Coordinate among stakeholders, including across international borders.

Source: World Fish, Pacific Community, IWMI, and Korumo (facilitator).

Table 12 | Suggested Research Priorities for Aquaculture in South and Southeast Asia

AQUACULTURE IN SOUTH AND SOUTHEAST ASIA
Refine the understanding of **key vulnerabilities and priorities** for adaptation actions.
▪ Identify potential mitigation and adaptation options for each of the different freshwater, brackish water, and marine aquaculture sectors throughout the region and the communities that depend on them.
Advance affordable and accessible **climate-smart technology** to promote low-emission supply chains and build the resilience of blue economy infrastructures.
▪ Build an evidence base of the benefits of improving access to climate-smart technologies, including adjacent mangrove ecosystem restoration, solar power, and other engineering applications across the aquaculture value chain.
▪ Enhance the management of aquatic food systems in ways that support socially, economically, and environmentally sustainable aquatic food production enterprises that incorporate local, indigenous, and scientific knowledge.
Promote wide use of **climate information services** and response systems, particularly for fisheries and aquaculture dependent communities
▪ Determine the effectiveness of different strategies among different aquaculture locations and systems.
▪ Enhance rapid communication of effective strategies to small-scale aquatic food producers via chat groups and other virtual technologies.
Close the **financial gap** to transition to climate resilient and inclusive blue economies.
▪ Quantify the probability of success of adopting specific climate-smart technologies to enable small-scale farmers to leverage financial resources to accelerate the transition to climate resilience along the aquatic food value chain.
Support **policy reforms** that deliver equitable socioeconomic and ecological outcomes.
▪ Evaluate the socioeconomic and environmental impacts of existing polices on the different freshwater, brackish water, and marine aquaculture sectors.
▪ Identify policy gaps and work with policymakers to address them, providing evidence of policies' effectiveness in enhancing equitable socioeconomic and ecological outcomes.

Source: World Fish, Pacific Community, IWMI, and Korumo (facilitator).

NEXT STEPS

- Revise and finalize the draft report on the multistakeholder consultation meetings and share with partners in the three hotspots and beyond.
- Create a space for dialogue and organize a partnership roundtable to identify and co-design intervention projects in all three hotspots.
- Cost out individual projects and secure funding to implement or operationalize the R4D priorities identified in all three hotspots.
- Establish a Blue Challenge systems-thinking advisory group to ensure coherence and cost-effectiveness and set expansive multidisciplinary boundaries in project design.

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