

Adaptation Fund Climate Innovation Accelerator

2020-2025



UNEP CTCN - AFCIA Impact Report

Supporting **resilience building**
of most vulnerable communities
through adaptation technologies



Funded by:



This report was developed and produced by
UNEP, The Climate Technology Centre and Network-AFCIA

Lead author: Eleanor Saunders

Design: Deepesh Sangtani

Cover Photo: Nepal, UN CTCN/Miranda Rikki Tasker

Technical reviewers and contributors:

Jessica Troni, UNEP, Head of Climate Change Adaptation Unit

Eva Comba, UNEP, Programme Management Officer

Nadege Trocellier, CTCN, Global Adaptation Lead

Isabel Hagbrink, CTCN, Communication Specialist

Acknowledgments:

We extend our sincere appreciation to all UNEP CTCN-AFCIA grantees and CTCN Country NDEs whose dedication, innovation, and tireless work have been at the heart of the programme. Their efforts in advancing locally led climate solutions and building climate resilience have made a tangible difference in the lives of vulnerable communities and have generated valuable lessons for future climate action.

We are equally grateful to the Adaptation Fund for their generous support and steadfast commitment.

About CTCN:

The Climate Technology Centre and Network (CTCN), the implementation arm of UNFCCC Technology Mechanism hosted by UNEP, promotes accelerated, diversified, and scaled-up transfer of environmentally sound technologies for climate change mitigation and adaptation in developing countries in line with their sustainable development priorities. Learn more at ctc-n.org.

UN disclaimer:

The views expressed in this publication are those of the author(s) and do not necessarily represent those of the United Nations, including the United Nations Environment Programme (UNEP), CTCN, donor agencies, or UN Member States.

Table of Contents

Acronyms	/ 5
Preface	/ 6
Introducing UNEP CTCN-AFCIA	/ 8
Impact showcase	/ 20
Impact by technology sectors	/ 26
Early warning systems	/ 27
Water management	/ 33
Food security	/ 39
Lessons learnt and best practices	/ 45
Partnerships and collaborations	/ 48
Future outlook	/ 50
Annex	/ 52



Acronyms

AFCIA

Adaptation Fund Climate Innovation Accelerator

CARPHA

Caribbean Public Health Agency

CTCN

The Climate Technology Centre and Network

DA

Designated Authority

GEF

Global Environment Facility

GIZ

German Society for International Cooperation

LDCs

Least Developed Countries

LLCA

Locally Led Climate Action

M&E

Monitoring and evaluation

MHP

Multi-Hazard Platform

NbS

Nature-based solutions

NDE

National Designated Entities

NSI

National System of Innovation

SIDS

Small Island Developing States

SPIS

Solar powered irrigation system

SRI

Sustainable Rice Intensification

UNEP

United Nations Environment Programme

UNFCCC

United Nations Framework Convention on Climate Change

US\$ (referred to throughout as \$)

United States Dollars

WEF

Water-Energy-Food Nexus



PREFACE

In 2020, the Adaptation Fund launched the Adaptation Fund Climate Innovation Accelerator (AFCIA) to foster innovation in adaptation in developing countries. Two accredited Multilateral Implementing Entities (MIEs), the United Nations Environment Programme (UNEP) and the United Nations Development Programme (UNDP), were selected to implement the first phase of the programme, called AFCIA I.

The AFCIA I programme strives towards the ultimate goal of fostering innovation for adaptation. UNEP implements the AFCIA programme via the technological mechanisms of the UNFCCC: the Climate Technology Centre and Network (CTCN) delivering technical assistance, while UNDP-AFCIA supports not-for-profit organizations and civil society organizations to generate locally led impacts through micro-grants. In combination, AFCIA empowers nationally and sub nationally from the government level right down to grass roots organizations to enable meaningful change for climate change resilience across the Global South.

The AFCIA Impact Report has two volumes:

UNEP CTCN-AFCIA

UNDP-AFCIA


This volume focuses on the impact of UNEP CTCN-AFCIA.

The AFCIA I Impact Report is a quantitative and qualitative exploration of impact resulting from UNEP CTCN-AFCIA, told through data gathered during regular reporting, narratives provided by beneficiaries, and statements quoted directly from local adaptation leaders. By examining the successes, challenges, and lessons learned, the report provides a comprehensive overview of how AFCIA I has contributed to advancing climate adaptation solutions and strengthening resilience in developing countries.

This analysis will lay the foundation for the next phase, UNEP CTCN-AFCIA II, which will pilot climate technologies in new contexts while strengthening the National System of Innovation (NSI) of these countries so that climate technology can be further deployed. It is also a rich source to inform and support other programmes and organizations on their own climate adaptation journey, and enable continued progress toward scaling up transformative climate technologies globally.

UNEP is the world's leading environmental authority. It inspires, informs, and empowers nations and communities to improve their quality of life while safeguarding the planet for future generations.

CTCN, the only UNFCCC body with a mandate to implement climate technologies under the Paris Agreement, plays a critical role in helping developing countries unlock solutions to meet their climate and sustainable development goals.



“CTCN is at the right time and the right place to plant the seed of innovative transformational changes through climate technology for decarbonization and community resilience. We have extensive climate expertise, a proven business model, a growing portfolio of innovative technologies, and the agility to meet developing countries where they are, alongside the support and collaboration of world-leading organizations.”

Ariesta Ningrum
CTCN Director

INTRODUCING UNEP CTCN-AFCIA

UNEP CTCN-AFCIA spans Africa, Latin America and the Caribbean, Eastern Europe and Asia Pacific.

It runs **25 projects across 23 countries**, supporting the pilots of innovative technologies.



Photo Credit: SKN UNEP/Duncan Moore

About UNEP CTCN-AFCIA

The need for climate adaptation is urgent, with [UNEP](#) predicting 2.9 degrees celsius of global warming this century, bringing increased climate hazards at an unprecedented scale. Adaptation measures need to happen at the local level to build resilience in the communities directly facing floods, droughts, cyclones, and wildfires. UNEP CTCN-AFCIA is a key driver to enable national and local resilience to protect vulnerable populations.

Funded with US\$5 million from the Adaptation Fund, UNEP CTCN-AFCIA successfully delivered technical assistance for climate adaptation innovation across 25 transformative initiatives from 2020 to 2025. Its primary goal is to:

Advance innovation and strengthen the evidence base for effective and scalable adaptation practices, products, and technologies to build resilience to climate change.

Develop the roots of a strong enabling environment with the endorsement of regulations, frameworks, policies, strategies, and roadmaps for adaptation technology expansion.

Help people to adapt to the climate challenges they face, and thrive despite increasing risks.

The three key components of UNEP CTCN-AFCIA included:

Sourcing

The identification of 25 projects through three calls for proposals, which garnered over 500 submissions.

Implementation

Providing tailored technical assistance to the selected 25 initiatives.

Knowledge sharing

Disseminating knowledge and sharing lessons learned to foster broader impact.

UNEP CTCN-AFCIA provided vital support through technical assistance (with values ranging from \$145,000 to \$250,000) to leverage innovative, locally led climate adaptation technologies. These technologies, including solar-powered irrigation pumps, blockchain insurance policies, and community-based data collection methods, span the full technology cycle from development to deployment.

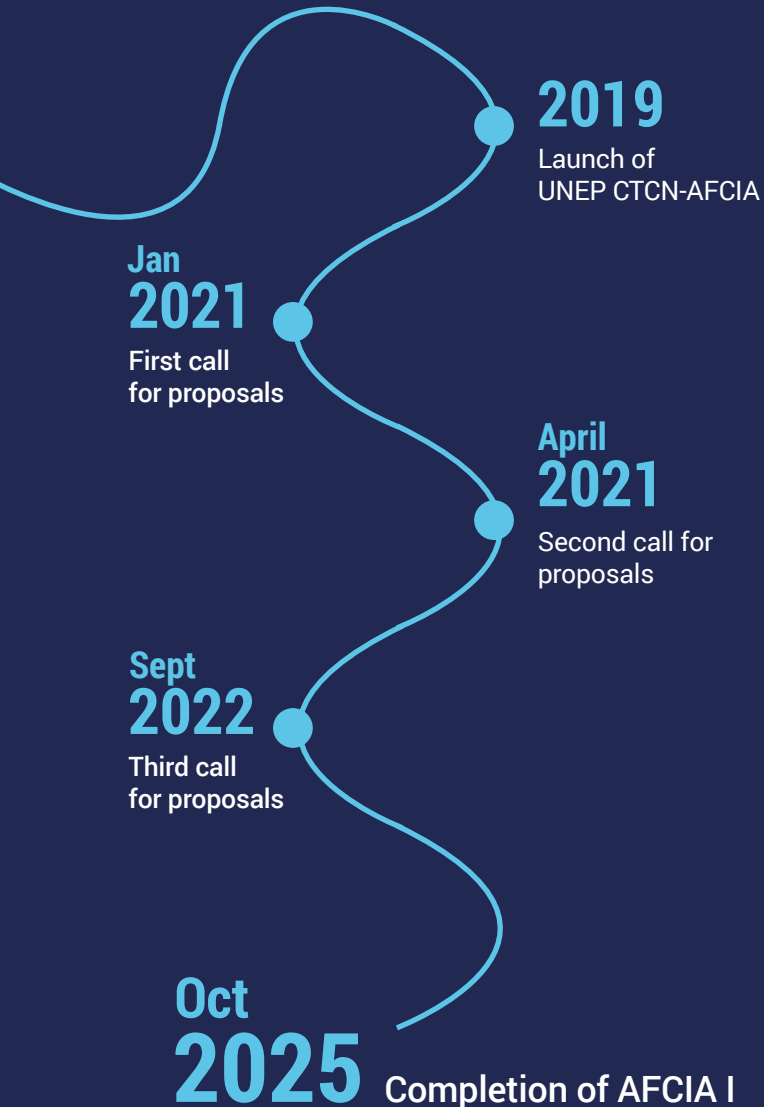
CTCN operates through initiatives endorsed by National Designated Entities (NDEs), official bodies nominated by their governments to serve as climate entities for the development and transfer of technologies. As such, all UNEP CTCN-AFCIA initiatives are government led, ensuring alignment with national priorities, strategies, and frameworks, resulting in solutions that are anchored within National Systems of Innovation (NSI).

Of the 25 initiatives supported, 21 focused on helping governments adopt technological systems, while the other four arose from civil society including universities, NGOs, and communities. The use of pilot projects to identify and refine the most appropriate technologies for specific local contexts enabled the adoption of culturally sensitive solutions for long-term success.

“As current NDC commitments place us on a trajectory of temperature overshoot, innovation and technology need to come into full force. The solutions need to deliver for communities, be requested by users, and rapidly deployed. AFCIA does just that, with a special emphasis on indigenous knowledge and enabling unbound creativity that could help us keep up with the pace of change.”

Ms. Mirey Atallah
UNEP, Head of Adaptation
and Resilience

UNEP CTCN-AFCIA timeline



“Climate technology is crucial for accelerating the design and implementation of solutions for climate adaptation and enhancing resilience. For the past 10 years, CTCN has been empowering communities with technology and capacity fit for purpose and the ability to ignite system transformations.”

