CREWS CLIMATE RISK & EARLY WARNING SYSTEMS

Annual Report

2022

HOW DO WE KEEP OURSELVES SAFE?

Delivering early warning for everyone

WORLD METEOROLOGICAL ORGANIZATION

GFDRR
Global Facility for Disaster Reduction and Recovery

Administered by
THE WORLD BANK
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UNDRR
UN Office for Disaster Risk Reduction

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**Delivering early warning
for everyone**

The CREWS Initiative

We are a unique and specialized fund for climate action that saves lives and livelihoods in Least Developed Countries (LDCs) and Small Island Developing States (SIDS).

We help countries and regions build strong and sustainable early warning systems providing timely, accurate and accessible climate risk and weather services to enable early action. Our tailored country-driven projects strengthen national and regional institutions to better protect people hardest hit by climate change.

We put women and men at the heart of our work by engaging communities and local organizations to find the right early warning solutions together and build resilience.

Our impact is underpinned by the expertise and collective experience of our implementing partners — the World Meteorological Organization (WMO), the World Bank Group/Global Facility for Disaster Reduction and Recovery (GFDRR), and the UN Office for Disaster Risk Reduction (UNDRR).

We are governed by a Steering Committee composed of donor countries as Members and invited Observers. As the decision-making body, the Committee oversees all activities funded by the CREWS Trust Fund. The United Kingdom is currently Chair.

Each year, we support more countries and regions through Member contributions. Our growing Membership and financial support testifies to the relevance, urgency, and value of our work.

Our value proposition

We are a **unique** finance mechanism for customized, country-led, early warning solutions.

People are at the **centre** of all that we aim for and do through risk-informed, impact-based warnings.

We build resilience of women and men with **gender responsive** projects.

Our **solution-orientated** focus draws on best available expertise aligned with approved standards and norms — making us agile, innovative, and effective.

We act as a **multiplier** by leveraging more climate action funds through our projects.

Our work complements and builds on that of partners, **promoting coherence**.

Content

Foreword

2022 was a pivotal year for the CREWS Initiative. As we shifted operational and policy gears, so did the early warning sphere. The Early Warnings for All initiative put greater focus on CREWS, recognising the urgent need for our work in systematically addressing climate change impacts. The challenge and opportunity of delivering this promise by 2027 is great. We all have our part to play – and CREWS' is critical.

Our relevance is clear as an operational fund supporting action on every element of effective early warning systems and services. Our funding model, remit to invest where early warning is most needed, and commitment to partnership in delivering early warning solutions for – and with – people, communities, and countries is a unique and powerful offer.

The CREWS Annual Report 2022 maps and illustrates how our work is making the world safer with early warning. New to *this* report is capturing progress against key programme indicators since our first projects. Evidence of performance is critical. It helps us, as CREWS Contributing Members, identify how and where best to invest for greatest early warning returns and outcomes.

In Africa and the Indian Ocean, Asia Pacific and the Caribbean, the report shows countries are advancing with World Bank, World Meteorological Organization and UN Office for Disaster Risk Reduction support. Progress includes effective governance, greater forecasting, warning and dissemination capacity on hazards, increasing numbers of people benefitting from systems and services, and disaster risk management. In 2022, 111 million more people in 15 countries globally were covered by new early warning and forecasting services. In Africa, where most CREWS projects are, extending sand and dust forecasts to six more countries allows 90 million more people to reduce their risk. Hydro-met related decrees in DR Congo, Mozambique and Togo laid legal foundations for early warning. There, and elsewhere, countries, national institutions and communities are adopting and building on CREWS investments.

Three new projects in Africa means CREWS now works in 23 fragile or conflict-affected countries. Reaching last mile communities in such contexts is critical to Early Warnings for All success. Our operational partners – national and international Red Cross Red Crescent entities, UN agencies and others – are delivering our goal of enabling the most vulnerable to better protect themselves.

Our initiative with the Green Climate Fund to scale up early warning financing amplifies CREWS' scope and impact. With this, our new Accelerated Support Window for quick impact interventions, and multi-year projects, CREWS now has three early warning finance pathways.

External evaluation of CREWS' first five years gave a good bill of health, offered valuable direction, and added impetus to more robust results tracking. However, CREWS' investment need grows. Whilst a 36% increase in CREWS' trust fund contributions since 2021 is welcome, operational support demand requires $155 million more up to 2025. I thank Members committing new funding in 2022, and we welcomed Canada as our 9th Member. We encourage more countries to join us in fulfilling CREWS' vital role to deliver effective early warning for everyone.

Gerard Howe

Head Adaptation, Nature & Resilience Department
Foreign, Commonwealth and Development Office (FCDO), UK
Chair, CREWS Steering Committee

2022 in numbers

9 CREWS Members

– **Canada** joined by pledging 10 million CAD over next 4 years

18 country, regional and global projects – up from 15 in 2021

3 short-term, quick impact interventions

20 regional, national and global projects in pipeline or to launch

282 million

extra people to have stronger weather and climate services via **3** new multi-year country and regional projects

23 countries[1]

supported by CREWS affected by **conflict** or **fragility**

8 countries

with stronger governance on hydro-met and climate services

3 decrees adopted in DR Congo, Mozambique and Togo

5 Pacific countries validated national strategic plans and/or frameworks

16 natural hazards

posing risk to life for which CREWS is increasing forecasting capacity through projects

111 million

more people better protected by new early warning systems and forecasting put in place with CREWS support

– Covering mainly drought, floods, sand and dust, coastal inundation and other marine hazards in **15 countries**

15 countries

in Central and West Africa used best alerting practice to issue warnings with CREWS support

Forewarning **271 million** people in total on different hazards to enable timely life-saving action

US$105.6 million

received to date in signed contributions[2] to CREWS Trust Fund since 2015

A **36%** increase since 2021 – and another $36 million pledged

US$155 million

more needed by 2025 to scale up CREWS early warning action and meet immediate demands

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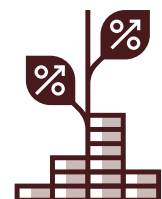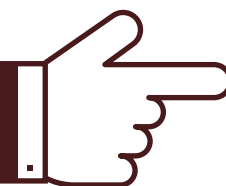
1 https://thedocs.worldbank.org/en/doc/69b1d088e3c48ebe2cdf451e30284f04-0090082022/original/FCSList-FY23.pdf
2 This figure includes Euro 10 million contribution by the European Commission to CREWS directly to GFDRR.

CREWS Initiative in action

Caribbean regional project
Anguilla, Antigua and Barbuda, Bahamas, Barbados, Belize, Cayman Islands, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, Montserrat, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago, Turks and Caicos Islands

West Africa regional project
Benin, Burkina Faso, Cabo Verde, Cameroon, Central African Republic, Chad, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo

Central Africa regional project
Angola, Burundi, Cameroon, Central African Republic, Chad, Republic of the Congo, DR Congo, Equatorial Guinea, Gabon, Rwanda, Sao Tomé e Principe

Haiti

Mali

Niger

Chad

Burkina Faso

Togo

Benin

Malawi

Mozambique

Democratic Republic of Congo

* Canada's co-funding of CREWS Pacific SIDS and Caribbean regional projects, and support for activities in Southeast Asia concluded 31st March, 2022.

Afghanistan

Cambodia and Lao People's Democratic Republic regional project

Pipeline projects
19 country, regional, and global projects are in the CREWS pipeline, awaiting funding totalling $76.5 million.

Horn of Africa regional project
Ethiopia, Somalia, Sudan

Tonga

South West Indian Ocean regional project
Comoros, Madagascar, Mauritius, Mozambique, Seychelles

Papua New Guinea

Pacific SIDS regional project
Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Republic of the Marshall Islands, Nauru, Niue, Palau, Samoa, Solomon Islands, Tonga, Tokelau, Tuvalu, Vanuatu

Map legend:

Country projects

Regional projects

Accelerated Support Window interventions

A defining year

2022 was a year when CREWS' relevance and remit came into sharp focus. The UN Secretary General's Early Warnings for All initiative to ensure every country has an early warning system by 2027 framed the impetus to CREWS' work – and an expansion in its support to LDCs and SIDS.

Three new national and regional projects launched during the year – Malawi, Central Africa, and the Greater Horn of Africa – meant 18 such CREWS-funded projects in 2022. Additional funding for CREWS Caribbean initiated critical data work in some countries to better inform disaster risk and response management, while a new project was approved for East Africa. In the pipeline, another **19** national, regional, and global projects await funding.

Although COVID-19 restrictions gradually lifted, their impact were still being felt in some established CREWS projects. Conflict, instability, and sanctions continued to impede activities to varying degrees in Afghanistan, Haiti, and Mali, and varioius projects extended into 2023.

For others, 2022 marked an end. Phase 1 of CREWS Pacific gave full way to phase 2. The global project to *Measure effectiveness of multi-hazard early warning systems through the Sendai Framework Monitoring* defined custom indicators to help countries do just that. CREWS Niger finished its planned work to strengthen early warning, especially for floods, with additional funding requested in the CREWS pipeline.

As Canada's co-funding of CREWS activities in the Caribbean and Pacific came to a close, it's support for CREWS took on new shape as Member. Funding over four years will contribute to help build or beef up early warning in developing countries particularly exposed to climate and weather-related disasters – especially Small Island Developing States.

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Boosting early warning in East Africa

The green light was given to a 4-year, $7 million project for East Africa. For launch in 2023 and being carried out by all three CREWS implementing partners, the project will assist six countries – Burundi, Kenya, Rwanda, South Sudan, Tanzania, and Uganda – to scale up early warning in some parts of the region. And lay the ground for it in others.

CREWS investment will develop national and regional capacity on short-term and severe weather forecasting, prediction and warning adapted to local contexts, update Common Alerting Protocols, and pilot Standard Operating Procedures to reactivate existing early warning frameworks in some countries. The goal is to enable people and communities to take early action to save lives and assets. Tailored support in Burundi and South Sudan includes assessing their hydro-met monitoring networks, early warning infrastructure, and institutional capacities to develop a roadmap for strong and effective early warning systems and services.

The project is effectively aligned with, and builds on, other programmes in the region. These include the Finnish Meteorological Institute's regional project (FINKERAT), the Systematic Observations Financing Facility (SOFF), and the UK-funded HIGHWAY project which piloted a regional early warning system for fisherfolk and others along Lake Victoria. Generating half a billion dollars in fish exports annually and supporting 25% of the population surrounding it, Africa's largest lake with its micro-climate of frequent severe storms, strong winds and rainfall, heavily affects East Africa's weather and climate. The region's diverse terrain, an increasingly variable climate, and one of the fastest urbanization rates anywhere, has made it ever more vulnerable to floods, droughts, and landslides.

© UNICEF/Mark Naftalin

Early warning to reach most-at-risk people

2022 also saw CREWS putting into practice newly developed people-centred operational guidelines and procedures. They deliver on CREWS' commitment to systematically apply people-centred approaches across projects to ensure those most at risk and most in need of timely, accurate, and understandable risk information — are listened to, involved, and reached in early warning solutions. This is critical as early warning systems are not delivering as aught. While disaster-related mortality is falling in most countries, reporting on global targets show the world is failing to significantly reduce disaster impact on lives, livelihoods, economic assets, and infrastructure by 2030.[1]

The procedures, underpinned by the guidelines, ensure coherence in the design, implementation, and monitoring of CREWS' people-centred early warning system initiatives through specific roles, responsibilities, and oversight. Implementing Partners co-design, execute and monitor national and regional projects by including and integrating the input of multiple collaborators — including women, communities and local organizations — across the full spectrum of early warning. The International Federation of Red Cross Red Crescent Societies

facilitates consultation with its National Societies at the start of project design to ensure they contribute and are financed to translate early warnings into anticipatory and early actions. This, and the continuous adapting and reassessing of people-centred approaches help ensure CREWS projects are driven by – and meet – the needs of people most dependent on effective early warning.

In its financing decisions, the CREWS Steering Committee makes sure sufficient time and resources have been allocated to engage at-risk people, groups and organizations in project design, application, and monitoring. The CREWS Secretariat, among other things, reviews new projects for compliance with people-centred operational procedures, develops and applies quality assurance, and provides updated guidance on people-centred approaches. The three new CREWS projects in Africa in 2022 are first to operate with these procedures.

Not only did the number of CREWS-supported countries expand in 2022, so did ways to access early warning finance through CREWS. In addition to multi-year CREWS projects, two new pathways came into being.

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1   UNDRR Status of Sendai Framework Targets 2023

Accelerated Support Windows – open

CREWS' new initiative to provide short-term, quick impact interventions to Least Developed Countries and Small Island Developing States kicked off. The Accelerated Support Window[2] – set up to support analyses, assessments, or advisory services to monitor or deliver early warning – complements multi-year CREWS projects. Interventions funded through this new financing mechanism must last less than 12 months, cost up to $250,000, and aim to make larger early warning investments more sustainable. Three countries – Benin, Mozambique, and Tonga – were first to get the go-ahead.

After an assessment of **Benin's** existing multi-hazard early warning capacity, a roadmap to develop an effective system is to be developed with an initial investment plan and training in key areas. Products and operational procedures to better communicate with and reach those most at-risk will be piloted in a municipality already part of a World Bank programme to build resilience and inclusive cities. Recurrent floods and droughts have led Benin to put disaster risk management and climate change adaptation at the heart of its national development programme.

Funding for **Mozambique** supported all 16 Southern African Development Community Members (SADC) who ultimately want a regional early warning system and response through a one-stop operations centre.

This will be essential for a region facing more severe weather events more often – especially Mozambique – but is not ready to face the next one. CREWS support enabled a Ministerial meeting of SADC countries to jointly develop and endorse a blueprint to deliver on Early Warnings for All in the region. Commitments included putting in place policies, laws and Standard Operating Procedures on meteorology and disaster management, investing more in human, financial and institutional capacities of national hydro-met and disaster response entities, and strengthening regional and continent-wide coordination.

The intervention in **Tonga** will produce a mobile app for a community multi-hazard early warning and response system – without using the internet to reach people. To work on most smartphones – and disability friendly – it will enable 2-way communication for wider and faster warning dissemination, and for staff at the National Met Service and communities to report natural hazards or damage to trigger rapid and tailored response. People in all 121 Tongan rural and urban communities, where above half the population have a smart phone, will be trained to trial-test the app so feedback is given to improve. The app builds on lessons learnt from Met Service use of community Facebook pages to disseminate warnings on quick onset disasters. This includes the 2022 volcanic eruption and tsunami for which there was very little lead time – but where every second counted.

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2   To find out more or to formally submit proposals, please contact crews_asw@wmo.int
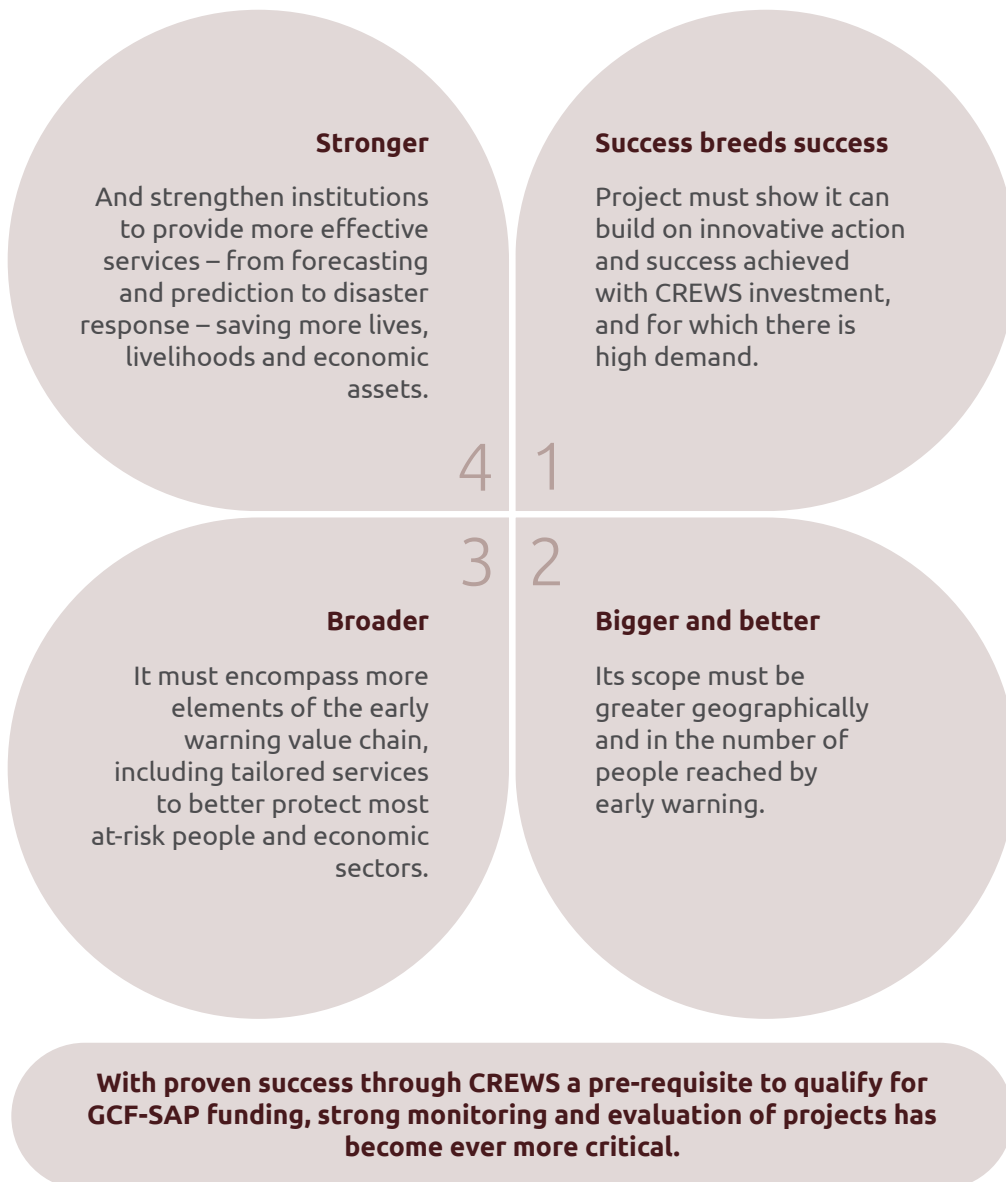
Fast-track access to early warning finance through GCF

With a 2027 deadline on Early Warnings for All, CREWS and the Green Climate Fund (GCF) joined forces to scale up early warning system financing. Countries most exposed to climate change who have successfully carried out CREWS-funded projects, can more easily and quickly access up to $25 million for early warning systems through the GCF's Simplified Approval Process (SAP). The funding will enable those countries with significant potential to amplify and reinforce CREWS-supported early warning

work and impact – and ensure its sustainability. Success through GCF-CREWS supported action will make it easier to access more resources for early warning afterwards – and potentially lead to much larger investments from other entities.

