



**Climate Action for Resilient and Low-emission
Food, Land, & Water Systems
(Climate Action Program)**

Full design document

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List of acronyms

AGNES	African Group of Negotiators Expert Support
AICCRA	Accelerating Impacts of CGIAR Climate Research for Africa
AoW	Area of Work
ARI	Advanced research institution
BC	Biophysical capital
CA	Comparative advantage
CCAFS	CGIAR Research Program on Climate Change, Agriculture and Food Security
CIS	Climate information services
CLIC	Climate and Cryosphere part of World Climate Research Program
ClimBeR	CGIAR Initiative: Climate Resilience
CoP	United Nations Framework Convention on Climate Change Conference of Parties
CRP	Consortium Research Program
ESG	Environmental, Social, and Governance (investors)
EWS	Early Warning Systems
FAO	Food and Agriculture Organization of the United Nations
FLW	Food, land, and water (systems)
G/NFCS	Global and National Framework for Climate Services
GCF	Green Climate Fund
GESI	Gender Equality and Social Inclusion
GHG	Greenhouse Gasses
GMP	Global Methane Pledge
IA	Impact assessment
HC	Human Capital
HICs	High-income countries
HLO	High level outputs
ICRM	Integrated climate risk management
IFAD	International Fund for Agricultural Development
IFI	International financial institutions
IIED	International Institute for Environment and Development
INGOs	International non-governmental organizations
IPCC	Intergovernmental Panel on Climate Change
ISDC	Independent Science for Development Council
LED	Low-emission development
LEFS	Low-emission food systems
LLA	Locally led adaptation
LMICs	Low- and middle-income countries
LT-LEDs	Long-term low-emission development strategies,
MELIA	Monitoring, evaluation, learning, and impact assessment
MFIs	Micro-finance Institutions
MRV	Monitoring, reporting and verification
NAPs	National Adaptation Plans
NARES	National Agricultural Research and Extension Systems
ND-GAIN	Notre Dame Global Adaptation Initiative
NCQG	New Collective Quantified Goal
NDCs	Nationally Determined Contributions
NGOs	Non-Governmental Organizations
NHMS	National hydrological and meteorological services
NUE	Nutrient-use-efficiency
R&D	Research & Development
ROI	Return-on-investment
SBSTA	Subsidiary Body for Scientific and Technological Advice, part of UNFCCC
SC	Social Capital
SMEs	Small and medium enterprises
TOC	Theory of Change
UNDRR	UN Office for Disaster Risk Reduction
UNEP	UN Environment Program
UNFCCC	UN United Nations Framework Convention on Climate Change

WB	World Bank
WEAI	Women's Empowerment in Agriculture Index
WMO	World Meteorological Organization
WRI	World Research Institute
WUE	Water-use-efficiency

1. Executive Summary

Climate change is accelerating. Global temperatures are expected to exceed 1.5°C above pre-industrial levels by the early 2030s. Extreme weather events are becoming more frequent and severe, with devastating impacts on food production, water availability, and livelihoods. Food systems are also a major driver of climate change, responsible for ~35% of global greenhouse gas (GHG) emissions. Systemic inequalities at multiple scales increase climate change challenges and impacts for vulnerable and marginalized people.

The Climate Action Program will deliver the science, innovation, and collaboration necessary to transform FLW systems for a climate-resilient, net-zero, and more equitable future. It contributes particularly to the CGIAR Impact Area on climate change adaptation and mitigation, while advancing all five Impact Areas. With an overall ambition of climate action across agri-food systems, the Program's research will support resilient, low-emissions farms, landscapes and aquatic resources of **38 million small-scale producers and value chain actors**. By 2030, the Program will contribute to **emissions reductions or removal of 1 gigaton of CO₂e by supporting equitable mitigation action at scale**. These targets will be enabled by the Program's support to the development of at least **100 climate policies and the unlocking of at least US\$ 15 billion in climate finance**.

The Climate Program strategically advances CGIAR's climate research portfolio, building upon the CGIAR Research Initiatives on CGIAR Initiative on Climate Resilience (ClimBeR), Low-Emission Food Systems (Mitigate+), Livestock and Climate and NEXUS Gains as well as the Climate Impact Area Platform. This integration enhances our ability for more comprehensive and impactful research and impact on a scale, enabling critical systems thinking to guide a just climate transition toward resilient Food, Land and Water (FLW) systems.

The Program consists of five interdependent Areas of Work (AoW):

- AoW1** Prioritization and Coordination of Climate Action
- AoW2** Digital Advisories and Climate Risk Management
- AoW3** Locally Led Adaptation
- AoW4** Low-Emission Transitions
- AoW5** Policy and Finance for Scaling Solutions

Acting as the climate hub for the CGIAR, the Program will foster system-wide climate-sensitive programming by aligning research agendas, facilitating collaboration, and amplifying innovations to scale impact (AoW1). It will develop climate analytics, and identify priorities and knowledge gaps to inform research on climate resilience, mitigation, and just transitions (AoW1). Research on climate risk management and digital advisories, locally led adaptation and low-emission transitions will support on-the-ground climate action by governments, the private sector and civil society organizations (AoW2, 3 and 4), while research on policy and finance will drive large-scale impact and institutional change (AoW5).

Strong national and partner ownership, stakeholder engagement, and coordinated collaboration across actors will ensure that research is demand-driven and co-designed, leads to large scale, desired outcomes, and develops and benefits from new models of capacity sharing. The Climate Action Program will leverage existing partnerships with national governments, the National Agricultural Research System (NARS), community-based organizations, and academic institutions. The Program will expand partnerships with international financial institutions (IFIs) and intergovernmental organizations to influence policy and investment for system-wide change. The success of the Climate Action Program rests on Gender Equality and Social Inclusion (GESI) approaches promoting deep, equitable

partnerships, active listening and building trust with disenfranchised actors and communities across FLW systems.

The Climate Action Program will prioritize working in countries with high levels of climate vulnerability and those with high mitigation potential, high partner demand, and potential to build on or scale out past achievements. The Program will roll out its five AoWs across 30 countries in CGIAR's six regions, working closely with all relevant CGIAR Centers for holistic FLW system transformation. With growing demand for climate action, the Program also expects growing bilateral support for research in other strategically important countries. Building on CGIAR's legacy of high-quality science and partnerships, the Climate Program sets a new standard for innovation, collaboration, and scaling in addressing the global climate crisis.

2. High-level vision in response to challenges and megatrends

2.1 Challenges and megatrends

Climate change is accelerating, with significant impacts for agri-food systems, the environment, and local and national economies. Global temperatures are 1.2°C above pre-industrial levels and will likely exceed 1.5°C by the early 2030s (IPCC 2023). Extreme weather is more frequent and severe (Hassan, Nayak, and Azam 2024; Lesk et al. 2022; Cullmann et al. 2021) and economic losses, particularly from extreme events, are accelerating. Due to this and an imminent overshoot, the most vulnerable small-scale producers and consumers in the Global South face the dual threats of climate catastrophe and food insecurity.

Food systems already contribute one third of global annual GHGs (Crippa et al. 2021). Population growth and changing consumption patterns toward increased intake of meat and dairy will further increase emissions, especially methane (Ivanovich et al. 2023). Environmental degradation is widespread and land is degrading faster than it is restored (UNCCD 2024). Geopolitical instability is exacerbated by climate-induced resource competition and conflict (UNHCR 2024). These megatrends will exacerbate human and ecosystem vulnerability and increase the imperative for mitigation. The challenge is aligning FLW systems with Paris Agreement targets (1.5 to 2 °C) without compromising food and nutrition security for vulnerable small-scale producers and consumers.

2.2 High-level vision

The Climate Action Program will deliver the science, innovation, and collaboration necessary to transform FLW systems for a climate-resilient, net-zero, and equitable future. The Program particularly contributes to the CGIAR Impact Area on climate change. It will advance research across agri-food systems benefiting 38 million of the most vulnerable small-scale producers and value chain actors across 30 countries through more resilient, low-emissions farms, landscapes and aquatic systems; and supporting other CGIAR Programs to reach an additional 100 million producers. The Program aims to reduce, avoid, and/or remove greenhouse gas (GHG) emissions by 1 gigaton CO₂e by 2030 in 30 countries, while setting a trajectory of 5 gigaton CO₂e annual reductions by 2050. Moreover, at least 100 policies and US\$15 billion USD in climate finance will be informed by the Climate Action Program.

The Program will provide guidance on climate analytics, priorities and knowledge gaps to drive research on climate resilience, mitigation, and just transitions (AoW1). Acting as the climate hub for the entire CGIAR, the Program will foster system-wide climate-sensitive programming by delivering user-ready data on climate risks and emission hotspots, aligning research agendas, facilitating cross-Program collaboration, mainstreaming climate justice, and amplifying contextualized innovations and insights to scale impact.

Research and Development on climate risk management and digital advisories, locally led adaptation and low-emission transitions will support on-the-ground innovation and implementation (AoW2, 3 and 4). Research on policy, finance, and institutional mechanisms will drive large-scale impact (AoW5).

Demand-driven research and partnerships will ensure the relevance of and support lasting outcomes from this Program. Diverse climate actors will use the research results to better implement multi-scalar climate solutions: bundled digital climate information services; early warning systems (EWS) and adaptive safety nets for vulnerable small-scale producers; climate-resilient landscape management; water management systems fit for future climates; national systems for integrated risk management; locally co-produced climate solutions and pathways; frameworks to avoid maladaptation; socio-technical bundles to implement large-scale carbon removals and methane reduction; food system innovations to reduce emissions; digital AI-aided monitoring, reporting and verification (MRV) systems; loss and damage assessment to drive financial transfers; and evidence-based policy and finance for scaling.

2.3 What is new in this Program?

The Program's vision encompasses a **broad systems focus**, targeting ambitious climate action in FLW systems, but **using strategic prioritization** to identify actions with high returns on investment. The key emerging areas of work include,

- **Mainstreaming Gender Equality and Social Inclusion (GESI) for Just Climate Transitions:** The Program ensures equitable benefits from climate adaptation and mitigation actions. Aligned with ISDC's Strategic Shifts **SS3 and SS4**, it addresses the root causes of vulnerability, inequality, and injustice in FLW systems (AoW1). It also fosters inclusive locally led adaptation and mitigation (AoW3, 4), water systems governance (**SS2**) (AoW2), and inclusive finance (AoW5).
- **Digital technologies and AI** are crucial across the Program, empowering stakeholders, particularly youth (**SS4**), and driving equitable climate action. This is achieved through education, capacity development (**SS5**), innovation, and co-creation. Under AoW2, digital technologies are crucial for scaling, and for innovation along the digital climate advisories – early warning systems (DCAS-EWS) continuum. Digital technologies also will be foundational for MRV advancements in AoW4, filling data gaps, and attracting new finance opportunities.
- **A novel approach to policy and finance** focusing on guiding and tracking policy implementation, reporting against global targets (**SS9**). It centers on country needs, leveraging climate science, data, foresight, and trade-off analyses (**SS8**) to improve the bankability of climate finance proposals (AoW5).
- **CGIAR's Climate Hub for Prioritization and Coordination** creates a new operational model, fostering partnerships and climate learning across sectors (**SS6**). It hosts climate analytics and provides user-ready climate data for prioritization as well as coordinates collaborations across the 2025-2030 portfolio on climate, enhancing research quality and amplifying impact through integration and engagement (AoW1).

The unique value proposition of the Climate Action Program strategically bridges gaps between user needs and usability, science-based information and decision-making, and local climate action with higher-level policy processes, delivering equitable climate action at scale.

3. Evidence-based and demand-led prioritization

Given the immense scale and interconnected nature of the challenges posed by climate change across FLW systems (Siegel 2021), CGIAR must carefully prioritize its focus on climate action, both geographically and thematically. To accomplish this, we adopted a rigorous, data-driven methodology complemented by a qualitative assessment to identify priority regions and countries. In its prioritization exercise, the Climate Action Program considered the following criteria:

Climate hazards and emissions, vulnerability, and potential for Program impact: We considered climate variables such as rainfall, temperature and drought indices, flood extremes, vulnerability to climate hazards, and lack of adaptive capacity of FLW systems as important criteria for geographic prioritization of adaptation needs within the Climate Action Program. For prioritizing countries for climate change mitigation work, two criteria were considered: 1) emission hotspots, and 2) enabling environments for impact, which includes consideration of priorities of national governments and institutional capacity. Generally, countries that are food secure and have stable policy and institutional systems would have higher potential for significant GHG mitigation outcomes.

Strong expressed demand: Our prioritization exercise considered feedback from over 2000 stakeholders consulted through webinars and face-to-face meetings by the Initiatives contributing to the Climate Action Program (ClimBeR, Mitigate+, NEXUS Gains, and Livestock and Climate), our participation in and summaries of the CGIAR listening sessions, as well as the demand expressed through bilateral programs that contribute to this Program.

Trust and partnerships: The contributing Initiatives have developed over 400 new partnerships focused on driving climate action across Africa, Asia, and Latin America. An even larger number of partnerships have been developed through climate-related bilateral research programs. As the Program's goals can only be achieved through strong local, national, regional, and global partnerships, countries with existing partnerships through initiatives or bilateral programs were considered.

Country presence: A CGIAR office in the country is an essential conduit for maintaining partnerships, receiving continuous feedback on research results and new demands, and shaping the national discourse on climate action. CGIAR's physical presence in a country was therefore a key criterion for prioritization of geographies for climate action.

Building on achievements: The contributing Initiatives have developed over 30 innovations that have proven impacts on climate action, specifically focusing on the poorest food producers and other food system actors. Geographies where these innovations have demonstrated early success and impact were given special consideration during the prioritization process. Other interventions with high potential for impacts in certain geographies were equally considered. Additionally, CGIAR Centers' advanced experimental facilities, synergies with bilateral programs, and regional balance across CGIAR geographies were also considered for prioritization.

Process:

We ranked 128 countries in the six CGIAR mega-regions based on their vulnerability to climate change (lower number indicating higher vulnerability) and lack of coping capacity (lower number indicating lower coping capacity) using the Notre Dame Global Adaptation Initiative ([ND-GAIN](#)) (Chen et al. 2018), the [INFORM Climate Change Risk Index](#) (Poljanšek et al. 2022), and the countries identified by (Bonilla-Cedrez et al. 2023; Costa, Thornton, and Wollenberg 2023) as global hotspot countries for adaptation and mitigation interventions in agriculture. This process ensured that our prioritization identified those countries that face the greatest challenges and have the largest potential for impact. This quantitative ranking of the countries was further adjusted to include countries with CGIAR presence, strong expressed demand, ongoing work from primary initiatives and bilateral projects, and established partnerships.

Following this procedure, the top 30 ranked countries were identified as priority countries for Program implementation (Fig. 3.1). These priority countries represent a diverse array of climate risks, FLW management systems, and socio-political contexts, each requiring tailored approaches for climate action. These countries are well-distributed across the six mega-regions of CGIAR: **South East Asia and the Pacific (SEA)**—China, Vietnam, Philippines, Cambodia, Indonesia, Timor-Leste; **South Asia (SA)**—India, Nepal, Pakistan, Bangladesh; **Central and West Asia and North Africa (CWANA)**—Uzbekistan, Morocco, Tunisia, Egypt; **East and Southern Africa (ESA)**—Kenya, Ethiopia, Sudan, Zimbabwe, Zambia, Tanzania, Malawi; **West and Central Africa (WCA)**—Senegal, Nigeria, Côte d'Ivoire; and **Latin America and the Caribbean (LAC)**—Colombia, Guatemala, Honduras, Mexico, Brazil, Peru. Countries like Pakistan, Bangladesh, and India, with high population densities, face both drought- and flood-related challenges yet contribute significantly to food system emissions. Nations like Sudan, Kenya, Ethiopia, Senegal, Nigeria, Côte d'Ivoire, and Zambia contend with food system productivity challenges, land degradation, food insecurity, conflict, and rapidly changing climate conditions. In the **CWANA** region, countries such as Uzbekistan, Morocco, and Egypt face arid climates, water management issues, and the need for sustainable land practices. Finally, countries like China, Vietnam, Brazil, Mexico, India, and Indonesia are food production powerhouses with dynamic economies, struggling to balance development and climate actions, offering significant opportunities for low-emission development across FLW systems. From these 30 priority countries, the top 15 ranked countries were selected to provide an overview of specific geographies, major production systems, and Areas of Work in section 7.2.

The team will conduct a further prioritization exercise during the Inception Phase to align the number of countries with the available budget. As the portfolio-wide prioritization process continues, the list of priority countries may change based on further input from partners, donors, and CGIAR Centers. Deeper engagement and analysis will be required to refine the prioritized countries, considering partnerships established through the primary initiatives, their 3-year achievements, and the geographic focus of bilateral projects mapped to this Program. The intensity of AoWs and activities will also vary across selected countries to address strategic needs and maximize potential impact. Based on the available budget, we will implement a full set of AoWs in 15 top prioritized countries (cross-hatched countries in Fig 3.1), while limiting the scaling of successful interventions in other 15 countries. While AoW1 and AoW5 will be essential in all countries of implementation, some countries will have a stronger focus on adaptation, while others may prioritize mitigation.

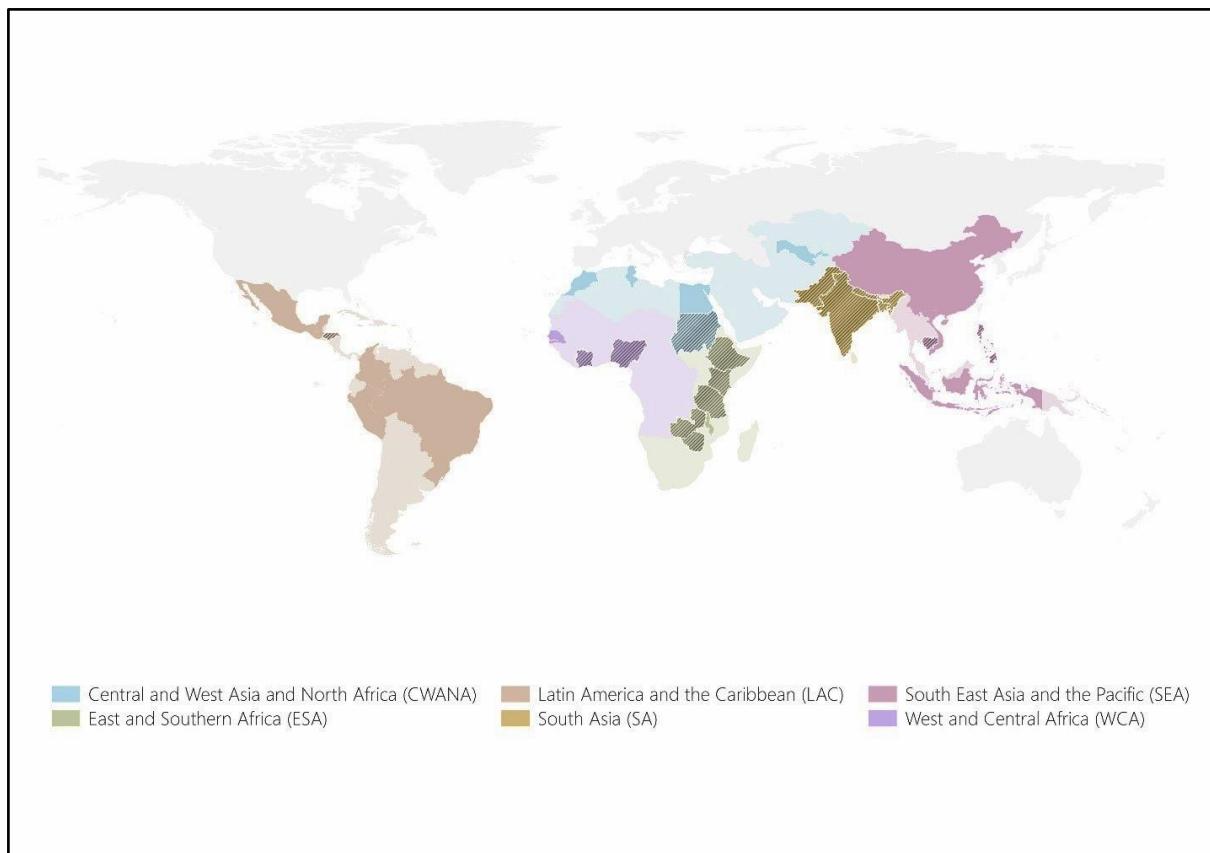


Fig 3.1. Priority countries for implementing the Climate Action Program. Cross-hatched countries are the top 15 prioritized countries for which an overview of the area of work is provided in section 7.2.

4. Comparative advantage

CGIAR's comparative advantage (CA) in implementing climate actions across food, land, and water systems in the Global South lies in its interdisciplinary expertise, strong partnerships, and over 20 years of research on climate adaptation and low-emission development. As a global science-based solutions broker, CGIAR is uniquely positioned to provide actionable climate data, prioritize climate actions, and integrate cutting-edge innovations with local contexts. By co-developing and co-evaluating tailored climate-adaptation and low-emission strategies for smallholder producers and food system actors, CGIAR plays a key role in shifting FLW systems into more resilient and low-emission pathways. Its strong networks with national agencies and trust with policymakers makes CGIAR a key player in shaping climate change policies and integrating climate into sectoral policies across the countries in the Global South. The historically high return-on-investment (ROI) of CGIAR technologies (Fuglie and Echeverria 2024; Alston, Pardey, and Rao 2022) places CGIAR in a strong position to collaborate with financial institutions and convince them to boost climate investments, enabling the scaling of equitable, inclusive, and justice-oriented climate solutions. Additionally, CGIAR's deep-rooted partnerships with local and international research and development agencies, strong trust with policymakers, and collaboration with ARIs and global think tanks have positioned the organization as a key partner in shaping international policies and processes on climate. Below we describe the details of our analysis of CGIAR's CA, and identify strategic partners in delivering desired high-level outputs.

The Climate Program will generate six high-level outputs (HLOs) under the categories of Innovation, Capacity and Policy:

Innovation:

- Prioritized science for advancing adaptation and low-emission development action, based on demand and impacts
- Pipeline of adaptation and mitigation solutions tailored for different users and contexts
- Frameworks, tools, methods, and analytics for climate action

Capacity:

- Innovative models of capacity sharing and training

Policy:

- Data, evidence, and knowledge for climate-specific and climate-sensitive policy making, implementation, and climate finance
- Science and climate policy and other multi-stakeholder processes

Delivery of these diverse HLOs will be supported by the following:

Human Capital: The development of new innovations for adaptation, mitigation, and low-emission development, and supporting those innovations with data, evidence, and knowledge and the necessary framework, tools, and methods requires scientists with a range of transdisciplinary systems skills. Disciplinary experts in various biophysical, social, and data sciences, including climate and systems modelers, are needed with the maturity and skills to work in multi- and transdisciplinary manners in the varying contexts of LMICs.

The **biophysical capital** required to implement the Climate Action Program includes traditional field stations, on-farm experimental facilities and various infrastructure for implementing applied research and demonstrating and measuring diverse aspects of FLW systems. Central to the Climate Action Program will be modeling and big data analytics requiring high-performance computing and data facilities and supporting hardware.

Social capital is central to promoting collaboration within the networks of academic, national, civil society, and private sector actors required in the implementation and scaling of adaptation and mitigation innovations and policies, exchanging science and ideas across diverse sources and contextualizing these to the systems and environments of LMICs.

To determine CGIAR's CA, we considered potential partners who might deliver this set of requirements from across traditional partners such as: *demand partners* including the NARES, government, water and disaster risk agencies, community-based and farmer organizations and private sector; *innovation partners* who may have technical expertise and come from ARIs in LMICs and in High-Income Countries (HICs), NARES; and *scaling partners* including international NGOs, development actors, the private sector, climate finance investors and accelerator funds. Other possible and expanded partners will include national governments (e.g., for NDC support), multilateral donors and other IFIs, Intergovernmental and regional organizations, and an expanded engagement with other ARIs and international research organizations, institutes, and universities.

