



GLOBAL
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ADAPTATION

FROM RESEARCH TO RESILIENCE: SCALING CLIMATE ADAPTATION THROUGH THE GCA-CGIAR PARTNERSHIP





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Climate change poses an existential threat to global food security, livelihoods, and ecosystems. In the Global South, where agricultural productivity and rural incomes are most vulnerable to climate impacts, the need for resilient, adaptable solutions has never been more urgent. The Global Center on Adaptation-CGIAR partnership is a strategic alliance designed to bridge the gap between pioneering research and real-world impact, ensuring that climate adaptation innovations reach the communities and ecosystems that need them most.

A CRITICAL GAP: FROM ‘SCIENCE OF DISCOVERY’ TO ‘SCIENCE OF DELIVERY’

While CGIAR’s research has produced groundbreaking technologies—ranging from climate-adapted seeds and sustainable livestock management practices to digital advisory systems for farmers—these innovations often struggle to scale. Investment projects frequently fail to fully leverage these solutions, limiting their transformative potential. The Global Center on Adaptation-CGIAR partnership addresses this challenge by acting as a transmission belt that accelerates the uptake of climate-resilient technologies into large-scale investment projects led by International Finance Institutions and banks.

Like so many innovators, CGIAR is consistently ahead of the market for its products and inventions. We believe this gap can be narrowed, and even potentially closed, through:



Building more capacity



Enhancing policies and strategies



Financial investment

THE GOAL: TURNING INNOVATION INTO IMPACT

The program has set a benchmark of targeting US \$25 billion in climate-proofed investments showcasing how strategic collaboration can scale solutions and build resilience at a continental level. The partnership adopts a holistic approach to adaptation, integrating digital tools, climate-smart technologies, and innovative practices. By bundling these solutions, the Global Center on Adaptation-CGIAR partnership creates synergies that not only address immediate climate risks but also build long-term resilience for vulnerable communities.

To deliver on this ambition, GCA will work closely with several CGIAR research programs, with the Climate Action Program serving as the primary hub for the partnership's climate–food expertise. This program brings together leading scientists, practitioners and policy specialists to develop and deploy solutions that address the interconnected challenges of food security, rural livelihoods, and climate resilience. Given the shared focus on scaling innovation and achieving measurable impact, the CGIAR Scaling for Impact Accelerator will also play a pivotal role. The Accelerator's deep expertise in climate finance, market integration, and investment readiness will help ensure that proven adaptation technologies are not only deployed widely, but embedded into national systems and major investment programs. Together, these mechanisms will translate cutting-edge science into tangible results for millions of farmers and communities on the frontlines of climate change.

UNDER THE GCA & CGIAR PARTNERSHIP



14

IFI Projects



> 4 billion
value



Africa
all regions



Domains
value chains &
farming systems

SCALING CGIAR INNOVATIONS THROUGH AFRICAN BANKS

For the 50 million smallholder farmers in Sub-Saharan Africa, climate change is not a distant threat—it is a daily reality. The urgency to scale adaptation innovations in land, food, and water systems that directly shape small producers' livelihoods has never been greater.

GCA and CGIAR are responding by partnering with African financial institutions to embed CGIAR science and technologies directly into lending portfolios, reaching millions of farmers and value-chain actors. This work will be anchored in the Climate Action Program—home to much of CGIAR's climate–food expertise—and the Scaling for Impact Accelerator, which brings advanced capabilities in climate finance and investment readiness.

This approach builds on our joint work with International Finance Institutions, shifting from global project pipelines to mobilizing domestic capital flows that deliver impact at the farm and enterprise level. By translating CGIAR's research data and proven technologies into compelling investment cases and integrating them into lending practices, we ensure that scientific breakthroughs inform real-world financing decisions and unlock capital for climate-resilient practices at scale.