Kazem Kashefi

Former UNFCCC Adaptation Committee member, Iran

“Leveraging climate technologies – such as advanced weather forecasting systems – is essential to safeguard lives and protect crops in the face of natural disasters,”

Ariesta Ningrum

Director of the CTCN



Photo Credit: SKN UNEP/Duncan Moore

Geographical presence

Number of initiatives per country



UNEP CTCN-AFCIA supports countries in Africa, Asia-Pacific, Eastern Europe, and Latin America and Caribbean under the United Nations Framework Convention on Climate Change (UNFCCC), with priority given to Least Developed Countries (LDCs) and Small Island Developing States (SIDS).

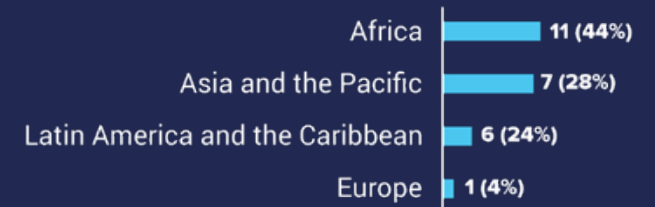
No. of initiatives










25
initiatives





23
countries








52%
of the initiatives are implemented in Least Developed Countries (LDCs) and Small Island Developing States (SIDS)










UNEP CTCN-AFCIA portfolio

Country	Initiative Champion	Initiative	Summary
Africa			
Burundi	Designated Authority Adaptation Fund	 Flood barrier (SLAMDAM)	A low-cost, climate-resilient solution using water-filled rubber barriers to prevent flooding and store water for use during droughts.
Ghana	Environmental Protection Agency (EPA)	 Solar-powered irrigation system	Adoption of Solar-Powered Irrigation Systems (SPIS), supported by financial mechanisms, information dissemination, and standardization efforts to enhance sustainability.
Liberia	Division of Land Development and Water Resources, Department of Technical Services, Ministry of Agriculture	 Solar-powered irrigation system	Enhancement of lowland rice production through the introduction of solar-powered irrigation systems (SPIS) and the System of Rice Intensification (SRI).
Malawi	Malawi University for Science and Technology (MUST), Centre for Climate Change and Disaster Risk Management (CCDRM)	 Mobile Climate Data Collection	Improved collection and use of climate data through simple mobile technology, integrated into existing climate information systems to enhance weather forecasting accuracy.
Mali	Agence de l'Environnement et du Développement Durable (AEDD), Ministère de l'Environnement, de l'Assainissement et du Développement Durable	 Real-time flood risk mapping	Creation of a real-time flood risk mapping system to reduce flooding risks for communities and infrastructure.
Mozambique	Agência de Desenvolvimento do Vale do Zambeze, Ministry of Science and Technology	 Integrated Water-Food-Energy system	Creation of an integrated Water-Energy-Food (WEF) system using digital technologies, aquaculture, biodigesters, bio-composting, and hydraulic management to support smallholder farmers.
Mozambique	Universidade Pedagógica de Maputo, Arsénio José Mindu	 Solar-powered irrigation system	Design of Solar-Powered Irrigation Systems (SPIS) with input from farmers, integrated with a "pay as you irrigate" model targeting smallholder farmers, especially women.

Nigeria	Green Habitat Initiative, Department of Climate Change, Federal Ministry of Environment	 Agrometeorological information dissemination	Pilot implementation of a radio and internet dissemination system for agrometeorological information to smallholder farmers.
Sudan	Ministry of Irrigation and Water Resources (MoIWR)	 Community based flood and drought preparedness	Update of the existing Flood Early Warning System (FEWS) to protect communities along the Nile River from extreme flooding due to climate change.
Sudan (soil)	Natural Resources General Directorate of Ministry of Agriculture and Natural Resources (NRGD)	 Soil erosion mapping	Use of advanced techniques like Atomic Absorption Spectroscopy and drone-based Earth observation tools to monitor soil erosion, a severe threat to agriculture and food security.
Zambia	Zambia Meteorological Department	 Groundwater monitoring	Implementation of advanced groundwater mapping technologies for data gathering and analysis, facilitating aquifer modelling to address drought challenges.

Country	Initiative Champion	Initiative	Summary
Asia and the Pacific			
Malaysia	Iskandar Regional Development Authority (IRDA), Ministry of Environment and Water	 Hazard forecasting information system	Development of a prototype Multi-Hazard Platform (MHP) for forecasting climate extremes and coastal hazards such as floods and storm surges.
Maldives	Water and Sanitation Department, Ministry of Environment, Climate Change and Technology	 Drainage system	Establishment of a skimming well gallery system for agricultural use to address increasing water scarcity.
Mongolia	Climate Change Department, Ministry of Environment and Tourism of Mongolia	 Enhancing sustainability of livestock farming	Study on improving pastureland management, capacity building, and development of community-scale meat processing systems.
Nepal	The Small Earth Nepal	 Agro-meteorological platform	Customization of weather and climate products by the Department of Hydrology and Meteorology to meet the needs of local farmers.
Pakistan	Pakistan Council of Research in Water Resources (PCRWR)	 Adaptive water management in urban areas	Improved adaptive capacities of the water sector in urban areas through surface rainwater harvesting, artificial groundwater recharge, and flood control strategies.
Thailand	The Office of National Higher Education Science Research and Innovation Policy Council (NXPO)	 Blockchain for climate risk insurance	Feasibility study on using blockchain technology for a real-time climate risk insurance system within the agricultural sector.
Viet Nam	Department of Climate Change, Ministry of Natural Resources and Environment, Viet Nam	 Water resources management	Development of localized water resource management technologies to predict and manage water flow in the Hong-Thai Binh River Basin, Viet Nam.

Country	Initiative Champion	Initiative	Summary
Latin America and the Caribbean			
Bahamas	Ministry of the Environment and Housing	 Climate-smart free trade zone	Creation of climate-smart, open green market spaces for street vendors, enhancing resilience to climate impacts.
Ecuador	National Institute of Meteorology and Hydrology (INAMHI)	 National Drought Monitor Enhancement	Enhancement of the National Drought Monitor (MONSE) by integrating a drought risk scenario module to improve drought predictability and monitoring.
Guatemala	Ministerio de Ambiente y Recursos Naturales (MARN), Saúl Pérez Arana	 Sustainable irrigation technologies	Promotion of sustainable irrigation technologies using a Water-Energy-Food (WEF) nexus approach to reduce climate risk for smallholder farmers.
Honduras	National Institute for Forestry Conservation and Development, Protected Areas, and Wildlife (ICF)	 Resilient biodiversity hotspots and natural areas	Development of an adaptation plan focused on nature-based solutions to enhance community resilience.
Saint Kitts and Nevis	Department of Environment	 Water supply system resilience	Development of sustainable farming practices, capacity building, and the introduction of innovative irrigation systems, alongside drought risk modelling.
Suriname	Ministry of Spatial Planning and Environment of the Republic of Suriname	 Drought risk modelling	Modelling of drought risks to develop a roadmap of prioritized alternatives for aquifer recharge.
Eastern Europe			
Georgia	Agency of Protected Areas of Georgia	 Remote sensing for forest fires	Integration of remote sensing technology into an early warning system for forest fire detection.

Financial input

\$6,839,350 million

Total investment from UNEP CTCN-AFCIA

\$3,500,000

Adaptation Fund (for technical assistances)

\$1,500,000

Adaptation Fund (for KMS activities, M&E, reporting)

\$1,804,350

CTCN

\$35,000

co-financed by Implementing Partners, Project Proponents.

Technical assistance budgets

\$145,000 to \$250,000



\$210,000

Value of average technical assistance

Funding per region



\$2.45 million

Africa

\$1.5 million

Globally used for
knowledge production
and sharing activities

\$1.5 million

Asia and the Pacific

\$1.1 million

Latin America and
the Caribbean

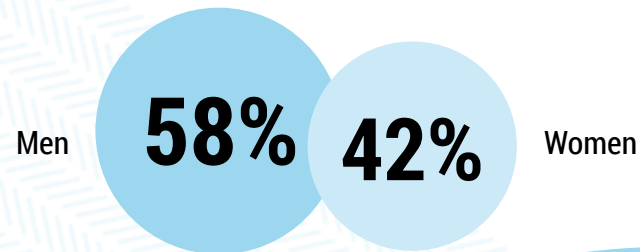
\$254,350

Europe and
Central Asia

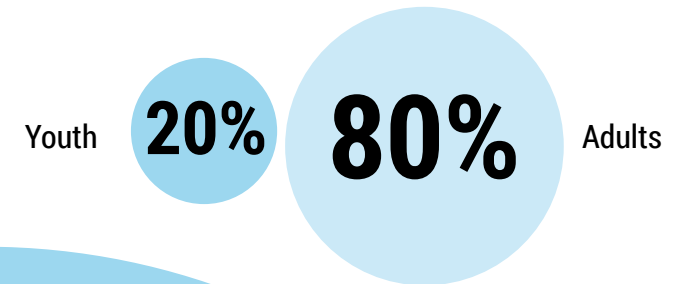
UNEP CTCN-AFCIA beneficiaries

Over the 2 million people reached by UNEP CTCN-AFCIA

Gender breakdown



Age profile



212,264

Direct beneficiaries

11,615 (37% women)

Number of staff targeted for capacity building to respond to, and mitigate impacts of, climate-related events

2,262,496

Direct and Indirect beneficiaries

UNEP CTCN-AFCIA impact data



15

new adaptation solutions tested



11,615

staff across 2,243 organizations with improved professional skills and increased capacity for adaptation



56

local technical tools, guidelines and training modules produced to support technology use



\$17 million

unlocked for scaling successful adaptation initiatives



10

enabling environments for adaptation technologies and innovation adoption and diffusion strengthened



947

municipalities are benefitting from a new, an improved or a strengthened early warning system, agrometeorological or multi-hazard platforms.



15

adaptation-related climate plans, strategies, and laws supported



3,000,716 ha

natural assets or ecosystems protected/rehabilitated

IMPACT SHOWCASE

This section presents the tangible results and transformative potential of the UNEP CTCN–AFCIA Technical Assistance Programme showcasing how AFCIA interventions have delivered climate, environmental, and socio-economic impacts across participating countries.

Through a series of case studies across three key areas of technological innovation for adaptation – early warning systems, water management, and food security – the report demonstrates how locally relevant, demand-driven adaptation technologies are strengthening resilience, improving livelihoods, and fostering sustainable development in vulnerable communities worldwide. The following case studies also illustrate how AFCIA-supported initiatives have successfully attracted additional investment and scaled their impact across diverse regions, from Africa to the Caribbean and Asia.



Technology innovation for adaptation



Climate and environmental resilience



Socio-economic resilience



Scaling and investment



Impact

Technology innovation for adaptation

The [UNFCCC 2022 technical paper](#) on adaptation technologies recognizes that technologies include both those developed by indigenous communities around the world, and newly developed technologies that offer novel practices and techniques in the service of adaptation.