An analysis of the potential partners and their CA (Appendix 1) showed that with regard to human capital, knowledge and skills, CGIAR has a likely CA due to the world-class transdisciplinary systems science, including social sciences and data analytics, that it applies in the contexts of the LMICs. CGIAR clearly provides these skills in geographies where such

skills are minimal. CGIAR has the global coverage and reach to interface between diverse partners and contextualize and apply innovations and science being created from this flow of information and collaboration. CGIAR may also have a likely CA on specific biophysical capital but with a more limited geographical coverage for field experimentation compared to NARES partners. CGIAR has global coverage for the collection and application of data, modeling, and analytics in the context of LMICs. For impact and scaling, CGIAR has the social capital, networks, and influence through long-term presence and formal country agreements to convene partners for co-designing and implementing innovations that can generate impact on the ground, such as MRV, policy influence, and adherence to the NDCs. CGIAR has highly regarded climate scientists conducting applied research in the climate vulnerable target regions and countries, who have well-established partnerships with policy makers dealing with the NDCs, and wide networks of influence to play the role of climate knowledge brokers and conveners. Incentives for delivering these HLOs are high for CGIAR and nearly all partners.

Given the CA of international NGOs and regional agricultural organizations in terms of their social capital and their specific human capital related to understanding the broader context and political landscapes, the Climate Action Program will explore more strategic partnerships with these organizations for cross-country delivery of climate-smart innovations. For policy related aims, the CGIAR has particularly strong design and engagement processes and is able to convene partners to benefit from the skills and networks of the NARES, local universities, and policy think tanks. Partnership with private sector actors will also bring important sources of CA in advocacy for positive policy environments, enhancing private sector participation. As the lead policy implementer, partnership with government is paramount, as favorable policies are aligned with government incentives for political influence and visibility. Non-state actors bring the CA of grassroots connections and working relationships with farmer groups and government, which positions them for advocacy and community engagement facilitation roles needed in policy processes related to climate action.

To deliver the HLOs, the Climate Action Program will further prioritize partnerships that will effectively utilize the strengths of various institutions and bodies, for example:

- Creating a pipeline of adaptation & mitigation solutions – The CA of NARS with regard to aspects of their technical capacity, their connection to and understanding of the context, and biophysical capital such as facilities and infrastructure in the target geographies;
- Creating the frameworks, tools, methods, and analytics – The CA of selected ARIs in providing up-stream sciences, blue-sky exploration, and modern infrastructure;
- Influencing science and climate policy and other multi-stakeholder processes – The source of CA of government, local NGOs, and INGOs, using their presence on the ground and their ability to enable implementation and scaling;
- The demand for science to advance adaptation and low-emission development – The CA of think tanks, civil society organizations, and farmer organizations for their ability to network, advocate for change, and engage a broad spectrum of stakeholders and society.

5. Theory of change

The Climate Action Program aims to help meet the Paris Agreement's targets of limiting global temperature rise to well below 2°C (ideally 1.5°C) and advancing the Global Goal on Adaptation. Unaddressed climate impacts will exacerbate food and nutrition insecurity, environmental degradation, and socio-economic inequalities (Barbier and Hochard 2018; Brown et al. 2015; Calvin et al. 2023), as well as compound future climate risks (AghaKouchak et al. 2020). We focus on supporting countries in achieving adaptation and mitigation goals outlined in their National Adaptation Plans (NAPs), and other climate and sectoral policies. Our ambition of climate action for more resilient FLW systems, through place-based solutions, and national and global climate policies, grounded in science and co-created with stakeholders, addresses climate concerns in the context of global megatrends, such as growing inequalities, technological disruptions, demographic shifts, and increasing conflict (ISDC 2023).

Box 1. Climate Action Program's 2030 Outcomes. These align with CGIAR Results Framework's indicators for the Climate Change Impact Area and represent the Program's results. Other Programs' and Accelerators' results will be additional (see Annex 3).

By 2030, we aim to:

- Benefit 38 million people,
- Support 100 climate and sectoral policies,
- Inform investment of US\$ 15 billion
- Avoid, reduce, or sequester 1 Gt CO₂e

5.1 Overarching research questions

1. What system approaches including combinations of socio-technological innovation, policy change, and capacity sharing reshape FLW systems to achieve inclusive climate resilience and low-emission development across diverse geographies and contexts?
2. How effective will different adaptation and mitigation interventions be in reducing community and ecosystem vulnerabilities, lowering emissions, and advancing broader development goals in a rapidly warming world?
3. What strategies, including climate-related information and co-creation processes, enable the scaling of locally led adaptation and mitigation actions across heterogeneous socio-ecological systems, effectively addressing the political economy dynamics, root causes of vulnerability, and engaging local stakeholder to overcome constraints?
4. What role can emerging technologies play in accelerating and enabling effective, timely, and equitable climate action by informing decision-making across all levels, from farmers coping with climate variability to financial institutions managing investment risk?
5. How can integrating latest climate science, place-based data, and local knowledge effectively unlock public and private investments that minimize maladaptation risks, support just transitions, and ensure that climate transitions deliver equitable, durable adaptation benefits and emission reductions?

These research questions guide the Program's outputs and intermediate outcomes, ensuring that research is demand-driven, context- and gender-specific, and actionable.

5.2 Pathways to impact

The Climate Action Program is implemented through five interconnected AoWs: (1) Prioritization and Coordination of Climate Action, (2) Digital Advisories and Climate Risk Management, (3) Locally Led Adaptation, (4) Low-Emission Transitions, and (5) Finance and Policy for Scaling Solutions. These AoWs work in concert through three interlinked pathways to impact—Innovation, Capacity Sharing, and Policy Change—aligned with the CGIAR Research Strategy. Each pathway plays a critical role in accelerating the achievement of the 2030 targets and incorporates explicit scaling strategies to enhance impact. Scaling up and scaling out are integral to our impact pathways. The Program embeds these scaling strategies within each pathway, building on the experience gained from the Consortium Research Programs (CRPs), 2022 – 2024 Portfolio (Initiatives), and bilateral projects.

The **Innovation Pathway** facilitates the customization and scaling of demand-driven, prioritized, and co-developed solutions that address key adaptation and mitigation challenges. This pathway not only generates new data and knowledge but also integrates solutions developed across the CGIAR Portfolio 2025-2030 that contribute to climate resilience, risk reduction, mitigation, equity, and just transitions. Examples include frameworks for understanding the root causes of vulnerability (AoW1.2), for avoiding maladaptation (AoW3.3), identifying incentive structures for methane reductions (AoW4.2), and tracking and reporting progress toward the Global Goal on Adaptation (AoW5.1). Key strategies for scaling within this pathway include replicating and adapting successful climate solutions across locations. These scaling strategies address challenges such as translating climate forecasts into actionable advisories (AoW2.1) and designing business models for methane reduction in rice, livestock, or aquaculture (AoW4.2). As the Innovation Pathway drives these and other breakthroughs, it keeps CGIAR at the forefront of science and innovation, shaping the future of climate resilience and low-emission development.

The **Capacity Sharing Pathway** focuses on capacity strengthening of governments, producers and value chain actors, the private sector, and research institutions, including CGIAR scientists, to work on demand-driven climate issues. This pathway emphasizes capacity-sharing mechanisms to assess needs, set priorities (AoW1), and co-develop training programs and collaboration models that enhance both technical and institutional capacities while ensuring inclusivity (AoWs1-5). New methods, such as on-demand technical assistance (AoW5.2), a centralized entry point for climate (AoW1.1), and embedding seconded staff within key organizations (AoW2, AoW5), ensure that partners can readily access and utilize CGIAR innovations. To expand reach and inclusivity, digital platforms are used to connect with key audiences (e.g., AoW2.2, AoW4.4). Strong partnerships with local institutions are also forged to embed capacity sharing within existing structures (AoWs 2, 3, 4), ensuring sustainability and long-term impact. This pathway fosters mutual learning, collaboration, and knowledge exchange, empowering local and global actors with the necessary skills to take effective climate action.

The **Policy Change Pathway** focuses on translating scientific evidence into actionable policies and investments that align with international targets and national development goals. Key activities include convening or strengthening existing multi-stakeholder platforms and supporting governments in developing and implementing NDCs, NAPs, and LT-LEDS while repurposing policy frameworks to drive more climate, environmentally, and socially sound agriculture and land use (AoW1.5, AoW5.1). The pathway also builds the investment case for adaptation, mitigation, and Loss and Damage financing (AoW5), and ensures local concerns inform national policies and investments (AoW3.2, AoW4.1-4.3). By linking science to policies

and investments, this pathway supports development of frameworks for future inclusive FLW systems while helping to unlock the resources needed to accelerate adaptation and low-emission development today.

5.3 Gender and social inclusion

GESI is integral to the Climate Action Program's impact pathways, ensuring that women, youth, and marginalized groups benefit from climate adaptation and mitigation solutions. In the Innovation Pathway, solutions are co-developed through locally led adaptation and living labs for low-emission food systems to address the unique needs and constraints of various social groups, with a focus on creating innovations that are accessible for vulnerable populations. Gender- and social-disaggregated data will inform key interventions, such as digital advisory development and low-emission forage solutions, supporting inclusivity in all scaling pathways. In the Capacity Sharing Pathway, GESI is embedded in training and knowledge-sharing efforts, supporting access to programming and information. This includes empowering women and marginalized communities to engage in climate action at multiple scales whether through co-design, formal/informal educational opportunities, or in global processes such as UNFCCC negotiations. In the Policy Change Pathway, the Program advocates for gender-responsive and inclusive policies such as gender-smart financial mechanisms that promote equitable access to climate finance, integrating and amplifying the voices and needs of the most vulnerable in climate governance, and integrating GESI concerns into climate policy frameworks to drive more inclusive responses. Through these pathways, the Climate Action Program embeds GESI at every level.

5.4 Key actors and partnerships

Achieving the Program's objectives will require the engagement of a diverse set of actors throughout FLW systems. Climate action demands a shift in discourse, attitudes, power dynamics, and deliberate actions that break from business-as-usual approaches. This Program will be rooted in strong national and partner ownership, functional institutional structures, and coordinated collaboration across actors and the CGIAR system. A systematic partnership prioritization process will be established in the initial phase of the Program implementation, coordinated with other relevant Programs. This will foster alignment across Programs and help to identify catalytic partnerships that amplify impact (AoW1.1). Policymakers will play a crucial role in aligning sectoral policies with global climate goals, particularly the Paris Agreement (AoW1, AoW5). The private sector, from corporations to small- and medium-sized agri-enterprises (agri-SMEs), will be key in scaling low-emission innovations, driving green investments, and adaptation actions (AoW3, AoW4). Research institutions, including NARES and universities, will co-develop solutions, data tools, and scientific outputs (AoWs 2 to 4). Local actors, such as land, water, and ecosystem managers, along with marginalized and vulnerable groups, like Indigenous Peoples, will be instrumental in driving locally led climate adaptation (AoWs 2 to 4). Furthermore, financial institutions, particularly climate funds, will mobilize resources to support large-scale implementation (AoW5). These meaningful partnerships ensure the Program's relevance, legitimacy, and long-term sustainability, allowing CGIAR innovations to contribute to a transformative global climate agenda.

5.5 Key assumptions

- **Cooperation Drives Action:** Continued collaboration and cooperation at international and regional levels will ensure the flow of information, funding, and support for climate adaptation and mitigation efforts.

- **Policies Drive Climate Investments and Projects:** Climate policies at both national and international levels will serve as a crucial catalyst for development of adaptation and mitigation investments and projects.
- **Engagement Drives Ownership and Uptake:** Scaling models will effectively and meaningfully engage local communities and marginalized and vulnerable groups, ensuring their ownership of adaptation and mitigation solutions, which will increase uptake and sustainability.
- **Evidence Drives Change:** Governments and the private sector will use evidence on the impacts of climate change to drive interest and capacity to create research-informed policies and investments.

5.6 Programmatic innovation

The Climate Action Program represents a strategic advancement in CGIAR's climate research portfolio, synthesizing the experience from past initiatives such as CCAFS, Climate Resilience, Low-Emission Food Systems, the Climate Change Impact Area Platform, NEXUS Gains, and significant bilateral projects such as Accelerating Impact of CGIAR Climate Research in Africa (AICCRA), Programme for Climate-Smart Livestock (PCSDL) in East Africa, Climate-smart Initiatives for Climate Change Adaptation and Sustainability in Prioritized Agricultural Production Systems in Colombia (CSICAP), Climate-Smart Technologies in Mali, Enhanced Coastal Fisheries (ECOFISH) in Bangladesh, and Thai Rice NAMA, amongst many others. By unifying efforts under a singular mission and towards critical topics central to the CGIAR Results Framework and Strategy, the Program takes a novel integrated approach towards supporting adaptation and mitigation action. Furthermore, integrating innovations, capacity sharing, and policy change into a cohesive framework enhances our ability to generate impact at scale. By embedding experts within key institutions and offering on-demand technical assistance, the Climate Action Program also creates new and consolidated direct channels for science to influence policy and practice, driving system-wide change. Building on CGIAR's legacy of high-quality science, this Program sets a new standard for innovation in addressing the global climate crisis.

Table 5.1. Climate Action Program outputs and outcomes. Partners including demand, innovation, and scaling partners.

ToC Element	Statement	Contributing AoWs	Partners (including internal) and roles	Assumption	Indicator and target
OP 1	Prioritized science for advancing adaptation and low-emission development action	1	CGIAR, ARIs, NARES, UN agencies		
OP 2	Frameworks, tools, methods, and analytics for climate action	1 - 5	CGIAR, ARIs, NARES, UN Agencies, governments, private sector actors		

OP 3	Pipeline of adaptation & mitigation solutions tailored for different users & contexts	2 - 4	CGIAR, ARIs, NARES, local governments, private sector actors, rural communities		
OP 4	Innovative models of capacity sharing and training	1 - 5	CGIAR, NARES, local governments, CapDev Accelerator		
OP 5	Science and climate policy and other multi-stakeholder platforms	1, 5	CGIAR, NARES, UN agencies, regional climate negotiation organizations, IPCC		
OP 6	Data, evidence, and knowledge for climate-specific and climate-sensitive policy making, implementation, and climate finance	4, 5	CGIAR, ARIs, NARES, national ministries, IFIs, UNFCCC		
IOC 1	FLW actors use climate action frameworks, tools, and analytics to guide future climate actions	1 - 5	NARES, local governments, private sector, international organizations that build resilience, reduce climate risk, and increase mitigation	Tools and frameworks are user-friendly and adaptable to different contexts	
IOC 2	FLW actors increasingly use prioritized climate solutions in decision-making processes and investment	4, 5	National governments, NARES, International organizations	Science outputs are accessible and relevant to decision-makers	
IOC 3	FLW actors and CGIAR staff have strengthened capacities to design, implement and track climate solutions through innovative training models	2 - 5	NARES, local governments, producer organizations, CapDev Accelerator	Training models effectively address capacity gaps and are culturally appropriate	

IOC 4	Increased engagement and collaboration on climate action through multi-stakeholder platforms	1	NARES, UN agencies, civil society organizations, private sector	Platforms are inclusive and facilitate meaningful dialogue	
IOC 5	Improved integration of climate-specific data and evidence in policy formulation and implementation	1, 5	National ministries, local governments, IFIs	Policymakers have the capacity to interpret and apply climate data	
2030-OC 1	Producers and other FLW system actors use climate adaptation or low-emissions solutions	2 - 4	National governments, NARES, local communities	Engagement drives ownership and adoption;	38 million producers/users adopt climate adaptation or low-emission solutions
2030-OC 2	Public and private sector actors mobilize new finance for climate action and just transitions by investing in new programs	5	National governments, IFIs	Policies drive programming; Evidence drives change	US\$15 billion invested for climate action
2030-OC 3	New climate/sectoral policies are informed by climate data and evidence	5	Local, national, regional governments	Cooperation drives change: Evidence drive change	100 climate-related policies implemented, including NAPs, NDCs, other sectoral policies
Impact	Reduction in FLW system GHG emissions	4	National governments, private sector, CGIAR Programs	Low-emission innovations are scalable and adopted	Net emissions from FLW systems decrease by 1 Gt by 2030 relative to baseline
Impact	Small-scale producers have increased resilience, increased adaptive capacity, and reduced vulnerability	2, 3	National governments, NARES, local communities	Solutions developed enable small-scale producers to adapt	150 million small-scale producers are resilient to climate shocks / using low-emission production options

5.7 Theory of change diagram

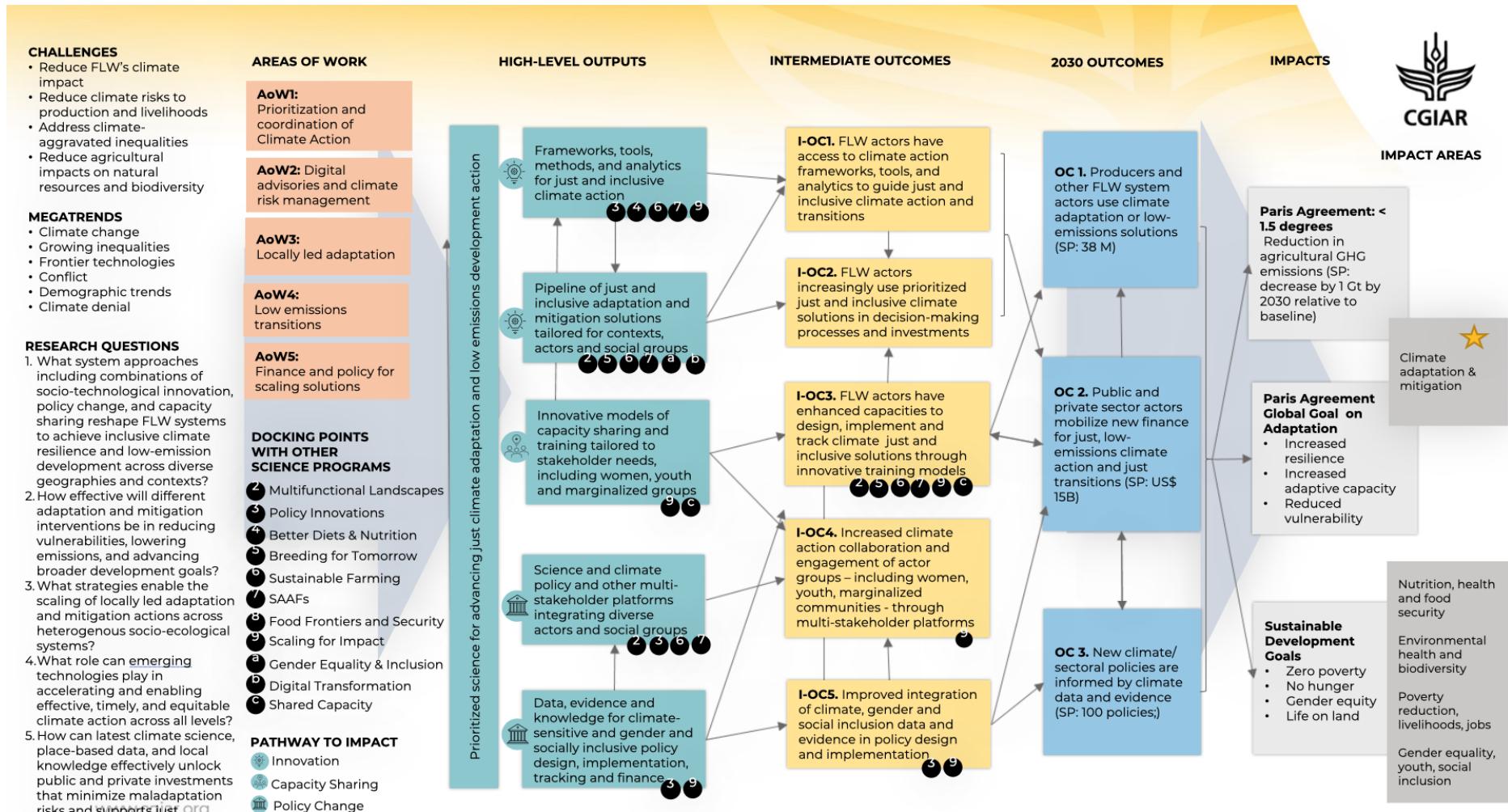


Fig 5.1. Climate Action Program's Theory of Change visual; [Climate Program - ToCs.pptx](#)

6. Areas of Work

The overall ambition of the Climate Action Program is to deliver the science, innovation, and collaboration necessary to transform FLW systems for a climate-resilient, net-zero, and equitable future. The five AoWs described below (Fig. 6.1) will contribute to CGIAR's three 2030 collective global targets on climate adaptation and mitigation, addressing the needs of local communities and contributing to development objectives and social justice (CGIAR 2022). This is achieved through activities conducted by this Program and through facilitating climate action across the entire CGIAR Portfolio 2025-2030. Integration amongst the AoWs is essential. AoW1 helps set climate change priorities for CGIAR and global partners with a complementary synthesis role. AoW2, AoW3 and AoW4 drive on the ground adaptation and mitigation action, also linking to other Programs and Accelerators. AoW5 provides the enabling environment for scaling through policy and finance.

Areas of Work

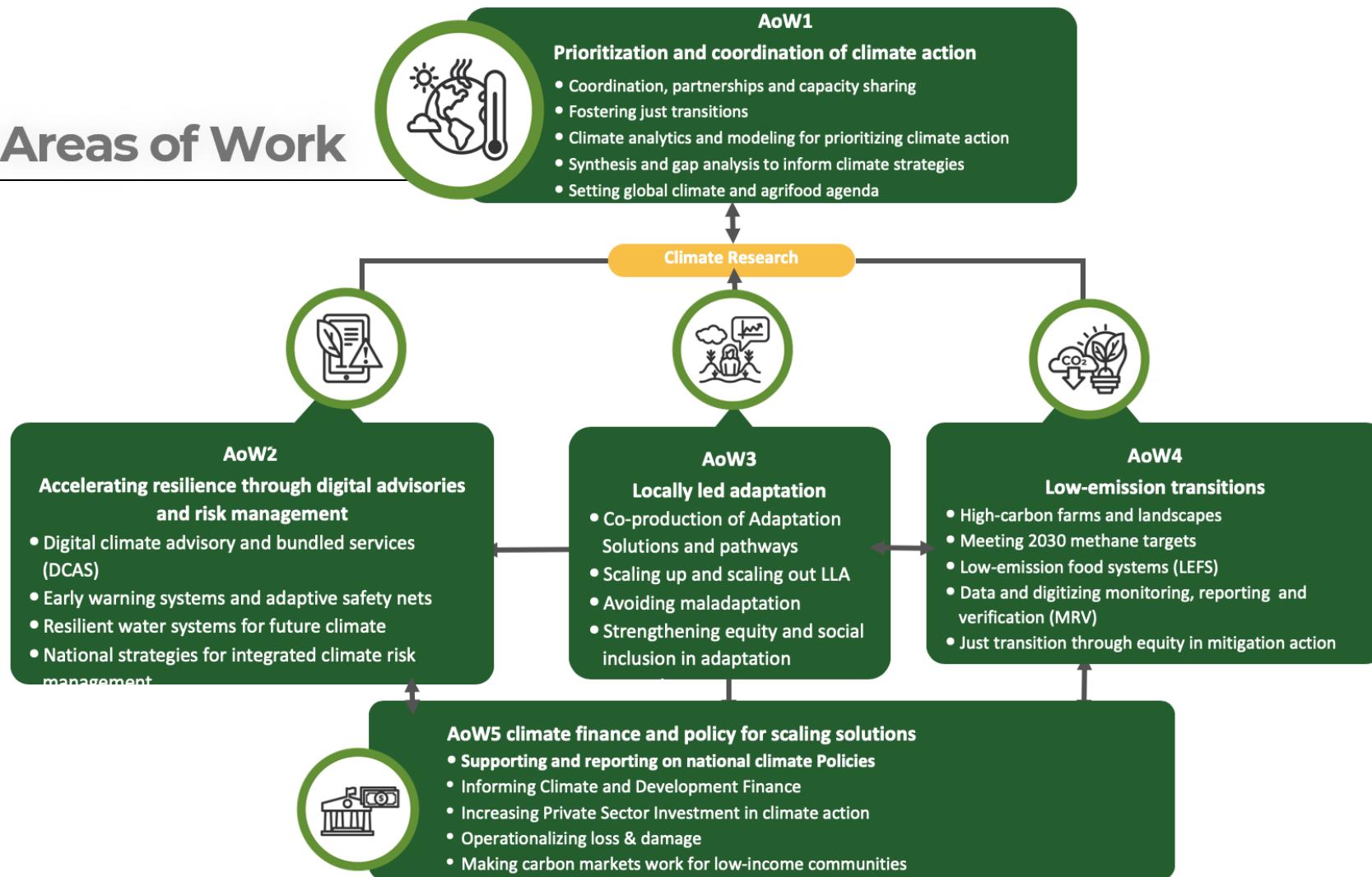


Fig 6.1. Five AoWs of the Climate Action Program and their linkages

6.1 Prioritization and coordination of climate action

6.1.1 Ambition

The benefits of climate action outweigh by far the costs of inaction, especially in a 1.5°C warmer world (IPCC, 2018). However, with finite financial resources, and often fragmented climate action efforts, coordination and prioritization are paramount. AoW1 will lead an unprecedented global effort in prioritization and coordination of climate action for CGIAR and its partners. Serving as the climate hub for the entire CGIAR, AoW1 will (1) strengthen coordination and collaboration on climate action across the entire CGIAR through a front-desk function; (2) mainstream a just transitions lens that informs strategies and theories of change; (3) produce, host, and disseminate climate analytics for prioritization; (4) synthesize and consolidate climate and FLW system research and action; and (5) engage in and influence international policy processes. By 2030, these pillars will provide clear evidence of a more integrated CGIAR climate agenda; nurture at least 125 global, regional, national, and local partnerships; incorporate tailored insights and mainstream a just transitions lens into 100% of CGIAR's actions; and co-lead at least 30 international multi-stakeholder initiatives that influence global agendas, including those of the UNFCCC. These outcomes will enable CGIAR and partners to contribute to ambitious global climate targets.