The *GCF-SAP-CREWS Scaling Up Framework for Early Warning* will be piloted over two years. Between 3-5 selected projects will be initially identified by CREWS before being approved by GCF, fine-tuned and rolled out. The process begins in 2023.

Critical criteria

Stronger

And strengthen institutions to provide more effective services – from forecasting and prediction to disaster response – saving more lives, livelihoods and economic assets.

Success breeds success

Project must show it can build on innovative action and success achieved with CREWS investment, and for which there is high demand.

4 1
3 2

Broader

It must encompass more elements of the early warning value chain, including tailored services to better protect most at-risk people and economic sectors.

Bigger and better

Its scope must be greater geographically and in the number of people reached by early warning.

With proven success through CREWS a pre-requisite to qualify for GCF-SAP funding, strong monitoring and evaluation of projects has become ever more critical.

We are proud to be an implementing partner of CREWS and the work it accomplished in 2022. Its work with LDCs and SIDS to build inclusive and multi-hazard early warning systems has never been more valuable in light of the goal set by the Early Warnings for All Initiative. If we are to achieve universal early warning coverage by 2027, support to CREWS must be greatly increased.

Mami Mizutori,
Special Representative of the UN Secretary-General for Disaster Risk Reduction
Head of UNDRR

The Climate Risk and Early Warning Systems initiative is key to the success of Early Warnings for All because it embodies a people-centred approach that prioritizes community engagement and helps transform and enhance meteorological and warning services, human capacities, and last mile action. WMO is committed to increasing resilience and climate adaptation through CREWS and to improving global basic weather and climate information through the Systematic Observations Financing Facility (SOFF).

Prof. Petteri Taalas,
WMO Secretary-General
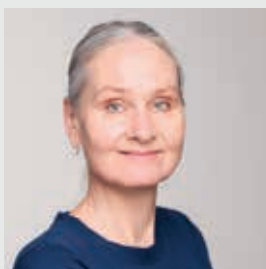
The World Bank is committed to enhancing resilience to climate shocks and to helping countries build effective multi-hazard early warning systems. Partnerships like CREWS can help influence climate adaptation financing provided by the World Bank by channeling critical funding for technical assistance, enabling governments and communities to develop the most from their climate financing, thereby contributing to build their climate resilience.

Bernice Van Bronkhorst,
Global Director for Urban, Disaster Risk Management, Resilience and Land Global Practice
World Bank

CREWS in Africa

- Only 21 countries in Africa – 40% – report having early warning systems in place with coverage often limited.[1]

- 60% of people are not covered by early warning systems.[2]

- People in Africa are among those who are 15 times more likely to die from climate disasters.[3]

36 countries assisted through CREWS	**7** country programmes
4 regional programmes	**2** accelerated support interventions

Why invest in CREWS? Because CREWS works. It bridges the protection gap for vulnerable populations in the face of climate disasters. It has a proven track record of saving lives. That's why France is enhancing its support for CREWS in 2023 and beyond.

Stéphane Crouzat,
Climate Ambassador, Ministry for Europe and Foreign Affairs
France

Sub-Saharan Africa is a priority region for Switzerland and we are committed to work together with countries and people suffering most from climate change.
As a long-term CREWS supporter, Switzerland has increased its financial contribution to CREWS. Its support to most-at-risk communities by improving early warning systems results in fewer lives and livelihoods lost.

Patricia Danzi,
Ambassador, Director General of the Swiss Agency for Development and Cooperation

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1 https://www.undrr.org/news/early-warnings-all-africa
2 Early Warnings for All Executive Action Plan 2023-2027
3 https://www.un.org/africarenewal/magazine/april-2023/fast-tracking-global-early-warnings-systems

Most prevalent hazards/disasters 2012-2022[2]

floods   drought

WMO	2017-2024	$2.19 million	Expenditure rate: 73%	Leverage: $35 million

In 2022, the government of Burkina Faso, WMO and the World Bank worked together on a $5.2m contract taking early warning investment in the country further. WMO will provide technical assistance to national hydrometeorological services. Funded by GCF as part of the partnership with CREWS to scale up early warning finance, the support will be an expansion of the initial CREWS project. Both the project and new contract are now expected to be completed by the end of 2024, in line with the World Bank Strengthening Climate Resilience in Burkina Faso.

Progress so far

1 law(s), bill(s), national strategic plan(s), framework(s) or Standard Operating Procedures (SOPs) for national hydro-met services developed with CREWS support

— **Strategic Plan** for national Met Service, ANAM, updated in 2019 and adopted in 2020.

— Hydrometeorological, food security, civil protection and disaster risk reduction services are developing SOPs for an integrated approach to warning.

4 hazards – **drought, sand and dust storms, floods, severe weather** – which pose a risk of life loss in the country for which CREWS is supporting increased forecasting and warning capacity

— **22** staff from meteorological and hydrological services trained in numerical weather prediction and interpretation, flood and crop modelling, weekly and monthly forecasting.

— **62** Ministry of Agriculture (extension agents) staff and local radio operators trained in disseminating warnings to people needing them.

— Sand and dust advisory system provides daily information for weather forecasters.

— Hydrologists and forecasters trained on flash flood guidance system under development.

3 risk information products/tools produced with CREWS support used to enhance services

— Crop calendar, agro-met bulletins, agro-met indices.

— Production of indices started under CREWS Burkina Faso with French agricultural research cooperation CIRAD, **extended** to other CREWS projects in collaboration with WeatherForce.

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1   https://thedocs.worldbank.org/en/doc/69b1d088e3c48ebe2cdf451e30284f04-0090082022/original/FCSList-FY23.pdf
2   EM-DAT data download 26 March 2023; disaster defined as when more than 10 people killed and/or at least 100 affected or injured

© WFP/Esther Ouoba

Estimated **22.5 million people**[3] covered by sand and dust storm forecasting system through CREWS support

— Sand and dust advisory system extended to 6 other countries in West Africa.

— Agrometeorological advisories also reach **1329** farmers at **3** pilot sites with a total population of nearly **167,000** people.

Common Alerting Protocol (CAP) used to issue warnings, with CREWS support

— **15** warnings using CAP issued in 2022 - all for storms and rain.

— Meteorologists trained to use CAP via 2 regional workshops in 2022.

500+ women benefitted from capacity development offered by CREWS

— Women made up **38%** of 1329 farmers at 3 pilot sites trained on weather/climate information and dissemination. 240 women at one site – Titao – empowered by training to create cooperative and using agro-met guidance and warnings. Result: higher yields and profits.

— In total, **1391** people using hydro-met services trained and supported by CREWS Burkina Faso at pilot sites, with powerful socio-economic benefits and outcomes.

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3   https://www.worldometers.info/world-population/burkina-faso-population/

2022 developments

Analysis of user feedback and requirements on real-time monitoring and forecasting tool for Africa – MISVA – led to tool's improved function and Burkina Faso taking lead in running weekly predictions to enable forecasts 6 weeks ahead.

By end of 2022, observations from weather stations at **8** of **9** airports were being exchanged hourly or sporadically. This followed 3rd CREWS-funded support mission to Ouagadougou. It installed new data sharing software and developed plan to ensure network sustainability.

— Data is being shared with WMO Global Data Processing and Forecasting System.

— In January 2022, all 9 stations were silent. Only 1 by year end.

Still to do:

— Finish developing a **Flash Flood Guidance System** and then operationalize it with training on its use.

— Solve communication issues with last **3** of 243 automatic weather stations to better collect and share data with global weather and climate observation system for more accurate forecasting in Burkina Faso and world.

People-centred solutions – *Roving seminars for farmers' agro-met self-reliance*

Although early warning in Burkina Faso has been evolving from drought and locust monitoring to warning on multiple hazards – food security is still a critical issue in the country. Nearly 1 in 5 people are under nourished and a quarter of all children stunted.[4] And drought, conflict and poverty are major culprits. To make farmers more self-reliant in tackling weather and climate issues affecting production and income, they – along with local radio staff and agricultural extension agents from the Ministry of Agriculture – are trained and guided on using weather and climate information for farming needs. Since 2018, that has happened **3** to **4** times a year at Niangoloko, Tenado and Titao projet pilot sites through 'roving seminars'. These regular mobile training sessions build and entrench learning for self-reliance. They also increase interaction between farmers and national hydro-met entities – so farmers get the services they need for greater food security.

© ANAM

© WFP/Marwa Awad

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4   https://impact.economist.com/sustainability/project/food-security-index/explore-countries/burkina-faso

Chad

Most prevalent natural hazards/disasters 2012-2022[2]

floods

drought

landslides

WB/GFDRR, WMO	2019-2024	$3.15 million	Expenditure rate: 33%	Leverage: $156 million

With the lifting of COVID restrictions, **CREWS Chad** was back on track in 2022. A mid-term project evaluation identified its approach of building and transferring skills already proven by CREWS Burkina Faso – as a strength. Qualitatively, change was noticed in farmers' ability to use agro-met information and adapt behaviour accordingly. Ultimately, this should mean higher yields, fewer losses due to weather and climate, diversification, and increased income – but capturing structured feedback from farmers and others using weather and climate services is key. The project builds on a pre-existing food security warning system by including additional hazards and involving five national institutions.

Although CREWS Chad coordinates closely with UNDP, IFAD and two World Bank hydro-met and early warning initiatives, structural lack of qualified staff and human and financial resources to maintain even basic hydro-met service – is a major impediment to success. Interventions would serve little purpose without addressing this. A positive: synergies and collaborations developed by national hydro-met services through CREWS Chad. These are needed for project sustainability.

Progress so far

0 law(s), bill(s), national strategic plan(s), framework(s) or Standard Operating Procedures (SOPs) for national hydro-met services developed through CREWS support

— In development: a strategic plan for the national Met Service, ANAM, and SOPs for multi-hazard early warning.

6 hazards – **floods, drought, sand and dust storms, heavy rain, strong winds** and **thunderstorms** – which pose a risk of life loss and for which CREWS is supporting increased forecasting and warning capacity

— Rehabilitation of hydrological stations along 2 rivers enable flood monitoring, and work initiated on flood early warning system

for the capital, N'Djamena. **50** hydro-met, and civil protection staff trained on flood forecasting.

— Sand and dust advisories available for Chad, though ANAM operational procedures needed to convert advisories into warnings.

1 risk information product produced with CREWS support used to enhance services

— Crop calendar developed with input from women producers uses a weather-based tool to monitor drought. It helps define onset and end of cropping season for optimal water use and improved yields. And anticipates impacts.

© UNICEF/Aldjim Banyo

13,670 people covered by early warning systems or (local) preparedness through CREWS support:

— Nearly 179 producers and families at pilot sites trained on early warning response and involved in developing site specific, needs-based bulletins and warnings covering **6** hazards. Another 1774 people – 300 women – and families with greater awareness on managing climate and weather risk and responding to warnings.

— Agrometeorological bulletins disseminated through local radio in accessible format – warn and advise farmers, particularly on drought.

0 Common Alerting Protocol (CAP) used to issue warnings

— ANAM designated and trained for use of CAP but not yet using it. Multi-hazard early warning operational procedures yet to be developed.

71 women have benefitted from capacity development offered by CREWS

— **37%** of 193 pilot site farmers, breeders and local radio journalists, and ANAM staff trained to operate and maintain hydro-met stations, and to develop and use weather forecasts, seasonal forecasts and warnings.

2022 highlights

3 customized agro-met advisory and warning bulletins designed for **4** pilot sites.

— Site specific bulletins covering Bongor, Linia-Mani and Mailao-Tchendjou for farm production ahead of rainy season used feedback from men and women farmers on their design and content.

— Dissemination of daily forecasts, warnings and bulletins also reaching other farmers, herders and public via local radio. Audience figure: **3.03 million people.**

— **35** village focal points – including 10 women – trained in agrometeorological monitoring and guided on crop cultivation.

6 hydrological stations rehabilitated along Logone and Chari Rivers also serving 4 pilot sites. Out of operation for above a year, 7.6 million people had no warning when floods came in 2022.

2022 developments

Design underway of gender-responsive flood early warning system for Chad's capital N'Djamena. It will inform future investment in flood protection infrastructure and public risk information through a new World Bank project (PILIER).

— Design will be underpinned by risk assessment also identifying flood-vulnerable neighbourhoods.

— Early warning system to be accompanied by contingency plan covering every aspect of flood preparedness and response, including alert protocols and training plan. It will minimize damage and loss to better protect the city's **1.6 million** population.[3]

— CREWS Chad leveraged $7.5 million in PILIER project to set up operational forecasting, warning, and emergency response centres in Chad. They will be key to success by enabling risk mapping, early warning, and response.

5 ANAM technicians and management staff trained on Common Alerting Protocol. It will be used when a national hydro-met warning centre is up and running.

People-centred solutions: *Meeting farmers' particular information needs*

Until trained on using weather and climate forecasts and warnings through CREWS Chad, farmers at 4 pilot zones reliant on rain-fed agriculture used traditional knowledge to produce. The value of climate and weather services was little known. That has changed. Advisories and warnings now inform their farming decisions – crops to cultivate, and when to sow, irrigate or harvest. But to yield more produce, *localized* and updated daily, weekly, 10-day, monthly, and seasonal information was needed for accuracy. And it was the farmers wanting it: When will rains come and go? How much rain will fall or river levels rise? When are storms expected? Or dry spells begin and end? Also wanted: advice on crops to grow on different types of terrain and soil. The result – geo-specific daily bulletins tailored to individual communities' needs for greater food security – and disseminated through local radio. Critical information for 3 million people, especially those most at-risk – farmers and herders.

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3   https://worldpopulationreview.com/world-cities/n--djamena-population

Democratic Republic of Congo Conflict situation[1]

Most prevalent natural hazards/disasters 2012-2022[2]

floods   landslides   drought

WB/GFDRR, WMO	2017-2023	$3.09 million	Expenditure rate: 63%	Leverage: N/A

> With COVID-19, low institutional capacity and other issues significantly affecting progress on **CREWS DR Congo** in the two preceding years, 2022 saw the project advance substantially. Important milestones in early warning capacity in DR Congo were reached on policy, law, and early warning. However, a flood observation, forecasting and warning system in place will require adequate government funding of national Met Service, MettelSat, to operate properly. While work remains on a quality management system for aviation meteorology and recovering costs from the aviation sector before a project extension period ends – the ground for people-centric and user-relevant services has been laid.

Progress so far

6 law(s), bill(s), national strategic plan(s), framework(s) or Standard Operating Procedures (SOPs) for national hydro-met services developed with CREWS support

— A National Framework for Climate Service (NFCS) adopted as **Decree**, Meteorology legal text now under review, **2 plans** for MettleSat implemented – and a business plan drafted.

— Consultations on the NFCS and its action plan led to 6 priority sectors wanting Met services, 2 more than expected. When adopted, the Met legal text should mean greater financial and administrative autonomy for MettelSat.

2 hazards – **floods** and **strong winds** – which pose a risk of life loss in the country for which CREWS is supporting increased forecasting and warning

— Flood early warning for **2** watersheds in N'djili (Kinshasha province) and Kalamu (Boma, Central Congo province) benefits urban populations in both cities.

— Improved strong winds forecasting due to better thunderstorm forecasting using data from new weather stations – and new equipment for weather info dissemination.

2 risk information products produced with CREWS support used to enhance services

— Daily bulletins for temperature, wind, rain, and relative humidity. MettelSat's improved forecasting and technical improvements have enabled public bulletins to be updated **every 3 hours** – instead of once a day or every 6 hours – to deal with extreme weather.

— Warning bulletins on flood risk for the 2 watersheds and for agriculture are disseminated when warranted. Civil protection is directly informed by Mettelsat in case of flood risk forecast.