Innovation for adaptation, according to the innovation pillar of the Adaptation Fund, is understood as the testing (piloting), deployment, or diffusion of new, adapted, or improved adaptation solutions. UNEP CTCN-AFCIA focused on the pilot phase of technology innovation, including:

New, existing, or improved technologies

Hard or soft technologies (soft technologies refer to the knowledge, skills, and processes associated with technology use)

Scalable technologies that can be replicated across regions and contexts

The UNEP CTCN-AFCIA programme builds climate, environmental, and socio-economic resilience in an integrated manner, recognizing that strengthened ecosystems, adaptive livelihoods, and reduced climate risks are mutually reinforcing pillars of sustainable development.



Impact Climate resilience

Main climate risks addressed by the 25 initiatives

Drought/rainfall variability		19
Floods/flash floods		4
Sea level rise		1
Strong winds		1

25

UNEP CTCN-AFCIA initiatives collectively address the most pressing climate risks affecting vulnerable communities worldwide

The drive towards climate resilience through the variety of activities under UNEP CTCN-AFCIA not only safeguards the environment, but also fosters long-term economic stability and prosperity.

Impact Environmental resilience

Main ecosystem services supported by the 25 initiatives

Regulating Services		6
Provisioning Services		7
Cultural Services		7
Supporting Services		5

3,001,716 hectares

Number of natural assets protected or rehabilitated during the UNEP CTCN-AFCIA pilots

Healthy and functioning natural ecosystems are fundamental to human resilience. They buffer communities against extreme weather, sustain livelihoods, and enhance overall wellbeing. In a global context marked by intensifying climate shocks, environmental degradation, and socio-economic inequality, the deployment of innovative adaptation technologies has become essential.

Through AFCIA, UNEP and CTCN are driving environmental resilience by supporting the development and deployment of technologies that reduce losses from climate extremes by protecting and restoring vital natural ecosystems, enabling them to continue providing essential services that support people and communities.

“Climate resilience is the capacity of a community or environment to anticipate and manage climate impacts, minimize their damage, and recover and transform as needed after the initial shock.”

UNDP,
The Climate Dictionary,
2023

Impact

Socio-economic resilience

Adaptation technologies help vulnerable communities gain the necessary tools to secure their basic needs amid a changing climate and environment. UNEP CTCN-AFCIA understands that resilience is not created by any one activity alone, but combines economic empowerment, gender mainstreaming, strong governance, locally led climate action, and capacity building to protect and strengthen the livelihoods of the most vulnerable people. When intersectional needs are met, communities can thrive. This knowledge underpins the range of activities that build up socio-economic resilience across the 25 initiatives.

UNEP CTCN-AFCIA directly benefits 212,264 people, with a wider (indirect) impact reaching more than 2 million people. Those who directly benefit see an average income increase of 15%, while indirect beneficiaries gain enhanced security in terms of food, water, energy, or jobs.

Initiatives that target the needs of marginalized and vulnerable groups help to improve socio-economic resilience both at the national level and among the most at-risk populations. **While eight UNEP CTCN-AFCIA initiatives have prioritized women as direct beneficiaries, and have successfully integrated gender-sensitive activities, the other 17 initiatives (68%) have built gender responsive decision-making tools. As a result, UNEP CTCN-AFCIA initiatives have reached 88,981 women (42%) among its direct beneficiaries, retaining a similarly high inclusion rate across indirect beneficiaries (42% women) and number of staff targeted for capacity building (36%).**

45

Number of adaptation assets (eg. new technologies and/or knowledge) created or strengthened in support of individual or community livelihood strategies

Mongolia, Honduras, Burundi, Liberia, Mozambique, Malawi, Nigeria, and Guatemala prioritized women as key beneficiaries



Impact

Scalability and investability

UNEP CTCN-AFCIA operates primarily at the pilot phase of technology innovation, generating evidence to inform future scale up and replication. While the full impact of scaling and investment is difficult to measure at such early stages, the initiatives have successfully laid strong foundations for future growth. Projects with clear potential to scale up and attract additional investment are prioritized to maximize impact, ensure sustainability, and broaden access to and use of climate adaptation technologies.

To date, 10 of the 25 initiatives (40%) have already secured additional support and finance for scale-up – Burundi, Georgia, Malawi, Ghana, Pakistan, Sudan EWS, Zambia, Maldives, Mongolia, Saint Kitts and Nevis – either from governments, private sectors, or through new grants. UNEP CTCN-AFCIA provides continued assistance including follow-up and matchmaking to ensure all initiatives are positioned for their next phase of development. This helps partners identify pathways to take successful technologies and practices forward. The following examples illustrate how AFCIA-supported pilots have successfully managed to enhance their scalability and investability.

25

Number of innovative adaptation practices, tools, and technologies accelerated, scaled-up and/or replicated through UNEP CTCN-AFCIA

“This system has the potential to be scaled up in other vulnerable regions facing similar climate challenges, ensuring food security and sustainability in the face of climate change.”

Gina Tsarouchi

a Principal Engineer at HR Wallingford, collaborator to Saint Kitts and Nevis

Both countries are developing full proposals for the Adaptation Fund, worth up to \$5 million each. In Burundi, if approved, the project is expected to benefit over 48,000 households (approximately 255,000 people 60% women) across 14 provinces. In Maldives, the project aims to provide access to safe drinking water for over 5 million people.

Burundi and the Maldives

Sustainable livestock farming:
The initiative leveraged \$7.5 million from the Government of Canada and an additional \$100,000 in corporate contributions, enabling a scale up that could benefit more than 3.4 million herders, 30% of the Mongolian population

Mongolia

The government has requested access to the second AFCIA funding window to pilot the business model for the value chain across the country's northern and coastal savannah zones.

Ghana

Early warning system for forest fires:
The Agency of Protected Areas has co-funded part of the equipment to cover approximately 12,000 hectares of land with the early warning system equipment including cameras, towers of control, connectivity with the digital early warning system board. The EWS has been tested in a national park, to protect the biodiversity as well as the communities living in the area.

Georgia

Water management:
The initiative attracted \$100,000 from the Caribbean Public Health Agency (CARPHA) to develop a Water Information System that will have an impact on the entire population of 46,922 inhabitants across both islands.

Saint Kitts and Nevis

The EWS for Flood project has secured \$50,000 in additional funding to upgrade its current EWS platform, improving transfer of information between regional entities and reducing cloud maintenance costs.

Sudan

Indigenous water management:
The government of Pakistan has funded the piloting of two technologies identified through the blueprint roadmap generated under AFCIA providing clean water access to 50 families.

Pakistan

The implementing partner, Water in Sight, allocated its own funds to procure and install additional gauge readers, expanding the pilot area beyond the UNEP CTCN-AFCIA project scope and thereby doubling the number of direct beneficiaries.

Malawi

The Ministry of Mines has committed to support a groundwater mapping activity at national scale.

Zambia

Technological sectors

Case studies

Of the 25 initiatives supported by UNEP CTCN-AFCIA, 15 (60%) focus on accelerating the deployment of new or existing technologies, while 10 (40%) emphasize capacity building to create enabling environments necessary for innovations to thrive.

While many of the initiatives identified water management as a pressing issue (either too much or too little), others targeted challenges including soil degradation, forest fires, and limited climate data for adaptation planning.

To tackle these issues, the initiatives piloted a diverse range of innovative adaptation technologies including early warning systems (EWS), solar-

powered irrigation systems, drone-based soil mapping, and rainwater harvesting. These solutions help communities anticipate and manage climate risks more effectively.

Complementary technologies such as forecasting tools and climate insurance mechanisms allow communities to take informed risks, manage responses and recover faster when disasters strike.

Through partnerships with local innovators, UNEP CTCN-AFCIA ensures that these initiatives not only deliver tangible short-term results but also build long-term resilience, empowering people to adapt, recover, and prosper in the face of climate change.

Interventions by sector of the 25 initiatives

9 Early warning systems

6 Water management

10 Food security

Early warning systems

Early warning systems (EWS) are cost-effective disaster risk reduction and climate change adaptation measures which can save lives, livelihoods, and ecosystems in the face of climate-related hazards.

As climate change continues, the frequency and intensity of climate-related hazards is expected to increase. Early warning systems for floods, drought, and forest fires support well-informed science-based decision-making, with great potential to avert disaster risk and minimize loss and damage caused by climate-related hazards. According to UNEP, giving just 24 hours' notice of an impending hazardous event could reduce damage by 30 percent¹.

The following four projects (out of nine) showcase the testing and demonstrated impact of early warning systems across Latin America and the Caribbean, Africa, Asia, and Eastern Europe.

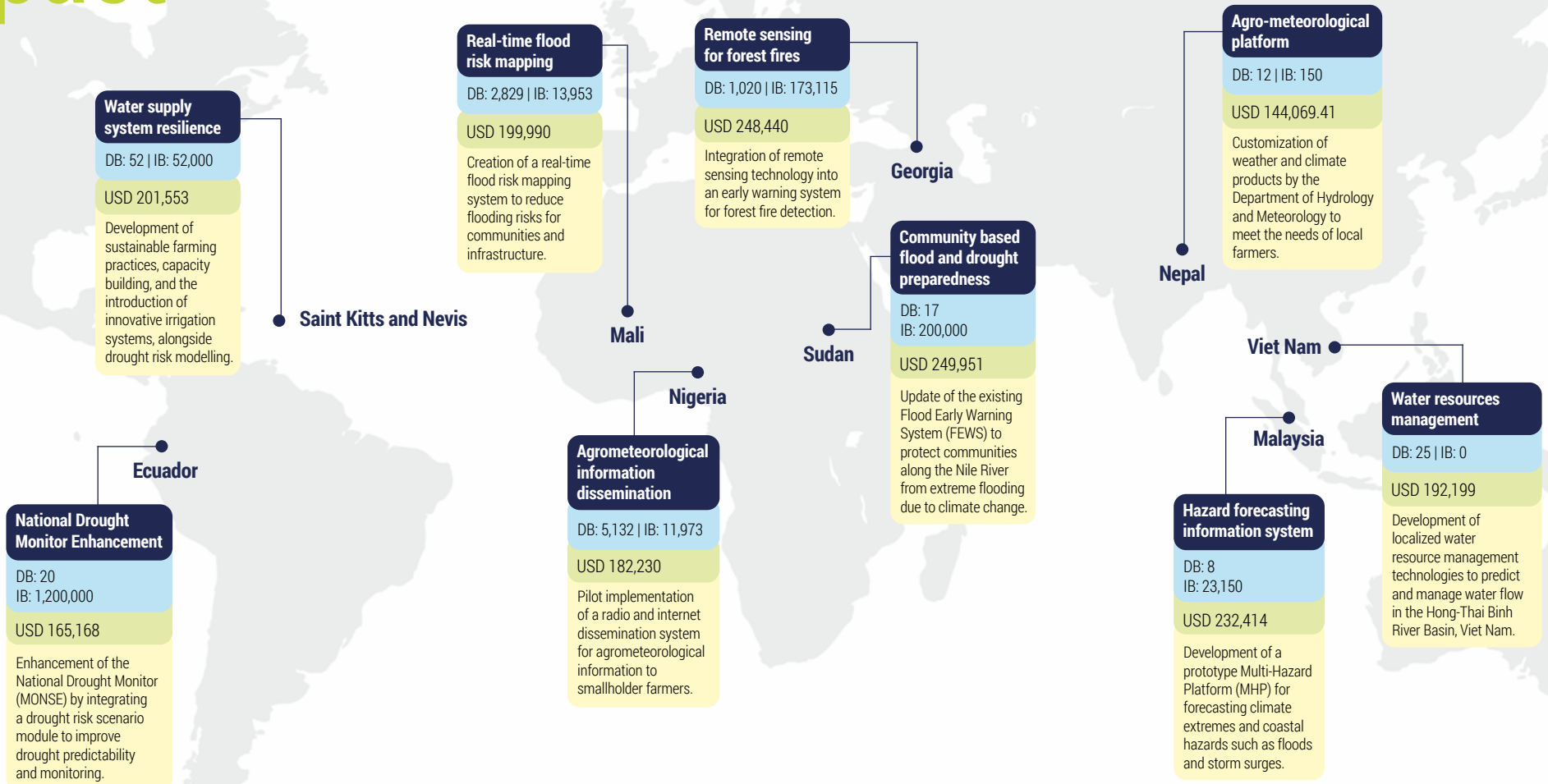
¹ <https://www.unep.org/topics/climate-action/climate-transparency/climate-information-and-early-warning-systems>