Commercial banks are the bridge between adaptation plans and tangible action on the ground. With the right tools, data, and investment frameworks, they can assess climate risks and opportunities, identify and finance bankable projects, and support clients—from smallholder farmers to agribusinesses—in adopting resilient practices that protect revenues, enhance productivity, and safeguard livelihoods.

Since early 2025, GCA has launched targeted collaborations with leading African banks:

- CRDB Bank (Tanzania)
- Tanzania Agricultural Development Bank
- Pipeline development in Kenya, Tanzania, Zambia, and Democratic Republic of Congo

To embed lasting capacity within these institutions, GCA is training bank staff and clients through its Adaptation Finance Masterclass, creating an open-source resource to help loan officers identify and finance adaptation solutions. CGIAR tools such as the Impact SF Analyzer will be integrated into these trainings, encouraging adoption across the African banking sector and accelerating the scale-up of climate adaptation finance.



CRDB BANK (TANZANIA)



Partnering to channel USD 1 billion into adaptation and resilience, including CGIAR innovations. GCA supports CRDB, which has a market share of 40% of total agriculture lending in Tanzania, in identifying, structuring, and scaling investments linked to proceeds from its USD 300 million green bond and a USD 200 million agricultural adaptation facility.

TANZANIA AGRICULTURAL DEVELOPMENT BANK

Developing a climate-smart agriculture due diligence tool for 15 priority crops—such as avocado, coffee, and paddy—featuring recommended practices and technologies drawn from CGIAR research. Loan officers now have a direct link between lending decisions and proven, resilient solutions.

PIPELINE DEVELOPMENT IN KENYA, TANZANIA, ZAMBIA, AND DEMOCRATIC REPUBLIC OF CONGO

Mapping returns on investment for priority adaptation solutions in three high-impact crop and livestock value chains per country, in collaboration with multiple CGIAR programs.

ADAPTING LIVESTOCK SYSTEMS TO A CHANGING CLIMATE



Livestock play an indispensable role in global food systems, providing livelihoods, nutrition and economic opportunity to nearly one billion people—particularly in low- and middle-income countries where pastoralism and mixed farming systems remain foundational to rural economies. However, climate change is increasingly threatening the viability and productivity of these systems. Rising temperatures, shifting rainfall patterns, water scarcity, and the growing intensity and frequency of droughts and floods are placing enormous stress on livestock health, feed availability, disease dynamics and supply chain stability.

The International Livestock Research Institute (ILRI), a key CGIAR center, has warned that without urgent adaptation, climate impacts could significantly undermine livestock-based food security, worsen rural poverty and reverse decades of development gains. In arid and semi-arid lands, which are home to some of the most vulnerable populations, climate shocks already account for the loss of over 25% of livestock herds during severe drought years. These losses not only affect meat, milk, and income, but also have cascading consequences for nutrition, education, and gender equality, particularly where women are primary caretakers of livestock.

To confront this challenge, the Global Center on Adaptation (GCA) is working closely with CGIAR and ILRI to co-develop and scale evidence-based climate adaptation solutions for livestock systems. These innovations are designed to build resilience

across the entire livestock value chain—from farm to market.

At the core of this collaboration is the development and dissemination of climate-resilient breeds that can withstand hotter, drier conditions while maintaining productivity. CGIAR researchers are also piloting adaptive shifts in species composition—encouraging transitions from cattle to small ruminants or camels where appropriate—alongside improvements in feed systems, including climate-resilient forages and strategic feed supplementation.

In addition, CGIAR is deploying cutting-edge tools for disease early warning and management, as changing climates fuel the spread of transboundary animal diseases such as Rift Valley Fever and East Coast Fever. Improved water harvesting and pasture regeneration techniques are being applied to increase ecosystem sustainability in degraded rangelands, while digital platforms are expanding access to climate-informed advisory services, market information and veterinary care for remote pastoralist communities.

Financial resilience is also being bolstered through innovations such as index-based livestock insurance (IBLI), pioneered by ILRI and now reaching hundreds of thousands of herders in the Horn of Africa. This approach uses satellite data to trigger payouts during drought, enabling households to avoid distress sales of animals and preserve their long-term assets.