300,000 people covered by early warning systems or (local) preparedness through CREWS support

— Approximately 10% of people in N'djili and Kalamu basins are potentially affected by floods and receive flood forecasts and warnings.

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1 https://thedocs.worldbank.org/en/doc/69b1d088e3c48ebe2cdf451e30284f04-0090082022/original/FCSList-FY23.pdf
2 EM-DAT data download 24 March 2023, Note: while drought was not more common than wildfires or lava flow, it was far more deadly.

24   CREWS Annual Report 2022

© UNICEF/Patrick Brown

Common Alerting Protocol (CAP) used to issue warnings with CREWS support

— **8** alerts on storms and rainfall issued in 2022 after training.

12 women have benefitted from capacity development offered by CREWS

— They account for **3.5%** of 339 MettelSat staff trained due to few women in technical teams, and work in administration.

2022 highlights

1 National Framework for Climate Services adopted by decree.

— CREWS will support its implementation through already approved additional funding to continue activities, capitalizing on equipment installed under a recently closed World Bank-funded DRC Hydromet project e.g. a national climate and hydrological database.

— The framework, a business plan for MettelSat, and eventually a quality management system (QMS), will ensure weather, water, and climate services providers collaborate on delivering early warning services.

— A gap will be bridged between information and services developed – and practical needs of those using them. This will be through continuous 2-way communication to keep products and services relevant and up-to-date, and the introduction of regional frameworks.

1 strategy and business action plan for MettelSat will underpin its financial sustainability.

— Proposals for additional revenue in the business plan can boost MettelSat's finances if followed through.

2 watersheds have operational **flood early warning systems** after hydro-met equipment is installed.

— The systems in N'Djili and Kalamu ensure people will have enough lead time for appropriate life and asset-saving action through impact-based forecasts and alerts.

— More accurate flood modelling using weather prediction tools is thanks to enhanced observations from weather stations based at 12 airports, with data regularly shared with the WMO Information System (WIS).

2022 developments

1 new Meteorology legal text being reviewed by government to provide legislative and regulatory clarity on meteorological governance, responsibilities of hydro-met institutions for harmonization, and funding.

160 + MettelSat staff trained on operation and use of hydro-met equipment during the year. They are among **339** forecasters, engineers, technicians, and administrative staff trained to build institutional capacity through a now completed plan. Capacity assessment will continue with CREWS funding after project ends.

Development of a QMS for air navigation meteorological services has stalled but is expected to continue with CREWS support beyond the project. When up and running, it will ensure meteorological services for the aviation industry adhere to international accuracy, reliability, and safety standards.

People-centred solutions – *Communities' essential role in early warning*

The flood early warning systems in N'Djili and Kalamu watersheds depend on gauges – enough of them – to understand how much rain has fallen and how much ends up in the rivers. Even with data transmitted to a central point via satellite or mobile networks, water levels still need measuring to see how fast river levels are rising – and data sent. Despite needing little space, measurement points often need community or landowner agreement to host them. On village commons, in schools, churches, or local utilities and businesses, these points also need maintaining – and protecting from theft or destruction. That buy-in is critical as water levels rise very fast in these 2 watersheds, requiring near real-time flood monitoring systems. When properly informed, communities not only cooperate – they also engage.

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Malawi

Most prevalent natural hazards/disasters 2012-2022[1]

floods   storms   droughts   landslides

| WB/GFDRR, WMO | 2022-2026 | $3 million | Expenditure rate: Inception phase | Leverage: N/A |

Key existing early warning capacity

4 law(s), bill(s), national strategic plan(s), framework(s), and Standard Operating Procedures (SOPs) for national hydro-met services

— A national policy on disaster risk and a comprehensive Disaster Risk Management Act frame the adoption of a National Meteorology Policy to guide the modernization of climate and meteorological services. The aim is to provide accurate and timely information for resilient development.

— Mechanism to implement this Met Policy – a National Framework for Climate Services with support provided through CREWS to monitor its implementation.

2 hazards – **floods** and **drought** – which pose a risk of life loss in the country for which prediction and warning capacity will be developed with CREWS support

— Drought monitoring, forecast and early warning system will be set up based on calibrated and automated Composite Drought Index.

— Beefing up of hydrometeorological forecasting capacity, improved information products and collaboration with weather and climate services' users will ensure people are better protected from floods and drought.

N/A people covered by early warning systems or (local) preparedness

— CREWS Malawi to work closely with Malawi Red Cross to develop and test gender sensitive, inclusive early warning systems and services for communities. Red Cross volunteers will ensure effective early warning dissemination within communities.

— Early action plans on disaster preparedness/ response and SOPs also to be developed and implemented by CREWS through Malawi Red Cross and Red Cross Red Crescent Climate Centre.

0 Common Alerting Protocol (CAP) used to issue warnings

— CREWS to support Early Warning System Committee (EWSC) to produce/update a National Forecast and Warning dissemination strategy in close collaboration with target communities and others and develop its SOPs. By working together, national agencies will better succeed in reaching people in time and with one voice.

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1   EM-DAT data download 22 March 2023

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Launched late 2022 and initially focused on project set up, **CREWS Malawi's** scope to strengthen risk information and hydro-met and early warning services over four years could not be timelier. It will complement and add value to diverse ongoing climate and early warning interventions by the World Bank, the Green Climate Fund, the EU and others to build national and community climate resilience.

This is much needed. Malawi and its predominantly agrarian population of 20.5 million[2] have been hit by a serious natural disaster every other year in the past decade. With no national multi-hazard early warning system, disaster losses are rising. Informal and unregulated urbanization and an urban population expected to triple by 2040, pose a new and growing risk as all four main cities are flood exposed.

The project will focus on improving climate information and early warning, with a strong emphasis on developing and producing services together with users and sectors via 2-way platforms to consult and gather feedback. Community engagement is also integrated into activities to strengthen existing drought and flood early warning systems and to develop district and local authority-level contingency plans. Flood risk management in two of the biggest cities will underpin efforts to better prepare and warn urban populations against floods and their damage. Developing observation and forecasting skills and capacity of national hydro-met staff, and ability of drought and flood risk communities and local Red Cross to access, disseminate and use climate and weather products – ensures the project delivers across the entire early warning chain.

Key to success: people-centred expertise of Red Cross and Red Crescent entities as additional operational partners. With Malawi Red Cross staff and volunteers often disaster-affected community members, their engagement on dissemination, warning uptake, and inclusive and gender sensitive early warning product design, plans and strategies to manage hazard risk – will be essential.

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2   https://www.worldometers.info/world-population/malawi-population/

People-centred solutions – *Bringing people-centred early warning approaches to life*

With 85% of Malawi's population in rural areas and mostly engaged in rain-fed subsistence farming, floods and drought mean devastation for families and economies. With little to limited access to information, technology, and finance, most at risk are displaced, women, children, and elderly people. How can CREWS Malawi ensure early warning systems and services are locally appropriate – and reach the most vulnerable, priority economic sectors and whole communities? Climate and flood early warning services will be co-designed and produced with those that need and use them. Community members, farmers, fisherfolk, the media and disaster management personnel will be consulted from the offing – and regularly afterwards. The frequency, content and clarity of alerts and messages and dissemination effectiveness will be assessed. Inputs and feedback will be gathered from at least four different locations each time, ensuring geographic and linguistic coverage. Supplemented by information gleaned through an ongoing 2-way feedback platform, these consultations will be critical for tailored early warning services reaching the very last mile communities.

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We increasingly appreciate the need for people-centred early warning systems to save lives and strengthen community resilience to climate hazards. Working with communities and organizations like CREWS and Malawi Red Cross to develop early warnings will help ensure that people are not taken by surprise.

Lucy Mtilatila,
Director of the Malawi Department for Climate Change and Meteorological Services

Mali

Most prevalent natural hazards/disasters 2012-2022[2]

floods   drought

WB/GFDRR, WMO	2017-2023	$3.33 million	Expenditure rate: 57%	Leverage: $31 million

The combination of COVID-19 and growing political instability and insecurity in various parts of the country in previous years had already taken a significant toll on the ability of **CREWS Mali** to function. Insecurity in the centre, northern and southern parts of the country continued to seriously limit, delay, or prevent training, workshops, field missions and internal activities. Two coup d'états in 2020 and 2021 followed by ECOWAS economic sanctions against Mali in January 2022 essentially paralysed the project despite the end of sanctions in July and the gradual lifting of COVID restrictions. The project, to modernize Mali's hydrological and meteorological services, is thus at high risk with a year to go. CREWS Mali is working in close coordination with a World Bank initiative to strengthen hydro-met and early warning services in the country.

Progress so far

2 law(s), bill(s), national strategic plan(s), framework(s) or Standard Operating Procedures (SOPs) for national hydro-met services developed with CREWS support

— **Standard Operating Procedures** developed and business plan for national Met Service, MALI-METÉO – elaborated.

3 hazards – **droughts, floods** and **storms** – which pose a risk of life loss in the country for which CREWS is supporting increased forecasting and warning capacity

— A mobile phone app, SOS SECURITE, was developed to collect, analyze and report information to alert the national civil protection agency to hazards such as floods, droughts, and other emergencies. It also enables the public to inform civil protection of risk and crises. The 2-way communication channel enables civil protection to issue advisories and warnings to the public for timely protective action.

— A flood risk assessment and identification of potential flood mitigation investments in flood-prone Bamako – building on community flood mapping of the capital by Mali Met and others – will support an urban resilience project being developed.

2 risk information products produced with CREWS support used to enhance services

— In addition to the SOS SECURITE mobile app, regional awareness campaigns on disaster risk and response were developed and carried out face-to face.

300,000 people covered by early warning systems or (local) preparedness through CREWS support

— The population receiving forecasts and warning in pilot areas supported through CREWS Mali, mainly farmers.

© WFP/Simon Pierre Diouf

— Nearly **2 million people** are reached through efforts to strengthen media and communication channels on weather, climate and water information for the public, and drought and floods awareness campaigns in 6 regions. Particular attention is paid to women and vulnerable groups with difficulties understanding or accessing information.

Common Alerting Protocol (CAP) being used to issue warnings with CREWS support

— **33** warnings issued in 2022 using CAP – 29 for storms and rain, 4 for heatwaves.

— Nearly 15,000 people so far subscribed to the mobile app, SOS SECURITE, which alerts the public to hazards. An information campaign in **6** southern regions of Mali is expected to be extended nationally.

— The mobile app, along with other civil protection efforts, has considerably reduced the national agency's intervention time in peri-urban areas – **from 3 hours to 15 minutes**.

350 women at least have benefitted from capacity development offered by CREWS

— Women leaders from different regions trained on climate risk and early warning for floods, storms and drought can integrate this knowledge into awareness raising campaigns and disaster risk management in their communities.

— Women hydro-met staff trained on disaster risk and response, forecasting, and flash floods not only improve the accuracy of their predictions but the speed and value of timely information to better protect the public.

2022 highlights

21 climate and early warning products and services produced and disseminated by Mali-Méteo despite challenging security and political environment nationally.

— These include public weather bulletins, seasonal forecasts, dry or short drought spell forecasts, and forecasts for the start and end of the dry season. With increasing desertification and food insecurity, these help the public prepare for and adapt to an increasingly variable climate.

2022 developments

Quality and accuracy of forecasts, warnings and hydrometeorological services to ultimately save lives and reduce losses continue to improve through investment in capacity:

— **5** Mali-Méteo forecasters' ability to analyse hydro-met events and develop flash flood forecast information strengthened through **Flash Flood Guidance System** training for West Africa at the Hydrologic Research Center in the USA.

— Forecasters trained in 2021 on a real-time monitoring and forecasting tool for Africa (MISVA) continued weekly briefings with Méteo France until October to analyze 7-day and monthly rainfall and severe weather outlooks to boost forecasting skills.

People-centred solutions – *Empowering women for early warning*

Across the CREWS Mali project scope, the inclusion and focus on women as integral players in reducing climate-related disaster risk is clear. CREWS is taking a multi-pronged approach. Whether it's through strengthening hydro-met and civil protection skills and capacity to deliver timely and accurate forecasts and warnings on floods and other hazards to training and engaging 350 women community leaders from 6 regions on early warning systems and preventing or managing hazard risk – or building communication networks to amplify their reach and that of others in the early warning value chain – women in rural and urban areas are being better equipped to protect themselves, their families, and assets. And whole populations too.

© Propulsés par RENOVLABS

This training allowed women to master the techniques of prevention and management in the event of disasters…. and to contribute to strengthening the resilience of vulnerable communities.

Fatoumata Diarra,
President, Femme Solidarité MUSO DIJI, NGO

Niger

Most prevalent natural hazards/disasters 2012-2022[2]

floods   drought

WB/GFDRR, WMO	Completed	$2.74 million	Expenditure rate: 91%	Leverage: N/A

CREWS Niger completed its original workplan to put in place flood and severe weather warning services in the country and strengthen early warning on food security. Despite COVID-19 challenges and insecurity delaying completion by a year, CREWS Niger has contributed to early warning in the country. It showed linking CREWS' technical assistance to strengthen hydro-met services' capacities and services with State investment in infrastructure and equipment – can establish functional early warning systems and services to alert people and better organize aid efforts.

A diagnostic on national hydro-met and early warning systems and services with an investment plan, a cost/benefit analysis and sustainability guidance, has laid the ground for transformational change. Investment priorities to strengthen Niger's hydro-met services and three early warning, civil protection, and disaster management entities have been identified. Findings will support the design of hydro-met and early warning elements of a US$240 million IDA-financed Niger urban development programme and a World Bank food security and resilience project.

CREWS support to Niger does not end here. The project seeks additional funding to improve modeling and impact-based forecasting capacity of national and local authorities and establish a local flood early warning system for some municipalities.

CREWS Niger achievements

2 law(s), bill(s), national strategic plan(s), framework(s) or Standard Operating Procedures (SOPs) for national hydro-met services developed with CREWS support

— Updated **National Strategic Plan** for the Met Service will ensure stronger collaboration and coordination between hydro-met and water resource entities to better meet needs of people and economy. It will also pave way for Met Service to become an autonomous national agency.

— A hydro-met **investment plan** to ensure resources deliver greatest early warning impact.

4 hazards – **floods, drought, sand and dust storms,** and **severe weather** – posing a risk of life loss for which CREWS supported increased forecasting and warning capacity

— A sand and dust advisory system enables Niger to forecast such storms more accurately.

— Severe weather and flash floods forecasting through training of **5** meteorologists on a real-time monitoring and forecasting tool for Africa (MISVA) and a hydrologist on a soon-to-be implemented flash flood guidance system.

1 https://thedocs.worldbank.org/en/doc/69b1d088e3c48ebe2cdf451e30284f04-0090082022/original/FCSList-FY23.pdf

2 EM-DAT data download 28 March 2023

© FAO

24 risk information products/tools produced with CREWS support used to enhance services

— **Meteorological bulletins**, including extreme weather forecasts, are issued each weekday and one for the weekend, and TV weather bulletins are broadcast nationally.

— **Hydrological reports** on Niger and Komadougou rivers enabled forecasts on floods and low flows; 10-day bulletins on river flows across the country based on 10-day hydrological notes on water flow using data from observers and automatic stations; monthly hydrology bulletins; 2 flood information notes and 3 TV spots on floods also produced and disseminated.

— Monthly **climate bulletins** for socio-economic sectors including agriculture and disaster risk reduction, and 4 **climate services** bulletins on links between climate and health, water resources, food security and disaster risk management.

— Online **risk mapping tool** – www.risques-niger.ne – provides data for impact-based forecasting and disaster response and planning.

Estimated **27 million people[3]** covered by national mechanism for early warning and crisis response (COVACC) or (local) preparedness through CREWS support

— COVACC monitors, collects and disseminates data on weather, water and climate phenomena to alert authorities and population exposed to imminent risk of flooding. It produces and disseminates warning and 'vigilance' messages through SMS and ringtone for mobile phones for timely public information and advice on impact of current floods/events during the rainy season. Vigilance messages have enabled a government strategy to reinforce awareness on extreme weather and events that could become disasters. COVACC also coordinates evaluations of flood impacts, sharing results with relevant actors to inform action.

— CREWS-supported technical assistance to hydro-met services has enabled data collection and processing for stronger data analysis. This includes for World Bank funded development of flood hazard maps covering **1.24 million people** in **7 cities[4]** to inform the IDA Niger urban flood risk reduction investment plan. CREWS' assistance to strengthen data analysis not only improves government capacity to assess flood risk in urban areas – it also ensures it can provide more precise early warning services at local and urban level.

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3   https://www.worldometers.info/world-population/niger-population/
4   Ibid, combined population of Niamey, Gaya, Tahoua, Maradi, Tessaoua, Agadez and Diffa

— Training of representatives from **100 municipalities** in effective community disaster risk reduction planning and its implementation will better safeguard **12 million people** in 3 regions.

— Nationally: Flood contingency plan was produced by Ministry of Humanitarian Affairs and adopted by the government with CREWS contribution.

— Network of women leaders created after training of **600** women on flood risk management led to an alert system in the heart of communities, cutting time for warnings and information to reach people. It also empowered and mobilized women to initiate and act on community disaster management and community resilience. Civil protection authorities now rely on the women leaders' network for 2-way information, timely crisis prevention, and response communication among communities.