EWS for Flood	Mali	Sudan
EWS for Forest Fire	Georgia	
Drought Modelling and Forecasting Systems	Saint Kitts and Nevis	Ecuador
Agrometeorological Platform	Nepal	Nigeria
Multi-hazard Platform	Malaysia	
Transboundary Water Management	Vietnam	



Photo Credit: Nepal, UN CTCN/ Miranda Rikki Tasker

Impact



- Initiative
- Direct (DB) and Indirect beneficiaries (IB)
- Funds
- Summary

USD 1,816,014.41
Total Funds

Saint Kitts and Nevis

Deploying an early warning system to better handle drought

“What was considered as a wet season is no longer a wet season.

It creates some sense of confusion, especially towards the agriculture sector.”

Cheryl Jeffers

a Chief Technical Officer within the Saint Kitts and Nevis Climate Action Unit

In Saint Kitts 70% of all drinking water comes from groundwater wells, and in Nevis that figure increases to 90%. These essential groundwater sources face new pressures from increased periods of drought due to a changing climate, coupled with a growing tourism industry placing a heavy demand on water.

Accurate and up-to-date data is required to assess drought risk and map the two islands' water resources. The Department of Environment tackled this challenge by deploying an advanced remote sensing technology that communicates groundwater balance to a digital platform that can accurately map and forecast drought risk and water resources. The assessment of water resources, including groundwater mapping, has supported better water management strategies and an early warning communication system to provide timely information on drought risk to communities (especially farmers).

The system includes information on when to allow ground water supplies to 'recharge' so they are not depleted of freshwater, which would allow salt water to come into the island and disrupt the natural ecosystem.

The initiative targeted local government agencies, water departments, and vulnerable communities, providing them with the tools, training, and resources needed to manage water resources and grow resilience for long-term water management.

This technical assistance was scaled up in an initiative led by the Caribbean Public Health Agency (CARPHA), who invested an additional \$100,000 to install monitoring equipment to improve data collection and control tank levels and storage reservoirs on the islands of Saint Kitts and Nevis.

Impact



52,000

people benefitted from improved water management practices, including the launch of a dashboard to better record the availability of water resources and predict droughts.



5

climate technology RD&D events were organized



8 governmental institutions

1 private sector actor

1 NGO

had representatives trained in water management

Learn more [here](#) and video/blog [here](#).



Photo Credit: UNEP/Duncan Moore

Malaysia

Multi-hazard forecasting technology

In Malaysia, many losses are attributed to flooding, storm surges, coastal erosion, and saltwater intrusion, threatening resilience along the fast-growing coastal zones, which are critical to the country's economic development.

The coastal economic region of Iskandar Malaysia is successfully addressing this challenge by developing a localized forecasting tool: the Malaysia Multi-Hazard Platform (MHP). Using observations collected by different agencies and state-of-the-art forecasting models, the MHP is able to make accurate forecasts. And by combining the hazard data with socio-economic information, the MHP produces impact-based forecasts that empower decision makers to make timely decisions that can save lives and improve livelihoods.

Governmental agencies, such as the National Meteorological Agency and the Hydrological Agency, provide data for the

forecasts. This is then transmitted to a Disaster Committee composed of scientists, researchers, and NGOs to confirm its accuracy. When a climate hazard approaches, this Committee is responsible for activating an alert system and defining which channels should be used to reach the communities in danger.

The MHP is an innovation that helps to bring together governmental institutions, academia, and civil society through a platform and committees where they can collect and control the quality of the information, carry out data integration, and generate impact-based outputs. The resulting information not only supports communities with critical information but also fosters a culture of active participation in climate risk management.

The next stage will consist in continuing to feed the system with more data to strengthen and ensure the accuracy of the early warning system.

Impact



23,150

people benefit indirectly from access to accurate forecasts (46% women and 48% youth)



16

direct beneficiaries, including national stakeholders, participated in the initiative

Learn more [here](#).

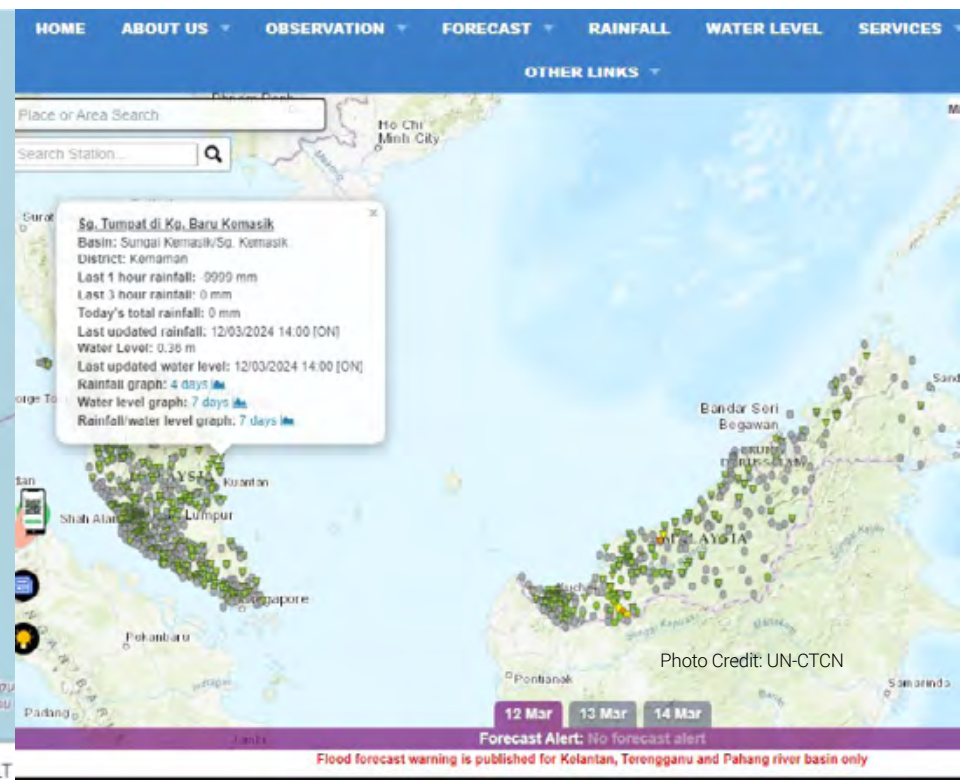
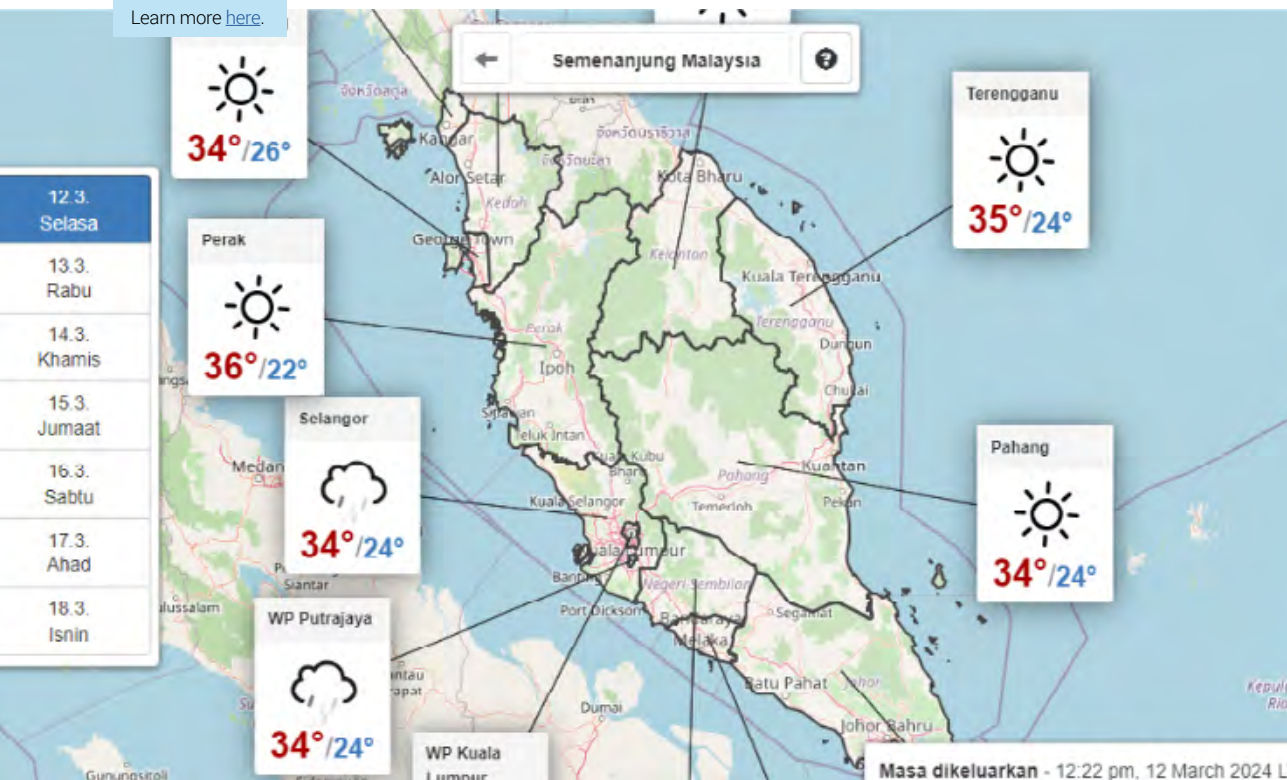


Photo Credit: UN-CTCN

Nigeria

Rural capacity-building and agricultural resilience

“ADS is not only about the technology of the dissemination system, but the social and behavior change we impacted on farmers to start utilising more reliable weather forecasts to plan their activities. It is a social innovation.”