Resilience is not just a matter of survival—it's also a pathway to opportunity. In Kenya's dairy sector, CGIAR and GCA are supporting the transformation of local supply chains to improve climate outcomes and gender equity. Strengthening cooperatives, enhancing women's participation in governance structures, linking producers to veterinary and

cold storage services, and introducing low-cost solar-powered refrigeration technologies have all contributed to reducing post-harvest losses and boosting incomes—especially for women entrepreneurs.

CGIAR is developing solutions to the impact of climate change on livestock systems, including:

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| <ul style="list-style-type: none">• Identifying and developing heat- and drought-adapted livestock breeds;• Developing index-based livestock insurance; | <ul style="list-style-type: none">• Promoting shifts from one livestock species to another (for example, from cattle to goats; and from goats to camels) or shifts from one breed to another; | <ul style="list-style-type: none">• Enhancing disease monitoring and control;• Improving water and pasture resources management. |
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Ultimately, building climate-resilient livestock systems is not only essential for adaptation—it is critical for delivering on global goals for food security, sustainable development, and climate justice. Through its partnership with CGIAR, GCA

is accelerating the integration of climate risk into livestock decision-making and investment strategies, ensuring that the systems millions depend on remain viable, productive, and equitable in a rapidly changing world.

STRENGTHENING CLIMATE RESILIENCE IN MOZAMBIQUE'S POULTRY AND CROP VALUE CHAINS



Mozambique is on the frontlines of the climate crisis. Intensifying droughts, shifting rainfall, and rising temperatures are undermining food production, livelihoods, and economic stability—especially for smallholder farmers and vulnerable rural communities. Agriculture remains the backbone of the economy but its viability is increasingly at risk.

In response, the Inclusive Agri-Food Value-Chain Development Programme (PROCAVA), a US \$105 million initiative led by the African Development Bank, is working to deliver climate-resilient, inclusive rural transformation. With investment and technical support from GCA and CGIAR centers, the International Institute of Tropical Agriculture and International Livestock Research Institute, the project integrates maize, soybean, and poultry value chains to drive food and nutrition security, reduce poverty, and build resilient livelihoods across Mozambique.

GCA's contribution is focused on climate-proofing the value chain through targeted technical assistance. This includes conducting climate risk assessments, identifying the capacity needs of Digital Climate Advisory Services (DCAS), and analyzing farmer typologies and seed markets to support the scaling of climate-resilient innovations. CGIAR's science-backed interventions are central to this effort, introducing high-performance backyard poultry breeds, drought-tolerant and water-efficient maize and soybean varieties, as well as smart cropping systems including intercropping and crop diversification strategies.

Specifically, the project is promoting a suite of CGIAR-developed technologies such as Drought Tolerant Maize for Africa (DTMA) and Water Efficient Maize for Africa (WEMA) maize varieties, climate-smart soybeans suitable for poultry feed, dual-purpose food–fodder cowpeas, drought-resistant fodder plants, and conservation-based water management practices. Alternative crops like sesame are also being piloted to offer income and nutrition security when climatic conditions delay the onset of the growing season.

Early implementation is delivering tangible outcomes. A 1,000-bird-per-hour poultry slaughterhouse is under construction with climate-resilient design. Work is being undertaken to connect smallholder producers to processors and aggregators, while a new poultry sector revolving fund—supported by a dedicated feasibility study—is unlocking finance for small agri-enterprises. Capacity building is also a core focus, with over 2,000 farmers, government staff and local organizations trained in business, finance, and adaptation practices, alongside 2,000 women and youth equipped with skills on quality standards and market readiness.

By 2027, the project will have influenced US \$103 million in climate-resilient investment. GCA's technical assistance is ensuring that these funds deliver lasting, scalable impact. The emphasis on integrated systems, localized solutions, and gender inclusion is making PROCAVA a model for how to build resilient food systems in climate-vulnerable regions. By embedding adaptation across the entire value chain, the program is helping ensure that Mozambique's rural communities can withstand future shocks, while building a stronger, more inclusive and climate-resilient agricultural economy.