6.1.2 Research questions

1. What specific structural, institutional, and governance barriers perpetuate climate injustices in FLW systems and how can FLW systems be transformed to achieve the dual challenges of resilience and mitigation while ensuring that climate action is just?
2. In the context of a 1.5°C warmer world, how can a harmonized analytical framework, new data, models, and supportive scientific infrastructure integrating economic, biophysical, and social inclusion dimensions be developed to accurately identify critical climate action hotspots in LMICs' FLW systems, and how does this improve the prioritization of interventions?
3. What are transformative climate futures, and how do scientific and practice knowledge syntheses help identify gaps in climate action research and project implementation to attain these futures?
4. How can we use the latest climate science and policy to inform and influence global, regional, and national climate processes, including the UNFCCC negotiation tracks?

6.1.3 Description of sub-areas of work

AoW1.1 Coordination, partnerships and capacity sharing

Climate change is highly cross-cutting, creating challenges of fragmentation of projects, initiatives, funding streams, and partnerships across CGIAR and partners. AoW1.1 will become CGIAR's Climate Hub, coordinating efforts on climate action across the entire CGIAR. It will develop innovative partnership and capacity sharing models to promote learning, collaboration and scaling. The hub will identify climate action entry points in all Programs of the 2025–2030 CGIAR portfolio. It will serve as an essential gateway and go-to resource for partners and academic institutions, helping these stakeholders understand how to engage with the Program, its outputs, and its networks. AoW1.1 also aims to enhance critical thinking of climate scientists and partners globally to tackle cutting-edge questions in climate change research and design, including on climate justice (linked to AoW1.2) and implementing effective climate interventions in FLW systems. Key activities include establishing a CGIAR community of practice with regular consultations and workshops, facilitating exchange programs with ARIs, and supporting and mentoring young researchers from diverse backgrounds across LMICs. The goal is to disseminate CGIAR's findings more broadly, to

promote two-way learning with the development community, and to integrate new knowledge into policy (AoW5) and practice (AoW2–4).

AoW1.2 Fostering just transitions

As a purveyor of FLW system research for some of the most climate vulnerable and marginalized communities in the world, it is essential that CGIAR prioritizes climate action that is fair and just. Under AoW1.2, CGIAR and partners will implement research on the underlying structural, institutional, and governance challenges driving climate injustices and identify effective, inclusive, and transformative climate actions that address the underlying inequalities that are the root causes of climate vulnerability. This includes novel frameworks and analyses on connections between climate change, justice and conflict (Whitfield et al. 2021; Raleigh et al. 2024; Sanz-Barbero et al. 2018) that can be used to develop just and equitable transitions toward a more sustainable and resilient future (Gupta et al. 2023). This research will inform CGIAR and partners, and support governments and other actors in designing effective interventions for empowering women, youth, and other vulnerable groups. Results will guide implementation of AoWs2-4, feed into the Just Transitions Climate Finance Facility implemented in AoW5, and support just transition efforts across the CGIAR 2025-2030 Portfolio.

AoW1.3 Climate analytics and modeling for prioritizing climate action

CGIAR partners have expressed a need for precise and actionable climate insights, underpinned by evidence and best-in-kind models and data. However, in many LMICs climate insights, food system models, decision-support tools, and datasets are scanty or difficult to integrate, making their rapid deployment and use challenging, especially by non-experts. AoW1.3 will bring together new and existing data, analyses, and insights on climate drivers, impacts, and uncertainties in a harmonized manner that can be used by CGIAR Programs and partners to prioritize climate action. Use cases for analytical work are identified through AoW1.1, AoW1.2 and AoWs2–5, creating a deep understanding of the demand. Close collaboration with the global climate change community and ARIs will support transdisciplinary approaches. Research includes biophysical and socio-economic observations, surveys, remote sensing analytics, climate impact modeling, and scenario-based modeling (UN ESCWA, 2021). Results will be used to identify hotspots of climate risks, GHG emissions, reduction in ecosystem services, and land use change. Scenario-based foresight and *ex ante* assessments (conducted with the Policy Innovations Program) will be used to assess changes in effectiveness of adaptation and mitigation action, including potential for synergies and trade-offs (Antle et al., 2020). Outputs from AoW1.3 will support prioritization of adaptation and mitigation activities in AoW2-4 and policy and finance interventions in AoW5 and will help set climate priorities for the CGIAR Portfolio.

AoW1.4 Synthesis and gap analysis

Across the CGIAR and its partners hundreds of papers are published and projects carried out each year on climate impacts, adaptation, and mitigation for FLW systems. There is an enormous opportunity to synthesize insights from this body of scientific and practical knowledge to identify collective learnings and key research gaps. These syntheses could also provide estimates on the return on investment for climate-focused FLW research agendas, which thus far remains largely unknown. AoW1.4 will perform targeted systematic reviews and meta-analyses on key topics, integrating novel AI and data science tools to develop living syntheses. Tailored products including climate outlook reports, policy briefs, position papers, and communication strategies will inform national to global climate strategies (AoW1.5, AoW5.1) and investments (AoW5.2-5.5). Within CGIAR, outputs will bridge the gap between data and impact, empowering stakeholders with key insights to improve project design and set future research agendas.

AoW1.5 Setting the global climate and FLW agenda

AoW 1.5 will strategically engage in global climate policy arenas, including key forums like the UNFCCC's CoP and SBSTA, the World Economic Forum, and the G20 Climate and Sustainability Working Group. CGIAR will leverage science generated from across the Portfolio to provide data-driven inputs on critical topics such as the New Collective Quantified Goal (NCQG) on climate finance, the Global Goal on Adaptation, Loss and Damage, food systems approaches, Just Transitions, transformative adaptation, non-market approaches, and Climate Security. Through research publications, policy briefs, blogs, side events, webinars, advocacy materials, and position papers, CGIAR will engage in and influence global discussions. AoW1.5 will also develop training programs for climate negotiators engaged in FLW system discussions. These will be done in partnership with regional agencies, focusing on improving technical and analytical skills to effectively utilize and interpret climate science. We will collaborate with regional partners, including regional economic communities and sectoral forums, as well as key negotiator blocks such as African Group of Negotiators Expert Support (AGNES), Least Developed Countries, and more, to strengthen capacity for future decision-making.

6.1.4 High-level outputs

- Innovative partnerships and capacity sharing with key climate actors to drive scaled up climate action across CGIAR (AoW1.1)
- Frameworks, strategies and tools to identify vulnerability root causes, and pathways and priority focus areas for just transitions (AoW1.2)
- User-ready data, simulations, decision-support tools for understanding climate risks, emission hotspots, and trade-offs across multiple dimensions (AoW1.3)
- Synthesis products that identify key knowledge gaps and effective climate interventions and advocacy and communication materials to influence decision-makers (AoW1.4)
- Communications strategies, advocacy materials, and curricula for negotiators to support strategic engagements with global climate bodies (e.g., UNFCCC) (AoW1.5).

6.1.5 Theory of Change



Area of Work 1: Prioritization and Coordination of Climate Action

RESEARCH QUESTIONS

1. What specific structural, institutional, and governance barriers perpetuate climate injustices in FLW systems and how can FLW systems be transformed to achieve the dual challenges of resilience and mitigation while ensuring that climate action is just?
2. In the context of a 1.5°C warmer world, how can a harmonized analytical framework, new data, models, and supportive scientific infrastructure integrating economic, biophysical, and social inclusion dimensions be developed to accurately identify critical climate action hotspots in LMICs' FLW systems, and how does this improve the prioritization of interventions?
3. What are transformative climate futures, and how do scientific and practice knowledge syntheses help identify gaps in climate action research and project implementation to attain these futures?
4. How can we use the latest climate science and policy to inform and influence global, regional and national climate processes, including the UNFCCC negotiation tracks?

RESEARCH ACTIVITIES

- Climate Hub will coordinate CGIAR's climate action efforts and promote collaboration.
- Prioritize research on climate injustices and identify effective, inclusive climate actions.
- Provide harmonized climate insights and modeling analytics to support climate action prioritization.
- Synthesize research on climate impacts and FLW systems to inform climate strategies.
- Strategically engage in global climate policy arenas to influence discussions on climate action in agrifood systems.

SUPPORT ACTIVITIES

- Serves as the "Hub" of Climate Action where other CGIAR Programs and global partners can interact.
- Collaboration with ARIs, International Organizations and Development Partners
- Interaction with ministries and other stakeholders of focal countries
- Other CGIAR Science Programs and Bilateral Projects

HIGH LEVEL OUTPUTS

- OP 1.1** Innovative partnerships and capacity sharing with key climate actors to drive scaled up climate action across CGIAR.
- OP 1.2** Frameworks, strategies and tools to identify vulnerability root causes, climate justice pathways and priority focus areas for just transitions.
- OP 1.3** User-ready data, simulations, decision support tools for understanding climate risks, emission hotspots and trade-offs across multiple dimensions.
- OP 1.4** Synthesis products that identify key knowledge gaps, effective climate interventions, advocacy and communication materials to influence decision-makers.
- OP 1.5** Strategic engagements with global climate bodies (e.g. UNFCCC) through CGIAR science and outreach to inform and influence global climate and agri-food policy agendas

INTERMEDIATE OUTCOMES

- I-OC 1.1** Decision makers are equipped with evidence-based tools to address structural vulnerabilities and to identify just transition pathways towards inclusive climate action
- I-OC 1.2** Decision makers, investors, and CGIAR scientists access consolidated and harmonized knowledge and evidence on risks, hotspots gaps, and adaptation effectiveness
- I-OC 1.3** Science and programming partners – including youth - have enhanced capacities to design and track effective and inclusive climate research and action programs
- I-OC 1.4** Policymakers and negotiators have enhanced technical and analytical skills to utilize and interpret climate science and effectively contribute to high-level climate negotiations

Other AoW intermediate outcomes:

- AoW2: I-OC 2.1 (access to actionable advice); I-OC 2.3 (access to locally-tailored recommendations);
- AoW5: IO-C 5.2 (enhanced capacity of investors), IO-C 5.4 (enhanced capacity of policymakers), IO-C 5.5 (enhanced capacity of climate negotiators)

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Fig 6.2. AoW1 Theory of Change visual

6.1.6 Partnerships

This AoW will enhance its impact through strategic partnerships with ARIs, international organizations, NARES and local NGOs dedicated to climate justice. It will work closely with academic and government institutions with expertise and data in climate, impact and GHG modeling and Earth observations. Collaborative efforts with other CGIAR Programs and accelerators are crucial for delivering high-level outputs and outcomes. Plans for building new partnerships focus on equitable research collaborations that scale solutions and foster significant impact.

Table 6.1. AoW1 outputs and outcomes

ToC Element #	Statement	Partners (including internal) and roles	Assumption (for outcomes only)	Indicator and target (for 2030 outcomes only)
OP 1.1	Innovative partnerships and capacity sharing	CGIAR, NARES, ARIs, UN agencies, regional climate negotiation organizations, private sector		
OP 1.2	Strategies and tools to identify and assess root causes of climate vulnerability and climate justice pathways	Ministries of Environment and Climate Change, Ministries of Agriculture, Ministry of Social Welfare and Rural Development, CBOs, NARES, International development partners, CGIAR, ARIs, private sector		
OP 1.3	Harmonized data infrastructure on climate, risks, current and future hotspots and effects of overshooting above 1.5 degrees	Ministries of Environment and Climate Change, Ministries of Agriculture, UN Agencies, hydrometeorological agencies, space agencies, CBOs, digital and AI companies, NARES, development partners, CGIAR, ARIs		
OP 1.4	Syntheses products on knowledge gaps, effective climate interventions and metrics	UN Agencies, IFIs, development partners, CGIAR, ARIs		
OP 1.5	Communications strategies, advocacy materials, and curricula for negotiators to support strategic engagements with global climate bodies (e.g., UNFCCC)	CGIAR, NARES, ARIs, UN agencies, regional climate negotiation organizations.		

IOC 1.1	Decision makers are equipped with evidence-based tools to address structural vulnerabilities and to identify just transition pathways towards inclusive climate action	Ministries of Environment and Climate Change, Ministries of Agriculture, Ministry of Social Welfare and Rural Development, UN Agencies, development partners	Decision makers are interested in addressing root causes of climate vulnerability.	
IOC 1.2	Decision makers, investors, and CGIAR scientists access consolidated and harmonized knowledge and evidence on risks, hotspots gaps, and adaptation effectiveness	UN Agencies, IFIs, development partners, CGIAR, ARIs	Decision makers want more information and evidence to support their decisions and evidence is in an accessible format.	
IOC 1.3	Science and programming partners – including youth - have enhanced capacities to design and track effective and inclusive climate research and action programs	CGIAR, NARES, ARIs, UN agencies, regional climate negotiation organizations, private sector	Incentives exist for partners to want to track climate action.	
IOC 1.4	Policymakers and negotiators have enhanced technical and analytical skills to utilize and interpret climate science and effectively contribute to high-level climate negotiations	CGIAR, NARES, ARIs, UN agencies, regional climate negotiation organizations,	Policy makers want to access and use climate data in their decisions.	

6.2 Digital advisories and climate risk management

6.2.1 Ambition

Average annual climate-related losses to the agricultural sectors of LMICs are estimated at US\$21.6 billion (“Loss and Damage and Agrifood Systems” 2023; Holleman et al. 2020). These losses will increase in the coming decades unless small-scale producers and vulnerable communities have timely access to information and technology bundles to anticipate and manage climatic stresses (Born et al. 2021). Through human-centered Climate Information Services (CIS) and Early Warning Systems (EWS), this AoW will harness global, regional, and national capabilities in weather and climate forecasts and real-time monitoring and address information asymmetries and gaps that currently hinder appropriate responses from farm to national levels (Funk et al. 2023), and particularly engage rural youth and support women producers and other marginalized groups (Partey et al., 2018). The sub-AoWs use a broader framework of risk management that includes cascading impact pathways of proactive risk reduction while safeguarding critical FLW systems and mainstreaming climate actions, which will form a strong foundation for successful implementation of adaptation action and low-emissions transitions. They will strengthen institutional networks, national governments, and private sector capacity to co-design and scale inclusive service bundles that integrate

climate-informed advisory, risk insurance, and anticipatory cash transfers and other climate-adapted assistance. Results will benefit other Programs/Accelerators and AoW3-5, and will be informed by insights from AoW 1.1 prioritization efforts, to inform policies and catalyze investment. Our goal is to transform CIS and EWS in 30 countries, helping 30 million vulnerable people including small-scale women producers adapt to climate variability and extremes. This, in turn, supports improved FLW systems, with tangible benefits for all five CGIAR Impact Areas.

6.2.2 Research questions

1. How effective are bundled digital CIS in meeting the specific needs of women and men small-scale producers and vulnerable communities within crop, livestock, and fisheries value chains?
2. How can improved design, deployment, use, and continuous evaluation of EWS and linked anticipatory action overcome information asymmetries, coordination gaps, and dissemination challenges for more equitable protection of most at-risk rural populations and the ecosystem services that support their livelihoods?
3. How can enhanced governance approaches (institutions, policies, regulation, and infrastructure) improve equity in access to and management of water resources under future climate conditions?
4. How can existing national frameworks and strategies for climate services be strengthened, adapted, or expanded to address evolving and compound climate risks and deliver measurable resilience outcomes across sectors and scales?

6.2.3 Description of sub-areas of work

Collaborating with international, national, and local stakeholders, this AoW will identify impactful entry points and support institutional readiness for climate information services and risk management (in collaboration with AoW1.1). Human-centered design, inclusive, participatory approaches and modeling, and responsible digital innovation methods will be central to AoW2. Through collaboration with national partners, AoW3, and other Programs/Accelerators (Breeding for Tomorrow, Sustainable Farming, Sustainable Animal and Aquatic Foods, Multifunctional Landscapes, and Digital Transformation), we will design and test bundles for climate risk reduction with a special focus on water as a core resource for climate resilience (Cofie and Amede 2015). Partnerships with the private sector (SMEs, MFIs, digital start-ups) will spur digital and business model innovations and scaling (Agyekumhene et al., 2023). Continuous evaluation will build a strong evidence base for transforming CIS and EWS for enhanced and more inclusive impacts.

AoW2.1 Digital climate advisory and bundled services (DCAS)

Significant opportunities exist to boost CIS' impact with more consistent use of human-centered design principles, improving translation of climate and weather forecasts and monitoring and surveillance systems into more actionable, more equitable, and more integrated advice. For this, empowering farmers and institutions providing national hydrological and meteorological services (NHMS) is crucial (Findlater et al. 2021). AoW2.1 will, together with AoW1, identify impactful entry points through a hotspot mapping approach to assess climate risks, institutional readiness, and infrastructural or technical bottlenecks. This approach will guide strategic investments and interventions where CIS and climate-resilient technologies are most impactful. CIS actions will incorporate human-centered design principles toward scaling the provision of tailored climate-informed and actionable, bundled services for 30 million small-scale producers considering local priorities. Enhanced capacities in NHMS and the private sector (including SMEs) and learning cycles (climate literacy) will be critical for harnessing state-of-the-art climate science. CIS will be delivered to grassroots level

through well-established channels, including digital extension platforms, collaboration with the Digital Transformation Accelerator, participatory approaches (e.g., (Loboguerrero et al. 2018)), and stakeholder networks. They will offer bundled advisory services with credit, insurance, and climate-resilient farming technologies, linking with AoW3 and 4 as well as the Breeding for Tomorrow, Sustainable Farming, Sustainable Animal and Aquatic Foods, and Multifunctional Landscapes Programs.

AoW2.2 Early warning systems and adaptive safety nets

The Sendai Framework and the Early Warning for All (EW4All) initiative aim to expand access to EWS (UNDRR, 2023). AoW2.2 will partner with the World Meteorological Organization (WMO) and national organizations to address gaps in EWS pillars—detection, communication, and preparedness—with a focus on rural livelihoods (G. Amarnath et al. 2024). We will strengthen early warning capacity in at least 30 vulnerable countries by improving cross-sectoral coordination, addressing data gaps and information asymmetries, and by co-designing tailored gender-sensitive adaptive safety nets (Hidrobo et al., 2024). NHMS and Disaster Risk Management Offices will improve real-time response protocols for disaster prevention and early responses. Improved EWS will incorporate innovations in cross-timescale climate forecasting (AoW1.2), flood and drought forecasting, pest and disease surveillance and forecast systems (linked to the Food Frontiers and Security Program), Earth observation, impact-based forecasting, and data science (Digital Transformation Accelerator) (Lam et al. 2023). The EWS will enable the progression from early warnings to adaptive safety nets (e.g., forecast-based finance, anticipatory cash transfers, disaster risk insurance). Cross-sector coordination with humanitarian organizations will ensure timely aid. We will assess alignment with the Sendai Framework’s targets, including EWS coverage and action plans, in a just transition framework.

AoW2.3 Resilient water systems for future climates

Resilient water systems are the foundation of climate-resilient agricultural systems (Sikka, Alam, and Mandave 2022; Cofie and Amede 2015). AoW2.3 will strengthen water systems’ ability to withstand climate challenges at the watershed to basin scale. High-resolution climate change data (AoW1.3), hydrological modeling, water accounting, and equitable engagement of stakeholders will underpin the co-creation of tailored recommendations, in collaboration with and informing the Sustainable Farming, Policy Innovations, and Sustainable Animal and Aquatic Foods Programs. For instance, integrated water accounting and productivity studies provide evidence for addressing the potential effects of future climate on the water, food, energy, and environment nexus (Johnson 2022). Our approach will empower public and private stakeholders (including government, small-scale producers, and development partners) to proactively develop and implement integrated nature-based long-term resilience measures and governance frameworks for enhancing water-related risk management enabling system resilience (Rosenstock et al. 2024). Prioritization and planning of water-related investment enables sustainable surface and groundwater management in extreme climatic conditions. Evidence generation will guide the design and implementation of coherent policies (AoW5.1) that promote sustainable water futures.

AoW2.4 National strategies for integrated climate risk management

Pervasive hazards and interconnected risks evolve over time, often compounding one another (Challinor et al. 2018; Niggli et al. 2022), requiring nationally coordinated and multi-sectoral responses that demand strategies and investments for implementing integrated climate risk management (ICRM). AoW2.4 will leverage the Global and National Framework for Climate Services (G/NFCS, (Hewitt et al. 2020)) as a key planning and coordination instrument, to co-develop integrated climate risk management strategies and action plans with partners in at least 20 countries. AoW2.4, along with government partners, will assess whether and how the

existing progress in NFCS implementation has delivered resilience outcomes in agriculture and other sectors and supported marginalized populations, including women farmers. The evidence of NFCS impact (or lack thereof) together with stakeholder consultations and participatory and scenario-based assessments, will help refine priorities from the bottom-up, planning for theories of change, and create effective ICRM strategies and roadmaps. These will lay out clear institutional and coordination arrangements within and across sectors for delivery. The strategies and action plans will inform and be informed by national adaptation planning (AoW5.1), link to Policy Innovations Program, and help catalyze investment (AoW5.2 & 5.3).