Common Alerting Protocol (CAP) adopted to issue warnings with CREWS support

— Registered and trained – Niger to begin issuing alerts using CAP in 2023.

People-centered solutions – *Looking ahead at what's still to come*

COVACC will be decentralized to each region to ensure permanent monitoring, early warning, early action – and faster disaster response to save lives, homes, and assets.

Flash Flood Guidance System developed by CREWS West Africa will be operational in 2023. In a country where 16 of 20 natural hazard-related disasters since 2012 were caused by floods, leaving an estimated 635,000 people homeless and killing nearly 750 people,[5] the system will mark key and tangible early warning progress in Niger.

© FAO

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5   EM-DAT data download 28 March 2023

Togo

Most prevalent natural hazards

floods   heavy rains   drought

WB/GFDRR, WMO	2019-2024	USD 2.36 million	Expenditure rate: 43%	Leverage: N/A

CREWS Togo's work to strengthen national capacity to deliver improved drought, flood and other weather and climate warning services saw some landmark moments in 2022. Togo's national meteorological service transformed into a national agency – ANAMET – with an evolved legal status by decree. Togo also implemented best practice on disseminating early warnings to reach its people more widely and effectively. Although technical capacity has significantly improved in national hydro-met and civil protection services, much more is needed for multi-hazard early warning in Togo. A key challenge for progress and sustainability: sufficient financial resources to maintain and develop services.

Progress so far

1 law (s), bill(s), national strategic plan(s), framework(s) or Standard Operating Procedures (SOPs) for national hydro-met services developed with CREWS support

— Bill making Met Service an agency issued as **Decree** in November 2022. Initial work begun on developing a strategic plan for ANAMET.

2 hazards – **floods** and **extreme weather** – which pose a risk of life loss and for which CREWS is supporting increased forecasting and warning capacity

— Diagnostic on flood early warning needs of farmers in Oti and Mono river basins used to improve warning and forecasts, with CREWS planning on expanding flood forecasting support to 2 other areas.

— **14** national hydro-met staff and technicians trained on monitoring and forecasting of severe weather and floods.

50 risk information products produced with CREWS support used to enhance services

— **46** maps of flood risk zones developed for 12 prefectures and 34 municipalities, **4** similar risk maps for Agbanakin, Agomé-Glozu and Koulfiekou communities, and Anié market.

N/A number of people covered by early warning systems or (local) preparedness through CREWS support

— Although diverse activities to strengthen community and municipal knowledge, preparedness, and resilience to hazards form major part of CREWS Togo work.

Common Alerting Protocol (CAP) used to issue warnings with CREWS support

— The adoption of CAP was a key recommendation of a CREWS multi-hazard early warning systems diagnostic for Togo. Its **first use** was at the end of 2022.

318 women benefitted from capacity development offered by CREWS

— Making up **41%** of those trained on disaster risk reduction.

— Of 36 civil protection and hydro-met staff trained, **3** were women.

© K. Wilson-Bahun

2022 highlights

Togo's Met Service became an agency by decree.

— New legal status means a more autonomous and efficient agency with flexibility to mobilize and manage its own resources to deliver effective forecasts and warnings.

Togo's first weather alert using CAP issued 1st December 2022. The warning, on thunderstorms in the Maritime region, helped people take shelter in time.

— CAP for hydrology and civil protection also planned before the end of the project.

— Before CAP: **19** national warnings on high rainfall covering 8 million population[1] issued by ANAMET, and **1** flood alert by Togo's civil protection agency. Rainfall warning verification found 88% acceptably accurate.

Annual national contingency plan on flood disaster management developed with operational procedures, kicking into action in rainy season when situation dictates.

— The 3rd flood disaster management plan since 2020.

More than **650 people** from communities and civil protection empowered to use seasonal flood forecasts and disaster risk information to prepare against and respond to floods, storms and other hazards.

— **304** prefects, mayors, municipal councillors and traditional leaders – 43 women – each from one municipality, trained in managing risk from floods, high winds, wildfires and drought – and reinforced by 1000 practical guides informing and supporting their actions before, during, and after an emergency.

— **42** National Disaster Risk Reduction Platform members – 7 women – assessed crises intervention capacity and resource availability for effective disaster response via **3** simulations on flood, storm, and inter-communal conflict hazards.

— More than **40** farmers and local radio staff in southern Togo can better understand seasonal flood forecasts and apply knowledge to their farming.

— **90** media professionals – 40 women – trained on every stage of emergency communications. Timely and knowledgeable media reporting plays critical public information role to protect lives.

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1   https://www.togofirst.com/fr/gouvernance-economique/0504-11660-togo-les-villes-les-plus-peuplees-et-les-moins-peuplees

2022 developments

1 multi-hazard early warning system capacity and needs assessment – with recommendations – validated.

— These have initiated technical support to improve hydrological seasonal forecasting and lay ground for more accurate weather and climate interpretation, forecasting and products.

— Following recommendations would lead to more efficient early warning system development tailored to each main hazard faced in Togo, enabling early crisis action. But requiring significant support.

5 assessments to help **4** communities better manage hazard risks will ensure greater protection.

— **2** risk assessments for Anié in central Togo identified need for emergency response plans for its municipalities and 61,000 population.[2] Urban expansion has increased city's flood vulnerability, with Anié river frequently overflowing during rainy season.

— **3** communities – Agbanakin, Agoméglozou and Koulfiékou – in flood prone zones can identify potential sources of flood risk through risk assessments and which actions to reduce it.

People-centred solutions – *Starting young*

Education professionals in nursery, primary and secondary schools across Togo are taking on a new subject to teach. More than 250 educationalists have been trained so far by Togo's civil protection agency ANPC to use and integrate a 158-page disaster risk guide into school curricula. The aim? Generally, to help frontline communities and individuals help themselves as a first line of defence against disaster – and ensure local response and resilience is more robust. Specifically, it is to instill a lifelong culture of resilience to disasters, knowing such an effort must start at young age. Whether it is a flood, strong winds or another hazard, children need to know what to do to stay safe. Knowledge to take into adulthood.

© Janot Mendler de Suarez/Climate Centre

2   Ibid.

Central Africa

Conflict situation: 3 countries
Institutional/Social fragility:
3 countries[1]
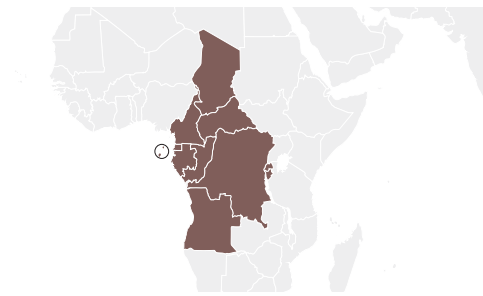
Most prevalent natural hazards/disasters 2012-2022[2]

floods　　landslides　　drought　　storms

Angola, Burundi, Cameroon, Central African Republic (CAR), Chad, Republic of the Congo, Democratic Republic of Congo, Equatorial Guinea, Gabon, Rwanda, Sao Tomé e Principe

WMO, WB/ GFDRR, UNDRR	2022-2026	$4.85 million	Expenditure: Inception phase	Leverage: $100 million

Key existing warning capacity

5 countries with law(s), bill(s), strategic plan(s), framework(s) or Standard Operating Procedures (SOPs) for national hydro-met services

— Angola, Republic of the Congo, DR Congo, and Sao Tomé e Principe rated in 2021 as having modest and Rwanda as substantial level of legislation or mandates governing climate service provision in place.[3]

— DR Congo adopted National Framework for Climate Services by decree in 2022 with CREWS support.

36 regional and national institutions and organizations will be supported by CREWS in capacity development for enhanced services to the countries

— National hydro-met services of 11 Economic Community of Central African States (ECCAS) will be assisted through collaboration with **4** regional centres specialized in meteorology, hydrology and agriculture. Cooperation between hydro-met and civil protection also promoted.

3 hazards – **floods, drought, severe weather** – which pose a risk of life loss for which CREWS will support forecasting and warning services

— Storms, flash and riverine floods, and agricultural drought identified by countries as predominant hazards. Specialized regional centres will input into plan to develop monitoring and forecasting systems and services, and operational procedures for warnings.

N/A people living in areas covered by forecasts for 1 hazard and receiving early warning messages

5 countries using Common Alerting Protocol (CAP) to issue warnings with CREWS support

— Cameroon, Rep. of Congo, DR Congo, Gabon and Sao Tomé e Principe issued **24** warnings in total in 2022, predominantly for storms and rainfall.

— CREWS Central Africa will train telecom and disaster risk reduction entities on using CAP for hydro-met and climate warnings in Rwanda and Sao Tomé e Principe from 2024.

0 specialized partnerships/twinning arrangements between national hydro-met services established

— Various institutions are currently being considered for partnering on technical support provision including regional specialized centres.

1　Conflict situation countries: Cameroon, Central African Republic, DR Congo; Fragility countries: Burundi, Chad, Congo https://thedocs.worldbank.org/en/doc/69b1d088e3c48ebe2cdf451e30284f04-0090082022/original/FCSList-FY23.pdf

2　EM-DAT data download 8 May 2023

3　Etat des lieux sur l'état de l'hydrométéorologie et les systèmes d'alerte précoces en Afrique Centrale, Deltares, 2021

© UNHCR/Moise Amedje Peladai

2022 marked early days for **CREWS Central Africa**. Mostly in inception phase, the project prepared for implementation. It aims to strengthen national early warning within the region through multi-hazard systems and impact-based forecasting. With 7 of 11 countries LDCs and/or SIDS, the project will build capacity based on user needs to adapt to climate change and manage disasters.

Human and institutional capacity development at regional and intergovernmental entities will be supported to deliver monitoring and forecasting services on main hazards. Numerical weather prediction and flood forecasting tools will be introduced and advice on flooding in coastal and urban areas provided to better contribute to warning decisions.

Nationally, support is being tailored to context. It ranges from technical advice on investments to strengthening governance and management via national strategic plans, frameworks, and operating procedures, e.g. in Angola, Burundi, Central African Republic, Rwanda, and Sao Tomé e Principe. In DR Congo, CREWS Central Africa is a continuation of CREWS' country project there. Support will be given for hydro-met legislation and further strengthening meteorological and civil protection capacities.

Risk information products will be developed to guide early warning systems and hydro-met services in Burundi, Central African Republic and Rwanda – reaching **2 million people** in each country by the end of the project. Emphasis is also on people-centred tools and procedures to disseminate alert messages e.g., the Common Alerting Protocol, so more people and communities are reached – and more effectively. Diagnostics on all **11 countries'** early warning capacity will allow the development of tailored sustainability plans.

2022 developments

Actions initiated:

— For mapping hydro-met governance landscape in **5 countries** – Angola, Burundi, Central African Republic, Rwanda and Sao Tomé e Principe.

— On structuring support to enhance weather observation capabilities and international data exchange through the WMO Information System (WIS) with new facilities.

— To prepare needs assessment in **Central African Republic** for future investment in warning systems through meetings with national hydro-met services and civil protection.

— Baseline analysis on agrometeorological services needed in **Sao Tomé e Principe** identified 10 priorities. Most urgent – supporting development of a National Strategic Plan for the Met Service and a Quality Management System.

As part of synergies with ongoing programmes and projects in the region:

— **5** agrometeorologists – 2 women – from **Angola, Rwanda** and **Sao Tomé e Principe** jointly trained with EUMETSAT on agro-met remote sensing tools for drought monitoring. Focus was on identifying satellite products best suited to add value to agro-met services already being provided.

People-centred solutions: *Reaching those most-at-risk in conflict and fragile contexts*

In a region where hydrometeorological and climatic hazards are diverse and resources to reduce impacts so limited, *Early Warnings for All* is a formidable but essential challenge to overcome. **Six** of 11 CREWS Central Africa countries are conflict-affected or socially and institutionally fragile. War and violence are recent history in others. In Cameroon, the Central African Republic, and DR Congo alone, nearly 9 million people[4] are displaced largely due to violence and natural hazards. Reaching particularly vulnerable people, e.g. the displaced, women, older people, those with disabilities, with timely climate information and alerts is a priority. CREWS Central Africa will build warning capacity through better monitoring and forecasting, particularly on floods, storms and drought. And to reach the most vulnerable? SMS-based systems to communicate early warning messages to – and among – communities in priority risk areas.

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4   Combined 2023 displacement figures for these countries, UNOCHA

Greater Horn of Africa

Ethiopia, Somalia, Sudan

Most prevalent natural hazards/disasters 2012-2022[2]

floods   drought   storms   landslides

WB/GFDRR, WMO, UNDRR	2022-2026	$5.24 million	Expenditure rate: Inception phase	Leverage: $300 million

Key existing early warning capacity

2 countries with national strategies, frameworks, or legislation for national hydrometeorological services

— Ethiopia and Sudan currently have some form of legislation. Somalia has a National Hydromet Policy which CREWS will support to implement.

— Ethiopia has roadmap for impact-based multi-hazard early warning services, while Somalia's National Water Strategy includes establishing Meteorological and Hydrological Services.

2 regional and **7** national institutions and organizations being supported by CREWS in capacity development for enhanced services to the countries

2 countries – Somalia and Sudan have *basic* forecast and warning capacity

— By project end, both countries should have *essential* warning capacities.[3]

1 country, Ethiopia, has *essential* forecasting and warning capacity

— It should have *full* capacity by 2026.

1 hazard which poses a risk of life loss in each country for which prediction and warning is available

— Information on **drought** hazard is provided through regional services such as Climate Outlook Forum. For **floods**, Somalia has some flood warning capacity.

— In Ethiopia, CREWS will help put in place 3 flood early warning systems.

N/A - people living in areas covered by forecasts for 1 hazard and receiving early warning messages

0 countries using Common Alerting Protocol (CAP) and/or Standard Operating Procedures (SOPs) for early warning

— CREWS will support Ethiopia, Sudan and Somalia to develop or revise SOPs to alert and respond to natural hazards, and Ethiopia to put in place CAP to disseminate warnings.

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CREWS Greater Horn of Africa, launched midway in 2022, aims to strengthen hydrometeorological and early warning capacities in one of the world's most challenged areas. Highly exposed to climate risks and experiencing more frequent and intense droughts and floods while people and economies depend on rain-fed agriculture, Ethiopia, Somalia, and Sudan are further weakened by conflict, socio-economic fragility and political instability.

By building regional and national capacity to produce and use hydrometeorological services and early warning systems, CREWS will strengthen early action to save lives, livelihoods, and assets in each country through tailored action:

Ethiopia – The goal is to reach last-mile communities. Developing demand driven weather, climate and early warning services and systems will better ensure public's early action to reduce human and economic loss.

Somalia – Development and delivery of priority hydro-met services to public and institutional capacity are key in a country with a fragmented early warning landscape. Somalia has had some of its worst ever flooding in recent years and is in the throes of a growing drought crisis.

Sudan – Low socio-economic development, inadequate infrastructure, and economic dependency on climate sensitive sectors have led to low resilience to climate shocks and natural hazards. CREWS is prioritizing stronger community engagement in early warning systems and more effective flood early warning services. World Bank engagement policies after 2021 coup d'état mean it cannot operate in Sudan for now. While technically, WMO and UNDRR can, activities in Sudan are on hold until the political and security situation evolves positively.

With strong people-centred project objectives, partnering with IFRC and national Red Cross or Red Crescent Societies in the region is key to operationalizing community focused interventions.

2022 developments

Initial discussions with key government entities to scope project activities and their terms of reference:

— **Ethiopia** – on specific areas of support for impact-based flood early warning system and flash flood forecasting systems in **3** priority basins – Awash, Rift Valley Lakes and Omo – where 635,000 people are exposed to flood risk.

— **Somalia** – on training needs of women and men in priority technical areas, e.g. observation, data management and analysis, and hydro-met forecasting.

— Workplan for regional activities includes supporting national and regional climate outlook fora and developing climate service toolkits.

Plan developed with the Systematic Observations Financing Facility (SOFF) to build national capacity on weather and climate observation and data management.

— WMO Regional Centres for Information Systems (WIS) and Integrated Global Observing Systems (WIGOS) will be supported to deliver on this.

CREWS investment is leveraging other initiatives.

— **Somali** government supported to prepare terms of reference for hydro-met monitoring, community engagement, public-private engagement, and flood modelling activities to be financed by ongoing World Bank Somalia Crisis Recovery Project.[4]

— CREWS working with **Ethiopian** government to develop activities for new World Bank/IDA $300 million flood management project in Ethiopia that includes impact-based flood early warning systems.

People-centred solutions: *No one-size fits all – engaging communities for tailored action*

With conflict and fragility wreaking havoc in a region where human resilience to natural hazards is at best minimal, early warning for vulnerable people and communities in rural and urban areas can make a real difference. Whether it is building district-level flood management or alert dissemination capacity in Ethiopia – paying particular attention to warning access among women often without tools or means to receive them – or reaching last mile communities including farmers and pastoralists in Somalia with tailored services – CREWS Greater Horn of Africa puts people at the heart of its work. Communities in remote and urban areas will be reached to define their early warning needs and access solutions. They won't only be listened to. They will co-develop solutions and services. Red Cross and Red Crescent knowledge and community-based volunteer networks in each country will be key. CREWS will also draw upon NGOs in Somalia to build drought resilience.