Sadiq Abubakar Gulma,
Executive Director,
Green Habitat Initiative

In Nigeria, floods have destroyed an estimated 180,000 hectares of cultivated farmland nationwide, and desertification impacts a further 350,000 hectares. Farmers lacked the necessary climate and weather forecast information to prepare for these events, which has impacted the country’s food security. While the Nigerian Meteorological Agency (NiMet) has the necessary information, it has found it difficult to communicate it to rural farmers, as the right media format and language style are needed to effectively broadcast the forecasts.

An Agro-Weather Dissemination System (ADS) was developed and piloted in Kebbi State. ADS delivers agro-weather information to smallholder rural farmers via SMS messages, Unstructured Supplementary Service Data (USSD), Interactive Voice Response (IVR), and

radio services. It is the first communication channel that links NiMet directly to smallholder farmers at the click of a button.

ADS works well in rural areas, is easy to use, and can reach even the most remote farmers. Timely and accurate weather forecasts tailored to farmers’ needs help to plan the best times for land preparation, planting, irrigation, and harvests. The system also forewarns communities of severe weather events, enabling them to prepare, seek shelter, and select suitable plant varieties that can withstand the predicted weather conditions. The result is better planning and decision-making, leading to increased crop yields and reduced losses from floods and droughts. The next stage will be to scale up this system to other regions of the country once funding is secured.

Impact



250

farmers from 2 farming clusters, were directly engaged in weather information dissemination.



12

farmers and extension workers were trained on better understanding weather and climate forecasts through workshops.



23

stakeholders from NGOs, local governments, and CSOs participated in various workshops.

Learn more [here](#).



Photo Credit: Nigeria radio/ Haruna Atiku Gwandu

Georgia

Wildfire resilience

“One of the most urgent threats is increasing forest fires [...] Forests are at the heart of Georgia’s environmental identity. Protecting our forests is not just an ecological necessity. It’s a national priority. Early detection saves time and protects lives. Together, through collaboration and technology, we are building a safer, more climate resilience future for all.

Masho Khakhnelidze,
the Head of Climate Change Division in the
Ministry of Environment.

The Borjomi-Kharagauli National Park in Georgia is a vital ecological asset, teeming with biodiversity. However, Georgia faces an increasing risk of wildfires due to rising temperatures and seasonal water scarcity, endangering plants, animals, and people. Wildfires not only damage the environment and biodiversity but also disrupt local safety, tourism, and wellbeing, causing economic strain on local communities and the National Parks.

To tackle this, the government developed an innovative early warning system designed to protect the forests, supported by UNEP CTCN-AFCIA. The National Park piloted the system by setting up solar-powered monitoring towers with lightning conductors, and remote sensing tools, including video cameras. The towers are

connected through a network so they can communicate with one another, and all information gathered is stored on a central system. In addition, a new disaster management protocol was developed, including an evacuation plan for communities living near the park.

The approach in Borjomi-Kharagauli National Park reduces the impact of wildfires through early detection and quicker, more effective responses. Protecting Georgia’s forests and wildlife supports biodiversity, strengthens local economies, improves wellbeing, and preserves a critical carbon sink for generations to come. The next stage will be to scale up this system, starting with the expanding coverage to include the whole National Park once funding is secured.

Learn more [here](#).

Impact



1,020

people will directly benefit from reduced wildfire in the Borjomi-Kharagauli National Park



20 governmental institutions

3 private sector actor

2 NGOs

have participated in training, strengthening collaborative efforts to protect Georgia’s forests



Photo Credit: Georgia, UN CTCN/ Miranda Rikki Tasker

Water management

From harvesting technologies and adaptation at watershed, river basin, and national levels, to the use of IoT for improving data collection and forecasting, countries across the global south and the global north are deploying innovative climate technologies to address water-related challenges. These interventions aim to strengthen early warning systems, forecasting capacities, and strategies to cope with both water scarcity and sudden excess water, while also managing sea water intrusion.

The main goal is to ensure that communities have reliable access to basic water services, that clean water is available for livestock and agriculture, and that safe and sustainable water environments are maintained. Under UNEP CTCN-AFCIA, 24% of the technical assistances implemented focus on water management.

The snapshots below showcase four of these projects, each demonstrating innovative solutions for building water security and resilience.

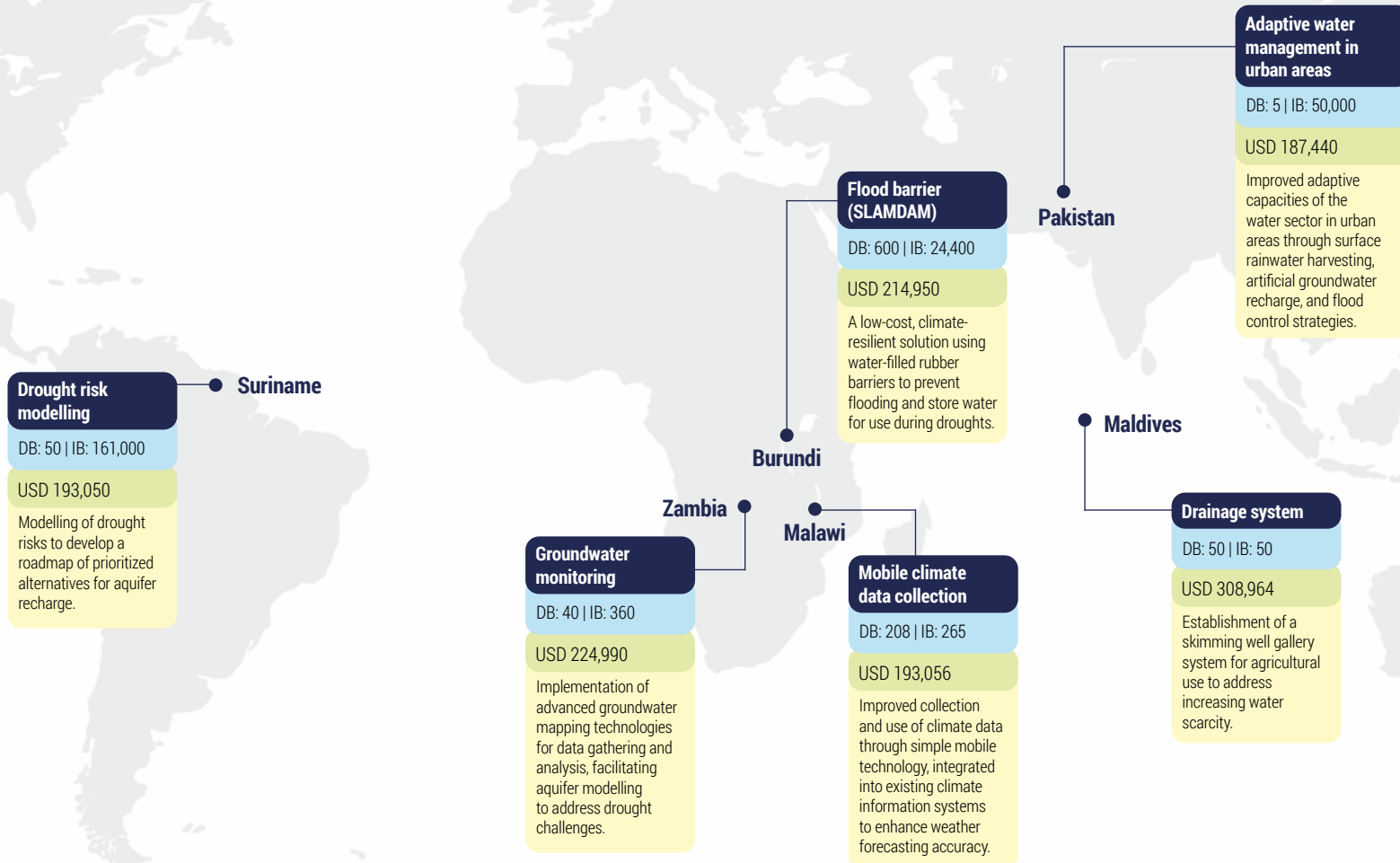
The NDEs built up a strong evidence base for their innovations during UNEP CTCN-AFCIA, and developed the capacity to produce detailed proposals for future funding.

- Aquifer mapping** Zambia
- Flood mitigation barrier** Burundi
- Flood sensor technologies** Malawi
- Rainwater harvesting system** Pakistan
- Water drainage system** Maldives
- Roadmap for aquifer recharge** Suriname



Photo Credit: Maldives, UN CTCN/David Cox

Impact



- Initiative
- Direct (DB) and Indirect beneficiaries (IB)
- Funds
- Summary

USD 1,322,450
Total Funds

Malawi

Data Collection Technology

“For Malawi, climate change is real. And now we’re being hit on almost a yearly basis.”

Amos,
Deputy Director at DCCMS

“We always remember Cyclone Freddy in our family because of what the cyclone did to us.”

Stephen,
River Gauge Reader

Learn more [here](#) and [here](#).

Devastated by Cyclone Freddy in 2023, the people of Malawi know first-hand how life-changing climate events can be. They urgently needed clear forecasting tools to prepare for incoming disasters, but sophisticated meteorological systems were too expensive and difficult to maintain. Traditional paper-based systems of data collection were too slow and inaccurate to provide the level of reliable forecasts required.

In response, the Department of Climate Change and Meteorological Services (DCCMS) and Department of Water Resources (DWR) extensively tested and investigated the use of mobile phone technologies to collect and digitize

weather observations. Under this initiative, selected members of the community send daily readings via free SMS. Their data is collated instantly into a national online platform called Blue IQ and analyzed by artificial intelligence (AI) to provide government agencies with near real-time data. This quick access to important data not only helps to give communities critical time to prepare and evacuate in case of disasters, but it also helps to plan daily life and seasonal harvests with regular, reliable forecasts.

The next phase is to deploy this simple system to other regions in Malawi, which already have water gauge readers installed stemming from previous initiatives.

Impact



473

direct and indirect beneficiaries in the pilot phase



100

households reached, and **40** technical experts trained



Trained

6 governmental institutions

1 private sector actor

2 NGOs



6

different technologies to be transferred or deployed as part of the project



Photo Credit: Malawi - UN CTCN/Lisa Murray

Zambia

Technologies for water mapping

“Access to accurate groundwater data is not just a key to unlocking sustainable development, but also a powerful tool in the fight against poverty. By understanding and managing this vital resource, we can empower communities to thrive and break the cycle of poverty.”

Belynda Petrie,
OneWorld Sustainable Investments

In Zambia, surface water sources like rivers, lakes, and reservoirs are drying up due to the effects of climate change. In search of water, communities turn to groundwater sources for their homes and farms. Yet, there is little data on groundwater resources, with many hydrological surveys neglecting this crucial water reserve. Groundwater locations and volumes are unknown and inaccessible to the communities who need them.