6.2.4 High-level outputs

1. Contextualized, equitable, human-centered climate information products, decision-support systems, and service bundles for localized advisory provision and climate risk reduction for small-scale producers (AoW2.1)
2. Early warning and anticipatory action instruments and comprehensive capacity development programs to empower national and local organizations protecting those most risk (AoW2.2)
3. Tailored, cross-scale, multi-sector actionable recommendations to enhance sustainable water management under future climates (AoW2.3)
4. Integrated climate risk management strategies and action plans that deliver long-term resilience equitably in agricultural systems (AoW2.4)

6.2.5 Theory of change

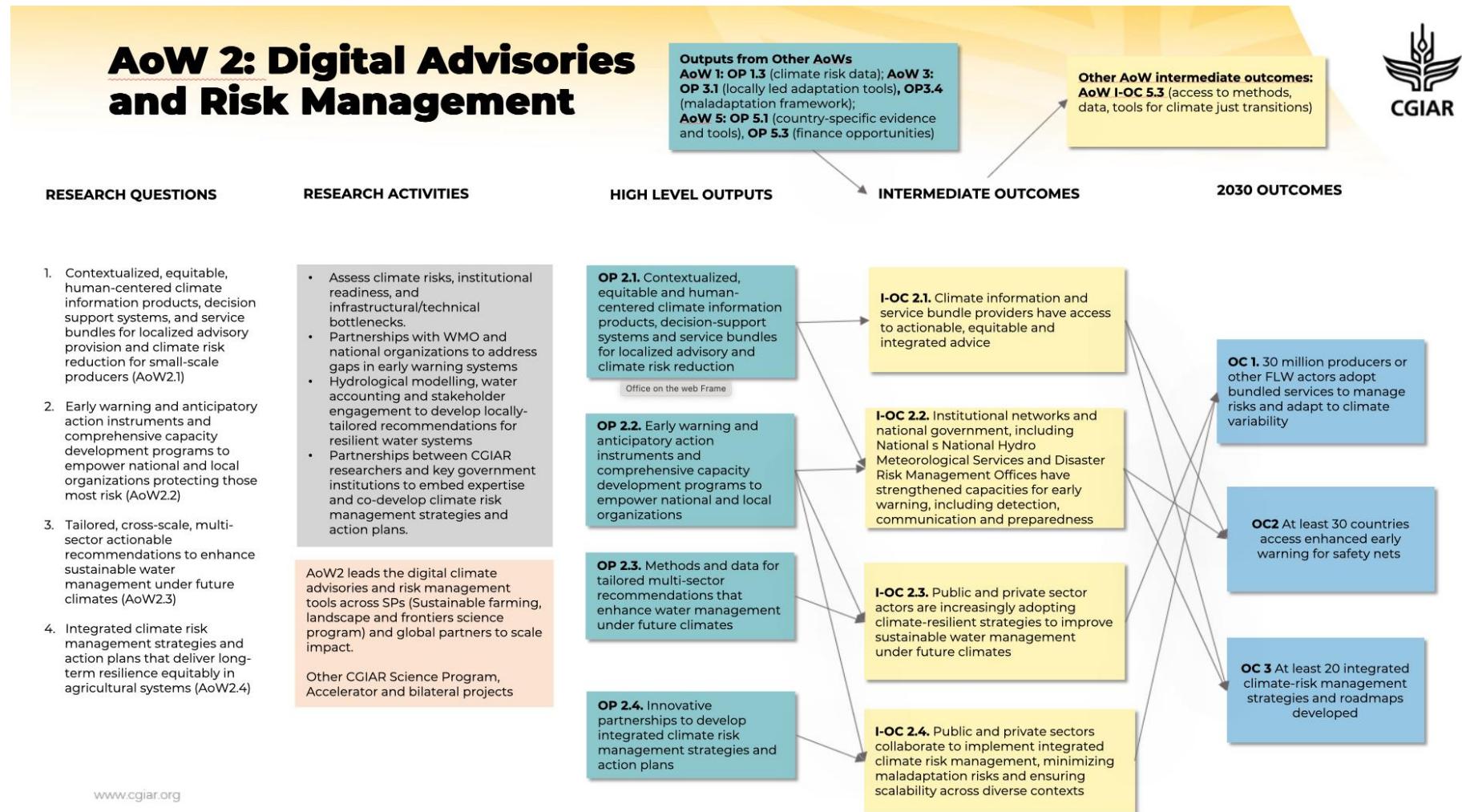


Fig 6.3. AoW2 Theory of Change visual

6.2.6 Partnerships

This AoW engages with global organizations including the WMO, the United Nations Office for Disaster Risk Reduction (UNDRR), national agencies (NHMS, disaster risk reduction offices, national research organizations), global and regional climate prediction centers, international organizations (including from the humanitarian sector), local organizations (NGOs, farmer organizations, grassroots women's groups, youth organizations), and the private sector (SMEs, MFIs). Partnerships with the WMO and UNDRR and the humanitarian sector will contribute to coordination at various levels and strategic direction especially under AoW2.2 and AoW2.4. Work with national and local organizations (including the private sector) will help establish a demand-driven agenda, build capacities, and co-design innovations in risk reduction based on human-centric design principles. Harnessing state-of-the-art climate prediction and observation will require collaborations with ARIs. Partnerships with MFIs and SMEs and governments facilitate scaling of promising solutions.

Table 6.2. AoW2 outputs and outcomes

ToC Element #	Statement	Partners (including internal) and roles	Assumption (for outcomes only)	Indicator and target (for 2030 outcomes only)
OP 2.1	Contextualized, equitable and human-centered climate information products, decision support systems, and service bundles for localized advisory and climate risk reduction	Ministries of Agriculture, Hydrometeorological agencies, Space Agencies, Tech Startups, NARES, development partner, CGIAR, community organizations, insurance companies, financial institutions, SMS and radio providers		
OP 2.2	Early warning and anticipatory action instruments and comprehensive capacity development programs to empower national and local organizations	Ministries of Agriculture, Disaster Management Organizations, Agriculture Service Center, NARES, INGOs, Social protection agencies, development partners, CGIAR, Humanitarian Organizations, Financial institutions		

OP 2.3	Methods and data for tailored multi-sector recommendations that enhance water management under future climates	Ministries of Agriculture, Land, Forestry, Water, Livestock and Fishers and Local Development Agencies, NARES, Development partners, INGOs, Planning Departments, Basin development authority,		
OP 2.4	Innovative partnerships to develop integrated climate risk management strategies and roadmaps	Small-scale producers, Grass root organizations, indigenous groups, CGIAR, Civil Societies, Development partners, INGOs, CGIAR, SMEs, Think Tanks		
IOC 2.1	Climate information and service bundle providers have access to actionable, equitable and integrated advice	Ministries of Agriculture, Hydrometeorological agencies, Tech Startups, NARES, development partner, CGIAR, community organizations, insurance companies, financial institutions, SMS and radio providers	Partners will adopt DCAS innovation and solutions to enhance their interventions and programs targeting small-scale and marginalized producers and vulnerable communities.	# farmers, strengthened capacity to de-risk production
IOC 2.2	Institutional networks and national government, including National Hydro Meteorological Services and Disaster Risk Management Offices have strengthened capacities for early warning, including detection, communication and preparedness	National governments, NARES, INGOs, Social protection agencies, development partners, humanitarian Organizations, Financial institutions, Frontiers Program and Digital Accelerator	Our solutions will support collaboration across partners to invest in capacity development and early warning systems.	# institutions with strengthened capacity
IOC 2.3	Public and private sector actors are increasingly adopting climate-resilient strategies to improve sustainable water management under future climates	Ministries of Agriculture, Forestry, Water Resources, NARES, Development partners, INGOs, Planning Departments, Basin development authority, AOW1, 5 and Landscape Program	Our cross-scale multi-sector actionable recommendations would guide partners' needs, national and international organizations are motivated to invest in water system resilience for future climate strategies.	# national govts and international organizations using or investing in our tools, evidence and guiding coherent policies.

IOC 2.4	Public and private sectors collaborate to implement integrated climate risk management, minimizing maladaptation risks and ensuring scalability across diverse contexts	National governments, Dept. of Disaster Management, Environment and CC.	National partners, NARES, and donors collaborate to empower vulnerable communities with accessible, scalable ICRM approaches, minimizing maladaptation risks and fostering long-term resilience.	# of partner organizations using avoiding maladaptation integrate ICRM strategies
2030-OC 1	30 million producers or other FLW actors adopt bundled services to manage risks and adapt to climate variability	Min. of Ag, Dev. Partners, NGOs	Relevance of data, tools, methods to sector needs and local context. Relevant engagements with partners and stakeholders that support change.	Initiatives, projects, Programs, measures in target countries achieve 30 million farmers
2030-OC 2	At least 30 countries access enhanced early warning for safety nets	Min. of Disaster Management, NGOs, Humanitarian organization, Ag, Dev. Partners, NGOs, Dev. partners	Robust community engagement and ownership, effective data collection and analysis, strong coordination among stakeholders, and adequate funding and resources. Early warning systems must be culturally relevant, accessible, and linked to actionable response plans. Capacity development programs should focus on building local expertise, promoting adaptive management, and fostering sustainable partnership.	Initiatives, projects, Programs, measures in target countries achieve 30 countries

2030-OC 3	At least 20 integrated climate-risk management strategies and roadmaps developed	Min. of Disaster Management, NGOs, Humanitarian organization, Ag, Dev. Partners, NGOs, Dev. partners	Our solutions expect a future where agriculture and food systems are fortified against the unpredictable challenges of climate change. National governments and vulnerable communities, equipped with effective climate risk management tools, are empowered to adapt and thrive and ensuring equitable access and scalable solutions, for a resilient future	Initiatives, projects, Programs, measures adopted by 20 countries
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6.3 Locally led adaptation

6.3.1 Ambition

Vulnerable communities often lack resources and decision-making power to adapt to climate change. This AoW develops tools and approaches that support strengthening the capacities of these communities to adapt in ways that address gendered and other socio-economic inequalities. As such, locally led adaptation (LLA) is a cornerstone of the just transition approach taken by the Climate Action Program. Using the principles of LLA (Coger et al. 2022), this AoW will support organizations' climate adaptation action in developing mechanisms for financing LLA, building local stakeholders' capacities to access funds, facilitating locally developed adaptation solutions and pathways, and integrating local priorities into national and global policy processes (GCA 2023). While AoW3 is focused on adaptation, actions must take place within low-emission pathways to avoid maladaptation, with a particular emphasis on solutions that enhance synergies and co-benefits with mitigation (Bertana et al. 2022). AoW3 will develop and apply frameworks and methodologies for development partners, implementers, and researchers for avoiding socio-economic and ecological maladaptation, with attention to synergies and tradeoffs with mitigation and social inclusion goals. Social inclusion – across categories and intersections of gender, age, economic resources, and other social identities – will be cross-cutting and embedded across all AoW3's engagement and scaling processes (Rahman et al. 2023; Carr and Thompson 2014). The research ambitions in AoW3 center around analyzing the interplays of socio-economic, institutional and technical factors in processes of climate change adaptation and scaling (Glover et al. 2019). Outputs of this research will support subsequent institutionalization of LLA in programmatic and policy contexts. **By 2030, AoW3's LLA activities will benefit 8 million people through transdisciplinary and multi-scale participatory action research that integrates socio-economic, technical and institutional research and engagements with scaling partners.**

6.3.2 Research questions

- How can adaptation solutions and pathways be co-produced, locally adapted and scaled in ways that build local institutional capacities, leverage local knowledge and address gendered and other socio-economic inequalities?

- How can household and institutional interventions combine to enhance local agency in pursuing climate change actions that are technically effective, socially inclusive, and institutionally sustainable?
- How can LLA solutions and principles be scaled through local governments, producer networks, finance ministries, NGO networks, agribusinesses, and private investment, in ways that foster accountability and transparency as well as cross-sector collaboration?
- How can climate adaptation solutions and pathways avoid maladaptation and adverse environmental outcomes and enhance synergies and co-benefits, especially with respect to mitigation and social equity domains?
- How can we strengthen equity and social inclusion of marginalized groups in adaptation strategies?

6.3.3 Description of sub-areas of work

AoW3.1 Co-production of adaptation solutions and pathways

Local climate change adaptation requires new technologies, practices and services to be used within household production systems operating within institutional and ecosystem contexts. AoW3.1 supports practical processes that address the institutional, financial, technical, and GESI dimensions of LLA (Vincent 2023). Working with AoW1 and Scaling for Impact, AoW3.1 will collaborate with local institutions, producer organizations, governments, value chain actors, and businesses to establish adaptation priorities that also enhance synergies and co-benefits with mitigation (Yet et al. 2020). Adaptation solutions, business models, and pathways will be developed locally, but will leverage CGIAR and partner expertise along with citizen science. Local communities will be empowered through capacity building and decentralizing decision-making to ensure that climate solutions fit small-scale producers' complex lives and address larger environmental and socio-economic goals, including inequalities.

While some climate solutions in AoW3.1 will draw on innovations from AoW2, AoW4 and other Programs, AoW3.1 will also use transdisciplinary methods to collaborate directly with local innovators to develop solutions that leverage local knowledge and scientific insights (Naess, Thompson, and Allen-O'Neil 2023). By 2030, AoW3.1 will have strengthened local institutional capacities for designing and implementing inclusive adaptation pathways. It will also empower producers to co-develop adaptation solutions and socio-technological bundles with partners.

AoW3.2 Scaling LLA

Turning LLA into impact at scale requires innovative models, approaches, and partnerships with and between local actors. Building on collaborations from AoW3.1, AoW3.2 will strengthen local institutional, business, and producer capacities to develop and implement mechanisms for scaling adaptation solutions focusing on business model support, systemic capacity, enabling environments and innovative mechanisms for financing LLA across scales (Amarnath et al. 2023). This involves bundling technologies, management practices, services, financing, delivery mechanisms and institutional arrangements (Barrett et al. 2020). It also involves implementing mechanisms that address supply-side constraints and de-risking climate finance for agriculture. Working with the Scaling for Impact Program, AoW3.2 will utilize LLA to co-design scaling pathways with local stakeholders, which will then be deployed and evaluated for effectiveness. Specifically, scaling out LLA involves a range of mutually-reinforcing activities, including strengthening local governance, developing scalable models and best practices, fostering knowledge exchange, ensuring sustainable funding, building strategic partnerships, integrating local knowledge, advocating for supportive policies, and leveraging digital technologies, while ensuring scaling is responsible, inclusive, and equitable. While AoW3.2 will focus on scaling out through reconfiguring local institutional relationships

and processes, AoW5 will complement this work by scaling up LLA approaches through national policy frameworks, funding mechanisms, and global development partners' program design.

AoW3.3 Avoiding maladaptation

AoW3.3 will test frameworks for *ex ante* analysis of potential maladaptation risks, as well as practical strategies for addressing them in collaboration with AoW1.3. Designed for development partners, planners, and implementers, these frameworks and strategies will include analysis of adaptation actions across two broad categories. First, we will analyze distributional equity and social inclusion impacts, with a focus on gender, youth and economic assets. Second, we will analyze ecological impacts, especially GHG emission and carbon sequestration, but also water, soil, and air quality. We will work with AoW4 to apply mitigation analyses to adaptation solutions, identifying potential synergies and trade-offs between adaptation and mitigation goals. In addition to informing programming design, the avoiding maladaptation framework will also be adapted to inform MELIA activities, starting within the Climate Action Program and ultimately expanding to development partners and other CGIAR Programs.

AoW3.4 Strengthening equity and social inclusion in adaptation strategies

The most vulnerable people are often also least able to adapt to the negative impacts of climate change given lack of access to resources, services, and structural inequalities (FAO, 2024). This sub-area develops research and works with partners to strengthen the resilience capacities of marginalized groups, including women producers and youth, through social and policy innovations and bundled solutions that support transformational adaptation and livelihood security (Carr et al. 2022). It will develop the evidence base on drivers of inequalities and power dynamics in climate change adaptation using a political economy approach. It will also design new and apply recent CGIAR innovations that support gender and climate justice, such as the Women's Empowerment in Climate Change Index (under development) and will collaborate with the Gender Equality and Inclusion Accelerator. In collaboration with AoW3.1, 3.2, AoW1, and AoW5, it will work with grassroots women's organizations, youth, Indigenous peoples, vulnerable smallholder producers, and other value chain actors to elevate their voices and agency in decision-making processes and leadership roles for climate-resilient agrifood systems at multiple scales.

6.3.4 High-level outputs

- Institutional innovations and technical practices that simultaneously address climate change adaptation, livelihood, GHG emissions reduction and social inclusivity goals (AoW3.1).
- Detailed methodologies for implementing LLA so that it integrates adaptation planning, financing, and climate solution co-development in ways that enhance social inclusion, local agency and economic sustainability (AoW3.1)
- Guidelines on how to scale out climate solutions to producers, how to scale up LLA processes within governance systems and how to implement LLA processes in new sites. These will be designed for local and national partners, as well as development planning and implementation partners, as appropriate (AoW3.2)
- Framework and methods to support local and national planners, development partners and implementers to anticipate and address potential negative outcomes associated with adaptation efforts (AoW3.3)
- Policies, institutions, and interventions to address the root causes of inequality, including gender-transformative approaches, for equitable climate change adaptation (AoW3.4)

6.3.5 Theory of change

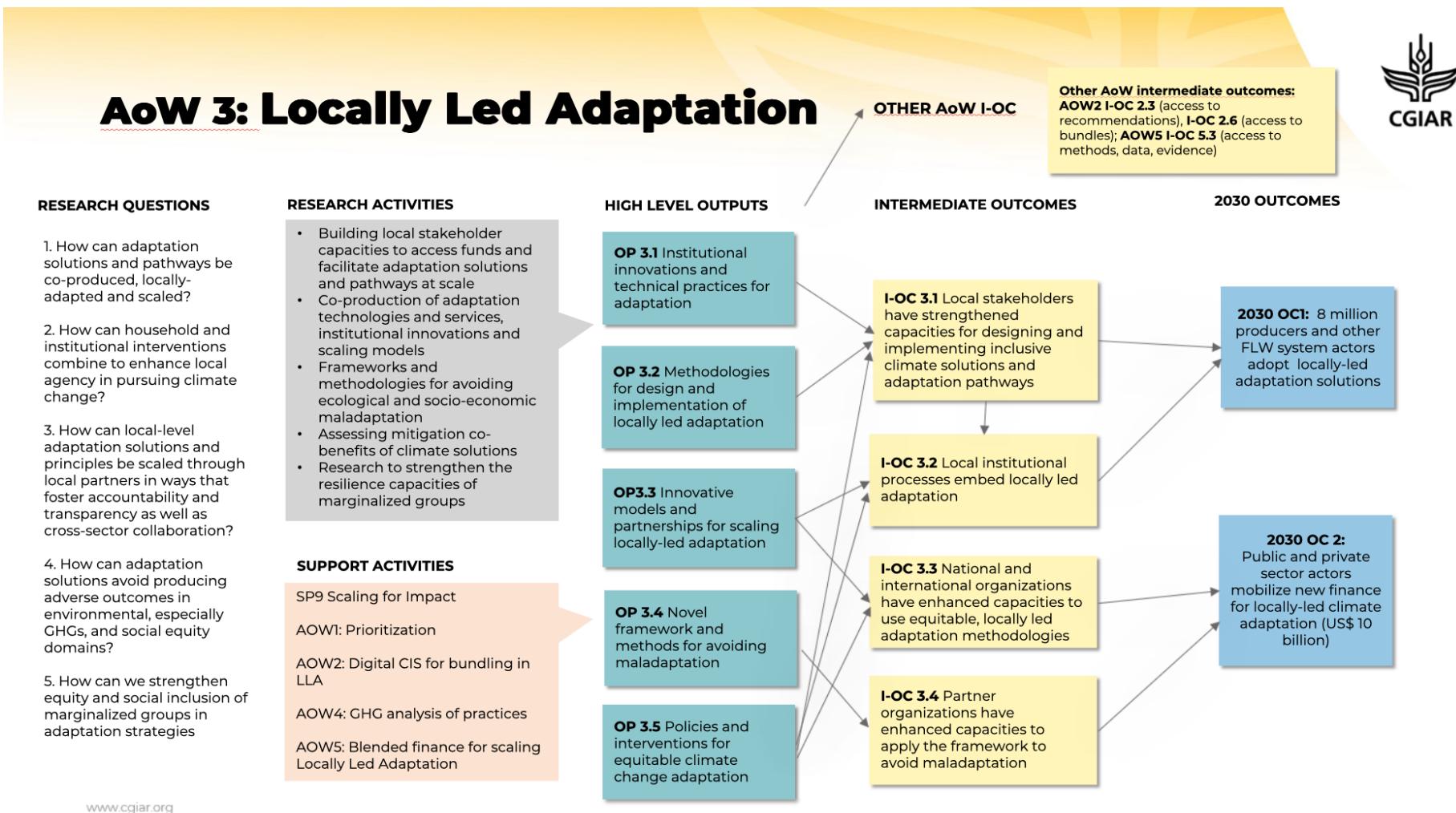


Fig. 6.4. AoW3 Theory of Change visual

6.3.6 Partnerships

AoW3 will work through partnerships across scales. We will work with farmer organizations, NARES, local businesses, producer organizations, and local civil society to ensure a broad foundation for LLA planning. Scaling activities will then bring in financial institutions – which can include banks, national investment capital, blended finance – as well as local organizations for outreach and implementation. In conjunction with AoW5, we will link LLA processes with global financial inputs, connecting national partners with organizations that are keen to support LLA, such as the Green Climate Fund (GCF), the World Bank, and other thought leaders, such as Global Centre for Adaptation, CARE, and WRI.

Table 6.3. AoW3 outputs and outcomes

ToC Element #	Statement	Partners (including internal) and roles	Assumption (for outcomes only)	Indicator and target (for 2030 outcomes only)
OP3.1	Institutional innovations and technical practices that simultaneously address climate change adaptation, livelihood and social inclusivity goals.	Local govt.s, SMEs, NARES, research partners, AoW1, AoW4		
OP3.2	Methodologies for design and implementation of locally led adaptation development in ways that enhance social inclusion and local agency.	Local govt.s, SMEs, NARES, research partners, AoW1, AoW4		
OP3.3	Innovative models and partnerships for scaling locally led adaptation.	Local govt.s, SMEs, financial institutions, NARES, Ministries of Treasury, Ministries of Agriculture, AoW2, Program9		
OP3.4	Novel framework and methods for avoiding maladaptation.	Local govt.s, research partners, NARES, AoW1, AoW5		
OP3.5	Policies, institutions, and interventions for equitable climate change adaptation	Grassroots women's organizations; governments Gender Accelerator		

IOC3.1	Local stakeholders have strengthened capacities for designing and implementing inclusive climate solutions and adaptation pathways	Local govt.s, local civil society, NARES, SMEs, producer organizations, financial organizations, development partners, scaling partners	Our LLA interventions address priority needs, local partners are willing and able to pursue LLA process and principles	
IOC3.2	Local institutional processes embed locally led adaptation	Local govt.s, civil society, SMEs, NARES, producer organizations, financial organizations	Local govt.s and other partners have enabling environment to integrate LLA	
IOC3.3	National and international organizations have enhanced capacities to use equitable, locally led adaptation methodologies	Ministries of Treasury, Ministries of Agriculture, financial institutions, NARES, development partners, AoW5	Our LLA methodologies meet partners' needs, national and international organizations are motivated to support LLA	
IOC3.4	Partner organizations have enhanced capacities to apply the framework to avoid maladaptation	Local and national govt.s, research partners, development partners, AoW5,	Partner organizations are receptive to frameworks for avoiding maladaptation.	
2030-OC1	8 million producers and other FLW system actors adopt locally led adaptation solutions	Local and national govt.s, development partners, AoW5	LLA is widely picked up by the climate and development community	8m producers or users adopt climate solutions
2030-OC2	Public and private sector actors mobilize new finance for locally led climate adaptation (US\$ 10 billion)	Local and national govt.s, development partners, scaling partners, AoW5	Our LLA methodologies meet partners' needs, national and international organizations are motivated to support LLA.	Investors develop US\$5 billion climate projects

6.4 Low-emission transitions

6.4.1 Ambition

In LMICs, population growth and demographic changes are increasing the demand for nutritious food, including livestock products, driving GHG emissions up due to intensified agricultural production (Pretty et al. 2018), land use changes, and greater energy consumption (Frank et al., 2019). These activities will worsen climate change, raise adaptation costs, reduce the biological carbon sink, and threaten food, water, energy security, and social equity. To reduce the climate impact of FLW systems, it is essential to adopt a holistic approach (from 'seed to fork') that sustainably integrates production systems within landscapes. This approach – addressing land use practices, policies, and finance (e.g., carbon markets) – aims to achieve food security, reduce emissions, and harness ecosystem services from sustainably managed landscapes. Together with partners, this AoW will support the creation and implementation of low-emission development (Nash et al. 2015) in at least 30 countries by enhancing carbon sequestration, decreasing current GHG emissions and avoiding future emissions to achieve an overall GHG reduction of 1 gigaton CO₂e by 2030 in 30 countries. Additionally, this AoW will strengthen national and local implementation of at least 15 NDCs and mobilize up to \$5 billion in mitigation related climate investment, with over 50% directed towards small-scale producers and their communities.