© Somali Red Crescent

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4   https://www.worldbank.org/en/news/loans-credits/2020/05/15/somalia-somalia-crisis-recovery-project
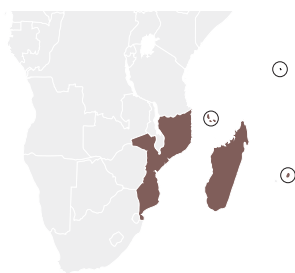
South West Indian Ocean

Most prevalent natural hazards/disasters 2012-2022[2]

tropical cyclones   floods   drought

Comoros, Madagascar, Mauritius, Mozambique, Seychelles

WMO, WB/GFDRR, UNDRR	2020-2025	$4 million	Expenditure rate: 32%	Leverage: $100 million

2022 and Cyclone Freddy in early 2023 underlined yet again why effective multi-hazard early warning in this region is critical – and urgent. More accurate forecasts and warnings helped limit loss of life when Madagascar was hit by 5 tropical cyclones and Mozambique by a cyclone and 2 tropical storms during the year. Nevertheless, continuous devastation from extreme weather ensures human and national resilience to climate and disaster in **CREWS SWIO** countries is low. The project, providing coherence and more optimal use of multi-donor early warning investments in the region, is aligned with various country specific and regional disaster risk management and hydro-met projects.

Progress so far

1 country with law(s), bill(s), strategic plan(s), framework(s) or Standard Operating Procedures (SOPs) for national hydro-met services developed with CREWS support

— **Mozambique:** Decree defining data exchange and flood and cyclone warning responsibilities of hydro-met and disaster management agencies issued in **2022**.

21 regional and national institutions and organizations supported by CREWS in capacity development for enhanced warning services to the countries

3 hazards – **tropical cyclones, heavy rainfall, floods** – which pose a risk of life loss for which CREWS supports increased forecasting and warning capacity

— All 5 countries suffer heavy rains and floods. Seychelles[3] is not affected by cyclones.

— Training in forecasting, modelling, warning and emergency messaging in Mozambique. Training in the Seychelles on activating national early warning system plan.

1 tool and other risk data products generated for impact-based warnings with CREWS support

— Daily 4 km numerical weather prediction models providing detailed information enable Mozambique's Met Service to forecast localized weather phenomena more accurately.

50.9 million women and men living in areas where forecasts and warnings were **improved** with CREWS support for given hazard(s)

— All **5** countries already receive cyclone warnings. Ongoing improvement of cyclone warning system is helping to develop similar warning thresholds and dissemination protocols for other hazards such as **coastal inundation, flooding, and drought.**

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1   https://thedocs.worldbank.org/en/doc/69b1d088e3c48ebe2cdf451e30284f04-0090082022/original/FCSList-FY23.pdf
2   EM-DAT data download 26 March 2023
3   Although no longer eligible for ODA assistance, Seychelles' inclusion in the project was based on an earlier decision.

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4 countries using Common Alerting Protocol to issue warnings

— Mauritius, Madagascar, Mozambique and the Seychelles registered and trained to use best practice in warning.

3 specialized partnerships/twinning arrangements between national hydro-met services established

— Metéo France, through regional specialized met centre (RSMC) La Réunion, supports the 5 countries with tropical cyclone and numerical weather prediction at very fine – 1.3 km – resolution. Along with South African Weather Service and RSMC Pretoria's 4km resolution models, product services strengthen severe weather forecasting capacity in the countries.

2022 highlights

3 reviews on early warning system performances during 2021-2022 cyclone season for **Madagascar, Mozambique** and **region** complete baseline information and will inform CREWS SWIO disaster risk management activities from now on.

— Using hot-off-the-press post-cyclone debriefs, reviews gave up-to-date overview of most pressing early warning system gaps. A common ask among emergency responders was forecasts with more lead time and in digital format, enabling addition of other risk information.

4 countries will be better prepared for coming cyclone seasons with products and outlook scoping their probability. Provided by RSMC La Réunion, forecasters will soon have access to numerical datasets through dedicated server.

— Products support **Comoros, Madagascar, Mauritius,** and the **Seychelles** to move towards more accurate and reliable forecast and warning production and dissemination – with more lead time.

2022 developments

6 analyses: 1 regional and 5 national – Comoros, Madagascar, Mauritius, Mozambique and Seychelles – covering all multi-hazard early warning elements, operational procedures, and institutional strengthening with recommendations, provide basis for priority investments.

— **Common challenges:** over-reliance on project funding with insufficient planning across interventions; need specific models for flooding and coastal inundation, more staff and training; lack capacity and budget for operation and maintenance.

— National-level assessments drafted for Mauritius and Seychelles under discussion with each country. Diagnostics for Madagascar, Mozambique and Comoros drafted. Findings identify priority needs to reach remote and marginalized people and communities and will inform World Bank, UNDP, UNDRR, AFD, EU, PIROI, WMO and IOC projects.

51 people from all 5 countries trained on using custom indicators to measure multi-hazard early warning system effectiveness – developed through CREWS global project and piloted in Mauritius. Training also on using early warning data to guide policy.

Mozambique:

— Rain and wind forecasting being improved with 4-month long training of **5** forecasters to use numerical weather prediction.

— All **3** hydro-met and disaster risk management agencies now better coordinated to issue warnings as part of an integrated early warning system.

— Work ongoing to identify priority areas for flood modelling and risk information in **2** river basins in coastal province of Cabo Delgado and strengthen flood forecasting skills.

In **Seychelles**, revision of national disaster risk management policies supported to better connect forecasting with early action. Hands-on training of **10** trainers at political, technical and community level on warning activation.

People-centred solutions – *Investing in local disaster management for early warning*

Hit by 31 natural disasters since 2012[4] – mostly cyclones and floods – protecting communities in Mozambique and building their resilience through early warning and timely action is essential. It's why creating, equipping, training, and ensuring local disaster management *committees* function sustainably in every high-risk *community* is a government priority. So is strengthening and consolidating cyclone and riverine flood early warning systems so people hardest to reach are alerted in good time. The government prepares local communities and committees with annual emergency response plans and regular disaster simulation exercises. Hydro-met services forewarn them with more accurate and localized forecasts. Using enhanced numerical weather predictions through CREWS SWIO, these forecasts better anticipate impact and activate emergency response plans – when disaster hits.

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4 EM-DAT data download 26 March 2023

West Africa
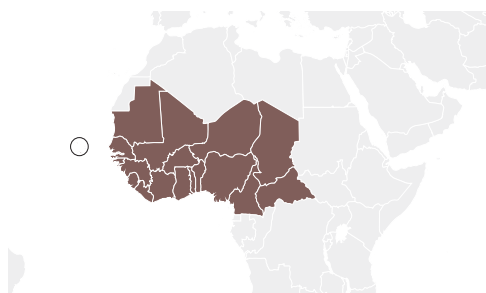
Most prevalent natural hazards/disasters 2012-2022[2]

floods   drought   storms

Benin, Burkina Faso, Cabo Verde, Cameroon, Central African Republic, Chad, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo

WMO, WB/GFDRR	2018-2024	$5.3 million	Expenditure rate: 36%	Leverage: $51 million

CREWS West Africa builds and strengthens risk information and early warning services by enhancing capacity of regional institutions to support 19 countries. It also develops pilot warning services in Sierra Leone. The project has been extended to 2024.

Progress so far

1 country – **Cabo Verde** – supported with a national strategic plan developed with CREWS support

25 regional and national institutions and organizations supported by CREWS in capacity development for enhanced services to the countries

— 19 national hydro-met services, ECOWAS, and 5 regional specialized hydro-meteorological, agricultural and observation centres.

4 tools and other risk data products generated for impact-based warnings with CREWS support

— Catalogue of extreme events, climate watch service, climate assessment database and agrometeorological drought monitoring bulletins with rainfall assessment tool.

113 million women and men[3] living in areas covered by sand and dust forecasts put in place with CREWS support

— Through sand and dust advisory system.

12 countries using or enabled to use Common Alerting Protocol to issue warnings with CREWS support

— **10** countries – Benin, Burkina Faso, Côte d'Ivoire, Gambia, Guinea, Guinea-Bissau, Mali, Mauritania, Senegal and Togo issued **109** CAP warnings in 2022, mostly for storms and rain. **5** of Mauritania's **6** warnings on sand and dust storms.

— Chad and Niger registered and trained for CAP.

6 specialized partnerships/twinning arrangements between national hydro-met services established

— Méteo France, Spanish Met Service (AEMET, regional dust forecasting centre), Morocco Met Service (DGM, regional WIGOS centre), Senegal Met Service (ANACIM, RSMC), Deutscher Wetterdienst (DWD), Royal Netherlands Meteorological Institute.

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1 Burkina Faso, Cameroon, Central African Republic, Mali, Niger, Nigeria – conflict situations; Chad and Guinea-Bissau with institutional and social fragility https://thedocs.worldbank.org/en/doc/69b1d088e3c48ebe2cdf451e30284f04-0090082022/original/FCSList-FY23.pdf

2 EM-DAT data download 7 May 2023

3 Combined estimated population of Burkina Faso, Cabo Verde, Chad, Mali, Mauritania, Niger and Senegal https://www.worldometers.info

© Veilio Coviello

2022 highlights

Sand and Dust Advisory System co-funded by EU is operational in **7** West African countries.

— Initially used in Burkina Faso. Now extended to Cabo Verde, Chad, Mali, Mauritania, Niger and Senegal, covering **90 million** more people.

West African forecasters able to produce sub-seasonal forecasts 6 weeks ahead of time, with site-specific rainfall, wind, temperature and other relevant information.

— Feedback from forecasters and training led to upgrading of a real-time monitoring and forecasting tool for Africa (MISVA).

In Sierra Leone – technical operational and training plans developed for integrated multi-hazard early warning system design. It follows project's first mission to the country.

— Analysis of user needs and technical gaps inhibiting delivery of enhanced weather and climate information services carried out.

— Analytics developed to assist national hydro-met services in making strategic investment decisions for a flood early warning system for the capital, Freetown. Short-term improvement in weather and flash flood forecasting services identified as priority.

Technical expertise and knowledge developed through CREWS West Africa helped Sierra Leone's hydro-met services progress on installation and rehabilitation of **3** weather observation sites and **4** hydrological stations.

— CREWS capacity building work leverages various World Bank infrastructure investments in the country. Functioning stations and sites enable more accurate forecasts and better hazard monitoring and management. Expanding Sierra Leone's observation and network capacity will support early warning system development.

15 countries with greater capacity to forecast severe weather, impact-based forecasts and to issue CAP warnings following training of **29** forecasters – including 5 women.

2022 developments

Mapping of flash flood prone river basins in Burkina Faso, Mali and Niger finalized for **West Africa Flash Flood Guidance System**. And demo version launched for training purposes.

Indicators for producing agrometeorological bulletins and warnings across West Africa under development with WeatherForce.

— They will support site specific agro-met bulletins for more relevant advice for farmers, enabling greater yields and reduced losses in highly food insecure region.

All **19** CREWS West Africa countries supported on data exchange with WMO's Information System (WIS). Online Data Quality Monitoring System (WDQMS) shows:

— **15** countries were sharing more surface weather observation data in December compared to January 2022. Guinea-Bissau and Sierra Leone for the first time. Ghana and Côte d'Ivoire saw biggest jump – **79%** and **46%** respectively.

Directors and strategic planners from **23**[4] Francophone countries in Africa identified opportunities for climate services and quality management systems (QMS).

— During training for **60** people on strategic planning and QMS.

— In 2022, Cabo Verde, Niger and Togo received strategic planning and institutional strengthening support. DR Congo on QMS.

People-centred solutions – *for Sierra Leone*

Sierra Leone is among countries most at-risk from and least able to adapt to climate change impacts. Mountains, low-lying coasts and heavy rainfall leave it exposed to floods, storms, landslides and coastal erosion. Lives and livelihoods in the capital, Freetown, largely built on high-risk slopes but also vulnerable to sea-level rise, are often disrupted by flash floods. CREWS West Africa will design a flash flood early warning system built for – and with – communities there. It will better protect urban poor as disaster prone areas house mostly informal settlements. Mapping of specific vulnerabilities is to ensure everyone gets alerted. Warning products and their dissemination will address needs of vulnerable communities in content, format, language, timing and frequency of alerts – building on existing community communication channels. Residents will help design community warning and contingency plans. Lessons learnt will inform flood early warning elsewhere in Sierra Leone.

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4   Algeria, Bénin, Burkina Faso, Burundi, Cameroun, Comores, Côte d'Ivoire, Djibouti, Gabon, Guinée, Madagascar, Mali, Maroc, Maurice, Mauritanie, Niger, République centrafricaine, République du Congo, République Démocratique du Congo, Sénégal, Tchad, Togo, Tunisie.

CREWS in Asia Pacific

- The world's most disaster-prone region. More than 2 million people killed in disasters between 1970-2020 – one person every 13 minutes.[1]

- More than $35 billion of damage caused by weather and climate hazards in Asia in 2021.[2]

- 60% of countries in Asia Pacific reporting on the Sendai Framework Monitor[3] have multi-hazard early warning systems – up from just 25% in 2015.

18 countries assisted through CREWS programmes	**2** country programmes
2 regional programmes	**1** accelerated support intervention

Early Warning Systems protect lives and livelihoods in the face of extreme weather events. By supporting CREWS, Canada is helping to build these systems in developing countries and Small Island Developing States, strengthening resilience of the most vulnerable. These important systems help meet the United Nations' Secretary General's call to action to ensure that all are covered by 2027.

The Honourable Steven Guilbeault,
Minister of Environment and Climate Change Canada

CREWS' focus on early warning in Least Developed Countries and Small Island Developing States is an effective investment to minimize and avert losses and damages from climate change. Working together closely, CREWS and the Global Shield against Climate Risks can make a significant contribution to the Early Warnings for All Initiative, and to protecting the poorest and most vulnerable from the worst effects of climate change.

Svenja Schulze,
Federal Minister for Economic Cooperation and Development Germany

1   https://public.wmo.int/en/media/news/regional-conference-commits-early-warnings-all-asia
2   https://www.un.org/africarenewal/magazine/april2023-/fast-tracking-global-early-warnings-systems
3   https://sendaimonitor.undrr.org

Afghanistan

Most prevalent natural hazards/disasters 2012-2022[2]

floods   landslides   earthquakes   storms   drought

WB/GFDRR, WMO	2019-2023	$3.66 million	Expenditure rate: 27%	Leverage: N/A

Working to enhance hydro-met, early warning and climate services for a more resilient country and people, **CREWS Afghanistan** has largely been brought to a standstill since the Interim Taliban Administration came to power in 2021. With internal World Bank policy limiting direct engagement with national agencies, all World Bank CREWS project activities have been on hold since August 2021.

Since, project focus has been on completing activities already begun that did not require travel to the country. As a result, work on early warning, capacity building and agrometeorological advisory services has been particularly affected. WMO's re-establishing contact with human resources at the national Met Service enabled some training of technical staff in 2022. Nevertheless, the project will be restructured in 2023 to realign it with the operational environment. The UN in Afghanistan's condemnation of discriminatory measures implemented by the Taliban *de facto* authorities in April 2023 and the initiation of a UN operational review highly affects the risk level of the project.

Progress so far

3 law(s), bill(s), national strategic plan(s), framework(s) or Standard Operating Procedures (SOPs) for national hydro-met services developed with CREWS support

— A **legal framework** and regulation document for Afghanistan Meteorological Department (AMD) to support the development of its legal mandate when the situation permits.

— A concept of operations – or **blueprint** – developed for AMD provides a route to modernizing and maintaining national hydro-met operations and services.

— Guidance on **Standard Operating Procedures** governing national Disaster Risk Management authority response when disaster strikes. In addition, **2 national plans** were revised in 2019 on emergency response and early warning communication system.

3 hazards – **floods, drought** and **landslides** – which pose a risk of life loss in the country for which CREWS is supporting increased forecasting and warning capacity

— **1 drought** early warning system, **2** regional **flood** and **flash flood** early warning systems.

— The inclusion of Afghanistan in and upgrading of the Central Asia Regional Flash Flood Guidance System also enables early warning on **landslides** – the second most prevalent hazard in the country.

1 risk information product produced with CREWS support used to enhance services

— Drought analytics produced through a drought monitoring tool are instrumental in targeting aid operations to those in need by identifying drought hit areas.

© UNICEF/Sayed Bidel

40 million people covered by early warning systems or (local) preparedness through CREWS support

— A flash flood guidance system covers Afghanistan as well as Pakistan.

— The national drought early warning system in 2021 identified drought 4 months earlier than the 2018 drought. The drought warning triggered early humanitarian action.

0 Common Alerting Protocol (CAP) used to issue warnings

160 women benefitted from capacity development offered by CREWS

— They account for nearly **32%** of 504 people on hydro-met issues or community risk awareness and planning.

2022 highlights

5 flash flood forecasts and warnings produced during the year using a numerical weather prediction tool operationalized in 2021. Warnings were published on the Met Service website.

— Flash flood warnings published in August identified threats in several north-eastern provinces in good time. Although 63 people were killed and 115 injured by the floods,[3] with more people missing, this was less than in 2021 in the same month and area.

Training of **12** men from national Met Service on how to build and install 3D printed automatic weather stations (3D PAWS) will help strengthen national weather and surface observation while investing in sustainability through low-cost observation network.