UNEP CTCN-AFCIA supported the Nyimba District of Zambia to solve this problem. They found their solution in the Danish-developed sTEM 5 Amp system and purchased the needed technology, associated licenses, and data analysis software. Once in place, data was successfully gathered from 180 points across

two different sites in Nyimba to create aquifer maps and water management plans to better serve their communities. The data collected helped the government secure water access and guided a broader strategy around food security, livestock management, and climate resilience.

What started as a technical challenge in a single district may soon become a national success story powered by data. As a next phase, the Ministry of Mines will launch a geological survey by helicopter to better understand what lies underground. Looking ahead, this project could impact up to 13 million Zambians – nearly 70% of the population – who rely on aquifers for drinking water, farming, and economic livelihoods.

Impact



400

individuals have directly benefited from capacity building in water resource data and management



25

government officers trained in the data collection and mapping technology



30

stakeholder consultations facilitated, fostering collaboration and knowledge sharing

Learn more [here](#).



Photo Credit: Zambia/Sven Kreher

Maldives

Overcoming saline intrusion

“We’ve always known that water is our most precious resource. Now, we understand how to make the most of what we have.”

Dawood Hassan,
Farmer, Maldives

The island of Nohivaranfaru in the Maldives is only 3.55 km long and 1.1 km wide. 1,081 people call the island home, and they need fresh water for farming, drinking, and sanitation. However, the water quality and quantity on the island is badly affected by climate variations, saltwater intrusion, and human activities like tourism.

To combat saline intrusion, the island constructed an Infiltration Gallery System with the support of UNEP CTCN-AFCIA. This technology extracts groundwater while minimizing its environmental impact and preventing over-extraction, which can lead

to saltwater intrusion. This system protects the groundwater sources and ensures a long-term, sustainable water supply for agricultural use – reducing the vulnerability of farmers to water scarcity and enhancing food security.

The new Infiltration Gallery System monitors the water, gathers data, and triggers alerts if the groundwater falls below a certain level. Such data can be used for future funding proposals. Based on the success of this first system, the Maldives is developing a project proposal for the Adaptation Fund, worth \$5 million, to scale up and deploy Infiltration Gallery Systems on more of the islands.

Impact



1,800

people supported through enhanced water security (50% women).



13

international experts were engaged to deliver a training of trainers for 20 national participants on the technology



7

different national stakeholders (Ministries, Island/Atoll Councils, and farming communities) engaged in activities



> 5 million

farmers could benefit from a sustainable access to drinkable water through upscaling (adaptation fund concept note)

Learn more [here](#).



Photo Credit: Maldives - UN CTCN/David Cox

Burundi

“The SLAMDAM has been very well received by the local population. The cost of installation was very cheap.”

Gerard Bucumi,
Mpanda resident

The scaled-up plan aims to enhance flood and drought resilience across Burundi, and beyond. SLAMDAM was showcased at COP27 and other countries, including Pakistan, are interested in testing it.

Learn more [here](#).

Burundi is one of the world’s most vulnerable countries to climate change, particularly to floods and droughts. Traditional infrastructure, such as dams to store water or bridges to help pass flooded rivers, are expensive and difficult to build in rural areas. Farmers need reliable flood protection and water sources for their crops and animals.

SLAMDAM is an inflatable rubber tube that can be set up quickly to capture flood waters and form a protective barrier around crops. Once filled, the SLAMDAM is a storage solution to hold water, which can then be used during droughts. It is easy to transport the empty rubber tubes to rural areas for flood protection as needed, and they provide an affordable solution to farmers in Burundi. The technology was implemented in Mpanda Commune in the Bubanza region of Burundi.

The pilot supported by UNEP CTCN-AFCIA helped farmers increase productivity by storing enough water for three harvests a year, which doubled agricultural income while offering flood protection to crops during extreme events. The evidence obtained by the Mpanda Commune farmers allowed the SLAMDAM group to prepare a concept note for the Adaptation Fund, which gained support for a feasibility study to explore the most effective ways to expand. This represents a pathway toward a larger-scale project. If the full proposal is approved, the project could benefit over 48,000 households or about 255,000 people (60% women) living in 14 provinces of the country. Ultimately, the larger-scale pilot of the technology is expected to support market uptake. This is an essential step towards the maturation of the technology, with the goal being for it to thrive without further grant support.

Impact



24,400

people with increased protection against flood and water access during droughts (50% women, 10% youth)



\$150

monthly increase for farmers due to enhanced agricultural productivity



6

institutions trained, including government bodies, NGOs, and private sector actors



Potential to benefit over 48,000 households or about 255,000 people (60% women) living in 14 provinces of the country



Photo Credit: Burundi - UN CTCN/Reuters

Food security

The impact of climate change on food availability and agricultural production were examined extensively in Chapter 5 “Food, fibre and forest products” of the IPCC Fourth Assessment Report (IPCC, 2007). The UNFCCC states that “climate technologies can provide significant opportunities to adjust to and mitigate climate change and strengthen food security”.

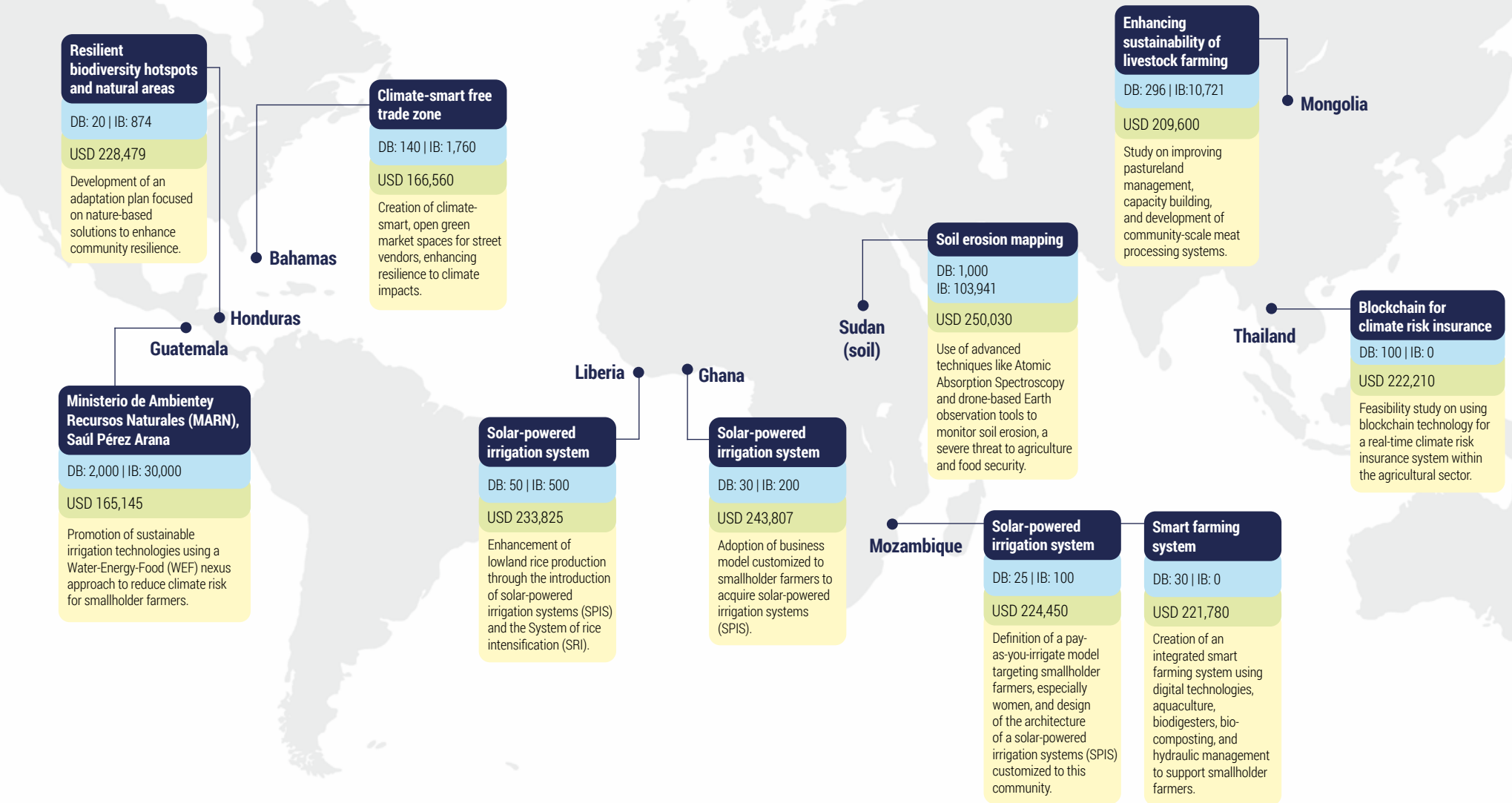
Under AFCIA, the CTCN has deployed innovative technologies, tested climate-resilient farming techniques, and developed business models that promote more efficient value chains and better inclusion of farmers, workers, and communities. It has also invested in education and capacity building to strengthen the skills and adaptive capacities of the most vulnerable populations. Overall, 40% of the technical assistances implemented under UNEP CTCN-AFCIA focused on food security.

The snapshots below showcase four of these projects, each illustrating how innovation can enhance agricultural resilience and food system sustainability.

- SPIS [Liberia](#) [Mozambique](#)
- Drones for soil mapping [Sudan](#)
- Enabling environment and SPIS [Ghana](#) [Guatemala](#)
- Climate-smart farming [Mozambique](#)
- Blockchain for crop insurance [Thailand](#)
- Climate-smart free trade zones [Bahamas](#)
- Pastureland management [Mongolia](#)
- Biodiversity hot spots [Honduras](#)



Photo Credit: Nigeria/ Abuhuraira Sidi



- Initiative
- Direct (DB) and Indirect beneficiaries (IB)
- Funds
- Summary

USD 2,165,886
Total Funds

Mongolia

Digital crop insurance supports agroforestry

Mongolia's pastureland is seriously degraded by overgrazing, deforestation, and climate change. Nomadic herders are highly vulnerable as their animals suffer from low nutrition and drought. To overcome these challenges, herders increase the numbers in their herds to account for future loss. Sadly, this only leads to further overgrazing. The effects on Mongolia's grassland ecosystems put the food security of the entire country at risk.

Mongolia's Climate Change Department joined forces with the Ministry of Environment and Tourism to strengthen climate-resilient livestock farming while supporting the

economic sustainability of vulnerable herding communities in Bayantümen Sum, Mongolia.

The technical assistance demonstrates a bankable technology concept that combines solar-powered irrigation and agroforestry for improved water management. To further support these farmers, a digital crop insurance product was developed to address gaps in damage protection and reduce investment risks. This project was leveraged by the Canadian Government, which invested \$7 million to scale up the insurance model in the country.

Learn more [here](#).

