# GFDRR on Hydromet

**GFDRR works closely with the World Meteorological Organization (WMO), national meteorological and hydrological services, and other partners to help countries modernize their weather, climate, and hydrological information systems.**

## Why Hydrometeorological Services Matter

Hydrometeorological ("hydromet") hazards—such as storms, floods, droughts, and heat and cold waves—are responsible for the greatest proportion of losses from adverse natural events, causing nearly 80 percent of disasters and over 50 percent of disaster-related deaths between 1980 and 2011.[1]

## What We Do

GFDRR helps countries develop modern and sustainable weather, climate, and water information systems, which are essential components of national disaster and climate risk management strategies. With support from GFDRR, in collaboration with regional and national meteorological and hydrological services, countries can improve preparedness, foster resilience, and enhance the economic performance of weather dependent sectors.

The GFDRR Hydromet Program, launched in 2011, focuses its work in three areas:

- Providing analytical support and knowledge management concerning weather and climate information systems and services;
- Building capacity and providing technical assistance to World Bank teams and client countries through workshops, training sessions, and advisory services; and
- Facilitating portfolio development and operations in priority countries.

Additionally, GFDRR provides country- and regional-level grants and implementation support for the modernization of weather, climate, and hydrological information services. Across its work, GFDRR emphasizes the role of the ultimate users of climate, weather, and water information—the people and businesses that will benefit most from effective hydromet services and drive sustainable demand for them.

**Developing countries could achieve**

**$30 billion**

**a year in economic benefits with better weather, climate, and hydrological observation and forecasting.**

**Developing countries could also achieve**

**$2 billion**

**in reduced annual asset losses with better hydromet services, according to the World Bank.[2]**

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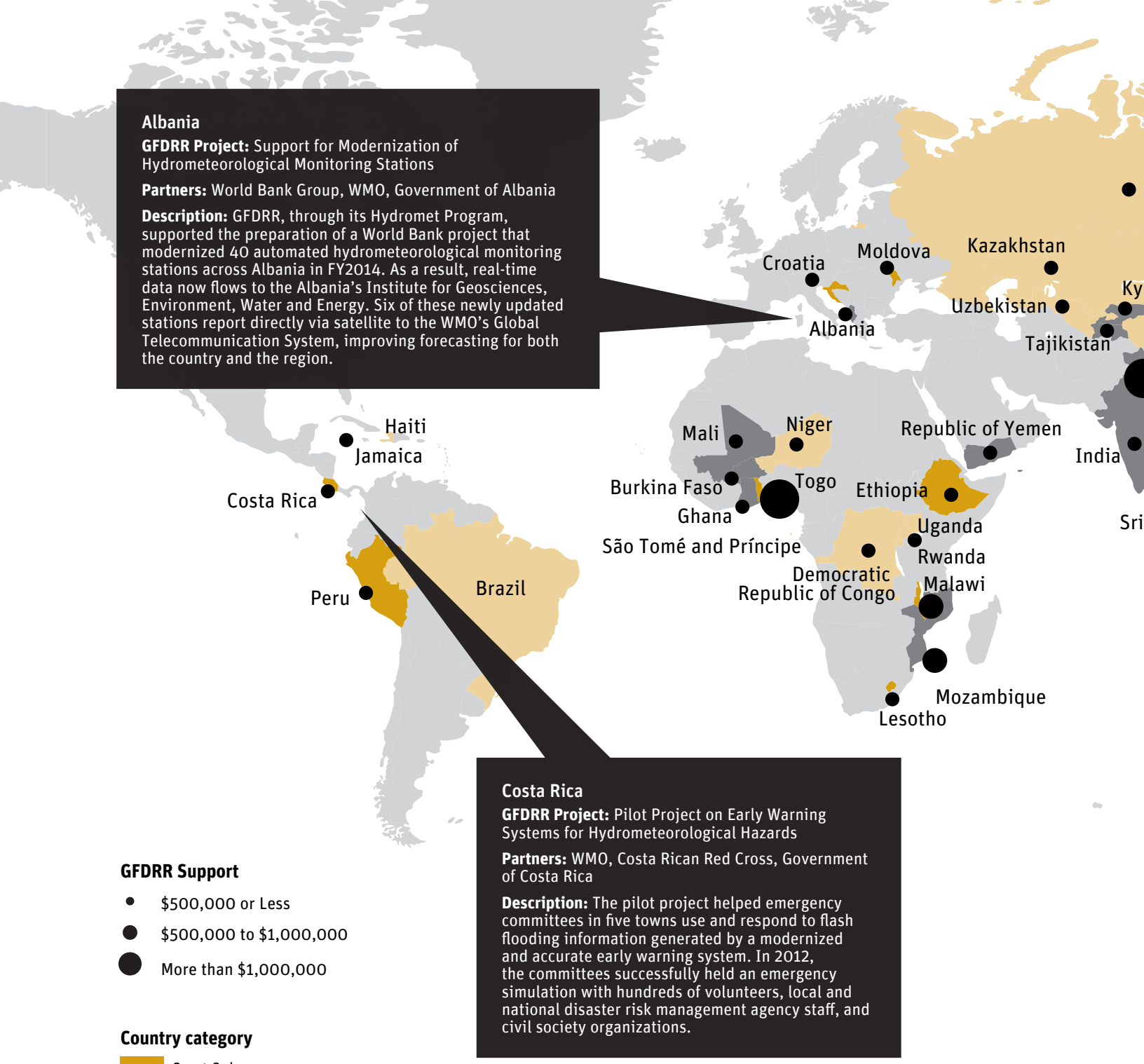