— The training was possible with support from the Turkish Met Service and 3rd party contractors.

— 10 3D PAWS already installed in pilot communities in 2020. Data from these – and those to come – converts into information for flood and landslide early warning and agricultural monitoring, ensuring communities are better protected from weather-related risk.

National Met Service able to predict and produce more accurate weather and climate forecasts with the return in April 2022 of data management servers. These had been sent abroad for maintenance but long held up at Customs.

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3   UN OCHA 24 August 2022

People-centred solutions – *Building resilience among remote communities*

In a highly disaster prone country ranked 180th in the Human Development Index, any CREWS project in Afghanistan needed components with direct and immediate impact on people and communities. The objective – building their resilience to natural hazards. In the past decade, nearly 70 disasters caused by floods, landslides, droughts, earthquakes and storms affected more than 25 million people in the country.[4] Before political change in Afghanistan put a brake on CREWS activities, a community-based disaster risk management initiative was piloted in 10 communities comprising nearly 10,500 people at the time. Low-cost sustainable weather stations and weather boards were installed; women and men trained to use them. Impact surveys showed 9 in 10 community members reported frequent use of weather data for decision-making. The result? Women, men, crops, and assets were better protected. With many Afghan communities in remote, hard-to-access locations in Afghanistan, expanding this approach, when possible, would see more resilient people and communities – including women.

Afghan Met Service staff trained to build and install 3D printed automatic weather stations © AMD

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4   EM-DAT data download 24 March 2023

Papua New Guinea

Most prevalent natural hazards/disasters 2012-2022[2]

| floods | earthquakes | landslides | storms | drought |

| WMO | 2017-2023 | $1.65 million | Expenditure rate: 47% | Leverage: N/A |

2022 marked an important achievement for **CREWS Papua New Guinea** (PNG) by delivering a drought early warning system, particularly as the country was affected by political violence, earthquakes – and drought. However, the impact of COVID-19 was still being felt. While there was good technical progress on a project focusing on weather and climate early warning systems and strengthening the national Met Service, delays on more human components like training meant overall advancement was moderate. Support from an Australia-funded capacity developing project to enhance weather observation reliability and train national Met Service staff increases the likelihood of CREWS PNG success.

Progress so far

0 law(s), bill(s), national strategic plan(s), framework(s), or Standard Operating Procedures (SOPs) for national hydro-met services developed with CREWS support

1 hazard – **drought** – which poses a risk of life loss in the country for which prediction and warning capacity is available through CREWS support

— A drought early warning system will enable Papua New Guinea to be better prepared against El Niño impacts in 2023.

10 risk information products and tools produced with CREWS support used to enhance services

— Many of these products including a risk map, rainfall outlooks, early action rainfall bulletins and extreme weather forecasts, synthesize information that feeds into the development of **monthly drought bulletin** produced for Papua New Guinea.

9.5 million people[3] covered by early warning systems or (local) preparedness through CREWS support

— The drought early warning system covers all 4 regions comprising 22 provinces in the country.

0 Common Alerting Protocol (CAP) used in Papua New Guinea to issue warnings

3 women who benefitted from capacity development offered by CREWS

— The women at PNG's Met Service trained to interpret and use drought monitoring information. One of the women is now producing the monthly drought bulletin.

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1   https://thedocs.worldbank.org/en/doc/69b1d088e3c48ebe2cdf451e30284f04-0090082022/original/FCSList-FY23.pdf
2   EM-DAT data download 17 March 2023
3   https://www.worldometers.info/world-population/papua-new-guinea-population/

© UNDP PNG/Nick Turner

2022 highlights

A drought early warning system for Papua New Guinea is in place and working.

— The system, jointly operated by the national Met Service and its Australian twinning partner, the Bureau of Meteorology, uses a drought risk assessment tool integrating region-specific drought hazard, drought vulnerability and drought exposure indices.

— PNG's Met Service is now fully trained to produce the monthly drought bulletin using the tool. In 2022, it produced **6 bulletins** also accessible on WMO's global agromet information service. They were disseminated to the agriculture, energy, health and water sectors, and the national disaster management team made up of government, UN, and other organizations. The warning levels, ranging from watch, alert to critical – ensure timely and proactive measures to minimize loss and damage for people and economy.

— Drought early warning system development and implementation based on **5** consultations with **170** users – 25% women – on their drought monitoring and early warning needs and pilot testing of the system for 6 months. Feedback included need for synthesized information, while an emphasis on women's equal consultation aimed to better capture and address gender needs.

Australia's Climate and Weather Extremes Monitoring System, adapted for PNG, now provides basic monitoring of **drought, heavy rainfall,** and **frost** events. National Met Service also feeds that information into the drought monthly bulletin for early warning.

— The social, environmental, and economic costs of climate and weather extremes, including heatwaves and floods, can be serious. With climate change impacting how often or intense such events can be, the system will help PNG prepare and respond to them in the short-term. Tracking over time will enable it to adapt in the long-term.

Monthly seasonal farm advisories tailored to smallholder farmers at local level are contributing to climate smart agriculture to grow more food in a country where hunger is extensive.[4]

— The advisories, based on seasonal forecasts developed through CREWS PNG, are result of strengthened collaboration with an Australian Centre for International Agricultural Research (ACIAR) project funded by Australia.

2022 developments

An updated climate data management system was put into action.

— It provides PNG Met Service with an updated central database for climate records using open-source software. Historical climate records are currently being digitized. Once completed, the Met Service will be able to provide better climate information, particularly on climate change impacts.

People-centred solutions – *Drought warnings for humanitarian action*

Why is drought early warning so important for Papua New Guinea? Its economy depends highly on agriculture, and two cash crops employ half the national workforce.[5] With 85% of the rural population also reliant on subsistence farming, drought has left at least 3 million people food insecure. By providing regular briefings on the drought bulletin to a national Disaster Management Team made up of UN humanitarian agencies and PNG's disaster management authority, PNG's Met Service is enabling early humanitarian action.

The CREWS-PNG project produces essential tools for the PNG Disaster Management Team's disaster preparedness and response coordination work.

Lindsay Lambi,
Humanitarian Coordination Officer, PNG

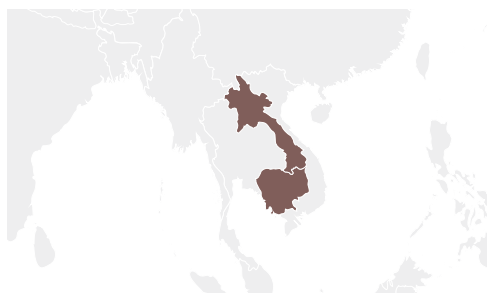The new CREWS products have greatly assisted PNG National Weather Service to provide more up-to-date and reliable information and forecasts.

Kasis Inape,
Assistant Director, PNG National Weather Service

© WFP/Andrea Tornese

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4   https://www.globalhungerindex.org/papua-new-guinea.html
5   https://www.cabi.org/news-article/papua-new-guineas-food-security-to-be-strengthened-further-through-plantwiseplus-programme/

Cambodia/Lao PDR

Most prevalent natural hazards/disasters 2012-2022[1]

floods

tropical cyclones

drought

landslides

earthquakes

Cambodia, Lao PDR

WMO, WB/GFDRR, UNDRR	2021-2025	$5.54 million	Expenditure rate: 19%	Leverage: $58 million

The first full year of **CREWS Cambodia/Lao PDR** to reinforce national hydrometeorological services and strengthen early warning systems included some initial setting up and planning. Hitting the ground running, a detailed scope of work was mapped, needs assessed, and investment for strong hydro-met networks in both countries planned. Several assessments laid the ground for what will need doing in coming years. CREWS project support is also contributing to both countries' reporting on their international disaster risk reduction commitments.

Progress so far

0 countries with law(s), bill(s), strategic plan(s), framework(s) or Standard Operating Procedures (SOPs) for national hydro-met services developed with CREWS support

13 regional and national institutions and organizations supported by CREWS in capacity development for enhanced services to the countries

6 hazards – **floods, landslides, drought, lightning strikes, heatwaves** and **severe weather** – which pose a risk of life loss for which CREWS is supporting increased forecasting and warning capacity

— Forecasters in both countries to be trained on nowcasting products to improve capacity in short and mid-term severe weather forecasts and warnings.

— Forecasters will be able to predict flash floods and landslides more accurately with additional training on Southeast Asia Flash Flood Guidance System (SeAFFGS) and its products.

0 tools and other risk data products generated for impact-based warnings with CREWS support

— **4** under development: 2 national flood and drought risk maps, and a visualization platform for hydrological tools and products.

0 women and men living in areas covered by forecasts and warnings put in place with CREWS support, for given hazard(s)

— Underway: Development of hydrological modelling and forecasting for **6** basins – 3 in each country.

0 countries using Common Alerting Protocol put in place with CREWS support

— Cambodia uses national alert system – EWS1294.

3 specialized partnerships/twinning arrangements between national hydro-met services established

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1   EM-DAT data download 21 March 2023

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2022 highlights

Validated comprehensive assessments of early warning systems in Cambodia and Lao PDR carried out by RIMES identified gaps and gave recommendations. They will underpin short, medium, and long-term strategies, project activities and guide future investments in both countries.

— Recommendations for **Cambodia**: developing policy and strategy for national hydro-met services, improving quality, frequency and timeliness of forecasting warning and advisory services, establishing observation network operating procedures (SOPS), and developing a human resource plan to build national hydro-met capacity.

— In both **Cambodia** and **Lao PDR**, a National Framework for Climate Services will be developed, existing SOPs for disaster management reviewed, tools to enhance flood forecasting capacities in target watersheds put in place, and a modernization plan for hydro-met services reassessed and reviewed. Human resource investment to focus on stronger weather forecasting, early warning, and climate and agro-met services.

National dialogue in **Cambodia** on mapping and better understanding early warning landscape will guide early warning system implementation.

— Decisions should improve public response to information and warnings as national institutions coordinate more – and transition to impact based warnings for early action.

— Collaboration will enhance existing SOPs and understanding of what risk information works and doesn't through improved monitoring.

User feedback mechanism designed with People in Need (PIN) in Cambodia following technical review of national alert system EWS1294. It will help national disaster management agency understand effectiveness of warning communications.

72-hour post-disaster assessment tool designed with the World Food Programme in **Lao PDR** covers impact and needs on agriculture, food security and nutrition. National parties to give feedback.

2022 developments

Cambodian and Lao national hydro-met services, disaster management entities, NGOs, CREWS implementing partners and others – defined and agreed project approach to community-based flood management and activities to map risk. And kickstarted key initial work on needs assessments and hydro-met network investment plans for both countries.

— **34** people in Cambodia – 10 women – and **41** people in Lao PDR – 14 women – introduced to risk mapping concepts in first step to develop **flood** and **drought risk maps**. By factoring hazards, existing vulnerabilities, exposure, socio-economic uncertainties and current and future climate scenarios for each country, the maps will inform flood and drought preparedness and early warning and response measures to minimize damage and loss.

— Training of Cambodian and Lao hydrologists to use a dynamic water resource assessment tool (DWAT) will enable better water resource management in **1** pilot river basin in each country.

— The tool assesses how land use in a pilot basin changes over time, and its impact on present and future water availability and quality in different climate scenarios. Such knowledge will inform water resource planning, policies and reforms for sustainable water availability and use.

Virtual 'nowcasting' training of **27** operational forecasters – 8 from Cambodia and 19 from Lao, including 7 women. Using satellite and radar products will enable production of early warnings of localized severe weather events such as heavy rainfall, high winds, lightning etc.

— Such events can lead to flash floods, landslides and other hazards threatening public safety.

People-centred solutions – *For communities on flood frontlines*

Chirou Ti Muoy, a rural community along the Mekong River, is no stranger to floods. Each year they come – and with increasing intensity. Its 6,000 population have seen homes, livelihoods, and infrastructure repeatedly damaged or destroyed – especially in low-lying areas. Flood warning and preparedness measures exist. But direct consultation with residents on their effectiveness revealed what needed to be done differently or better to manage the floods. Warnings with more lead time, more volunteers, training on using the national early warning system, communication to reach last mile groups of people, and properly equipped evacuation shelters. Such inputs will feed into CREWS' community-based flood management interventions in 3 pilot basins in Cambodia. Chirou Ti Muoy is the first to be identified.

© WMO
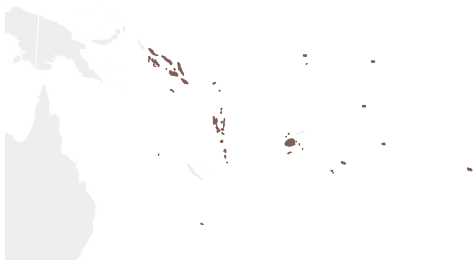
Pacific

Most prevalent natural hazards/disasters 2012-2022[2]

tropical cyclones   drought   floods   volcanic activity   earthquakes

Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Nauru, Niue, Republic of Marshall Islands, Palau, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu

| WMO, WB/GFDRR, UNDRR | 2017-2024 | $7.27 million | Expenditure rate: 50% | Leverage: $65 million |

> 2022 saw the first phase of **CREWS Pacific** completed. Phase 2 went into almost full stride as COVID-19 restrictions eased and borders began to open to international travel. Although COVID-related delays may affect final delivery on some CREWS Pacific work, there was progress on hydro-met governance and community resilience to hazards.

Progress so far

18 law(s), bill(s), strategic plan(s), framework(s) or standard operational procedures (SOPs) for national hydro-met services developed with CREWS support

— **3 countries** – Kiribati, Tonga and Tuvalu – with hydro-met **laws** in place.

— **8 countries** with National **Strategic Plans** and **5** with **Frameworks** for Weather, Water and Climate Services. Tonga has **2** strategic plans for hydrology and meteorology.[3]

32 regional and national institutions assisted by CREWS to develop capacity in providing enhanced early warning services to the countries

7 tools and other risk data products generated for impact-based warnings with CREWS support

— Wave buoys for Kiribati and Tuvalu, risk information and warning billboards on El Niño in Niue and landslides and fog in Samoa, traditional climate knowledge glossary in Palau, hazard risk assessment of 9 Samoan villages and site-specific early warning early action plans and training. Impact tables for various hazards for Samoa and Tonga drafted.

1.05 million women and men living in areas covered by forecasts and warnings put in place with CREWS support, for given hazard(s)

— 137,000 people in Kiribati and Tuvalu better protected against coastal inundation, an estimated 915,000 in Fiji by a flash flood early warning system,[4] 200 people in 9 Samoan villages have early warning and early action plans – and 3 communities in Palau with early warning and response mechanisms and plans on extreme weather and disaster management.

0 country with Common Alerting Protocol put in place with CREWS support

3 specialized partnerships/twinning arrangements between national hydro-met services to provide technical assistance established: Meteorological Services of Australia, Indonesia, and New Zealand.

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1 Marshall Islands, Micronesia (FSM), Solomon Islands, Tuvalu https://thedocs.worldbank.org/en/doc/69b1d088e3c48ebe2cdf451e30284f04-0090082022/original/FCSList-FY23.pdf
2 EM-DAT data download 22 March 2023
3 Kiribati, Marshall Islands, Micronesia, Palau, Tokelau with NSPs and Frameworks. Fiji, Tonga and Tuvalu only NSPs
4 Population data from worldometer 23 April 2023

Samoa's Met Service to use this poster and other materials to help public understand what tropical cyclones do and mean for them.
© CREWS/WB

2022 highlights

Governance on weather and climate services and impacts in Pacific States strengthened. Early warning services to reach more at-risk people in **5 countries** through plans to better predict and manage natural hazards – and positively impact lives, homes, and economies:

— **4** National Strategic Plans and Frameworks approved by governments in the Marshall Islands, Micronesia (FSM), Palau and Tokelau. **Tonga's** national framework and plan for Met Service finalized; under development in Samoa and Solomon Islands.

— With Tonga's hydrology strategic plan and those for Fiji, Kiribati, and Tuvalu – **9** strategies with action plans developed so far.

Estimated **137,000 people** in Kiribati and Tuvalu better protected after impact-based coastal inundation systems completed. A wave buoy for Tuvalu informed warning messages issued by the Met Service to more than 12,000 people[5] during Spring tides.

12 videos on coastal inundation and ocean buoys produced in 6 languages in synergy with CREWS Caribbean raises community awareness on marine hazards for informed and timely action.

500+ people from at least **15** disaster-prone communities in **5 countries**[6] trained so far on weather and climate, early warning, first aid and disaster response to save lives and boost community resilience.

— Radio infrastructure installation on Tonga's Tofua island – uninhabited but farmed by other islands 6 months a year – gave farmers access to vital weather and boat transport information. Tofua is now farmed year-round, meaning increased production and higher income.

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5   https://www.worldometers.info/world-population/tuvalu-population/
6   The Marshall Islands, Niue, Palau, Samoa, and Tonga

2022 developments

A feasibility study on FM radio network in **Tokelau** to keep **1,500** people spread across 3 far-flung atolls informed and connected – endorsed. Exposed to cyclones and rising sea levels, consulting communities and authorities was critical. Next step? Resources to make it happen.

While technical capacity and SOP work on Samoa's and Tonga's transition to impact-based forecasting began, focus groups developed preliminary impact tables for **5** hazards[7] in Samoa and **4** hazards[8] in Tonga, and public advice and action statements. Final impact tables will aid forecasters on issuing warnings. Statements, providing consistent public protection guidance, will be part of national impact-based warning services.