Impact



300

community members trained in climate adaptation and resilience-building techniques (50% women)



16 governmental institutions

13 private sector actors

16 NGO

had their representatives trained



\$7.5 million

financing accessed from the Government of Canada to scale up the initiative. This could serve up to 3.4 million herders, 30% of the population



Photo Credit: Mongolia - UN CTCN

Ghana

SPIS for smallholders

“Before this workshop, solar-powered irrigation was just a concept to many of us. Now we see how it can be tailored to our local realities and scaled across Ghana with the right support.”

Ms Shine Akakpo
District Director,
Ministry of Food and Agriculture,
South Tongu Municipality

According to Ghana’s National Adaptation Plan (NAP), the country will experience rising temperatures, reduced wet seasons, and more dry days in the next decade. These predicted changes, including an increased risk of drought, will significantly impact small-scale, subsistence farmers relying on rainfed agricultural production, demonstrating the necessity to integrate food security into its climate change adaptation strategy by focusing on building climate-resilient agriculture and food systems, supporting vulnerable communities, and engaging the private sector.

Ghana has an abundance of smallholder farmers, with 90% of farm holdings in the country covering less than two hectares of land. These farmers rely on seasonal rainfall to water their crops

and determine their income. The Environmental Protection Agency of Ghana initiated a forum to gather farmers, governments, and banks together and develop a financial model that would make solar-powered irrigation systems (SPIS) accessible to smallholder farmers. The forum developed a rental system that allows farmers to overcome the high investment barriers that have made access to these technologies difficult in the past, and brought in insurance companies to provide additional security to both the farmers and the banks.

The next stage is to prove the SPIS model, together with an insurance solution, to be implemented in the tomato value chain of Ghana’s northern and coastal savannah zones with AFCIA II funding.

Impact



34

farmers (30% women) trained on 3 different SPIS business models, with the potential to share knowledge



250

farmers with increased irrigation security



3+

banks and banking associations collaborated to develop viable business models, including Ecobank Ghana, ARB Apex Bank, and the Ghana Association of Banks

Learn more [here](#).



Photo Credit: UN CTCN/Prince D. Peters

Liberia

Combining access to SPIS and Sustainable Rice Intensification Technologies to intensify crop production

“Farmers can no longer solely rely on traditional practices, and they are ready to embrace sustainable innovation that can increase production, moving from a subsistence model to a market one.”

Prince D Peters
Chairman Fuamah District
Multipurpose Cooperative Society,
Liberia

Liberia, like many countries, faces declining rainfall and warming temperatures of almost 1°C across the country. The 2019 EPA of Liberia report highlights that flash floods and droughts seriously threaten agricultural production, farmer livelihoods, and national food security. As rainfed agriculture employs over 70% of the population in Liberia, these threats are devastating to the country's economy.

In response to increasing flash floods and droughts, the Ministry of Agriculture has implemented a solar-powered irrigation system (SPIS) in a small community of farmers. This is coupled with a technique called Sustainable Rice Intensification (SRI), which helps rice to grow well without the

usual flooding of fields. Traditionally, farmers in lowland rice growing areas could only grow one crop of rice per year, as their fields only flooded during the rainy season. During the first year of this pilot, the combined technologies have allowed farmers of this community to grow rice all year round, better supporting and stabilizing their incomes.

The next step is to establish the frameworks and standards to ensure that the private sector can start providing locally manufactured high-quality SPIS to Liberian users. With regards to the SRI farming techniques, a campaign of sensibilization and training targeting women and youth would likely support the scaling-up process.

Impact



1

national roadmap to scale up SPIS and SRI for lowland rice production



550

traditional farmers trained to produce more rice using less water through the SRI method



3

season production: Enhanced rice production, providing the means for a second crop of rice and potentially a third season of vegetables, while reducing water demand for irrigation and lowering greenhouse gas emissions

Learn more [here](#).



Photo Credit: Liberia - UN CTCN/Prince D. Peters

Mozambique

Smart farming

“We need a WEF system that is simple and practical, with a clear business model, so farmers can install it easily and use it themselves. We help farmers by providing advice to choose the technology appropriate for their needs and local conditions in Mozambique”

Luis Dias
 Agência de Desenvolvimento do Vale do Zambeze

With its long coastline and regions lying below sea level, Mozambique is highly vulnerable to climate change. It is at an inter-tropical convergence zone, where winds and rising warm air meet to create thunderstorms and heavy rains. Cyclones are of particular concern as they are becoming more frequent and intense, damaging farms, water resources, and energy systems.

The Agência de Desenvolvimento do Vale do Zambeze and the Ministry of Science and Technology designed an integrated Water-Energy-Food (WEF) system for smallholder farmers in the Zambezi Valley to improve agricultural practices and build resilience to cyclones. It includes access to solar-powered

irrigation, aquaculture, biogas, and composting technologies. These help farmers to be self-sufficient – particularly during climate hazards – and use natural resources, like renewable energy and composting.

15 investors from the private and banking sectors in Mozambique were brought in to work with the farmers and invest in the WEF system. Agência de Desenvolvimento do Vale do Zambeze went on to leverage additional funds to adapt the design for a scaled-up model across the Zambezi region and beyond. The next stage will be to promote smart farming and deploy these integrated farming systems at a national scale, potentially benefitting up to 32 million people.

Impact



20 smallholder farmers in the Zambezi valley, 15 investors from the private and banking sectors, and 15 institutional representatives collaborated in the initiative



4 different technologies tested



30 direct beneficiaries (50% women, 15% youth)



32 million people could benefit from the initiative on the national scale

Learn more [here](#).



Photo Credit: UN CTCN/Prince D. Peters

LESSONS LEARNT

Over the past five years, UNEP CTCN-AFCIA has successfully delivered 25 initiatives. These initiatives demonstrated strong results, as showcased throughout this report, enabling access to further funding for scaled-up efforts. Out of the 25 initiatives implemented under AFCIA, 10 (40%) have successfully secured future support.

However, it takes time to embed technologies, demonstrate their effectiveness, accuracy, reliability, and impact, and build trust among national stakeholders. This is a critical factor in driving innovation for climate adaptation, and it is an important element that supports all other lessons learned.

Lessons on innovation

Key insight

A strong enabling environment is essential to bringing new technologies to market and creating **national innovation ecosystems**.

Action

- Integrate individual, pilot technologies into broader systems.
- Promote collaboration and co-design (locally, nationally, and internationally) from the early stages.
- Ensure technology adoption readiness, by equipping end users with the skills necessary to use and maintain technologies.

Lessons on adaptation monitoring

Key insight

To build up evidence for the future roll-out of technologies, it is essential to measure and document on-the-ground impacts.

Although challenging and resource-intensive, this approach is still acknowledged as the direction for best practice.

Action

Two approaches are recommended, depending on the availability of climate data in the target country:

- **In data-scarce contexts:** Identify information gaps and invest in equipment, local monitoring networks, and community-based data collection.
- **In data-rich but fragmented contexts:** Consolidate existing data and establish a central repository that can be easily accessed by all relevant stakeholders.

Lessons on replicability and scalability

Key insight

Government ownership is critical for the success and replication of technologies. Once technology proves effective delivering results, its roll-out and scale-up require coordination across different entities, levels and sectors.

Action

Replication and scaling also requires new and diversified funding streams, particularly from the private sector. Key recommendations to support this include:

- Designing multi-stage funding mechanisms essential for scaling innovation and fostering long-term impact.
- Supporting blended finance models and diverse revenue streams.
- Engaging private sector actors early in the ideation stage to build interest, ownership and investment readiness.

By sharing these lessons learned, this report aims to provide valuable insights that can help strengthen future climate adaptation initiatives. The experiences from UNEP CTCN-AFCIA's work highlight the importance of building strong enabling environments, fostering local engagement, and ensuring the long-term sustainability and scalability of technologies.

Lessons and benefits of locally led adaptation

Key insight

Piloting small-scale climate change adaptation technologies can have a significant impact on community resilience.

Action

To ensure local ownership and sustainability, it is recommended to:

- Engage continuously with communities from the start of the initiative
- Ensure women, youth, indigenous peoples, and vulnerable groups are part of design and scaling efforts, not only beneficiaries
- Include at least one locally based, local-language-speaking team member to facilitate engagement and feedback.
- Ensure community representation on the project steering committee throughout implementation.

Lessons on knowledge generation and exchange

Key insight

Technology transfer depends heavily on capacity building and knowledge exchange. End users must have opportunities to learn about the technology and develop the skills needed to interact with it in the future.

Action

To ensure local ownership and sustainability, it is recommended to:

- Document and disseminate results and best practices through publication, knowledge platforms, and media
- Develop and deliver training and peer-learning opportunities
- Leverage networks by fostering collaboration among international, regional, and national entities.

Lessons learned on holistic approach integrating mitigation-adaptation intervention

Key insight

Initiatives like ecosystems restoration or renewable energy (e.g., solar-powered irrigation) can build resilience to future climate impacts and support livelihoods while limiting/reducing emissions.

Action

- Demonstrate co-benefits beyond a single objective to better attract funders and policymakers.
- Consider both mitigation and adaptation simultaneously throughout strategic planning processes to identify and develop synergistic “win-win” solutions.



By reflecting on these lessons, stakeholders can better navigate the challenges of implementing and scaling climate adaptation solutions, ultimately improving the resilience of vulnerable communities to climate change. These lessons also serve as a guide for future initiatives, helping to refine approaches, enhance impact, and encourage more effective and inclusive adaptation strategies worldwide.

Partnerships and Collaboration

Partnerships have been central to the success and sustainability of UNEP CTCN-AFCIA initiatives. Large and collaborative initiatives are typically more attractive to investors as they carry lower risk, greater returns, and wider application. To boost the scaling and investment potential of UNEP CTCN-AFCIA initiatives, collaboration is encouraged. Six of the 25 initiatives (24%) have been forerunners in building strategic partnerships with other projects or organizations to gather resources for growth:

The four SPIS initiatives in Liberia, Guatemala, Mozambique, and Ghana shared experiences and compared technologies to enhance integration, knowledge and capacity.

In Ghana, close coordination was established with the international donor GIZ to test and refine the business model, enabling smallholder farmers' access to solar irrigation pumping systems.

In Saint Kitts and Nevis, collaboration with other Caribbean countries and coordination with the GEF-funded Water Information System provided valuable learning and technical alignment

In parallel, UNEP CTCN-AFCIA leverages global partnerships to connect the AFCIA I programme with international initiatives advancing adaptation, gender equality, and sustainability. Key collaborative networks and institutions include:

- **The Global Adaptation Network (GAN):** Supporting global resilience to climate change by spreading adaptation knowledge. GAN has been a strong ally, supporting the CTCN in promoting the UNEP CTCN-AFCIA programme to the knowledge helix and non-governmental bodies, and instrumental in sharing programme results and lessons learned.
- **Women engagement for community force (WECF):** Supporting the CTCN in strengthening gender mainstreaming and defining its Gender Assessment and Action Plan (GAAP), which became a mandatory deliverable for the latest AFCIA projects (implemented since 2024).
- **Re-imagining International non-governmental organisations (RINGO):** Providing insights on transforming global civil society and guidance during CTCN Advisory Board meetings.
- **United Nations University (UNU):** Offering evidence-based solutions for sustainability and organizing a webinar to sensitize the private sector to the existence of AFCIA opportunity.