BUILDING CLIMATE- RESILIENT CROP PRODUCTION ACROSS AFRICA



Across Africa, more than 50 million farming households rely on crop production for their food security and income. Yet their livelihoods are under increasing threat from climate change. Droughts are becoming more frequent and prolonged. Rainfall is more erratic. Temperatures are rising—by nearly two degrees Celsius in parts of Southern Africa over just two decades. These shifts are already having devastating consequences: crop yields are falling, food prices are rising, and climate shocks are pushing millions into deeper cycles of poverty and malnutrition.

Nowhere are these challenges more stark than in countries like Zimbabwe, where drier growing seasons are constraining staple crop production, and in Mozambique, where the number and intensity of tropical cyclones have surged dramatically. Over the past two decades alone, six cyclones stronger than Category One have made landfall in Mozambique—compared to just one such storm in the entire previous century. The floods triggered by these events have destroyed harvests across borders, from Malawi to Zimbabwe, eroding gains in food security and economic development.

To reverse these trends, GCA is working closely with CGIAR and its network of agricultural research centers to deliver science-based solutions for climate-resilient crop systems. These include breeding drought- and heat-tolerant varieties of key staples such as maize, wheat, legumes, and root crops. In drought-hit regions, farmers using maize varieties developed through CGIAR's research—led

by the International Maize and Wheat Improvement Center—are reporting yield gains of up to 40% under severe water stress. These improvements translate into an estimated nine additional months of food security for farming families, significantly reducing the hunger gap.

Beyond seeds, GCA and CGIAR are driving innovations in soil health and water management. New agronomic practices are being introduced to enhance the soil's ability to retain moisture, which is critical for rain-fed systems that dominate African agriculture. Farmer-led irrigation models, particularly solar-powered systems, are being tested and scaled to overcome chronic underinvestment in irrigation infrastructure. Equally important are new strategies for managing excess rainfall through improved drainage, raised-bed planting and water harvesting.

Diversification is another key pillar of resilience. Many African farming systems are heavily reliant on monocultures, leaving them vulnerable to climate shocks. GCA-supported CGIAR research is promoting integrated systems such as maize-legume intercropping, as well as the incorporation of trees and perennial crops to buffer climatic variability, improve soil fertility, and enhance year-round productivity.

Real-time, climate-informed decision-making is also being enabled through digital advisory platforms and early warning systems. These services, often bundled with access to inputs, finance, and



insurance, are helping farmers time their planting and harvesting more effectively, reduce losses, and anticipate extreme weather events. Post-harvest innovations are also underway, with efforts to reduce spoilage through improved storage and handling technologies.

Together, these solutions are helping build climate-resilient crop systems that are not only more productive but also more equitable and sustainable.

By working with national governments, local institutions, and private sector actors, GCA and CGIAR are supporting a transformation in African agriculture—one that equips farmers to adapt, thrive, and drive the continent's food and economic future in a warming world.



CGIAR is developing technologies and innovations to counter climate change impacts on crop production. This includes developing [drought- and heat-adapted varieties](#), especially of the major staple crops such as maize and wheat, but also legumes and root crops.

Farmers using new varieties of maize developed with CGIAR research are reporting as much as **40% higher yields** in severe drought conditions, according to CIMMYT, the International Centre for the Improvement of Maize and Wheat. *"The extra income from these larger harvests means an additional nine months of food security for farmers and their families,"* says CIMMYT.

SCALING CLIMATE-SMART WHEAT PRODUCTION IN ETHIOPIA



Ethiopia is the second-largest wheat producer in Sub-Saharan Africa, yet it remains a net importer of wheat due to limited productivity and high climate vulnerability. With yields averaging just 3 tons per hectare and over 2.3 million people dependent on wheat farming, the need for climate-resilient, high-performing systems is urgent.