6.4.2 Research questions

- What is the feasibility of sequestering carbon in farms and landscapes at large scales, especially by small-scale producers, where are these potentials most promising, and how can they be incentivized?
- How can methane mitigation strategies in rice, livestock, and aquatic systems be advanced, tailored, and scaled fast enough to meet the 2030 global methane targets?
- What kinds of food system innovations can drive significant emissions reductions within different development trajectories and how can accountability for climate impacts be improved?
- How can data and MRV for low-emission FLW systems be improved while reducing the costs of its use via data platforms, data, remote sensing, and Artificial Intelligence?
- How can we increase equity in mitigation action and achieve a just climate transition in FLW systems?

6.4.3 Description of sub-areas of work

Mitigation is a critical topic that is both urgent and long overdue in relation to smallholder FLW systems in LMICs. Sequestering carbon in landscapes and avoiding further deforestation will be approached across all scales from field to landscape and from producer to policy maker in AoW4.1. Reducing methane emissions in rice and livestock systems and understanding methane emissions from emerging aquatic systems are critical for LMICs to meet the 2030 methane targets and the focus of AoW4.2. Developing low-emission food systems requires the full range of actors to be engaged in developing business and finance models, policies and the institutional agency that support integrated food system approaches and the focus of AoW4.3. Tracking and supporting low-emission transitions in LMICs needs MRV and data to

empower small-scale producers and communities to manage low-emission practices and attract external incentives. AoW4.4 proposes to build the systems and data for the context to overcome these barriers. Finally, AoW4.5 focuses on reducing inequalities and injustices in mitigation action for a more just climate transition.

AoW4.1 High-carbon farms and landscapes

The land sector provides a highly cost-effective way to scale carbon storage, with nature-based solutions like reforestation potentially sequestering up to 30% of global emissions at lower costs than engineering approaches for example (IPCC, 2019). AoW4.1 will work with a broad range of actors to test the potential for reducing CO₂ emissions and sequestering carbon in soil and biomass across farms, forests, grasslands, and coastal landscapes. These multi-stakeholder actors will co-develop higher-tier forest and emissions data and practices, policies (e.g., REDD+, EUDR), and finance mechanisms (e.g., green bonds, high-integrity PES with AoW5) to support carbon sequestration and emission reduction through sustainable management of FLW systems. Together with other Programs (Multifunctional Landscapes, Sustainable Farming, Sustainable Animal and Aquatic Foods), AoW4.1 aims to help countries eliminate the need to further deforest or change land use for food production. The approaches build on previous work, especially the approaches of the Low-Emission Food Systems Initiative, that facilitate partnerships for locally driven and socially inclusive action research and capacity strengthening. Through observations, modeling, remote sensing, impacts and trade-off analyses done with AoW1.3, the benefits of providing socially and economically viable mitigation strategies will be assessed and promoted. AoW4.1, together with AoW1.2, AoW1.3, and AoW5.5 (Making carbon markets work for low-income communities), will support government and NGO stakeholders in their efforts to prevent carbon losses, build carbon stocks, and restore landscapes, while enhancing biodiversity.

AoW4.2 Meeting 2030 methane targets

Livestock and rice are major drivers of global methane, a GHG with a relatively short life in the atmosphere and, therefore, a priority for rapidly reducing atmospheric warming and the focus of international mitigation initiatives (Jackson et al. 2024). Together with local and country partners, we will co-develop new socio-technological bundles for rice, livestock and also aquaculture systems that decrease methane emissions. We will build on successful but isolated mitigation technologies by integrating them with innovations from other Programs and assess other SDG-related benefits (e.g., on human, animal, and soil health, profitability, gender equity, and biodiversity) (Elias et al. 2021). We will further identify the best incentive structures for these advanced bundles using behavioral economic research. With AoW5, we will work with organizations supporting small-scale producers and development partners to create the evidence base, institutional awareness, and agency for policy makers to effectively act. We will build strong local partnerships for transdisciplinary action research, social inclusion, and capacity strengthening, including at sites established by the Low-Emission Food Systems Initiative and AoW3. AoW4.2 will work closely with AoW1.3 and AoW4.4 to support the local measurement and tracking of methane emissions that will also serve as a traceability function for low-carbon certified products and markets.

AoW4.3 Low-emission food systems (LEFS)

Food systems account for ~1/3rd of global GHG emissions and food system actors can foster low-emission development (LED) across the value chain. AoW4.3 will link with governments, private sector actors, and civil society organizations to develop knowledge and identify push-

and pull-mechanisms (i.e., business and finance models, policies, and institutional agency) for emerging and integrated LEFS innovations and low-carbon emitting nature-based approaches. Research will focus on reducing food loss and waste, circular and closed loop systems, local food systems, trade and emissions accounting, emission offsetting via the use and scaling of clean energy technologies (solar irrigation pumps, agrivoltaic systems), and precision nutrient management to reduce nitrous oxide emissions, with the goal of empowering food system actors to accelerate the transition to clean energy and low-emission food systems through market and non-market drivers. We will foster stronger climate commitments by the private sector (e.g. through voluntary agreements, strengthening global food commodity platforms, and voluntary carbon markets) and work on transparent approaches to reduce food system emissions. *Ex ante* impact assessments (e.g., on gender, equity, jobs, nutrition) will evaluate promising options in the context of future climate and market scenarios and scaling opportunities in close collaboration with AoW 1.3.

AoW4.4 Data and digitizing monitoring, reporting and verification (MRV)

The lack of data and accurate, transparent and cost-effective MRV systems for emission monitoring is a major barrier to the implementation and scaling of low-emission innovations in LMIC FLW systems (Rosenstock and Wilkes 2021; Luedeling et al. 2022). AoW4.4 will develop publicly accessible, big-data platforms for MRV of low-emissions farming at a range of scales: for countries to develop Tier 2 and 3 national GHG inventories; for private sector and value chain actors to quantify GHG emissions from the farm to the consumer for transparency and accountability; and for small-scale producers and communities to manage low-emission practices with user friendly MRV tools while gaining access to carbon markets. The platform will use the expertise, tools, and data from the CGIAR together with those available with national partners to establish big-data and remote sensing analytics and capacities for their use. New methods will be developed to measure emissions using remote and proximal sensing bolstered with AI and field verification including local capacity to cost-effectively verify emission reductions according to Article 6 and VCM standards. These methods will be applied to overcome the data gaps common in most LMICs, automate and update data in real time, support integration with larger digital information systems, advance models for estimating emissions and ultimately attract new forms of finance to rural food systems transformation supporting AoW5.5 (Vermeulen et al. 2018). The resulting low-cost MRV and data will contribute to the global stock take (2029) and improve access to finance, technical advisories, and benefits from carbon markets and higher value markets.

AoW4.5 Just transition through equity in mitigation action

Climate goals cannot be achieved without a just climate transition in FLW systems. Yet mitigation action often compounds and widens inequities in marginalized groups' access to resources, technical options, and benefits (Farnworth et al. 2017). Marginalized groups tend to be ignored or receive lower levels of mitigation benefits, while also being the most vulnerable to losing livelihood options due to mitigation policies (Huyer et al. 2024). To address this gap, AoW 4.5 complements AoW1.2 by focusing on women and youth as vulnerable populations whose participation is critical to the transformation toward a low-emissions economy. AoW4.5 will develop science-based policies, institutions, and interventions to increase women's and youth's agency, influence, and access to mitigation-related climate finance, technical options and benefits. Analysis of intersectionality and related barriers and opportunities for social inclusion will inform scaling in AoW4.1, 4.2 and 4.3 (Huyer et al. 2024).

6.4.4 High-level outputs

- Evidence and partnerships to inform low-emission development strategies, supported by incentives, policy, and private sector engagement across farms, forests, grasslands, and coastal landscapes (AoW4.1)
- Integrated socio-technological bundles co-developed and piloted with national partners to reduce methane emissions in livestock, aquaculture, and rice, contributing to 2030 NDC and GMP targets (AoW4.2)
- Evidence and partnerships to inform low-emission food systems strategies including closed-loop production systems, improved nitrogen-use efficiency (NUE), minimized food loss and waste, clean energy, and dietary shifts co-developed and tested with private, public and civil society sector stakeholders (AoW4.3)
- A public good, state-of-the-art digital platform for the MRV of low-emissions farming to support mitigation efforts from farm to national scales (AoW4.4)
- Policies, institutions and interventions to increase women's and youth's agency, influence and benefits from mitigation action (AoW4.5)

6.4.5 Theory of change

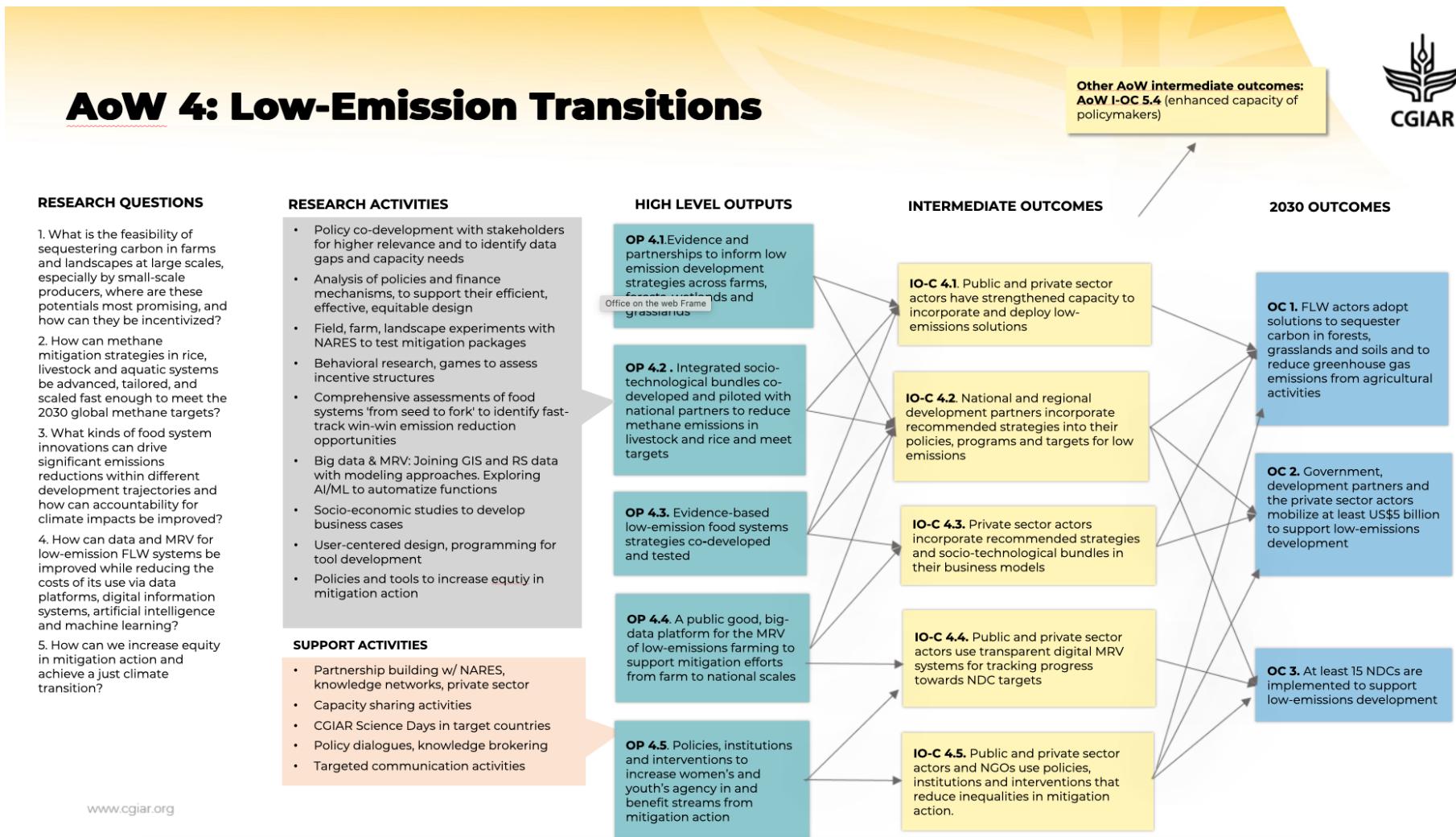


Fig 6.5. AoW4 Theory of Change visual

6.4.6 Partnerships

AoW4 will build strong partnerships with NARES for the co-development, refinement, and adjustment of innovation bundles and equip champions who integrate findings into policy with the necessary capacity. New strategies and approaches will be closely aligned with national and sub-national governments as the main users who will facilitate lasting impact at scale. Various partnerships with big food and energy companies and their umbrella organizations have been established under the Initiatives and will be crucial to drive down food system emissions according to findings and innovations from AoW4.3. New private sector partnerships will be sought in view of carbon investment which innovations in AoW4.1, 4.2, and 4.4. will stimulate. The collaboration with ARIs will be particularly important for the advancement of digitized MRV.

Table 6.4. AoW4 outputs and outcomes

ToC Element #	Statement	Partners (including internal) and roles	Assumption (for outcomes only)	Indicator and target (for 2030 outcomes only)
OP 4.1	Low-emission development strategies across farms, forests, grasslands, and coastal landscapes	ARIs, rural communities, private sector actors, Ministries of Ag., Env., Climate, Landscapes Program		
OP 4.2	Integrated socio-technological bundles co-developed and piloted with national partners to reduce methane emissions in livestock, aquaculture, and rice	NARES, rural communities, private sector actors, relevant Ministries of Ag., Env., Climate, SAAF Program, Sustainable Farming Program		
OP 4.3	Evidence-based low-emission food systems strategies co-developed and tested	NARES, ARIs, rural communities, private sector actors, relevant Ministries of Ag., Env. Climate		
OP 4.4	In three key LMIC target regions, the creation of a public good, big-data platform for the MRV of low-emissions farming	NARES, ARIs, private sector actors, relevant Ministries of Ag., Env. Climate, Digital Accelerator		

OP 4.5	Policies, institutions, and interventions to increase women's and youth's agency in and benefit streams from mitigation action	Grassroots women's organizations, governments, Gender Accelerator, private sector		
IOC 4.1	Public and private sector actors have strengthened capacity to incorporate and deploy low-emissions solutions	NARES, CapSha Accelerator	Methods, technologies address NARES and private sector needs and context. Complementary capacity development activities and resources from other development actors are consistently provided to public and private partners.	
IOC 4.2	National and regional development partners incorporate recommended strategies into their policies, programs and targets for low emissions.	Ministries of Ag., Env. Climate, NARES as national champions, NGOs, dev. partners, donors	Relevance of data, tools, methods, to sector needs and local context. Relevant engagements with partners and stakeholders that support change.	
IOC 4.3	Private sector incorporate recommended strategies and socio-technological bundles in their business models	Private sector value chain actors	Private sector partners have enough resources to support incorporation of new strategies and/or explore new services and products. Private sector partners are convinced of the viability of AoW4-promoted strategies.	

IOC 4.4	Public and private sector actors use transparent digital MRV systems for tracking progress towards NDC targets	NARES to bridge research to private sector actors, relevant Ministries of Ag., Env., Climate	Relevance of data, tools, methods, to sector needs and local context. Relevant engagements with partners and stakeholders that support change.	
IOC 4.5	Public and private sector actors and NGOs use policies, institutions and interventions that reduce inequalities in mitigation action. approaches	Governments, Gender Accelerator, Private sector actors, NGOs	Approaches are easy to adopt and seen as overall beneficial by marginalized populations.	
2030-OC 1	FLW actors adopt solutions to sequester carbon in forests, grasslands and soils and to reduce greenhouse gas emissions from agricultural activities	National governments, Ministries of Env. and Climate	Solutions developed for action are supported by incentives, available finance and policies.	15 countries meeting their NDC targets; NDC stock-taking and GHG inventories show reduced emissions as pledged by countries
2030-OC 2	Government, development partners and the private sector actors mobilize at least US \$10 billion to support low-emissions development	Min. of Ag, dev. partners, NGOs	Relevance of data, tools, methods to sector needs and local context. Relevant engagements with partners and stakeholders that support change.	Initiatives, projects, Programs, measures in target countries achieve combined 1 gigaton CO2e by 2030

2030-OC 3	At least 30 NDCs are implemented to support low-emissions development	IFIs, dev. partners, national ministries. AoW5, Scaling Program	Socio-technological bundles receive positive feedback from producers and other stakeholders (are aligned with development priorities, have effective business models attached, bring along other benefits) Investors, program developers are and convinced of overall benefits and effectiveness of socio-technological bundles	Mobilizing ca. \$5 billion in new climate investments
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6.5 Finance and policy for scaling solutions

6.5.1 Ambition

Despite commitments to climate action, scaling solutions for FLW systems remain constrained by fragmented policy and limited investment (Chiriac, Vishnumolakala, and Rosane 2023). Addressing these concerns is critical to achieving food systems transitions that align with national development goals and international climate targets. AoW5 supports the development and reporting of national climate policies and the integration of climate considerations into sectoral policies. Additionally, AoW5 will provide insights to improve access to both public and private finance, including new financial instruments like the Loss and Damage Fund. Using translational science, the AoW will translate complex data into decision-ready insights and tailored analytics for both policy and finance decisions while addressing data gaps. Special focus will be placed on just transitions, ensuring marginalized populations and fragile states benefit from these efforts equitably (Paglialunga et al 2022; Bryan et al. 2024). AoW5 builds on outputs from other AoWs, including adaptation and mitigation priorities (AoW1.3), national CIS roadmaps (AoW2.4), and low-emission business models (AoW4), and will be operationalized through strategic collaboration with governments, financial institutions, and private sector entities. By 2030, AoW5 aims to support 85 policies and mobilize US\$10 billion in adaptation and mitigation investments.

6.5.2 Research questions

1. What methods and information can strengthen national climate policies and sectoral policies for scaling inclusive climate-resilient and low-emission development while limiting the potential for maladaptive programming?
2. How can analytical tools meet the investment criteria of multilateral funds and development finance institutions to improve the bankability of projects?
3. Which financial instruments and models can reduce investment risks and attract private sector capital into climate-resilient and low-emission projects that benefit small-scale producers and marginalized communities?
4. What methodologies can build the evidence base for Loss and Damage finance and inform equitable allocation of resources?

5. What elements and frameworks are needed to create scalable carbon markets that ensure equitable benefit-sharing?

6.5.3 Description of sub-areas of work

AoW5 focuses on policy and finance. Policy efforts support the development and reporting on national climate policies and integration of climate consideration in sectoral policies (AoW5.1). Finance efforts target large-scale climate and development finance (AoW5.2), private sector investment in climate action (AoW5.3), Loss and Damage (AoW5.4) and carbon markets (AoW5.5). Research will be conducted for and within engagements with users. Each engagement refines our theory of change by delivering cutting-edge, stakeholder-driven, and context-specific solutions.

AoW5.1 Supporting and reporting on national climate policies

National climate policies like NDCs, NAPs, and LT-LEDS form the backbone of most countries' climate action plans. However, gaps in capacity, data limitations, and technical complexity hinder policy design and implementation (Nowak et al. 2024). AoW5.1, with AoW1.5, will support planning and delivering on climate goals by secondments of CGIAR experts to key institutions, coordinated through a CGIAR Climate Policy Working Group. These experts will collaborate with country teams to deliver science-driven analytics leveraging insights from AoW1.3 (risks and emission data) and AoW1.4 (synthesis), and innovations from across AoWs2-4 and CGIAR Programs. Tailored analyses, such as marginal abatement cost curves, policy coherence and cost-effectiveness assessments, and development of science-based targets will ensure CGIAR inputs are actionable at national and sectoral levels. Specific attention will be directed toward impacts and benefits for underrepresented groups, including women, youth, and small-scale producers, such as considering social cohesion, peace, and migration. Collaborating with other CGIAR Programs, AoW5 and AoW1 approaches will provide essential input for sectoral policies in agriculture, water, energy, and more, where climate change is likely to reduce their effectiveness and/or they may exacerbate emissions. To improve reporting, AoW5.1 will develop approaches and capacity building to support national GHG inventories and tracking and reporting on the Global Goal on Adaptation, complementing AoW4.4 sub-national efforts, and link these with less-explored dimensions such as peace and migration. Additionally, capacity-building initiatives will enhance skills for implementation of reporting systems. Emerging policy topics, such as non-market mechanisms from Article 6, will also be explored to advance new political pathways for climate action.

AoW5.2 Informing climate and development finance

Climate and development finance mechanisms, such as the GCF and IFIs, are critical for achieving climate goals. AoW5.2 will build on the foundational analytics in AoW1.3 to deliver science-driven analytical support to ensure national project proposals leverage the latest climate risk, emission, and equity data. AoW5.2 will conduct cost-benefit analyses of mitigation and adaptation interventions, and advanced financial models that identify potential high-impact projects and maladaptation risks. We will specifically support social equity and inclusion and target fragile states such that climate finance can address adaptation in conflict-afflicted and vulnerable areas (Queiroz et al. 2021). Working directly with financial institutions and Scaling for Impact, AoW5.2 will ensure that our tools and analytics meet the investment criteria such as the GCF's climate rationales and Multilateral Development Bank (MDB) guidelines. This approach will ensure that AoW5.2 scientific evidence fits seamlessly into institutional workflows, improving the bankability of climate finance proposals. Through capacity-building initiatives, we will empower countries and direct-access entities to better access climate and development finance.

AoW5.3 Increasing private sector investment in climate action

The global climate finance gap is vast, with trillions needed to achieve climate goals by 2030 in LMICs (UNFCCC 2024). Public funding alone is insufficient, making private sector

investment crucial for scaling climate solutions. However, challenges such as perceived risks, uncertain returns, and the lack of scalable business models persist. AoW5.3 will leverage CGIAR's local knowledge, FLW expertise, and advanced climate analytics to identify and build bankable projects that directly benefit small-scale producers, marginalized communities, and local economies. This research will focus on developing financial models that quantify the economic value of adaptation, ROI, payback periods, and scalability to assess the viability of interventions such as nature-based solutions and solar-powered irrigation. We will also consider the socioeconomic impact on different groups to ensure equity and opportunity, as well as the investment risks posed by lack of social cohesion, conflict, and migration. Collaborating with Scaling for Impact and working with financial institutions such as impact investors, commercial banks, corporations, and Environmental, Social, and Governance (ESG) investors, AoW5.3 will provide scientific input into the design of blended finance models, finance facilities, financial instruments for climate risk management, and risk quantification tools to de-risk investments. This will create favorable conditions for private sector participation, while linkages with AoW5.2 will ensure alignment with public sector resources to further unlock capital for climate adaptation and mitigation efforts.

AoW5.4 Operationalizing loss & damage

Marginalized and vulnerable communities, particularly in fragile and conflict-affected regions, disproportionately suffer from climate impacts, yet existing climate finance mechanisms often fail to address their needs ("Financing a Greener Future" 2023). This gap is especially critical in the context of a just transition, where the Loss and Damage mechanism is intended to play a pivotal role. AoW5.4 will develop and test methodologies like event attribution, remote sensing, participatory methods, and vulnerability mapping to provide evidence of losses and create a scientific foundation for Loss and Damage finance in LMICs (Engdaw et al. 2024). Tools will be co-designed with governments and communities ensuring outputs inform policy instruments and aligned with AoW5.1. These methodologies will also aid the design of financial instruments like sovereign insurance and disaster risk finance tools, to optimize resource allocation by international bodies, including the Loss and Damage Fund and Africa Risk Capacity.

AoW5.5 Making carbon markets work for low-income communities

Carbon offsets from agriculture and food systems account for only 1% of voluntary and 2.3% of compliance markets (Ecosystem Marketplace 2022), with funds largely inaccessible to smallholder farmers and marginalized communities. AoW5.5 will design mechanisms to enhance equity in carbon markets by reducing transaction costs, simplifying MRV protocols, and integrating local stakeholders in monitoring. Leveraging advanced MRV systems (AoW4.4) and financing strategies (AoW5.2, 5.3), AoW5.5 will create scalable frameworks for carbon offset projects that align with smallholder socio-economic realities. We will explore nested aggregation models to bundle smaller projects, reduce costs, and develop financial tools to manage market volatility. Governance protocols will ensure benefits reach marginalized groups, including women and youth, with third-party auditing to guarantee transparency. Continuous capacity-sharing will build local technical literacy and facilitate long-term participation in carbon markets, focusing on successful GHG sources like avoided deforestation and grassland management while exploring new areas like enteric emissions with high smallholder potential.