In addition to these networks, CTCN also draws on its own network of over 900 members.

“Collaborating with the community has been key to this project’s success, ensuring their involvement and addressing their concerns made this project a true partnership.”

Ameena Mohamed
a local Council Member.
Maldives



Across the UNEP CTCN-AFCIA pilots, many partnerships have emerged, laying the ground for long-term collaboration and sustainability. These partnerships have strengthened national innovation systems, enhanced coordination across sectors, and ensured that pilot initiatives can evolve into lasting climate solutions. Examples include:

In Viet Nam

Transboundary partnerships were created with water agencies in China, Lao People's Democratic Republic, and Viet Nam to design a Global Hydrological Model (GHM) and a water resource management plan. This collaboration enables the three countries to gather reliable, up-to-date information and model solutions to address shared water management challenges.

In Ghana

The initiative has enhanced the understanding of the solar irrigation landscape and brought together financial and private sector partners to support the technology deployment. Key partners include the Development Bank of Ghana, Sanlam Insurance, ACRE Africa (a digital technology provider), and FSD Africa Investments (FSDAi), a private company that serves as the investment arm of FSD Africa.

In Nepal

A customized weather and climate information system for climate-resilient agriculture was developed, including an application programming interface (API) for the automatic dissemination of customized, location-specific 3-day weather forecasts. The initiative exemplifies cooperation between government and vulnerable communities as the smallholder farmers contribute to improving real-time data quality and, in return, receive more accurate forecasts and agrometeorological advice.

Future outlook

UNEP CTCN-AFCIA directly impacted more than 200,000 people and enabled governments across 23 countries to pilot innovations that can scale to impact many more.

During the five years of deployment, the potential for climate resilience has increased with data gathered, capacity increased, and pilots conducted for a wide range of technologies, including solar pumps, early warning systems, soil mapping, community data gathering, flood barriers, and agro-tech.

75% of the completed initiatives are already set to scale within their countries with support gained from governments and international funds.

The next step is to grow this vital initiative beyond the first 25 initiatives and provide technical assistance to more vulnerable communities ready to adapt to the impacts of climate change, develop innovation systems at the regional and national levels, and attract more private sector investment.

UNEP-CTCN AFCIA II

UNEP CTCN continue their change-making collaboration with the Adaptation Fund to boost innovation in climate adaptation technologies through a second phase: UNEP CTCN-AFCIA II.

Launched in 2024, the new programme continues to target developing countries, with special attention to Least Developed Countries (LDCs) and Small Island Developing States (SIDS). In a change from AFCIA I, the programme will aim to broaden its remit from government organizations to include public institutions, private institutions, civil society organizations, community groups, research centres, and universities.

National Systems of Innovation (NSIs) are a core feature of UNEP CTCN-AFCIA II, and will provide the enabling environment (including regulations, policies, standards, certification, codes of conduct, and framework) as well as the financing opportunities (e.g., business models, incentives, and banking support) required to launch from the groundwork of UNEP CTCN-AFCIA I. All initiatives continue to be channelled through the NDEs, but directing their commitment towards the broader NSI environment.

UNEP CTCN-AFCIA II will grow to 40 initiatives for transformative climate adaptation technologies and solutions in developing countries. In addition, it will facilitate the scaling-up of 10 promising adaptation technologies that have already been successfully tested, doubling its reach across vulnerable communities.

To access more information, or to apply for technical assistance through AFCIA II, visit:
<https://www.ctc-n.org/technical-assistance/afc-ia-ii-programme-continues-collaboration-between-unep-ctcn-and-adaptation-fund-boost-innovation>

AFCIA expansion

Beyond UNEP CTCN and UNDP, other implementing entities are joining AFCIA to further increase its reach. At COP28 in Dubai, the Adaptation Fund welcomed two new partners: the United Nations Industrial Development Organization (UNIDO) and the World Food Programme (WFP). UNIDO and WFP will each manage programmes worth \$10 million, providing small grants and technical assistance to Small and Medium-sized Enterprises (SMEs) and non-profit organizations, respectively.

AFCIA II is already a \$30 million programme, and is expected to grow, building on the success of its first phase with additional partners joining the AFCIA family.

UNEP CTCN has been selected to coordinate the global AFCIA programme. Its role will enhance the performance and impact of the AFCIA II programme, enabling stronger collaborations between AFCIA partners, cross-cutting programming, joint monitoring, and learning activities.

As the adaptation finance gap in developing countries is projected to reach \$310-365 billion per year by 2035, AFCIA's role has never been more critical. As it expands and grows through a second phase and welcomes new delivery partners, its reach and impact become ever greater.

Every \$1 invested in adaptation and resilience generates more than \$10 in benefits over ten years. This translates to potential returns of over \$1.4 trillion, with average returns of 27%.

World Resources Centre, paper: Strengthening the Investment Case for Climate Adaptation, 2025

References/Annexes

Further resources on UNEP CTCN-AFCIA

Background information on UNEP CTCN-AFCIA can be found online at: <https://www.ctc-n.org/adaptation-fund-climate-innovation-accelerator-afcia-unep-ctcn>

UNEP CTCN-AFCIA fact sheets for each initiative can be found at: <https://www.ctc-n.org/technical-assistance/adaptation-fund-climate-innovation-accelerator-afcia-l/fact-sheets>

UNEP CTCN-AFCIA project reports and documentation can be found at: <https://www.ctc-n.org/technical-assistance/projects> (Filtered by programme for AFCIA I)

UNEP CTCN-AFCIA interactive dashboard: <https://www.ctc-n.org/technical-assistance/adaptation-fund-climate-innovation-accelerator-afcia-l>

CTCN 10 year anniversary report: <https://www.ctc-n.org/sites/default/files/resources/CTCN%2010%20year%20progress%20report.pdf>

Podcasts:

- <https://youtu.be/7rBQFBiJvdY>
- <https://www.unep.org/news-and-stories/audio/resilience-global-adaptation-podcast>.

Stories published on the UNEP website:

- Burundi: <https://www.unep.org/news-and-stories/story/can-portable-dam-help-africa-counter-rising-waters>
- Saint Kitts and Nevis: <https://www.unep.org/news-and-stories/story/drought-sets-farmers-saint-kitts-and-nevis-turn-technology-help>

Blogs published on the CTCN website:

- Sudan: <https://www.ctc-n.org/news/Sudan-juggling-priorities-during-difficult-time>
- Liberia: <https://www.ctc-n.org/news/solar-farm-table-liberia-improved-solar-powered-irrigation-practices-are-securing-lowland-rice>

Newsletters:

The project in Liberia was promoted in CTCN newsletter +subscribers. https://track.mdirector.com/files/campanias/105516/4/4/CAM/message_email.html

Videos:

- The project in Honduras was promoted by the implementing partner through this video: <https://www.youtube.com/watch?v=AVVPYDxUjOA>
- St Kitts and Nevis: <https://youtu.be/glxWPxUCvs0>

Methodology

The UNEP CTCN-AFCIA Impact Report was compiled based on the data gathered throughout the programme.

Impact in UNEP CTCN-AFCIA supported projects is continuously monitored throughout the lifecycle of the programme: initially through a monitoring and evaluation (M&E) report, then annually via project progress reports, and at closure through the Adaptation Fund Results Tracker and a final closure report. Both quantitative and qualitative data are collected to build a comprehensive understanding of the outcomes and impact at the local level.

Selection criteria for choosing initiatives

UNEP CTCN-AFCIA received over 420 requests across three calls for proposals, including some duplicated applications. These requests were distributed as follows: 36 from Latin America and the Caribbean, 142 from Asia, 239 from Africa, and 3 from developed countries. This high level of interest reflects the significant demand for accelerating climate adaptation innovation.

Call for proposals	Jan 2021	April 2021	Sept 2022
Applications received	71	134	215
Applications selected	6	6	13

Eligible countries for UNEP CTCN-AFCIA have to fulfil the following criteria: located in Africa, Asia-Pacific and Latin America and Caribbean, covered by the United Nations Framework Convention on Climate Change (UNFCCC) but without National Implementing Entities (NIEs) accredited with the Adaptation Fund (approximately 113 countries in total). Priority was given to Least Developed Countries (LDCs) and Small Island Developing States (SIDS).

Applicants (primarily governments) completed a Technology Concept Submission Form (available in English, Spanish, and French). These forms were submitted in close consultation with their respective national focal points to the Adaptation Fund and CTCN.

Successful initiatives were selected based on the ability to:

- Promote innovative, transformative and locally led climate adaptation technologies and solutions
- Utilize endogenous knowledge and/or locally developed technologies
- Engage stakeholders and empower women
- Contribute to knowledge transfer within the host country
- Demonstrate potential for replication or scaling up
- Align with national strategies and plans

By applying these criteria, the CTCN ensured that from the start, the initiatives selected were poised to deliver clear and measurable benefits to the requesting countries, advancing their adaptation to the negative impacts of climate change.

Monitoring and tracking initiatives

The monitoring and evaluation (M&E) strategy for the initiatives included the following key elements:

- A detailed work plan, M&E plan, impact statement, and inception meeting
- Documentation of deliverables for each activity (e.g., reports, datasets, etc.)
- Development of fact sheets directly with each initiative
- A project closure report, including comprehensive impact data

These efforts provided a structured framework for tracking the progress and impact of each initiative throughout its lifecycle.

Impact calculation methodology

Deliverables and closure reports were self-reported by the initiatives. Given the diversity of initiatives, there is some fluctuation in the ability to provide data across all categories in the reporting requirements of the Adaptation Fund and UNEP CTCN-AFCIA by the initiatives.

To address these challenges, impact data was gathered using three distinct methods:

Quantitative Data:

- Data gathered from the initiatives reports, and aggregated
 - **Strengths:** Ensures consistency across initiatives.
 - **Limitations:** Process-oriented and limited to predetermined reporting categories.
 - **Impact Data Quality:** Medium.
- Data gathered directly from initiatives during the development of project Fact Sheets.
 - **Strengths:** Focuses on achievement-oriented outcomes.
 - **Limitations:** Varies across initiatives due to different project categories.
 - **Impact Data Quality:** Medium.

Qualitative Data:

- Stories, videos, and quotes from the initiatives collected to provide narrative snapshots of the on-the-ground impact.
 - **Strengths:** Offers real-world insights and contextual understanding.
 - **Limitations:** Anecdotal and uneven coverage across initiatives.
 - **Impact Data Quality:** Medium.

These methods together provide a comprehensive, multi-faceted approach to measuring the impact of the UNEP CTCN-AFCIA initiatives, balancing quantitative rigor with qualitative storytelling to reflect the diversity of results.

UN 
environment
programme

 **CTCN**
UN Climate Technology Centre & Network