'Nowcasting' in Pacific improved with supercomputer and tools. Using real-time data, Nadi specialized regional centre can more accurately forecast immediate or near-term weather behaviour, including cyclones, so countries issue timely warnings.

People-centred solutions – *Women and disability at core of early warning action*

How to ensure early warning and early action don't leave women and people with disabilities behind? With Pacific countries and communities dispersed over a vast Ocean, reaching everyone is exacting. Consultations with women's groups, community members, older people with disabilities, and leaders of 7 rural, urban, and coastal communities in Fiji aimed to understand how diverse groups access, disseminate, and respond to early warnings. The study considered socio-economic, cultural, and gender norms' impact on hazard vulnerability and reaction to warnings. Identified gaps and good practices are feeding into gender and disability inclusive guidelines and checklist. They will help Met Services and disaster risk entities mainstream gender and disability into every early warning element to enable early action – saving more lives.

© UNDRR/Nazgul Borkosheva

> I live with my grandmother who can't read and write. I depend on her to receive warning information and decide on when and where to evacuate.

18-year-old man using sign language,
Korotale village, Fiji

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7   strong wind, thunderstorm, flooding, marine and high surf, and landslides
8   strong wind, thunderstorm, damaging swells/waves, and drought

CREWS in the Caribbean

- Hydrometeorological hazards caused more than 8,300 deaths and nearly $22.5 billion in direct damages between 2000-2022.[1]

- Cost of fully modernizing multi-hazard early warning systems and services in the Caribbean? $4-6 million per country, $80-120 million for the region.[2]

- Potential regional productivity benefits in agriculture, energy and water supply estimated at $24-148 million each year. Regional investments are likely to generate twice the benefits per dollar than national investments.[3]

19 countries assisted through CREWS programmes	
1 country programme	**1** regional programme

Climate change is a global challenge that demands a collective response. Support to the Climate Risk and Early Warning Systems initiative is an investment in increasing vulnerable communities' ability to adapt and thrive in a changing climate.

Gerard Howe,
Head, Adaptation, Nature & Resilience Department
Foreign, Commonwealth and Development Office
UK

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1   A Strategic Roadmap for Advancing Multi-hazard Impact-based Systems and Services in the Caribbean, World Bank for CREWS Caribbean.
2   Ibid.
3   Ibid.

Haiti

Most prevalent natural hazards/disasters 2012-2022[2]

| floods | hurricanes | earthquakes | drought |

WMO	2021-2023	$1.5 million	Expenditure rate: 19%	Leverage: $41.3 million

2022 was again a year marked by spiralling insecurity, socio-economic-political volatility, and natural disasters in Haiti. Another earthquake killed more than 300 people. The instability from ongoing conflict and gang violence necessitated flexibility in implementing **CREWS Haiti** – even more so when the impact of UN Security Council imposed sanctions in the last quarter brought the project to a halt. With the aim of building a sustainable and effective Met Service, multi-hazard early warning systems and strong disaster response capacity – project risk is medium high.

Progress so far

2 law(s), bill(s), national strategic plan(s), framework(s) or Standard Operating Procedures (SOPs) for national hydro-met services developed with CREWS support

— **1 National Strategic Plan** developed for hydro-met services. **1** draft decree will create a national hydro-met centre when adopted.

3 hazards – **floods, hurricanes, earthquakes** – which pose a risk of life loss in the country for which CREWS is supporting increased prediction and warning capacity

— A pilot area is being defined to install an integrated local flood alert system. It follows a review on improving hydro-met services in the country.

1 risk information product used to enhance services produced with CREWS support

— Posters and other materials developed for hazard awareness campaign for schoolchildren.

Estimated **45,000 people** covered by early warning systems or (local) preparedness through CREWS support

— Simulation exercises among residents of Anse Rouge in Haiti's Artibonite District and a hazard awareness campaign among school children in Port-au-Prince – ensure they know what to do when disaster strikes.

0 Common Alerting Protocol (CAP) used to issue warnings

— However, Haiti is to receive training on best CAP implementation practices implemented through CREWS Caribbean project elsewhere in the region.

21 women who benefitted from capacity development offered by CREWS

— They account for **23%** of 93 people trained on interpreting meteorological information for civil protection, aviation quality management, and disaster preparedness.

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1   https://thedocs.worldbank.org/en/doc/69b1d088e3c48ebe2cdf451e30284f04-0090082022/original/FCSList-FY23.pdf
2   EM-DAT data download 20 March 2023

© UNDP

2022 highlights

1 National Strategic Plan (NSP) with action plan validated.

— **20** representatives – 6 women – from government, the Hydrometeorological Unit of Haiti (UHM), Ministry of Agriculture and the national food security agency validated the plan. It gives UHM a defined mandate and strategy to better contribute to national socio-economic development through improved early warning services.

42 civil protection, food security and Ministry of Agriculture staff from Port-au-Prince – including 11 women – improved skills to interpret weather forecasts and warnings provided by UHM.

— Part of the NSP action plan, the training will strengthen Haiti's disaster response by better understanding the impact of weather information, and efforts for more sustainable and resilient food systems.

15 UHM staff – 3 women – trained on managing the quality of their services for aviation to make the Met Service more aware of structures and processes needed for more professional aviation services. The long-term goal is to fully recover the cost of this service provision.

2,000 children at **10 schools** in Port-au-Prince reached through a natural hazards awareness campaign targeting children on action to take for their protection.

— The capital is especially vulnerable to natural hazards as many inhabitants live in poor quality homes. The campaign, in an area with many schools, will be rolled out elsewhere in Haiti.

— Children and other vulnerable groups also targeted through **3** awareness videos in French Creole seeking to change behaviour in the face of natural hazards.

2022 developments

A draft decree to create a national hydrometeorological centre is under review. The decree, when adopted, will change UHM's legal status – a core objective of the National Strategic Plan – and ensure greater financial and operational sustainability with dedicated budget.

A pending agreement between UHM and Haitian Civil Protection marks a first step in institutionalizing relations between two national entities playing a pivotal role in protecting people and assets. Future improved collaboration will ensure civil protection gets tailored information it needs for effective disaster management. And UHM to reach vulnerable groups with timely and accurate alerts.

A **multi-risk contingency plan** piloted in Anse Rouge in northwest Haiti with UNDP and Civil Protection, to be replicated in other communities.

— Simulation exercises on communication and alert dissemination to an estimated **43,500**-strong community in Anse Rouge supported civil protection to update municipal-level contingency plans. And strengthened disaster management and resilience among some of the poorest and disaster-prone communities in Haiti.

— Plans to extend activity to neighbouring communities of Gonaïves, Gros-Morne and Terre-Neuve will better protect another **348,000 people**.

An agreement with the Cuban Met Service to provide technical assistance to UHM will help the latter deliver more accurate and timely forecasts and warnings tobetter protect the public.

People-centred solutions – *Reaching impoverished Haitian farmers with early warnings*

In a country where almost half the 11.7 million population don't have enough to eat and another 1.8 million people are highly food insecure[3] – a more productive agricultural sector is critical to tackle hunger. More than 40% of the workforce is employed in agriculture, which also accounts for 20% of national GDP.[4] Yet the sector suffers from weather and climate impacts that exacerbate hunger. CREWS Haiti is supporting the Agriculture and Rural Development Ministry to develop early warning services for an estimated 19,000 subsistence or small-scale farmers. Information from mapping farmers in Petite Rivière de l'Artibonite – one of the poorest and natural hazard prone areas – will be used to create a farmers' register. It will provide easily accessible details on producers in the region so they can be reached with targeted and timely hydrometeorological information. Greater yields for a more food secure Haiti.

© WFP/Theresa Piorr

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3 https://www.wfp.org/countries/haiti
4 https://www.worldbank.org/en/news/press-release/2023/02/08/the-world-bank-approves-additional-support-to-improve-haiti-s-food-security

Caribbean

Most prevalent natural hazards/disasters[2] 2012-2022

storms floods drought earthquakes volcanic activity

Anguilla, Antigua and Barbuda, Bahamas, Barbados, Belize, Cayman Islands, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, Montserrat, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago, Turks and Caicos Islands

WB/GFDRR, WMO, UNDRR	2018-2023	USD 6.5 million	Expenditure rate: 65%	Leverage: $1.5 million

CREWS Caribbean saw its work to streamline and strengthen regional and national systems for multi-hazard early warning services in 17 countries expand – geographically and in scope. The Cayman Islands and the Turks and Caicos Islands are also being supported on hydro-met and early warning strategic planning and governance. 2022 also saw landmark achievements with far-reaching consequences for region and people.

Progress so far

27 law(s), bill(s), strategic plan(s), framework(s) or Standard Operational Procedures (SOPs) for national hydro-met services developed with CREWS support

— **8 countries**[3] adapted regional **Model Met Law** to national needs. **8 countries**[4] have developed or updated National Strategic Plans and National Frameworks for Weather Water and Climate Services

— **1** regional **Strategic Road Map** for multi-hazard early warning systems. **1 model SOPs** for national use.

118 regional and national institutions and organizations supported by CREWS in capacity development for enhanced services to the countries

6 tools and other risk data products generated for impact-based warnings with CREWS support

— **3** awareness videos, a rainfall estimation tool, a database on non-cyclone related severe weather events helping regional forecasters recognize conditions and characteristics of different severe weather types – and a 'how to' put in place a coastal inundation early warning system.

300,000 women and men living in areas covered by forecasts and warnings put in place with CREWS support, for a given hazard(s)

— Population of Grenada, and at least 180,000 people in Antigua and Barbuda and Dominican Republic better protected from floods and marine hazards.

1 country – **Antigua and Barbuda** – using Common Alerting Protocol (CAP) put in place with CREWS support

0 Specialised partnerships/twinning arrangements between national hydro-met services established

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1   https://thedocs.worldbank.org/en/doc/69b1d088e3c48ebe2cdf451e30284f04-0090082022/original/FCSList-FY23.pdf
2   EM-DAT data download 26 March 2023
3   Anguilla, Antigua and Barbuda, Belize, Grenada, Jamaica, St Kitts and Nevis, Saint Lucia, and St Vincent and the Grenadines
4   Anguilla, Antigua and Barbuda, Dominica, Grenada, Guyana, Jamaica, St. Kitts and Nevis, and St. Vincent and the Grenadines

3 awareness videos on ocean buoys and coastal inundation in English, Creole and Spanish aim to change public behaviour regarding marine hazards © CREWS

2022 highlights

The adoption of a strategic regional multi-hazard early warning (MHEWS) roadmap will underpin regional efforts to establish strong and streamlined systems.

— Roadmap informed by socio-economic analysis of strong hydro-met services and early warning value, and mapping of existing national and regional MHEWS integrated into national situation analyses available online.

5.18 million people in **10** countries will be better informed, prepared and protected against floods, heavy rains and other hazards through **4** completed pilot initiatives.

— **9** countries[5] and **3** regional institutions moving to Impact-Based Forecasting (IBF). Training over 7 joint webinars with Weather and Climate Ready Nations Program based on transition implementation plan.

— **4** countries[6] more equipped against heavy rain impacts with a functioning prototype multi-sensor precipitation grid combining various rainfall and radar sources of data. It enables more accurate rainfall estimates to inform disaster management and water resource planning.

— Strengthened integrated flood management capacity of hydro-met and disaster risk agencies in **St. Lucia** and **Jamaica** with concept and guidance materials.

— Technical analysis on regional alert system development key step for effective early warning with enough lead time for everyone to act.

Estimated **180,000 people** more flood resilient in **2** countries through:

— Operational integrated river flood forecasting and early warning system in **2** river basins covers at least 160,000 people in the **Dominican Republic**. Flood management and first aid training for 32 people, and vulnerable homes mapping in **4** flood-prone communities of 20,000 people in **Antigua and Barbuda**.

An evaluation and action plan to strengthen regional radar network, coordinated with Caribbean Meteorological Organization, prelude to more performing and sustainable radar mosaic in region.

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5   Barbados, Belize, Cayman Islands, Dominica, Jamaica, St Vincent and the Grenadines, St Kitts & Nevis, St Lucia and Suriname
6   Barbados, Martinique, St. Lucia and St. Vincent and the Grenadines

2022 developments

Stronger governance – Met Bills accepted by respective ministries in **8 countries**. Enactment is critical for resourced and effective early warning services. Legislation for Barbados and plans for Cayman Islands and Turks and Caicos Islands also being developed.

1 model SOPs developed for collaboration between national hydro-met services and disaster management entities.

Different sectors being mobilized in **Guyana** and **Trinidad and Tobago** for open-sourced Risk Information Exchange Platforms on national disaster and climate risk data. Using sectoral information, aggregated data will inform risk analyses, policies, investments and action.

Findings from risk perception dialogues with communities in **4 countries** – organized with partners – to inform local and national strategy and policy on multi-hazard early warning systems so more people act on alerts.

People-centred solutions – *Warnings on the move*

How to easily know what today's weather – and next 5 days – means for you wherever you are in Jamaica? Using a tool likely at hand? With 1 in 2 people using smart phones, a mobile weather app will warn the public when weather and water poses danger. Under development by its Met Service, Resurgence and others with CREWS support, it fills a critical alerting gap in easy-to-access-and-understand warning so people can act in time for safety. So most-at-risk people use the app – especially women-headed households – 22 men and women from public safety, the Red Cross, media, farmers, fishermen etc., collaborated on design, messaging and dissemination. A solution replicable across the Caribbean. A bonus – fishermen's feedback led to new marine weather forecasts for small fishing and leisure boats.

© Resurgence

Measuring effectiveness of multi-hazard early warning systems

In 2022

Droughts affected nearly 90 million people in Africa alone[1]

Hurricane Ian caused USD 100 billion of damage in the Americas

In Asia-Pacific, floods accounted for more than 74% of disasters in the region and 88% of all disaster-related deaths globally[2]

UNDRR/WMO	**Completed**	$0.76 million	Expenditure: 100%

In 2022, nearly 31,000 people died and 185 million people were affected in 387 disasters from natural hazards. The economic cost of these disasters was nearly US$ 224 billion.[3]

21 Least Developed Countries (LDCs) and **14** Small Island Developing States (SIDS) to date have reported having multi-hazard early warning systems under Target G of the Sendai Framework.

29 LDCs and **27** SIDS so far have reported on Target A to substantially reduce global mortality between 2020-2030.

Although early warning is proven to save lives and reduce economic losses, only 98 countries in the world reported having multi-hazard early warning systems (MHEWS) through the Sendai Framework Monitor by year end. While CREWS operations make a practical contribution to both strengthening MHEWS and access to them in LDCs and SIDS, the **CREWS global project** worked to develop metrics to better measure how effective they are. It aimed to increase LDC and SIDS capacity to measure and monitor their multi-hazard early warning system efficacy and incorporate lessons learnt into the early warning value chain. The project contributes to greater reporting on Target G and gauging whether countries are on track to meet their international commitments to reduce disaster risk, essential for the Early Warnings for All Initiative and its monitoring system.

2022 saw the completion of project work. Follow-up on custom indicator use and monitoring would ensure better understanding of its impact and value – and inspire uptake.

Project achievements

53 country-level custom indicators adaptable to national contexts developed and accessible on the Sendai Framework Monitor (SFM) to complement existing national, and global targets and methodological guidance.

— Available in 7 languages, they will help targeted countries measure the effectiveness of single, cluster and multi-hazard early warning systems within the Sendai Framework monitoring system as required.

1 https://reliefweb.int/report/world/2022-disasters-numbers
2 https://reliefweb.int/report/world/2022-year-when-disasters-compounded-and-cascaded
3 https://reliefweb.int/report/world/2022-disasters-numbers

© UNICEF/David Hogsholt

2 countries – Fiji and Mauritius – tried and tested online and on-site training developed to help countries use the custom indicators.

  — As part of a roll-out in targeted countries in the Caribbean, Pacific and West Africa, Sendai Framework monitoring system e-modules were updated with videos on accessing and using the indicators.

  — An added plus: interaction during training led to Fiji's Met Service – which monitors extreme weather – and the Mineral Resources Department – which monitors geophysical hazards – wanting to share data and collaborate.

33 targeted LDCs and/or SIDS in the 3 regions have greater capacity to regularly monitor their early warning systems, understand the results, and apply them to decisions on action for more effective systems.

  — **3 regional** training workshops on custom indicators led to national hydro-met services, national statistical offices and disaster risk reduction organizations working together – often for the first time. It helped establish mutual understanding on different aspects of multi-hazard risk, explore possible and priority collaborative actions, and to work on custom indicators as needed to measure early warning effectiveness.

  — The trainings highlighted need for follow-up technical support to strengthen MHEWS design and set up, and to use custom indicators for monitoring their operationalization to better understand impact and outcomes in the long run.

2020 State of Climate Services report provided baseline information on climate information and early warning systems.

Post-project developments

St Maarten in the Caribbean is using the custom indicators to guide the design and development of a framework for a multi-hazard early warning system. Doing so helps ensure the framework will be both sustainable and adaptable to meet the needs of the population – and marks the start of an early warning journey for the Dutch overseas territory.

— It also enables the development of an effective multi-hazard early warning system – **the first ever for St Maarten** – through monitoring and evaluation.