6.5.4 High-level outputs

- Country-specific evidence and tools that support the design, tracking and reporting of national climate policies (AoW5.1)
- Analytical tools and frameworks that enhance access to climate finance (AoW5.2)
- Innovative finance models that increase private sector engagement in climate resilience and low emissions development projects (AoW5.3)
- Methodologies and evidence to operationalize the Loss and Damage Fund (AoW5.4)

- Proven and scalable frameworks for carbon markets that enhance participation and benefit-sharing for smallholders (AoW5.5)

6.5.5 Theory of change

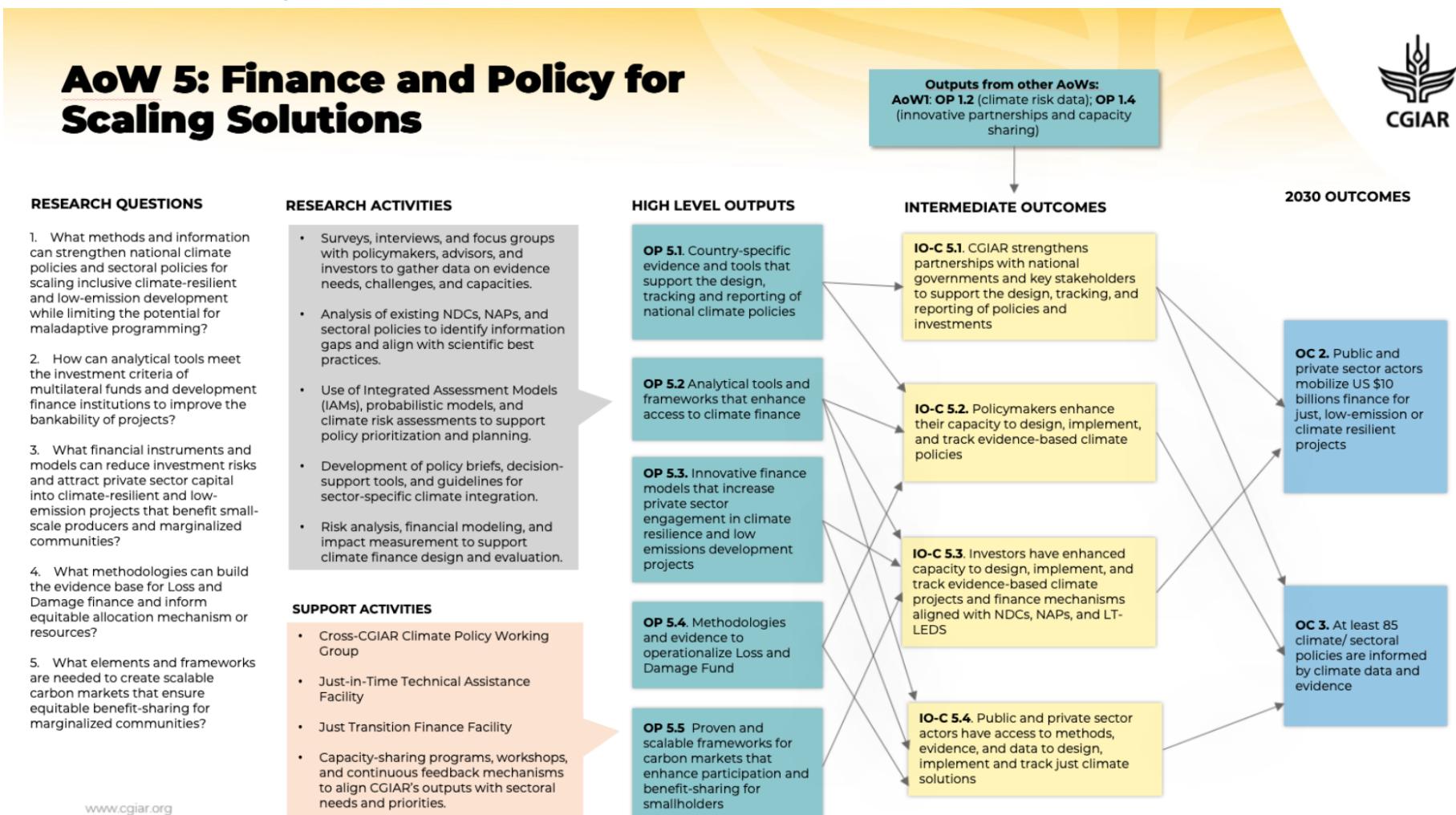


Fig 6.6. AoW5 Theory of Change visual

6.5.6 Partnerships

AoW5 will establish strategic partnerships with key stakeholders in the public and private sectors. These include government ministries in LMICs responsible for designing and implementing national policies and influential NGOs and think tanks such as the Global Center on Adaptation that support policymakers and amplify science-based messages on global platforms. Collaborations with IFIs such as the World Bank, African Development Bank, and GCF are key sources of large-scale finance. Private sector partnerships will focus on philanthropies, commercial banks, corporations, and impact investors in agribusiness, particularly those developing financial instruments. CGIAR will also collaborate with research organizations like World Weather Attribution and universities to leverage technical expertise.

Table 6.5. AoW5 outputs and outcomes

ToC Element #	Statement	Partners (including internal) and roles	Assumption (for outcomes only)	Indicator and target (for 2030 outcomes only)
OP 5.1	Country-specific evidence and tools that support the design, tracking and reporting of national climate policies	National ministries coordinating climate policy formulation, local governments formulating subnational climate policies, CGIAR Programs		
OP 5.2	Analytical tools and frameworks that enhance access to climate finance	International finance institutions, Multilateral Development Banks (MDBs), Green Climate Fund (GCF), and national partners (governments)		
OP 5.3	Innovative finance models that increase private sector engagement in climate resilience and low emissions development projects	Scaling Program, Impact investors, commercial banks, corporations, ESG investors advisory groups and investor coalitions and organizations supporting private sector investment in climate action International finance institutions, Philanthropies, GCF, CGIAR Programs		
OP 5.4	Methodologies and evidence to operationalize the Loss and Damage Fund	UNFCCC parties, Loss and Damage Fund, civil society, research partners (e.g., World Weather Attribution)		

OP 5.5	Proven and scalable frameworks for carbon markets that enhance participation and benefit-sharing for smallholders	Local communities and farmers, Philanthropies, audit and certification bodies,		
IOC 5.1	CGIAR strengthens partnerships with national governments and key stakeholders to support the design, tracking and reporting of policies and investments	Regional, national, and subnational multi stakeholder forums/platforms	Governments and stakeholders prioritize climate action and are willing to collaborate with CGIAR for policy and investment improvements	
IOC 5.2	Investors have enhanced capacity to design, implement, and track climate policies and finance mechanisms aligned with NDCs, NAPs, and LT-LEDS	IFIs, International Organizations, Direct Access Entities, impact investors, corporations, regional bodies such as AU and countries advisors, Scaling Program	Adequate resources, training, and institutional support is provided to align investments with national and global climate goals	
IOC 5.3	Public and private sector actors have access to methods, evidence, and data to design, implement and track climate just solutions	Ministries responsible for matters related to climate change, finance, and agriculture, Scaling Program, think tanks, IFIs, Philanthropies, Impact investors, Corporations	Reliable evidence is accessible, and there is a commitment to integrating it into policy and investment decisions	
IOC 5.4	Policymakers enhance their capacity to design, implement and track evidence-based climate policies	Ministries responsible for matters related to climate change, finance, and agriculture, Scaling Program, think tanks	Access to reliable data and expertise, adequate resources, training, and institutional support are provided	
2030-OC 2	Public and private sector actors mobilize US \$25 billions new finance for just, low-emissions climate action and transitions)	IFIs, impact investors, corporations, Accredited Entities helping countries access funds under UNFCCC financing mechanisms (e.g., UNDP, FAO), Scaling Program, NGOs	Data and evidence are sufficient foundation to inform and unlock investments	US\$10 billion

2030-OC 3	At least 85 new climate/ sectoral policies are informed by climate data and evidence	Ministries of environment, finance, agriculture, and other sectors, National Statistics Agencies/Bureaus, Regional political bodies, Policy Program, National governments, think tanks, advisors	Climate policies such as NDCs, NAPs, and LT-LEDs are political important and drive on-the-ground activities, availability of adequate financial resources required to support policy formulation	85 policies
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7. Country integration

7.1. Example of integration in India

How is the Climate Action Program co-designed with key stakeholders and the Scaling for Impact Program to respond to local demand? ICRISAT organized a set of stakeholder processes (listening sessions) in early 2024 to gather national perspectives on how the CGIAR Climate Programs/investments can contribute to a country's agricultural and food system goals. The perspectives from these engagements have influenced AoW focus (building on the strong climate agenda underway in India), the likely partnerships (especially for scaling and policy influence) in target geographies. We propose to continue this co-design and engagement process via the establishment of a national steering and expert technical committee to guide the work plan and respond to evolving needs using demand signaling and activity (re)prioritization in collaboration with the Scaling for Impact Program.

How will the Climate Action Program work be embedded in national and/or regional policies, strategies, programs, priorities, and processes? CGIAR's Climate Action Program builds on CGIAR's long-standing partnerships, particularly with the Indian Council of Agricultural Research (ICAR), national and state ministries, the academic system and NGOs. This helps ensure Program alignment with agricultural policies focused on poverty alleviation, environmental sustainability, and productivity growth under climate change. These strong partnerships support program efficiency through bundling, piloting, testing, and scaling innovations in climate adaptation and mitigation through various AoWs. Leveraging CGIAR's physical presence, the Program promotes co-planning and resource-sharing, while encouraging South-South exchanges to amplify its impact. Several contributing CGIAR Initiatives (e.g. NEXUS Gains, Mitigate+), past CGIAR research Programs (CCAFS, WLE), and bilaterally supported activities with ICAR, ministries, and state funded missions) have led to significant impact on the country's climate resilience of FLW systems.

How are country lessons from the 2022-2024 Portfolio (including regional/country partnership and engagement structures) integrated? We have integrated lessons on infrastructure sharing, enhanced South-South learning events, enhanced collaboration with private sector entities, especially digital for scaling and energy companies, and better integration of stakeholders such as Farmer Producer Organizations or Water User Associations into CGIAR Initiatives. Further, the Initiatives advanced climate data analytics and climate modeling and put a greater focus on the role of mitigation. Due to India's ample human capacity in most areas of climate science, the role of CGIAR in India is on supporting accelerated delivery of science, and to focus on areas of science which may be lagging (e.g., GESI, mitigation action), and to play the role of a regional knowledge broker facilitating multi-

country collaborations (e.g., regional policy, maladaptation, governance of water resources etc).

How will CGIAR work alongside specific local and other partners? Listening sessions highlighted key development demands at the state and district level and expectations of collaboration between CGIAR and partners. CGIAR anticipates fostering research innovations with scalable models for various technologies and practices that national partners can adopt and implement. Active participation in research by a vast network of local research and development centers who provide resources and local expertise will accelerate the achievement of the Program's goals. CGIAR's role as a facilitator and catalyst for partnerships, convening collaborations across sectors and geographies, was underscored as an essential role for innovation and knowledge exchange. Collaboration with stakeholders in understanding demand, refining research, influencing policies, prioritizing areas of study, leveraging of NARES technologies, and use of national expertise, highlights the importance of shared ownership and co-creation.

How will the Program link with other Programs/Accelerators for more effective scaling and impact in this geography? The Program will link with other Programs/Accelerators by leveraging synergies across AoWs. Integration of CGIAR's climate-focused strategies with the Multifunctional Landscapes and the Sustainable Farming Programs enhances the resilience of agro-ecosystems. The tools of the Digital Transformation Accelerator facilitate precision farming and climate monitoring. The Sustainable Animal and Aquatic Foods Program enhances diversification and provides climate-adapted species, contributing to nutrition security. Linkages with the Gender Equality and Inclusion Accelerator help ensure that vulnerable groups actively participate in scaling solutions. Further, collaboration with the Better Diets and Nutrition Program supports stronger linkages between nutrition and climate action.

7.2. Overview of selected work in top 15 countries

CGIAR Region	Country	Specific Geographies	Major Production systems	Area of work	Program and Accelerator collaboration***
CWANA	Sudan	Nile River Basin	Wheat, groundnut, pearl millet sorghum	AoW1-3, AoW5	FF&S, Breeding for Tomorrow
WCA	Nigeria	Guinea savanna, humid forest agro-ecological zones	Sorghum, pearl millet, groundnut, livestock cowpea maize, fisheries/aquaculture	All AoWs	SF, SAAF, Breeding for Tomorrow, Genebanks, Landscapes
ESA	Ethiopia	Ethiopian Highlands	Coffee, Enset, maize, bean, teff, livestock, chickpea	AoW1-3, AoW5	SF, Landscapes; Breeding for Tomorrow
SA	Pakistan	Indus River Basin	Irrigated cropping, wheat-rice, fisheries	All AoWs	SF, Landscapes
ESA	Kenya	Rift Valley, Semi-arid Regions	Mixed farming, horticulture, Pigeonpea, sorghum, millet	All AoWs	SF, Landscapes, Breeding for Tomorrow
ESA	Zimbabwe	Highveld Plateau, Middleveld	Maize-based, livestock, millets, pigeonpea	All AoWs	SF, Landscapes, Breeding for Tomorrow

SA	Bangladesh	Ganges-Brahmaputra Delta	Rice-wheat-vegetable, aquaculture, fisheries	All AoWs	SF, SAAF, Scaling
WCA	Côte d'Ivoire	Mountainous forest, humid forest, forest-savannah transition and Sudano-Saharan savannah agro-ecological zones	Rice, cassava, cocoa, coffee, livestock, fisheries	All AoWs	SF, Breeding for tomorrow, Landscapes, SAAF
ESA	Tanzania	Central plateau	Maize-sorghum-bean, Pigeonpea, crop-livestock and pastoral systems	AoW1-3, AoW5	SF, Landscapes, SAAF, Breeding for Tomorrow
ESA	Zambia	Zambezi River Basin	Maize-based, mixed cropping, aquaculture	AoW1-3, AoW5	FF&S, SAAF
SA	India	Ganges Basin, Deccan Plateau	Cereals, dryland crops and inland fisheries and aquaculture	All AoWs	Landscapes, SF, Breeding for Tomorrow, SAAF
SEA	Cambodia	Mekong basin	Rice, rice-fish, mixed annual cropping , inland fisheries	All AoWs	SAAF, Scaling
SA	Nepal	Himalayan foothills	Terrace farming, mixed farming	AoW1-3, AoW5	Landscapes
LAC	Honduras	Highlands, Pacific Coast	Millet, groundnut-based	AoW1-3, AoW5	D&N
SEA	Philippines	Luzon, Mindanao	Rice-based, marine fisheries	All AoWs	SF

WCA	Senegal	Old and new groundnut basin	Pearl Millet, sorghum, groundnut, livestock	AoW1-3, AoW5	FF&S, SAAF, Breeding for Tomorrow
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*We plan to collaborate with scaling for impact and accelerators for all AoWs in all countries

** **Key Partners:** Key partners in each country include relevant ministries (agriculture, environment & climate change, finance, local govts, SMEs, NARES, ARIs, Private Sector, negotiators (e.g., AGNES), ISF advisors, UN bodies (e.g., UNDP, FAO, UNFCCC) and various stakeholder forums. Detailed information will be collated during the project Inception Phase.

*** **Acronyms:** SF - Sustainable Farming; SAAF - Sustainable Animal and Aquatic Foods; D&N - Better Diets and Nutrition; FF&S - Food Frontiers and Security.

8. Boundaries and linkages with other components of the portfolio

8.1. Boundaries

As all Programs and Accelerators are expected to make progress on the Climate Change Impact Area, the Climate Action Program will have linkages with all of them. As the central hub for CGIAR's climate expertise, the Climate Action Program coordinates climate-related activities across the Programs and Accelerators. This Program will be the primary source of critical data and analytics for prioritizing and implementing climate-related activities across all Programs. It will also develop, test, and scale system-wide climate innovations such as climate advisories, place-based research approaches, carbon in landscapes, and policy and finance mechanisms. While other Programs focused on specific components of food systems—such as Breeding for Tomorrow, Sustainable Farming, Sustainable Animal and Aquatic Foods, Multifunctional Landscapes, and Better Diets and Nutrition—will develop context-specific socio-technical solutions, this Program adapts these solutions and contextualizes them within FLW systems to enhance climate resilience and low-emission development. Additionally, the Climate Action Program provides data infrastructure, tools, and impact measurement frameworks to quantify the resilience and mitigation potential of activities from other Programs. The Policy Innovations Program, for example, broadly addresses all policies related to food system transformation, whereas this Program focuses on climate policies and incorporating climate actions into sectoral policies. We pinpoint areas where the risk of climate insecurity is likely to increase, while the Food Frontiers and Security Program takes a more comprehensive approach by addressing broader issues of fragility and conflict within FLW systems.

8.2. Linkages across the portfolio

An overview of linkages between the Climate Action Program and other Programs and accelerators is shown in Table 8.1 and summarized in the following sections.

8.2.1 Breeding for Tomorrow

Climate data and analytics from AoW1 will contribute to the Breeding for Tomorrow Program's prioritization of traits (biotic and abiotic), product profile development and identification of target geographies for climate-resilient, resource-efficient varieties tailored to specific production systems. This will strengthen the capacity to develop breeding pipelines using prioritized traits to secure climate-resilient and nutritious crops and trees.

8.2.2 Multifunctional Landscapes

Climate Action Program will collaborate to deliver landscape solutions that provide co-benefits for climate, environmental health, and biodiversity. AoW1 will help inform the design of climate-responsive landscape solutions, while Landscapes Program, as a place-based Program, will share methods for participatory action, governance research, and multi-stakeholder platforms.

8.2.3 Policy Innovations

The Programs will collaborate to integrate climate priorities within broader policy objectives by sharing data and information to deepen understanding of how climate impacts intersect with policy outcomes. While the Climate Program provides scenarios, data, voice amplification, and support for developing climate-aligned policies, Policy Innovations provides foresight

modeling focused on food systems and integrates climate scenarios into food systems policies and institutions.

8.2.4 Better Diets and Nutrition

The Climate Program will collaborate closely with the Better Diets and Nutrition Program to promote healthy and sustainable dietary choices as strategies for climate mitigation and improving human health. By leveraging knowledge of climate-vulnerable zones, probable transformations of agricultural productivity, and vulnerable populations from this Program, the Better Diets and Nutrition Program can prioritize better diets and nutrition in these areas.

8.2.5 Genebanks

Genebanks will leverage climate data and analytics in their conservation strategies, focusing on developing and preserving genetic materials that are well-suited to current and future climate by preserving FLW resources that can respond to climatic shocks and stresses. By providing climate-resilient and resource-efficient genetic resources, Genebanks plays a crucial role in climate action, enabling the design and implementation of effective adaptation and mitigation strategies across food systems.

8.2.6 Sustainable Farming

Insights from climate data and analytics will inform the Sustainable Farming Program for targeted recommendations, helping prioritize target geographies and farming systems for solutions. The Climate Action Program addresses climate security from a global perspective, localizing modeling and prediction tools for specific farming systems, which will then provide input to Sustainable Farming's adaptation and mitigation recommendations and help to evaluate the co-benefits and trade-offs of adaptation and mitigation interventions at scale.

8.2.7 Sustainable Animal and Aquatic Foods

Both the Programs will support each other by helping to track progress toward 2030 methane targets, supporting scaling, and providing tailored information on climate impacts and hotspots to inform development of improved breeds, climate-adaptive farming practices, and low-emission systems. The Sustainable Animal and Aquatic Foods Program will collaborate closely with AoWs 2 to 4 to develop context-specific adaptation and mitigation solutions and business models, and with AoW5 on scaling effective financial mechanisms and sharing system-specific narratives.

8.2.8 Food Frontiers and Security

The Climate Action Program will support the Food Frontiers and Security Program by offering climate data and platforms to assess vulnerability to climate-related challenges which can be used for humanitarian and peace policies. It will also develop tools and provide capacity-building to ensure investments address climate issues. The Climate Action Program will promote empowerment, equity, and justice, with a focus on migration and supporting frontier food systems (fragile, urban, and island).

8.2.9 Scaling for Impact

The Climate Action Program will collaborate with the Scaling for Impact Program to accelerate adoption of climate solutions. The Scaling Program will use a range of bundled solutions developed in AoW 2 to 4. The Scaling Program will support the Climate Action Program in designing resilient and low-emissions scaling strategies in shared countries. AoW5 will specifically work with Scaling to secure and manage large-scale investment for climate-

resilient and low-emission FLW systems to achieve UNDP Climate Action's 2030 Program targets.

8.2.10 Digital Transformation Accelerator

The Programs will work together to integrate advanced digital technologies to understand climate risks, support improved MRV, and disseminate climate solutions. The Digital Transformation Accelerator supports the Climate Action Program by providing tools and platforms for accessing climate and weather analytics, enabling the creation of climate-informed advisory services. It also provides computing hardware and software expertise for collection of data, modeling and weather downscaling. Together, they will co-design and co-invest with partners to develop accessible digital platforms for sharing climate information and solutions.

8.2.11 Capacity Sharing Accelerator

Both Programs will prioritize capacity building in interpreting climate-related data, empowering stakeholders to make decisions and amplify impacts. By working with country partners, both Programs will develop training programs and capacity building systems. Key actions include building a CGIAR community of practice, fostering international collaborations, supporting research, promoting South-South cooperation on climate actions, and training climate negotiators.

8.2.12 Gender Equality and Inclusion Accelerator

The Climate Action Program will work closely with the Gender Equality and Inclusion Accelerator to ensure that the mitigation and adaptation solutions needed for gender-transformative solutions are co-developed and scaled in multiple locations, and that they incorporate probable impacts from climate trends and extremes. Compatible methodologies and approaches for identifying hotspots of climate vulnerability will be co-developed, and solutions that address structural inequities and enhance women's and other marginalized communities' agency for action will be co-implemented.

Table 8.1. Overview of linkages of the Climate Action Program with other Programs/ Accelerators

Program and Accelerator	What the Climate Action Program provides	What the Climate Action Program receives	Mechanism of linkage
Breeding for Tomorrow	Climate analytics, impact modeling, foresight	Climate targeted product concept designs and target product profiles, climate-resilient varieties	Exchange data, tailored made information, co-design and co-investment in adaptation and mitigation strategies for climate resilient FLW system
Sustainable Farming	Climate hazard analysis, GHG mitigation frameworks	Adaptation and mitigation solutions	Shared outcomes, co-investment, Shared data platforms; joint research and monitoring systems
Sustainable Animal & Aquatic Foods	Climate impacts, hotspot analysis	Climate-smart innovations on SAAF	Exchange of data and information; co-investment; shared outcomes
Multifunctional Landscapes	Climate emissions data, joint development tools	Bundled climate solutions, advocacy support	Exchange methods, tools, and data; co-investment; joint activities

Better Diets & Nutrition	Low-emission food systems data, trade-off analysis	Healthy diets supporting climate goals	Exchange of data and information; joint activities in a subset of to be identified geographies.
Scaling for Impact	Adaptation and low-emission solutions	Tools and approaches for scaling solutions	Joint investment, shared output/outcomes
Policy Innovations	Climate policy guidance	Foresight modeling, food systems policy insights	Exchange of data and information; co-investment in a subset of to be determined geographies
Food Frontiers & Security	Climate data, tools for climate challenges	Empowerment, support for food systems in fragile contexts	Exchange of data, insights, tools, capacity building co-investments
Gender Equality and Inclusion Accelerator	Methodologies to identify climate vulnerabilities	Gender-responsive approaches	Co-development and implementation of solutions
Shared Capacity Accelerator	Climate data, resilient agriculture technologies	Capacity building, access to innovations	Joint efforts to empower stakeholders through capacity building, training programs, skill development, and knowledge dissemination.
Digital Transformation Accelerator	Climate/weather analytics, crop modeling	Digital tools and platforms for advisory services	Data exchange through agreed protocols as well APIs; joint development of products/use cases;
Genebanks	Climate insights, conservation strategies	Climate-resilient genetic resources	Exchange of data and information; Co-investment

9. Monitoring, evaluation, learning, and impact assessment (MELIA)

9.1. Monitoring, evaluation, and learning (MEL)

To support MEL, the Climate Action Program will develop detailed plans for each AoW during the Inception Phase, integrated into the performance management plan. These plans will include in-depth details on pooled funding and light information on bilateral activities, ensuring synergy and avoiding overlap. Progress will be tracked against AoW TOCs, with six-monthly reviews to assess achievements, learnings, and adjust TOCs, indicators, and outputs through adaptive management. Annual risk monitoring will review and reduce risks. The M&E process will focus on user engagement with climate-resilient innovations, capacity development, and accountability to ensure efficiency.