To tackle this challenge, the African Development Bank, in partnership with GCA and CGIAR, is leading a transformative US \$94 million investment in Ethiopia's wheat value chain. The goal: to produce an additional 4.2 million tons of irrigated wheat by 2027—raising yields to 4.2 tons per hectare—while improving farmer incomes and national food self-sufficiency.

The project focuses on scaling climate-smart technologies across the value chain. GCA is delivering targeted technical assistance to embed climate risk analysis, digital advisory services and adaptive planning into national extension systems. Activities include profiling farmers' connectivity and climate needs, mapping digital service providers and developing a feasibility blueprint to guide the integration of digital climate services—particularly for smallholder farmers operating in high-risk zones.

CGIAR centers, including the International Maize and Wheat Improvement Center, the International Water Management Institute, and the Alliance of Bioversity International and CIAT, are deploying drought- and heat-tolerant wheat varieties, real-time climate risk monitoring tools, and automated vulnerability indexing systems. Furrow-irrigated raised bed (FIRB) systems and solar-powered irrigation are being introduced to improve water efficiency and resilience. Advanced river basin modeling is being used to optimize irrigation planning and mitigate the risks of drought and flood.

Results on the ground are starting to emerge. By 2027, it is expected over 250,000 farmers will be practicing climate-smart agriculture, with 600,000 households receiving tailored climate and agronomic advisories. The project will bring 25,000 hectares under improved irrigation and water management systems. A strong focus on gender is ensuring that 200 women are trained as wheat researchers and extension agents, while another 200 women are taking on leadership roles in wheat cooperatives—driving inclusive adaptation across the sector.

This project stands as a model for how digital innovation, scientific research, and strategic finance can be harnessed to transform a critical value chain. It is not just boosting wheat yields—it is laying the foundation for a resilient, inclusive and sustainable agricultural future in Ethiopia.



HARNESSING AGROFORESTRY AND TREE CROPS FOR CLIMATE RESILIENCE AND LIVELIHOOD SECURITY



Agroforestry—integrating trees into croplands and pastoral systems—is emerging as one of the most powerful, nature-based solutions to the climate crisis in agriculture. It enhances the resilience of farming systems by buffering crops from climate extremes, improving soil structure, conserving water and providing critical shade that reduces evapotranspiration and heat stress. At the same time, trees play a vital role in climate mitigation by sequestering atmospheric carbon and supporting vital ecosystem services such as pollination, nutrient cycling, and erosion control.

For millions of smallholder farmers across the tropics, tree crops such as cocoa, coffee, shea, cashew, and oil palm are vital sources of income. However, these systems are increasingly under threat. Higher temperatures, erratic rainfall, and the shifting range of pests and diseases are already reducing yields, altering product quality, and increasing tree mortality. According to the International Center for Tropical Agriculture (CIAT), up to 50% of current coffee-growing areas may become unsuitable for production by 2050 under current emissions trajectories—posing a serious threat to livelihoods and national economies.

In response, GCA and CGIAR are working in partnership to transform agroforestry systems into adaptive, diversified, and sustainable engines of rural resilience. This includes developing climate-resilient tree crop varieties and integrating new tree species into mixed farming systems

to enhance ecological stability and year-round productivity. CGIAR centers such as the International Institute of Tropical Agriculture (IITA), the Center for International Forestry Research, the World Agroforestry and the Alliance of Bioversity International and CIAT are advancing innovations in tree breeding, pest and disease resistance and water-efficient agroforestry models tailored to local agroecological zones.

For example, IITA is pioneering shading and shelterbelt systems in new cacao plantations to improve seedling survival and productivity under extreme weather. These systems are being combined with improved post-harvest processing techniques that preserve quality and reduce losses—essential for high-value crops like cocoa, which are sensitive to heat and humidity. At the same time, CGIAR is working with policymakers and cooperatives to build inclusive, climate-informed market mechanisms that reduce risk exposure and reward sustainable land management.