A joint scoping mission with government partners was carried out in **Kiribati** and **Tonga** to identify early warning system needs and priorities as a direct result of the training workshop for the Pacific region.

— A range of potential activities for a joint plan of action were identified by the 2 countries, including community-based and inclusive early warning system development, risk communication, and disaster risk knowledge improvement.

— Scoping missions to **Samoa** and **Vanuatu** are planned for 2023.

People-centred solutions – *Understanding human needs in early warning systems*

For early warning systems to succeed in minimizing human and economic loss, each component from beginning to end must understand and integrate people's needs in design, set up and functioning. And then monitored for impact. National case studies were critical for the CREWS project to show recommended actions within the newly developed custom indicators were feasible. A study involving 4 communities in Trinidad and Tobago, St Lucia, St Vincent and the Grenadines, and Jamaica, delved deeper into understanding the human factors preventing or fostering people's response to warnings. If people don't receive, understand or trust warnings, they are less likely to take preventive action. Bringing together 143 people community members, the Red Cross, and local and national authorities – 57% women – in workshops, bridged gaps in understanding on both sides. Communities learnt how they can be partners in early warning. Policymakers realized the limitations of systems that don't reach some of the most vulnerable and the value of using traditional and local knowledge in disaster management. Next steps? Integrating these and other insights into multi-hazard early warning systems globally.

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A fit for purpose CREWS Initiative

Assessing performance and impact

How is the CREWS Initiative faring on its goal to support Least Developed Countries and Small Island Developing States to put in place and strengthen early warning systems and services?

An initial phase external evaluation covering the first five years of CREWS operations (2017-2021), found it was highly relevant given the global context and international frameworks encompassing early warning. Its pertinence is heightened further by the Early Warnings for All Initiative. The evaluation found CREWS, with the expertise of implementing partners covering all four elements of effective early warning, was aptly aligned to help deliver on the Initiative.

Among concerned parties surveyed in CREWS regional and national operations, 86% agreed CREWS had contributed a lot or somewhat to global policies and priorities. The evaluation found that CREWS had contributed to improved availability of early warning information. Its projects were considered as effectively managed, despite COVID-19 leading to no-cost extensions for all 15 CREWS projects running at the time.

A key factor influencing CREWS output achievements globally, regionally, and nationally is its 10 core programme indicators being measured against global agreements and targets. This includes the Sendai Framework for Disaster Risk Reduction and the Paris Agreement on Climate Change.

With moderate inroads made on people-centred early warning systems and limited project sustainability planning potentially threatening the durability of CREWS results, the evaluation identified areas for improvement. Systematic engagement of early warning users, particularly vulnerable groups, is essential to achieve CREWS' objectives. To reach last mile communities, early warning and the humanitarian sector must interconnect, and communication gaps addressed.

Monitoring, evaluation, accountability, and learning (MEAL) underpinned by a theory of change should be integrated from project beginning to end to improve results tracking. It would also enable CREWS to better demonstrate its impact and contribution.

A common thread was establishing or cementing strategic partnerships and engagement with larger financing mechanisms, people and entities on the ground, and other global partners such as IFRC, InsuResilience, REAP and key regional institutions. It would scale up CREWS' work, deepen its relevance, improve its reach and effectiveness, and leverage more resources.

The evaluation has given impetus to CREWS to push ahead on a MEAL framework supported by training for its implementing partners and national and regional counterparts. Operational procedures on gender responsive programming and people-centred risk informed approaches are being rolled-out to deliver tailor-made early warnings that fully engage everyone. New partnerships with IFRC and other relevant actors result in more effective country programming. Sustainability planning is woven into project design and development and a scaling-up framework has been developed with GCF to provide additional funding following CREWS investments. The second 5 years of CREWS has begun – but not where it left off.

CREWS and 'Early Warnings for All'

A fit for purpose CREWS took on new urgency with the UN's launch of Early Warnings for All Initiative in 2022. The ambitious goal of protecting every person in the world with early warnings by 2027 requires an unprecedented and concerted level of investment and targeted action to deliver. Particularly in LDCs and SIDS where needs are greatest and capacity is lowest. Building sustainable institutional and human capacities in all four areas of effective early warning systems – disaster risk knowledge; strong observation, monitoring and forecasting; preparedness and response; and warning dissemination and communications – necessitates expertise and partnerships on a grand scale as well as finance.

In its first few years, CREWS has shown it is uniquely placed in the delivery of the Early Warnings for All promise as an operational funding mechanism working on every element of strong multi-hazard early warning. From investing in governance for strategic and legal early warning foundations, to strengthening institutions in best practice and service delivery, and actively reaching people so they take informed and timely action, CREWS is tried, tested – and succeeding.

Its funding model – pooled funds from Member States – ensures contributions are unearmarked. Investment is collectively decided on needs, priorities, potential for greatest impact, and tailored interventions avoiding duplication through coordination. The specialized expertise of implementing partners and a fast-growing network of operational partners e.g., IFRC, the World Food Programme (WFP), the Food and Agriculture Organization (FAO) and related global partnerships such as REAP and the Anticipation Hub, enable agile and dynamic project design and implementation covering all early warning system components. Three of the four lead organizations on the early warnings initiative – WMO, UNDRR and IFRC – are CREWS implementing or operational partners. Greater engagement with the fourth – the International Telecommunication Union (ITU) – is foreseen as more work is done on warning dissemination and communication.

CREWS' people-centred added values and operational procedures also guarantee support never loses sight of the main objective. Saving lives, livelihoods and assets of people and countries most-at-risk from natural hazards and climate change with early warning – but least able to protect themselves. And doing this even in the most challenging contexts. CREWS operations currently cover 23 fragile and conflict-affected countries. Upcoming projects will increase that number. Enabling early warning in such countries is crucial to achieve early warnings for all people. And everywhere.

With 27 of the 30 Early Warnings for All Initiative kick-off countries supported by CREWS, or soon to be, alignment between the two is clear. CREWS' targets of 50 LDCs and SIDS with hazard prediction capacities and using best practice on issuing warnings, and the policies and measures it introduced in 2022, further underscore that alignment.

Scaling up early warning financing with GCF, CREWS' work on measuring early warning system effectiveness via national reporting on global climate and disaster risk reduction goals, and its support to the monitoring and evaluation of progress on Early Warnings for All, have also helped ready CREWS to meet the Early Warnings for All challenge. CREWS is fit for purpose.

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Pulling together on early warning

2022 saw new levels of engagement with key partners. The International Federation of Red Cross Red Crescent Societies' (IFRC) engagement with CREWS became more systematic. After contributing to the development of CREWS' people-centred operational procedures through its best practices on community-based early warning, the IFRC, the Climate Centre and various member National Societies became operational partners in new projects such as CREWS Malawi and CREWS Greater Horn of Africa – and more involved in established ones like CREWS Caribbean.

IFRC's participation in CREWS project design in countries and regions with hard-to-reach populations will ensure activities connect community-level early warning planning – with implementation to reach everyone. National Red Cross and Red Crescent Societies, leveraging funds from CREWS projects and embedded in communities through their volunteers and grassroot networks, are critical partners for community-based hazard monitoring, detection and warning. Particularly for locally appropriate and tailored interventions to reach the very last mile communities – such as pastoralists in drought and cconflict-affected countries in the Greater Horn of Africa.

InsuResilience Global Partnership (IGP), which also contributed to CREWS' people-centred operational procedures, is helping develop procedures for CREWS' private sector engagement. In addition, the partnership on climate and disaster risk finance is providing inputs and insights on the CREWS project pipeline. These include the leveraging and synergy potential of a proposed project to support funding decisions. In turn, CREWS contributes data and information to IGP's monitoring and evaluation work which feeds into IGP Annual Reports, and inputs into and reviews IGP technical reports.

Engagement between the two initiatives will deepen as a Secretariat for the Global Shield against Climate Risks is established. Launched by the G7 and the Vulnerable 20 Group of Finance Ministers – V20 – the Global Shield will provide pre-arranged financial support for early and rapid deployment against climate disasters. CREWS will contribute to the Global Shield's on-site work in countries where CREWS also has investments, starting in Jamaica, Malawi, Senegal and Pacific Small Island Developing States. It will do this by mobilizing implementing partners and national entities to provide data and information generated through CREWS projects as a basis for setting up risk financing and insurance products and tools.

In early 2022, CREWS joined the Risk Informed Early Action Partnership (REAP). The goal is to enhance common efforts on making early warning systems more effective by strengthening early action and financing. This includes through sharing and exchanging expertise – CREWS for more coordinated country programmes and REAP by scaling up early warning system coverage through its network – and making them effective by delivering services meeting people's needs. REAP too had informed CREWS' people-centred operational procedures and guidelines with technical input and advice. The guidelines support operational partners in designing and implementing interventions that are co-developed and co-delivered by people most at risk.
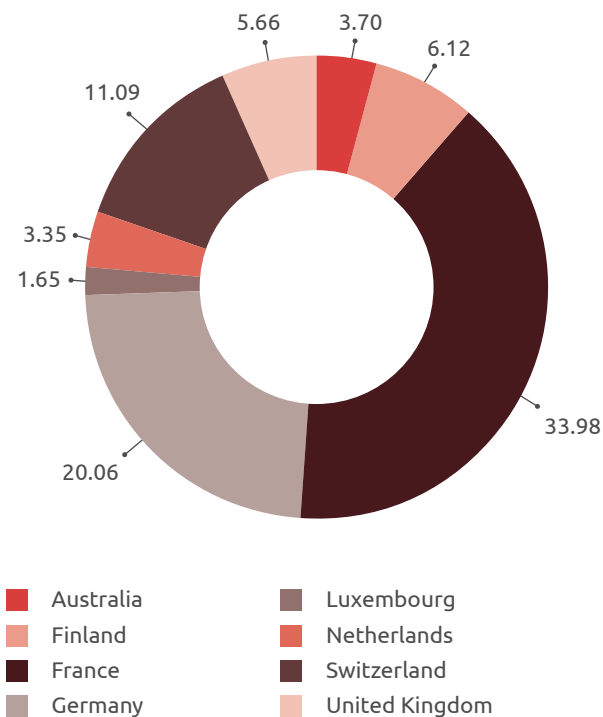
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Financials

In 2022, Canada became the 9th Member of the CREWS Initiative after pledging CAD 10 million over 4 years. It joins Australia, Finland, France, Germany, Luxembourg, the Netherlands, Switzerland, and the United Kingdom. CREWS thanks Members for their generous support during the year.

Fund contributions

By year end, signed contributions to the CREWS Trust Fund totalled USD 95.17 million, of which USD 85.6 million had been received. In addition to France's annual contribution of EUR 4 million and another EUR 3 million from Germany, the Trust Fund received the first 2 million of CHF 4 million pledged by Switzerland up to 2025, and £1.3 million from the United Kingdom.

The Trust Fund also earned approximately USD 1.84 million in investment income on its liquid balances and that received from the implementing partners.
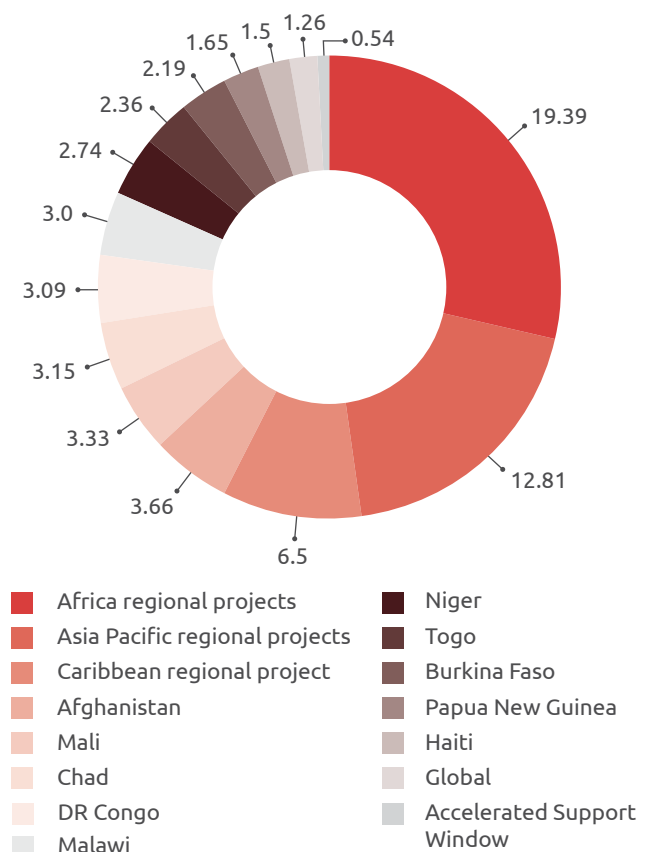
Project funding

By close of 2022, USD 74.07 million had been allocated to cover all costs related to CREWS programming, and the administrative costs of the Secretariat and the Fund Trustee since the Fund was set up. Of this, 81.5% was directly for projects. The European Commission also contributed EUR 10 million directly to the World Bank/GFDRR towards financing for CREWS projects.

CREWS Trust Fund received contributions
in USD millions, as of 31 December 2022

5.66 3.70 6.12 33.98 20.06 1.65 3.35 11.09

- Australia
- Finland
- France
- Germany
- Luxembourg
- Netherlands
- Switzerland
- United Kingdom

Funding decisions by projects*
in USD millions, as of 31 December 2022

1.65 1.5 1.26 0.54 19.39 12.81 6.5 3.66 3.33 3.15 3.09 3.0 2.74 2.36 2.19

- Africa regional projects
- Asia Pacific regional projects
- Caribbean regional project
- Afghanistan
- Mali
- Chad
- DR Congo
- Malawi
- Niger
- Togo
- Burkina Faso
- Papua New Guinea
- Haiti
- Global
- Accelerated Support Window

*Figures may differ from the Trustee due to different aggregation method and timing of report.

CREWS Trust Fund Summary – from inception to 31 December 2022 *in USD millions*	Total	% of Total
Donor Pledges and Contributions		
Contributions	87.77	92.2%
Pledges	7.39	7.8%
Total Pledges and Contributions	**95.17**	**100.0%**
Cumulative Resources		
Resources received		
Cash Receipts	85.60	88.2%
Investment Income earned a/	1.84	1.9%
Total Resources Received	**87.44**	**90.1%**
Resources not yet Received		
Contributions not yet received	2.17	2.2%
Pledges	7.39	7.6%
Total resources not yet received	9.56	9.9%
Total Potential Resources (A) *(in USD millions)*	**97.00**	**100.0%**
Cumulative Funding Decisions		
Projects	60.34	81.5%
Fees	7.41	10.0%
Administrative Budget	6.32	8.5%
Total Funding Decisions Net of Cancellations (B)	**74.07**	**100.0%**
Total Potential Resources Net of Funding Decisions (A) - (B)	**22.93**	
Funds Available		
Funds Held in Trust with no restrictions	13.37	
Approved Amounts Pending Cash Transfers	-	
Total Funds Available to Support Steering Committee Decisions	**13.37**	

a/ Represents investment income earned on the liquid balances of the CREWS Trust Fund and investment income received from IPs

Note: Sub-totals may not add up due to rounding.

Sustainable investment

The CREWS Trustee (World Bank) has been integrating Environmental, Social and Governance (ESG) factors into its investment processes since 2019 as part of a Sustainable and Responsible Investment (SRI) approach to investment management. The CREWS investment portfolio is primarily comprised of short-term high-grade fixed income securities. As of 31 December 2022, the portfolio has an ESG Quality Score of 7.16 out of 10 and an ESG Rating of AA,[1] with no change from 2021. Falling into the top decile of the ratings universe, the CREWS score and rating reflects high capability of its portfolio holdings in managing key medium to long term risks and opportunities arising from ESG factors.

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1   https://fiftrustee.worldbank.org/content/dam/fif/funds/crews/TrusteeReports/CREWS%20Trustee%20Report%20-%2012-31-2022.pdf

The CREWS Initiative gratefully acknowledges the support of:

CREWS Members

Australia	Canada	Finland	France	Germany
Luxembourg	Netherlands	Switzerland	United Kingdom (Chair)	

CREWS Observers

Austria	European Commission	Japan	Mexico	New Zealand	Norway	Spain	USAID

CREWS Implementing Partners

WORLD METEOROLOGICAL ORGANIZATION

GFDRR
Global Facility for Disaster Reduction and Recovery

Administered by THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

UNDRR
UN Office for Disaster Risk Reduction

CREWS Operational Partners

ACP

AEMET
Agencia Estatal de Meteorología

Anticipation Hub

Australian Government
Bureau of Meteorology

CDEMA
CARIBBEAN DISASTER EMERGENCY MANAGEMENT AGENCY
Resilient States · Safer Lives

CARIBBEAN METEOROLOGICAL ORGANIZATION

EUMETSAT

Food and Agriculture Organization of the United Nations

FMI

GREEN CLIMATE FUND

IGAD ICPAC
IGAD Climate Prediction and Applications Centre

InsuResilience GlobalPartnership

IFRC

ITU

METEO FRANCE

Met Office

Risk-informed Early Action Partnership
REAP

SOFF
Systematic Observations Financing Facility

SPREP
Secretariat of the Pacific Regional Environment Programme

UNDP
Empowered lives. Resilient nations.

UN environment programme

WFP World Food Programme

Visit **www.crews-initiative.org**

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