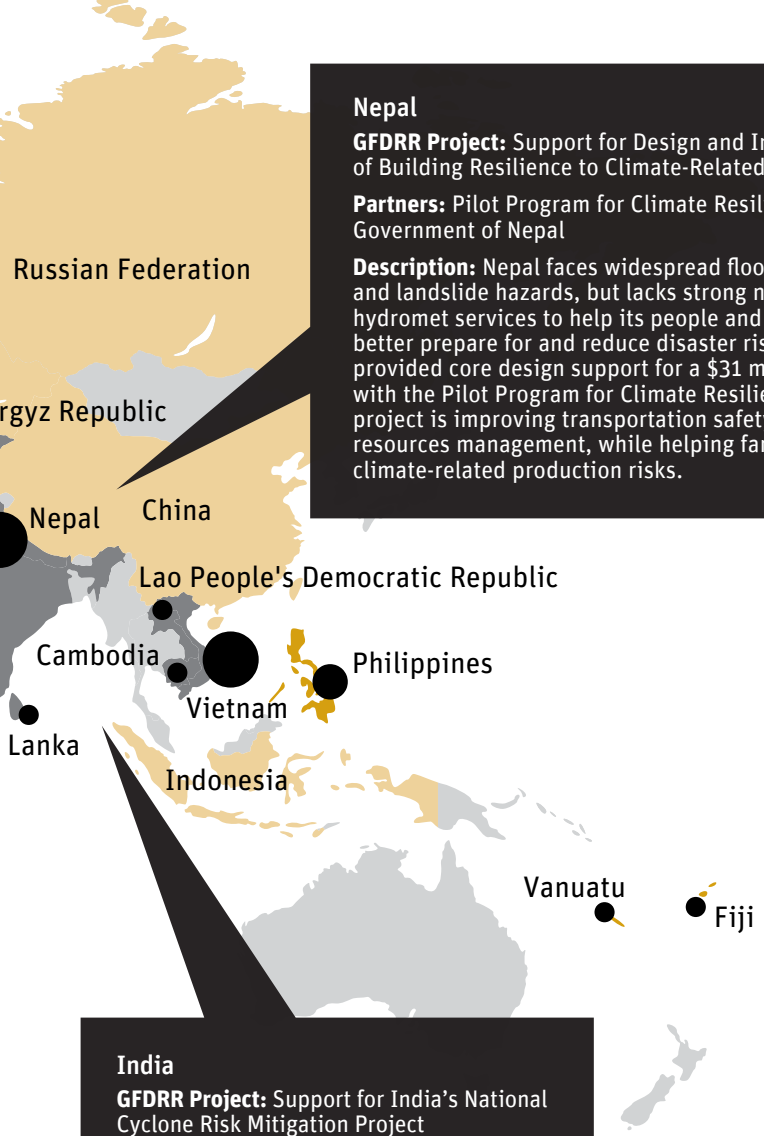

## Where GFDRR Works

Since its inception, GFDRR has supported hydrometeorological service improvements in 35 countries, providing support through grants as well as its own team of weather and climate specialists and disaster risk management professionals.