Agroforestry is not simply about trees—it's about transforming agricultural landscapes into climate-resilient ecosystems that sustain productivity, protect biodiversity, and secure livelihoods. Through its collaboration with CGIAR and national partners, GCA is helping ensure that tree-based systems deliver adaptive capacity and economic opportunity in a changing climate.



Several CGIAR institutes are involved with partners in developing agroforestry and tree crop systems that enhance resilience to climate change. This includes

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| <ul style="list-style-type: none"> • Developing new varieties; • Introducing new species into agroforestry systems; | <ul style="list-style-type: none"> • Promoting diversification of annual cropping systems by planting more trees; • Developing new ways of mixing trees with other crops or livestock; | <ul style="list-style-type: none"> • Enhancing pest and disease resilience of tree species; • Improving tree crop management. |
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BUILDING CLIMATE RESILIENCE IN GHANA'S TREE CROP SECTOR



Ghana's economy is deeply rooted in agriculture, with cocoa, cashew, coconut, and rubber accounting for more than 85% of the country's agricultural exports. Cocoa alone generates over US \$2 billion annually and employs hundreds of thousands of smallholder farmers. Yet, the productivity and profitability of these tree crops are increasingly threatened by climate change. Rising temperatures, shifting rainfall patterns, droughts, and intensified pest and disease outbreaks are undermining yields and the livelihoods of millions who depend on them.

The Ghana Tree Crop Diversification Project (TCDP)—a US \$228 million initiative led by the World Bank and supported by GCA and CGIAR—is building a more climate-resilient and inclusive future for the country's vital tree crop subsector. Over 842,000 farmers are set to benefit from this seven-year program (2023–2029), which focuses on institutional strengthening, climate-smart productivity, post-harvest systems and value chain governance.

GCA's support to the project is targeted and strategic: conducting climate risk and vulnerability assessments, designing DCAS, identifying adaptive farming practices, and building capacity for climate-smart e-extension services. A critical element of GCA's intervention is elevating the role of adaptation in project design and ensuring that climate risks inform every stage of implementation.

The project's goals are ambitious and measurable. Yields are expected to increase by 41% across all targeted crops—up to 70% for cocoa, 40% for coconut, 30% for cashew, and 25% for rubber. More than 52,000 farmers will adopt improved agricultural technologies, including nearly 20,000 women, and at least 10,000 cocoa farmers will gain access to extension services and inputs through a dedicated Cocoa Management System.

Climate-smart landscape management is a cornerstone of the project. Over 92,200 hectares of tree crop land will be brought under sustainable management practices, while 92,000 hectares will be digitally traceable—strengthening value chain transparency, certification, and access to global markets. The project also integrates 12 tree crop varieties tailored to different ecological zones, ensuring resilience to temperature and precipitation shifts.

Through its collaboration with CGIAR, the project draws on leading innovations in tree crop resilience. The CocoaSoils Initiative led by IITA is enhancing integrated soil fertility management. The Alliance of Bioversity International and CIAT is supporting stress-tolerant tree varieties and multistrata agroforestry systems, including nitrogen-fixing intercropping rows and live fences that stabilize microclimates and reduce erosion. DCAS, developed with CGIAR expertise, are equipping farmers with early warnings and agronomic advice tailored to local conditions.

The implementation of GCA's technical assistance, delivered in partnership with the Alliance of Bioversity International and CIAT, is already delivering results. CIAT's climate vulnerability assessments have provided a clear picture of risk exposure across Ghana's tree crop landscapes, guiding project partners in the selection of adaptation measures with the highest return on investment. Capacity-building guides and e-extension blueprints are in development to support wide-scale rollout.

The Ghana Tree Crop Diversification Project stands as a model for integrating adaptation into high-value commodity systems. By aligning climate resilience with economic opportunity, the project is helping secure Ghana's agricultural backbone against future shocks—ensuring that smallholder farmers, and particularly women, are not left behind in a changing climate.





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