Performance will be monitored through data on: a) research output quality and quantity; b) partnerships and capacity sharing; c) communication activities; and d) resource mobilization. Established indicators will track progress against global targets. E.g., AoW2 will use WMO's EWS indicators, while AoW5 will use metrics from the Global Stocktake. Indicators will be updated to reflect ongoing discussions on the New Quantified Finance Goal and the Global Goal on Adaptation. The Program Management Committee will adjust pooled budget allocations based on MELIA results, and will be supported by one full-time Program Manager.

9.2. Impact assessment (IA)

This Program will assess contributions across all CGIAR Impact Areas, focusing on adaptation and mitigation by continuing IA studies from initiatives, deriving learnings from bilateral funding IA, and initiating new studies. Ongoing evaluations include an endline for a low-emission agroforestry training in Colombia (Low-Emission Food Systems), and mid- and end lines for clean energy interventions in South and Central Asia (NEXUS Gains). Bilateral evaluations include AICCRA's assessment of CIS and CSA in Senegal, Mali, Ghana, Kenya, Ethiopia, Zambia, and the GCF-funded CSICAP project in Colombia, covering CIS, climate-resilient technologies, and capacity development.

New evaluations will systematically cover all AoWs, focusing on the effectiveness, scalability, and impact of interventions. The following questions provide illustrative examples of such evaluations: For AoW2, this might include answering How do Digital Climate Advisory and Bundled Services and Early Warning Systems enhance smallholders' capacity to anticipate and mitigate climate risks? AoW3 will use impact assessment to identify maladaptation risks, such as increased emissions or intimate partner violence linked to adaptation action. AoW4 will assess the benefit streams from mitigation action for vulnerable populations. Finally, for AoW5, IA will test hypotheses linking climate policy to finance, and ultimately to resilience and mitigation outcomes; evaluating how effective policies drive finance flows, and how this finance fosters climate action. We will employ choice experiments, Randomized Controlled Trials (RCT), quasi-experimental designs comparing adopters and non-adopters, and high-frequency satellite information. Evidence on policy and finance mechanisms in delivering real-world climate impacts will be assessed through causal analysis, and qualitative methods, such as outcome harvesting across regions, to assess real-world climate impacts.

10. Capacity sharing

One of the pathways for impact in this Program is through capacity sharing activities to contribute to necessary changes in knowledge, attitudes, skills, and practices. Skill-based training, such as hands-on sessions on new technologies, will play a key role in this process. Additionally, exposure to a variety of capacity-building tools, including those focused on knowledge sharing and behavioral change, will help shift attitudes. Since all capacity-sharing activities will be co-designed, jointly implemented, and locally led, they will be well-targeted to address the most pressing gaps in knowledge and skills, driving meaningful and sustained improvements in climate resilience and the transformation of food, land, and water systems. Priorities for capacity sharing activities in this Program include such topics as: Advanced analytics to pinpoint climate change priorities for adaptation and mitigation (AoW1); Bundling of digital advisory systems with diverse services for farmers (AoW2); Local adaptation planning for local governments (AoW3); AI in the delivery of MRV for emissions reductions and carbon sequestration (AoW4); emerging issues related to the new Loss and Damage Fund, as requested by farmer organizations (AoW5); and role of national banks in mainstreaming climate adaptation in their lending portfolios to smallholder farmers (AoW5).

Capacity sharing targets three different actor groups to ensure the effective dissemination and adoption of climate solutions. The first target group includes farmers, pastoralists, fisherfolk and SMEs and all other direct users of our innovations and technologies. For these stakeholders, capacity sharing activities will be centered around the uptake of the latest climate-resilient technologies and approaches emerging from both this Program and other CGIAR Programs. These activities will focus on ensuring that the climate solutions developed by CGIAR are well understood by relevant stakeholders, facilitating their adoption when supported by further scaling efforts, for example, in the Scaling Initiative. The impact expected

from capacity sharing of this target group is adoption of these climate-resilient solutions, especially by communities and individuals most vulnerable to climate risks. The capacity sharing activity for this target group will prioritize those stakeholders with higher exposure to climate-related challenges, ensuring that CGIAR science reaches those who are most impacted by climate change. AoW3 on locally led adaptation will be particularly prominent in capacity sharing activities, but capacity sharing of this target group is also mainstreamed in AoW2 and AoW4. CGIAR will also bring in the necessary expertise and external scientific knowledge to support the adoption and scaling of climate-ready solutions, many of which will be co-designed with local stakeholders to ensure contextual relevance and effectiveness.

The second target group for capacity sharing will be policy makers from local to global levels. This will be focused on the necessary knowledge to drive policy change and improve the enabling environment for climate action, including through increasing financial flows to climate action. This target group also includes climate negotiators from various countries in the Global South. The objective of that capacity sharing will be to ensure that the latest scientific evidence informs their positions within UNFCCC negotiations. CGIAR's capacity-sharing activities for policy makers will be demand-led, responding directly to needs and requests. Capacity sharing for policy influence is a core function of the Climate Platform and that work will continue. AoW5 will provide much of the content-leadership related to options and solutions related to policy and finance to be fed into national to global processes, but will work closely with AoW1 which has a mandate for capacity sharing across the CGIAR, and for drawing out priorities and synthesis lessons across the CGIAR.

The third target group is CGIAR and NARS scientists, who will benefit from capacity-sharing activities designed to keep them up to date on the latest developments in climate science and policy (for example, through workshops with IPCC and Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) scientists for an update on latest assessment findings and contributing to gaps) as it relates to CGIAR's work, through mutual learning. In addition, there would be activities dedicated to enhance skills of CGIAR scientists to use the latest climate science to influence and inform climate policies across different scales. By continuously engaging in these capacity-sharing exercises, CGIAR will ensure that its scientists and their partners remain at the cutting edge of climate science and provide them with tools to influence policy decisions that are crucial for climate adaptation and mitigation. These activities are designed to equip CGIAR scientists and partners with the skills needed to translate scientific insights into impactful policy recommendations, facilitating broader systemic change across food, land, and water systems. This activity will be coordinated by AoW1.

11. Gender equality, youth and social inclusion

Global climate goals cannot be achieved without addressing climate justice in FLW systems, both to ensure gender and social inclusion as well as just livelihood transitions. Systemic inequality increases climate change challenges for vulnerable and marginalized people. Gender- and equity-blind climate action widens inequalities further. Climate shocks affect women's livelihoods in agrifood systems more than men's and their coping and adaptation options remain limited (Schipper et al. 2022). Women's work burden in agriculture increases relative to men's because of climate extreme events, such as heat stress (Nico and Azzarri 2024; Lee et al. 2021); and women are more likely to suffer production and income losses (FAO 2024). Rural women and girls fare worse on every human development indicator with data and face inequalities in access to resources that are essential for climate resilience, including climate information, digital tools, finance, and mitigation benefits (Bryan et al. 2023;

FAO 2023; Bryan et al. 2024; Sultana 2022). These trends demonstrate the need for attention to social inclusion in climate change research and point to where interventions are needed.

Formative research under the contributing CGIAR Initiatives also informs the Program. ClimBeR has an overall focus on social equity, including entry points to strengthening Indigenous Peoples' participation in climate policy processes (Hellin et al. 2024). Mitigate+ has addressed power inequities in access to mitigation benefits through the Living Labs for People Innovation and is implementing diagnostic research on linkages between the Women's Empowerment in Agriculture Index (WEAI) and climate mitigation. NEXUS Gains is similarly advancing the science on interlinkages between climate action and women's empowerment and has also developed tools to monitor equitable mitigation action, such as the Women's Empowerment in Energy Index (Alvi et al. 2023) and the Energy Inclusivity and Equity Score. The Climate Action Program will build on CGIAR research and other latest global science to tackle these injustices head on by co-developing participatory research around the following research questions:

1. What are the root causes of climate injustice and gendered inequalities in climate action in agrifood systems and how can these be addressed?
2. What enabling factors and interventions facilitate the empowerment of marginalized and vulnerable people, including women and youth to access options for climate change resilience, low-emission development and just livelihood transitions?
3. What equitable adaptation and mitigation action can reduce gender-related and other inequalities in agrifood systems?
4. How can we co-design CIS, LED incentives, innovative finance products and alternative livelihood options that are accessible and benefit youth, women and other marginalized producers?
5. How can we ensure that mitigation benefits poor producers and other value chain actors?
6. How can we promote a change in the global climate change discourse toward climate justice and just livelihood transitions?

AoW 1 on Prioritization and Coordination uses a climate justice lens to support future scenarios and research prioritization to promote social inclusion and just transitions. AoW2 on Digital Advisories co-designs CIS, EWS, and safety nets that de-risk production and livelihoods to service the needs of vulnerable small-scale producers and communities. AoW3 on LLA co-produces with local communities socially inclusive adaptation technologies and pathways. AoW4 on Low-Emission Transitions supports the active engagement of women and small-scale producers co-producing new technical practices. AoW5 on Policy and Finance works toward changing the climate discourse toward climate justice through directing policy and finance toward marginalized populations and supporting Loss and Damage assessment methods. Research outcomes in these five areas will contribute to increased climate resilience for millions of women who work in FLW systems and new opportunities for millions of youth for employment, education, or training.

The success of the Program's capacity to deliver research outcomes rests on identifying demand-driven research, working with deep, equitable partnerships—building on decades of CGIAR partnerships—and using active listening and trust with disenfranchised agrifood system actors, including grassroots women's organizations, Indigenous Peoples, youth, smallholder producers and other vulnerable groups. It also includes engaging gender, youth and inclusion departments in ministries tasked with climate action and participation in global processes that drive increased equality in FLW systems. The success also rests on making sufficient resources available to drive gender, equality and youth research, action, and outreach. For this we estimate needing a team of at least five specialists who directly support this and collaborate with other Programs and partners that want to turn around deep climate change inequities and injustices.

12. Climate change

This section does not apply to this Program as this proposal is all about climate change.

13. Risk management

Note: Risks will be finalized and mitigation actions will be developed as part of the risk management plan during the Inception Phase.

Table 13.1. High level risks, events, sources and consequences

Risk	Risk statement (event, sources, consequences)
1: Underestimated catastrophic buildup of climate hazards	Accelerated post-2030 climate change due to sudden events (e.g., Amazon tipping point) risks making CGIAR climate science irrelevant, driving away users and donors
2: Populism jeopardizes climate change responses	The rise of populist governments neglecting climate change could reduce climate funding, partner action, and overall impact
3: UNFCCC climate policy decisions delayed	Slow progress in UNFCCC processes (Sharm-el-Sheikh Work Programme on Agriculture; Enhanced Transparency Framework; NDCs) due to stalled negotiations is hindering global climate action, worsening effects on the global poor and the Global South, limiting CGIAR's impact
4: Short-term economic interests clash with climate interests	Conventional practices prove too profitable to incentivize sector actors towards transitioning to low-emission pathways
5: Climate induced displacement	Mass migrations from extreme climate events increase pressure on resources in recipient regions, altering emergency relief and CapSha needs

14. Funding sources

The Climate Action Program strategically advances CGIAR's climate action agenda through a combination of pooled and bilateral funding. In the first year, pooled funding will largely be used to continue to advance the most impactful science and partnerships initiated by the contributing Initiatives while new results-based management systems are adopted. Pooled funding will increasingly be used to target strategic catalytic new innovative research and drive emerging and high-risk/high-potential topics where funding is not yet available. Moreover, pooled funding will also support essential but lower-profile activities, like data infrastructure and program management costs, that are often overlooked by funders. Finally, small levels of funding will be used to enable contributing bilateral projects and Programs to seamlessly fit into the Program. Most pooled funding is envisioned to be used in Program prioritized geographies. By comparison, bilateral funding, which constitutes the largest source of funding for the Program, typically consists of specific in-depth, long-term, and large-scale research activities in either Program priority or other countries and regions.

Nearly 200 bilateral projects implemented by CGIAR Centers across the CGIAR mega-regions, with the total funding of \$167 million, have been mapped to the Climate Action

Program (Table 14.1; 14.2). Together with initial information on pooled funding, the CGIAR climate portfolio is valued at approximately \$200 million. While this highlights the significance of the Program and donor commitment, the 9:1 ratio of bilateral to estimated 2025 pooled funding reveals a significant imbalance, indicating that pooled funding allocated to this Program is quite modest. Moreover, while the Initiatives contributing to this Program are currently operating in 18 countries, we have identified 30 priority countries for the 2025-2030 Portfolio and note that the bilateral projects operate across 116 countries.

Table 14.1. Overview of the bilaterally funded projects mapped to the Climate Action Program

# Projects/Programs	CGIAR Center	Mapped Budget (kUSD)
31	ABC	74448
13	CIMMYT	35547
18	IWMI	14466
23	IRRI	9399
8	IFPRI	8297
11	WorldFish	6476
17	IITA	6063
7	ILRI	4572
7	CIP	4514
4	AfricaRice	2282
6	ICRISAT	1328
Total		167391

Table 14.2. Major bilaterally funded projects mapped to the Climate Action Program.

Project name	Funder Name	Lead Center	Mapped Budget (kUSD)
Climate-smart initiatives -Colombia	Colombia-MADR-Ministerio de Agricultura y Desarrollo Rural	ABC	48861
Crops to End Hunger	GIZ	CIMMYT	29179
Water Resource Accountability in Pakistan (WRAP)	United Kingdom-FCDO-Foreign, Commonwealth and Development Office	IWMI	8711
Accelerating Impact of CGIAR Climate Research in Africa	IDA-International Development Association	ABC	8529
Anti-methanogenic feedstock for livestock systems in global south	BMGF-Bill & Melinda Gates Foundation	ABC	8113
The Gender, Climate Change and Nutrition Integration Initiative (GCAN)	BMGF-Bill & Melinda Gates Foundation	IFPRI	5748

Asia Africa Bluetech Superhighway project	United Kingdom-FCDO-Foreign, Commonwealth and Development Office	WorldFish	4327
Mining useful alleles for CC adaptation	BMGF-Bill & Melinda Gates Foundation	CIMMYT	3498
Advancing Climate-Smart Technologies to Strengthening Rice Farming in Thailand	GCF-Green Climate Fund	IRRI	1708
Climate Smart Village+ Program for MILF Camps Transformation.	OPAPRU - Government of the Philippines	ABC	1707
Mining useful alleles for CC adaptation	Bill and Melinda Gates Foundation (BMGF)	IITA	1600
Groundwater for aDvancing Resilience in Africa (G4DR)	GEF-Global Environment Facility	IWMI	1500
Accelerating adoption of Reg Ag practices	FFAR-Foundation for Food and Agriculture Research	CIMMYT	1464
Multiple Harvest Rice for Africa	BMGF-Bill & Melinda Gates Foundation	AfricaRice	1413
Revival of Water Resources in Balochistan (Pakistan)	EU-European Union	IWMI	1227
Production of vitroplants and 2 greenhouses	The International Fertilizer Development Center (IFDC)	IITA	1208
The Adaptation and Valorization of Entrepreneurship in Irrigated Agriculture _ AVENIR	MEDA-Mennonite Economic Development Associates of Canada	ABC	1197
The Gender, Climate Change and Nutrition Integration Initiative (GCAN)	USA - USAID-United States Agency for International Development	IFPRI	1188
MILLETS in upland regions of Odisha for crop diversification, climate resilience and enhanced Food and Nutritional Security	India-Department of Agriculture and Farmers' Empowerment, Government of Odisha	ICRISAT	1070

Table 14.3 shows the budget breakdown by AoWs and HLOs under a baseline and a surge scenario. This budget breakdown is tentative, prepared based on the given budget scenarios. We estimate that fully implementing all AoWs across the 30 priority countries would require approximately 30% more funding than what is available under the baseline pooled funding scenario. However, we remain optimistic that the pool funding for this Program will increase due to potential interest from new donors beyond those currently funding the primary Initiatives mapped to the Program.

Significant consultation and analyses, including a detailed assessment of the contributions from initiatives and bilateral programs to individual AoWs and HLOs, will be required to finalize the budget breakdown, which will take place during the Inception Phase. During this phase, the team will undertake a rigorous prioritization exercise to align activities and the number of countries with the available budget. Additional funding, if secured, will be dedicated towards emerging areas of work, extending geographic priorities, enhancing equity across Centers, and supporting capacity-building efforts through awards for postdocs and associate scientists, while also fostering new partnerships.

In the final version, a Table 14.3 will be inserted here, showing the breakdown of pooled funding by Area of Work for different budget scenarios.

The pooled budget allocation across the five key AoWs in the incoming table reflects the initial scope and intensity of efforts to address climate challenges across FLW systems in priority countries. Approximately 19% of the budget is dedicated to **AoW1 Prioritization and Coordination of Climate Action** for coordination of climate action across the entire CGIAR through a front-desk function; integration of just transitions lens into its actions and strategies, hosting climate analytics for prioritization, and engaging in international policy processes.

Low-Emission Innovations receives around 25% of the budget, aimed at fostering scalable and inclusive solutions that balance climate mitigation with food security, resilient livelihoods, and environmental sustainability. About 26% of the budget is allocated to **Digital Advisories and Climate Risk Management**, which seeks to enhance resilience against climate risks across sectors and scales. This AoW leverages digital tools, early warning systems, and climate information services to support farmers and communities in managing risks and improving resilience. **Locally Led Adaptation** accounts for roughly 13% of the budget; it emphasizes community-driven strategies tailored to local vulnerabilities. This AoW empowers communities to co-develop and implement adaptation solutions that build long-term climate resilience.

Finally, 18% of the budget is directed towards aligning efforts on **Climate Policy and Finance**, focusing on translating scientific evidence into impactful policies and investments that drive large-scale climate action.

Annex - Pooled funding

It is important to note that, due to the limited guidance provided for managing pooled funding budgets from 2025 onward and ongoing adjustments to the Program structure following the two review and revision rounds, the details in this Annex should be considered a starting point for further analysis and discussion. Significant engagement and effort will be required during the transition phase to finalize the lists of continuing activities (Table A1) and prioritize new activities (Table A2). This is anticipated for several reasons. First, it is unclear whether and how the pooled funding for the Program may grow as a result of engagement with and decisions made by CGIAR Funders in their allocations (including designated funding). Secondly, the resolution of the proposal's Section 6 write-up (i.e., at sub-AoW) is insufficient to determine specific activities across target geographies. Notably, the new activity lists associated with this Annex are at a greater level of detail, making it challenging to determine whether all novel areas of the Climate Action Program proposal are adequately addressed. Third, existing Initiatives, which served as the primary organizing units for developing this Annex—could leave a potential gap in the Program's scope. Fourth, further reflection is needed on the 3-year achievements of the initiatives, the partnerships established, and the specific geographies and activities in the Program. Finally, there is limited visibility into the activities of the large bilateral projects mapped to Climate Action, making it challenging to fully identify synergies and suggest where pooled funding will be most impactful. Therefore, further engagement and in-depth analysis will be necessary to fully estimate the Program's funding requirements and recalibrate the relative pooled budgets across the Areas of Works presented below.

Introduction

This annex outlines the role of pooled funding in supporting the Climate Action Program from 2025 to 2030. Focused on a conservative baseline (Scenario 1), pooled funding will ensure the continuity of critical research, partnerships, and Initiatives established during the 2022-2024 cycle, including key successes from ClimBeR, Mitigate+, NEXUS Gains, Livestock and Climate, and the Climate Change Impact Platform. Approximately 80% of the pooled funding will be allocated to maintaining and scaling these foundational efforts, ensuring that proven Initiatives *continue* to deliver impact and drive CGIAR's climate goals forward (Figure 1). In addition, 20% of the pooled funding will be directed toward new activities, topics or geographies, with strong potential to generate significant outcomes, attract further investments, and enable clear shifts in focus of CGIAR Climate research. These new activities will support enhanced scientific collaboration and operational efficiency, addressing emerging challenges and opportunities within the global climate agenda. Should surge funding become available (Scenario 2), this would allow for accelerated growth into new research areas and an expansion of geographical and thematic coverage, building on demonstrated results and ensuring value for money. Together, these investments position the Climate Action Program to adapt to evolving climate challenges while maximizing its global impact, fostering both climate mitigation and adaptation.

Key aspects that will be funded by pooled

In 2025, approximately 65% of the baseline scenario budget is allocated to three critical Areas of Work (AoW): Prioritization & Coordination, Digital Climate Risk, and Low-Emissions Transitions. This distribution reflects the Program's prioritization of continuing core activities from Initiatives and the Climate Change Impact Platform. They have proven essential in providing data, tools, and capacity sharing that are foundational to CGIAR's future climate action (Table A1).

- Prioritizing and Coordinating Climate Action (receiving 25% of the budget) will continue to drive forward climate data modeling, foresight, greenhouse gas inventories, marginal abatement cost curves, and risk assessments, vital for anticipating climate risk and emissions “hotspots” and regions for priority action. This AoW also becomes the hub for training and capacity sharing for CGIAR Climate, though these functions also cut across AoWs. This AoW leverages outputs from Mitigate+ and ClimBeR initiatives, which contribute critical insights on emissions and climate risks and adaptation pathways. For example, efforts to understand the drivers of land use emissions or iFEED models of tradeoffs will continue to provide information and knowledge that provide the key inputs for governments and other decision maker to prioritize action. Efforts started under the Impact Platform to synthesize evidence as a key input into prioritization and decision-making as well as the Platform’s connections for training of various stakeholder for climate literacy will be essential
- Low-Emission Transitions (24% of the budget) builds on the substantial progress made under Mitigate+ and NEXUS Gains, focusing on reducing emissions across key production and land use systems (including rice, livestock, and deforestation), and enhancing sinks, by supporting national programs to be more effective and efficient. Continued work in locations such as Kenya, China, Vietnam, and Colombia will refine emission measurement techniques and mitigation strategies to support prioritization of actions, benchmarking, monitoring and reporting for Nationally Determined Contributions, the Bonn Challenge, value chain initiatives, etc. To support climate action planning and prioritization, new work will integrate emission reduction options with economic data to develop marginal abatement cost curves for national- and jurisdiction-level activities. Work will also be expanded to support national compliance on clean supply chain initiatives (e.g. the EU Deforestation Directive, EUDR) and protect small-scale producers. Living Labs for People operate in four countries and serve as collaborative, on-the-ground platforms for co-designing and implementing low-emission development approaches at scale with producers, land managers, governments, local civil society organizations, and the private sector. They receive considerable in-kind and material support from partners. Continued support is essential to achieving the objectives of this AoW. Key priorities for new work are to expand the focus on equitable sharing of costs and benefits of climate actions and on opportunities for locally appropriate, healthy diets with low emission profiles. Work on scaling and drivers of emissions has been developing work on the role of international trade on emissions with promising results. New activities in this area will be developed over the next 6 years. Following tool development and case study analyses NEXUS Gains will focus on scaling gender-responsive solar irrigation and other sustainable energy solutions for agri-food systems to enhance resource efficiency while reducing emissions and negative impacts on other key natural resources such as land and water. The Women's Energy Empowerment Index (WEEI) and the Energy Inclusivity and Equity Score (EIES) will be applied to locations with high energy insecurity to drive equitable investments. Research results on solar irrigation case studies from South Asia and Sub-Saharan Africa will be published and results will be integrated into national investment plans. Additional research will support government, private sector and civil society organizations to accelerate a rural green energy transition based on expressed stakeholder demand, such as by the Governments of Ethiopia, India, Nepal and Pakistan. By integrating mitigation strategies with food security, nutrition, and development goals such as peace building, these activities ensure that climate actions will support development.

National engagement has been growing and there is demand for more support from all our partner countries. Capacity building, both internally, and externally through the CLIFF-GRADS partnership with the Global Research Alliance, will also be continued as will many national and international partnerships.

- Digital Climate Risk (13% of the budget) focuses on scaling advisory services and early warning systems, which have become indispensable for climate-vulnerable farming communities. This AoW leverages the success of co-developed digital tools under initiatives like ClimBeR and Livestock & Climate, which have already shown promising results in countries such as Kenya, Senegal, Zambia, and Guatemala. These tools offer essential decision-making support for farmers, helping them manage climate risks, optimize water usage, and improve productivity in changing environments. The allocation to this AoW ensures that these existing digital solutions are continuously improved, enhanced with new technologies like AI-based recommendations, and adapted to meet the needs of more regions. As a scalable, demand-driven solution, DCAS represents one of the best opportunities to expand climate-smart practices quickly and efficiently, reducing risks for farmers and building resilience in agricultural systems. By focusing on approaches that target widespread access and use of critical information to support adaptive capacity and resilience, this AoW matches its methods with this Program's goal of reaching 100 million producers.

Note: Figure 1 will be inserted here.

Figure 1. Illustrative mapping of budgets (and activities) from 2022-2024 Portfolio to 2025-2030 Climate Action Program's Areas of Work. This figure is based on about 80% of the 2024 budgets and highlights the continuity of aligned Initiatives' work. It shows that activities prioritized for continuity by the Initiatives have found a home in the Program's structure. Furthermore, it illustrates the consolidation and coming together of streams of work creating greater coherence in the Climate portfolio and offering new opportunities for operational efficiency and impact. All budget values are provisional estimates intended to provide an idea of relative distributions based on continuity (see Table PA). Full accounting will be completed during the Inception Phase. Note that 'Climate Future' in V1 has been retitled 'Prioritizing and Coordinating Climate Action'.

The remaining 38% of the 2025 budget supports newer and complementary AoWs:

- Locally Led Adaptation (24% of the budget) will develop and scale community-driven adaptation strategies, drawing on the successful models developed under ClimBeR and NEXUS Gains. This AoW focuses on bundling services with capacity sharing, ensuring that local communities have the tools and knowledge to continuously adapt effectively to climate change. In regions such as Guatemala, Zambia, and Bangladesh, tailored adaptation approaches will address specific vulnerabilities, prioritizing resilience-building through risk reduction strategies such as diversification. These initiatives will leverage participatory action research and locally co-created solutions to empower local voices to guide decision-making processes. Formulation of this body of work into an AoW represents a new emphasis for CGIAR, as it firmly works to place decision-making power in the hands of local communities, ensuring that adaptation strategies are co-developed and implemented from the ground up, making CGIAR's work more responsive, inclusive, and impactful than before.
- Climate Transitions: Policy & Finance (14%) will unify CGIAR's various strands of work on climate policy and finance into a coordinated effort, focusing on leveraging

financial mechanisms and creating evidence-based policy solutions that drive climate action at scale. Building on Initiatives such as Mitigate+, ClimBeR, and NEXUS Gains and the Climate Change Impact Platform, this AoW will continue the work of generating critical country-specific evidence to set and deliver on their goals and supporting the negotiations. Furthermore, this AoW will engage key financial partners—like the Green Climate Fund, World Bank, and regional development banks—unlocking funding pathways for large-scale climate initiatives. A shift toward secondments, direct access facilities, and other innovations to get science into decision making processes, funding dependent, represents a new way of working for CGIAR, where scientific evidence is translated for directly influencing policy and finance, enabling a larger reach and greater impact through coordinated actions across regions.

Table PA. 2024 Financial Outlook for the aligned Initiatives/Platform. The amounts include the categories: indicated, confirmed, received, portfolio funding. It does not include carryovers & commitments and advance from 2023. Data is sourced from the CGIAR Financing Plan Dashboard (CGIAR 2024). Numbers are rounded and thus may not add up exactly. Because some institutions mapped less than the continuity principle (e.g., Mitigate+) and other more (e.g., Impact Platform), the table clearly shows that Climate Action and the Initiatives/Platform need to engage more intensively in the planning process for continuity and alignment for both continuing and new activities.

Initiative	2024 Funding (M US\$)	Mapped	Percent Mapped	Budgets for new activities	Total (Millions US\$)	% of 2024
Climate Change Impact Platform*	x	x	x	x	x	x
ClimBeR	x	x	x	x	x	x
Livestock & Climate	x	x	x	x	x	x
Mitigate+	x	x	x	x	x	x
NEXUS Gains	x	x	x	x	x	x

*The Impact Platform's 2024 budget does not match funding outlook because it received 250,000 GBP through W1 not reflected in website. Mapping in figure 1 above reduced to 80% of reported 2024 in line with Guidance V5 inclusion of all institutions receiving pooled funding and continuity principles.

**Livestock & Climate maps parts of three Work Packages to the Climate Program. Mapped is 20% of those activities.

NEXUS Gains maps all of its work under the Just Energy Transitions workstream and a small share of its work under the water productivity workstream to the Climate Program.

Pooled funding is critical for the success of Climate Action. It enables sustained effort beyond project-specific timelines, allowing the Climate Action Program to:

- **Be agile and responsive to emerging opportunities:** Pooled funding helps maintain financial flexibility, so that the Program can pivot quickly to capture new opportunities that arise due to shifts in the partnership landscape, technological advancements, or changing political contexts. Pooled funding allows the Program to adapt dynamically, ensuring that it remains relevant

and effective. Equal to moving into new opportunities is the ability to sunset activities when the efforts fail to progress. This flexibility is particularly important for work where conventional funding might be too rigid to respond effectively.

- **Maintain and scale assets:** CGIAR has a strong track record of developing cutting-edge tools and technologies, but there are often incentives to focus on creating new tools rather than maintaining and growing existing ones. Pooled funding can address this gap by ensuring that assets are sustained and improved. Maintaining these assets as they are applied in new regions or contexts can be just as important as innovation, and more cost effective. In some cases, this means previous bilateral may move toward pooled funding.

What is being stopped

Several activities were discontinued due to the Initiatives completing outputs with little to no follow-on activities required, changes in demand, and decisions to pursue more strategic priorities based on the potential for impact, added value to the Climate Action Program, and CGIAR's comparative advantage.

- **ClimBeR** completed several time-bound outputs through its Social Equity crosscutting theme (a social equity framework; gender case studies of climate security in five countries in collaboration with the Climate Security Work Package; a special issue in Current Research in Environmental Sustainability [CRSUST] on advancing transformative adaptation in food, land and water systems using a social equity lens). ClimBeR also began to develop a framework to track progress on the 'Leave No One Behind' principle of the 2030 Agenda for Sustainable Development through Work Package 4. However, due to the lack of data to develop indicators, this activity will also be discontinued. Due to changes in partner demand and changes in the involvement of specific partners, ClimBeR will no longer develop climate security investment plans nor an index to assess and compare climate security risks across geographies, while continuing the rest of the Climate Security agenda on Evidence, Policy, Programming and Finance (80% of the WP2 budget). However, we will continue to monitor changes in demand for these activities in case future 2041 opportunities arise. While most activities under ClimBeR will continue, the scope of these existing activities has been reduced to allow for exploration of new activities more aligned with this Program. These new areas include researching loss and damage attribution, scaling climate information services and climate security research in current and other regions, and locally led adaptation, conflict sensitive climate adaptation approaches among others.
- **Mitigate+** completed several preliminary assessment activities for national food systems, quantifying emissions, and assessing the feasibility of reducing emissions from several sources. Prioritization activities are complete, and teams are moving on to developing tools for monitoring progress on each national priority. The team has also completed the co-development of conceptual frameworks, situational analyses and stakeholder mapping with local partners for applied research in each of the Living Labs for People jurisdictions. Initially our planning focus was designed to support countries to develop Long-Term, Low Emission Development Strategies. However, over 75 countries have already submitted these plans to the UNFCCC, and others are near completion. We will stop this activity and focus on supporting the operationalization of these plans at jurisdictional and national scales. Our

- teams have co-developed several sustainability strategies for value chains with significant GHG emissions. The teams will transition to supporting stakeholders to implement these and monitor their success both in terms of GHG emissions and human wellbeing. We will, however, monitor the evolution of the European Union Deforestation Regulation and other initiatives and assess the need for additional strategy development.
- **Climate Change Impact Platform** All the functions and activities under the Platform will continue based on availability of funding.
 - **NEXUS Gains.** The following elements of WP3 under the NEXUS Gains Program will not be continued next year, as the specific activities have been completed: Baseline intra-household surveys on water, food, and energy security in India, Nepal, Pakistan, and Uzbekistan. Case studies on energy and gender dynamics in India, Ethiopia, and Pakistan, as well as on inclusive energy policy in Nepal have been completed. Development of the Women's Energy Empowerment Index (WEEI) and the Energy Inclusivity and Equity Score (EIES), both of which provide insights into women's and marginalized groups' access to clean energy. The assessment of two solar irrigation technologies in Nepal has been completed (solar-lift irrigation and solarization of deep tubewells). Tools for solar irrigation in South Asia, specifically the expansion of the tool from India to Nepal, and the Sub-Saharan African solar irrigation explorer have been developed. The Solar Irrigation Pump (SIP) sizing tool, an identified innovation of NEXUS Gains has been developed.

Potential new activities

In the absence of specific guidance on how to approach pooled funding budgets for 2025 and beyond, we sought suggestions from Initiatives for new activities under the assumption that they, along with their constituent Centers, would be heavily involved in decision-making on new activities because of the need for operational consistency within at least the first year of Science Program and the broad base of Centers involved. Each Initiative followed a different process to determine which activities should continue and what new activities to propose. As a result, they compiled a list of new activities, representing approximately 20% of the 2024 budget and aligning with the designated Areas of Work (AoWs). However, as of 12 September, the Writing Team has not yet vetted or made recommendations regarding these activities. The list presented here remains unembellished, without any prioritization or critique, as we await further guidance on who will ultimately make these decisions (e.g., Initiatives, WT, Centers) and any formal guidelines or processes that may be established. In short, more work is needed and transparency and criteria for decisions is critical.

Table A1. Continuing activity suggested by the Initiatives/Platform based on 80% activity/budget continuity.

Climate Action Program AoW	Activity name	Initiative
Prioritization & Coordination	Governance and Policy 4 Climate Security	ClimBeR
Prioritization & Coordination	integrated Future Estimator for Emissions and Diets (iFEED)	ClimBeR
Prioritization & Coordination	Inclusive Assessment Framework	ClimBeR

Prioritization & Coordination	Enhancing Climate Risk Profiles for Agriculture in Africa	ClimBeR
Prioritization & Coordination	Improved fine scale crop type mapping using spatial production allocation model	ClimBeR
Prioritization & Coordination	Synchronous multi-breadbasket failure (Correlated climate risk)	ClimBeR
Prioritization & Coordination	Country profiles	Mitigate+
Prioritization & Coordination	National level policy engagement	Mitigate+
Prioritization & Coordination	MACCs	Mitigate+
Prioritization & Coordination	PHD Student GFZ on EUDR	Mitigate+
Prioritization & Coordination	Impacts and Policies (sustainable and healthy diet to manage climate change)	Mitigate+
Prioritization & Coordination	Changing production practices, reducing FLW, and changing diets	Mitigate+
Prioritization & Coordination	National level policy engagement	Mitigate+
Prioritization & Coordination	Data from emissions from perennial systems (cacao and coffee)	Mitigate+
Prioritization & Coordination	Greenhouse gas emission factors for different cropping systems. Especially in livestock	Mitigate+
Prioritization & Coordination	GHG quantification methodologies in different crops in Colombia	Mitigate+
Prioritization & Coordination	TIER 2 approaches for GHG emissions from crop and livestock production systems	Mitigate+
Prioritization & Coordination	Reducing methane emissions in rice and livestock	Mitigate+
Prioritization & Coordination	Framework for Cost-effectiveness Analysis of GHG Mitigation Measures in Dairy Industry	Mitigate+
Prioritization & Coordination	TIER 3 modelling N2O emissions from cropping systems	Mitigate+
Prioritization & Coordination	Data and evidence generation around livestock emission	Mitigate+
Prioritization & Coordination	Emissions in the rice-shrimp systems	Mitigate+
Prioritization & Coordination	GHG MRV	Mitigate+
Prioritization & Coordination	Enhanced resilience through improved land and water management based on insights provided through eddy covariance experiments	NEXUS Gains
Prioritization & Coordination	Mapping of existing and emerging methods and metrics, includes Repository Curation; Data co-hosting and Dashboard for monitoring climate action in agrifood sector	Impact Platform

Prioritization & Coordination	Internal and external facing learning and capacity sharing/strengthening on the methods and metrics	Impact Platform
Prioritization & Coordination	Evidence synthesis- annual breakthrough report, synthesis of emerging issues with gaps, synthesis of CGIAR and partner evidence	Impact Platform
Prioritization & Coordination	Packaging and dissemination of evidence briefs/ explainers, etc.	Impact Platform
Prioritization & Coordination	Engagement in key global climate processes - IPCC, UNFCCC, etc.	Impact Platform
Digital Climate Risk	Consolidation of digital and financial tools	ClimBeR
Digital Climate Risk	Bundled climate information services (CIS)	ClimBeR
Digital Climate Risk	Climate Security Observatory (CSO)	ClimBeR
Digital Climate Risk	Climate Security Sensitivity Tool	ClimBeR
Digital Climate Risk	Climate Security Programming Dashboard 4 Climate Finance	ClimBeR
Digital Climate Risk	Climate Security Training Modules	ClimBeR
Digital Climate Risk	Bundled climate information services (CIS)	ClimBeR
Digital Climate Risk	Consolidation of digital and financial tools	ClimBeR
Digital Climate Risk	Fostering the scaling of Conservation Agriculture in Morocco	ClimBeR
Digital Climate Risk	Co-creation of policy action related to Agricultural Water Management in Morocco	ClimBeR
Digital Climate Risk	Fostering Crop Diversification as a Climate Adaptation into Senegal's Climate Action in the Ag sector	ClimBeR
Digital Climate Risk	Fostering Water Management Policy and Vision in Senegal	ClimBeR
Digital Climate Risk	Promoting Resilience and Food Security through Risk-Contingent Credit in Africa	ClimBeR
Digital Climate Risk	Bundled climate information services (CIS) [RCMAS Climate+]	ClimBeR
Digital Climate Risk	Consolidation of digital and financial tools [ARBY]	ClimBeR
Digital Climate Risk	Bundled climate information services (CIS) [RCMAS Climate+]	ClimBeR
Digital Climate Risk	Consolidation of digital and financial tools [ARBY]	ClimBeR
Digital Climate Risk	Early warning, early action, and early finance	ClimBeR
Locally Led Adaptation	Bundled climate information services (CIS)	ClimBeR
Locally Led Adaptation	Disruptive Seeds	ClimBeR
Locally Led Adaptation	Social equity toolkit	ClimBeR
Locally Led Adaptation	Locally Led Adaptation (ACTION program)	ClimBeR
Locally Led Adaptation	Multiscale polycentric governance in transformative adaptation to climate change: a tool guide	ClimBeR
Locally Led Adaptation	Positive Deviance approaches to co-designed technologies	Livestock & Climate

Low-Emissions Transitions	The Living Lab from WP3	Mitigate+
Low-Emissions Transitions	Capacity Sharing: Junior Scientist Tandem	Mitigate+
Low-Emissions Transitions	Net mapping and fuzzy cognitive modelling	Mitigate+
Low-Emissions Transitions	Co-production of knowledge case study	Mitigate+
Low-Emissions Transitions	MSP research and capacity at the global level including the Community of Practices (CoP) on MSP	Mitigate+
Low-Emissions Transitions	LL4P in practice- identifying, co-developing and scaling innovations	Mitigate+
Low-Emissions Transitions	The Living Lab from WP3	Mitigate+
Low-Emissions Transitions	Capacity strengthening (e.g., decision analysis, proposal writing for partners, training of facilitators, etc.)	Mitigate+
Low-Emissions Transitions	Workshop Support land use planning	Mitigate+
Low-Emissions Transitions	Productivity analysis	Mitigate+
Low-Emissions Transitions	Economic valuation in terms of WPT or WPA	Mitigate+
Low-Emissions Transitions	Streamline Near Real-Time Land Use Monitoring and Delineate Crop Patterns	Mitigate+
Low-Emissions Transitions	Trade-Off Analysis Among Ecosystem Services	Mitigate+
Low-Emissions Transitions	Citizen juries in Colombia	Mitigate+
Low-Emissions Transitions	Dairy sector baseline survey on mitigation options	Mitigate+
Low-Emissions Transitions	Drivers of food and land systems emission	Mitigate+
Low-Emissions Transitions	Adoption of Low Emission technologies	Mitigate+
Low-Emissions Transitions	Financial and policy instruments for scaling low emissions food systems	Mitigate+
Low-Emissions Transitions	6-step approach for scaling low emissions food systems	Mitigate+
Low-Emissions Transitions	Business model around low emissions food systems	Mitigate+
Low-Emissions Transitions	Research on Financial and policy mechanism for scaling low emissions food systems	Mitigate+
Low-Emissions Transitions	The impacts of Sino-Brazil beef trade on deforestation	Mitigate+

Low-Emissions Transitions	Promote zero carbon smart village work	Mitigate+
Low-Emissions Transitions	Scaling strategies for low emissions food systems	Mitigate+
Low-Emissions Transitions	Scaling solutions to rice emissions	Mitigate+
Low-Emissions Transitions	Rangelands, Mitigation, and Peace	Mitigate+
Low-Emissions Transitions	Carbon markets in rice	Mitigate+
Low-Emissions Transitions	Assessing the impact of training on farmers' adoption of practices with low-emission potential	Mitigate+
Low-Emissions Transitions	Assessment of impacts of clean energy transition on CGIAR area impact indicators (gender, jobs, nutrition, equity, etc.)	Nexus-Gains
Low-Emissions Transitions	Scaling of business and finance models and tools developed under NG to accelerate the rural clean energy transition	Nexus-Gains
Low-Emissions Transitions	Determinants of scaling of solar solutions	Nexus-Gains
Low-Emissions Transitions	Gender Transformative Approach to Low-emission food systems	Mitigate+
Climate Transitions: Policy & Finance	Technical support for Green Climate Fund proposals	ClimBeR
Climate Transitions: Policy & Finance	integrated Future Estimator for Emissions and Diets (iFEED)	ClimBeR
Climate Transitions: Policy & Finance	Inclusive Assessment Framework	ClimBeR
Climate Transitions: Policy & Finance	Climate Smart Governance Dashboard for adaptation planning	ClimBeR
Climate Transitions: Policy & Finance	Assessment of the impact of the Program's communication strategy on discourse (and actions) of stakeholders	Mitigate+
Climate Transitions: Policy & Finance	Capacity sharing for early career researchers	Mitigate+
Climate Transitions: Policy & Finance	International Policy Engagement (Webinars, Conference, Organizing event, Negotiation)	Mitigate+
Climate Transitions: Policy & Finance	Climate communications- internal and external (content production, packaging, dissemination and reporting	Impact Platform

Table A2. New activities suggested by the Initiatives/Platform based on 20% activity/budget continuity principle. The activities have not been prioritized or confirmed as we await guidance on the decision-making process. Additional activities may be suggested based on guidance provided.

Climate Action Program AoW	Activity name	Initiative
Prioritization & Coordination	Climate Resilience Tool kit co-designed/co-created with national and regional partners	ClimBeR
Prioritization & Coordination	Readiness and Preparatory Support Framework for Peace Positive Climate Action	ClimBeR
Prioritization & Coordination	Climate Outlook Reports	Impact Platform
Prioritization & Coordination	Exchange programs for CGIAR scientists and PhD support for ECR from Global South on climate issues	Impact Platform
Prioritization & Coordination	Customize CGIAR's PRMS for climate reporting and synthesize insights from CGIAR's climate portfolio for annual reporting leading to 2030	Impact Platform
Prioritization & Coordination	Partnerships for livestock and climate	Livestock & Climate
Prioritization & Coordination	Economic analysis to develop marginal abatement cost curves for national- and jurisdiction-level	Mitigate+
Prioritization & Coordination	EU Deforestation Directive, EUDR	Mitigate+
Prioritization & Coordination	New primary data collection for emissions factors	Mitigate+
Prioritization & Coordination	National engagement	Mitigate+
Digital Climate Risk	Climate Smart Villages+	ClimBeR
Digital Climate Risk	Scaling up of Bundled Climate Finance Product (e.g. Risk-contingent credit) tested in ClimBeR	ClimBeR
Digital Climate Risk	Compounded climate risk management	ClimBeR
Digital Climate Risk	DCAS Training toolkit	ClimBeR
Digital Climate Risk	Tailored cross-scale multi-sector recommendations to enhance sustainable water management under future climates	ClimBeR
Digital Climate Risk	Climate Information Systems and DCAS to support e-extension Systems in Morocco	ClimBeR
Digital Climate Risk	Adapt and integrate existing climate service frameworks by conducting comprehensive reviews, updating frameworks, and facilitating multi-stakeholder collaboration to ensure cross-sectoral coordination	ClimBeR
Digital Climate Risk	Integrate climate-informed financial mechanisms such as microinsurance and forecast-based financing into climate service frameworks	ClimBeR
Digital Climate Risk	Develop AI-based approaches to facility impact based forecasting	ClimBeR
Digital Climate Risk	Compound Risk Framework	ClimBeR

Digital Climate Risk	Co-design and scaling of livestock insurance products and inclusive service bundles for de-risking livestock systems	Livestock & Climate
Digital Climate Risk	Co-design and scaling of livestock insurance products and inclusive service bundles for de-risking livestock systems	Livestock & Climate
Digital Climate Risk	Scaling credit risk scoring to unlock finance in pastoral areas	Livestock & Climate
Locally Led Adaptation	Targeted climate technical assistance, capacity building, and financing for locally led climate action and SMEs	ClimBeR
Low-Emissions Transitions	Unintended effects on adaptation, peace, biodiversity, gender and nutrition from adoption of low emissions technologies	Mitigate+
Low-Emissions Transitions	Integrating climate mitigation and adaptation, biodiversity, gender, nutrition and peace	Mitigate+
Low-Emissions Transitions	Landscape Restoration, for adaptation, biodiversity, gender, nutrition and peace	Mitigate+
Low-Emissions Transitions	Unintended effects on adaptation, peace, biodiversity, gender and nutrition from adoption of low emissions technologies	Mitigate+
Low-Emissions Transitions	Integrating climate mitigation and adaptation, biodiversity, gender, nutrition and peace	Mitigate+
Low-Emissions Transitions	Landscape Restoration, for adaptation, biodiversity, gender, nutrition and peace	Mitigate+
Low-Emissions Transitions	Reduce negative impacts from clean energy transition on key natural resources, such as water, and the environment	NEXUS Gains
Low-Emissions Transitions	Link clean energy solutions to new climate finance streams for rural areas, such as Green Climate Fund	NEXUS Gains
Low-Emissions Transitions	National compliance on clean supply chain initiatives	Mitigate+
Low-Emissions Transitions	Implementing low-emission development approaches at scale with producers, land managers, governments, local civil society organizations, and the private sector.	Mitigate+
Low-Emissions Transitions	The role of international trade on emissions	Mitigate+
Low-Emissions Transitions	National engagement	Mitigate+
Low-Emissions Transitions	Sustainability strategies for value chains with significant GHG emissions.	Mitigate+
Low-Emissions Transitions	Scaling of Living Labs for People approach in Kenya, China, Vietnam, Colombia	Mitigate+
Climate Transitions: Policy & Finance	Localizing Loss and Damage: Event attribution to support loss and damage	ClimBeR
Climate Transitions: Policy & Finance	Climate Resilience Tool kit co-designed/co-created with national and regional partners	ClimBeR

Climate Transitions: Policy & Finance	Strengthening institutional capacity to offer macro-financing tools through the Sustainable Agriculture Finance Facility	ClimBeR
Climate Transitions: Policy & Finance	Training for climate negotiators	Impact Platform

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