## How GFDRR Leverages Impact

The GFDRR Hydromet Program leverages:

- Leading expertise and knowledge provided by key partners including the World Meteorological




**Nepal**

**GFDRR Project:** Support for Design and Implementation of Building Resilience to Climate-Related Hazards

**Partners:** Pilot Program for Climate Resilience, Government of Nepal

**Description:** Nepal faces widespread flood, drought, and landslide hazards, but lacks strong national hydromet services to help its people and economy better prepare for and reduce disaster risk. GFDRR provided core design support for a $31 million project with the Pilot Program for Climate Resilience. The project is improving transportation safety and water resources management, while helping farmers mitigate climate-related production risks.

**India**

**GFDRR Project:** Support for India's National Cyclone Risk Mitigation Project

**Partners:** World Bank Group, Government of India

**Description:** Since 2011, GFDRR has provided grant support and technical assistance to India's National Cyclone Risk Mitigation Project. This technical and financial support has enabled the central and state governments to modernize early warning systems, design and build cyclone shelters, and construct protective embankments. As a result, when Cyclone Phailin struck the coast of Odisha in October 2013, damages were considerably reduced in comparison to a storm of similar magnitude ten years earlier.

Organization (WMO), national meteorological and hydrological services, and WMO Centers of Excellence;

- Relationships with national meteorological and hydrological services in developing countries for strong institutional development and investment results;
- A range of international investment possibilities and financing tools to help countries achieve larger-scale improvements in hydromet services; and
- Access to central planning and finance ministries to raise the profile of and government support for national meteorological and hydrological services.

## Snapshot: Leveraging in Practice

The GFDRR Hydromet Program supports design and implementation for large-scale improvements in countries' hydromet services, leveraging new projects with the Climate Investment Funds (CIF) through their Pilot Program for Climate Resilience (PPCR), the World Bank through the International Development Association (IDA)—a fund for the poorest countries—and the International Bank for Reconstruction and Development (IBRD), among other partners.

- **Central Asia:** Hydrometeorology Modernization Project, $27.7 million (IDA and PPCR)
- **Malawi:** Shire River Basin Management Program, $136.3 million (IDA and GEF)
- **Mozambique:** Strengthening Hydrological and Meteorological Information Services for Climate Resilience, $22 million (PPCR and Nordic Development Fund)
- **Moldova:** Disaster and Climate Risk Management, $10 million (IDA)
- **Myanmar:** Ayeyarwady Integrated River Basin Management Project, Hydromet Observation and Information Systems Modernization Component, $30.15 million (IDA)
- **Nepal:** Building Resilience to Climate-Related Hazards, $31 million (PPCR)
- **Russia:** Hydromet Modernization Project II, $139.5 million ($60 million IBRD)
- **Vietnam:** Managing Natural Hazards Project, Hydromet Component, $30 million (IDA)
- **Republic of Yemen:** Climate Information System and PPCR Coordination, $19 million (PPCR)

**GFDRR grants and initiatives to improve hydrometeorological services have helped leverage and shape more than**

# $400 million

**in investments from the Climate Investment Funds, World Bank Group, and other partners.**

## Highlights

In collaboration with the WMO and other partners, GFDRR supports the modernization and strengthening of national weather, climate, and hydrological services, as well as early warning systems and other efforts for disaster preparedness, leading to significant investment and reform.

### Ghana: Launching State-of-the-Art Flood Forecasting Model

The White Volta River Basin is a major contributor to Ghana's agriculture, energy, transport, and health sectors. Yet during the last decade, floods and other water-related hazards have become more frequent, posing a major threat to Ghana's economy.

With technical and financial support from GFDRR, the government of Ghana conducted a flood hazard assessment to identify flood-prone areas and develop a new warning and flood forecasting system, which was launched in FY2014. The system will provide communities with advanced flood information, helping to save lives and manage flood-related crises in the region.

### Central Asia: Taking a Regional Approach to Shared Hazards

The Central Asia Hydrometeorology Modernization Project takes a cooperative approach to strengthening transboundary weather, climate, and hydrological services. In 2008-09, GFDRR supported an action plan for improving service delivery in low-income countries in Central Asia, working directly with the national hydromet services of the Republic of Kazakhstan, Kyrgyz Republic, the Republic of Tajikistan, and the Republic of Uzbekistan.

This led to a $27.7 million program with the Pilot Program for Climate Resilience and the International Development Association. It aims to improve the accuracy and timeliness of regional forecasts by institutionalizing the sharing and archiving of hydromet information.

### Mozambique: Managing Institutional Complexity toward Greater Climate Resilience

Since the destructive floods of 2000, Mozambique's achievements in disaster risk management have led to significantly fewer lives lost due to flooding. To further these achievements, the Pilot Program for Climate Resilience and the Nordic Development Fund are jointly financing a $22 million project, building on GFDRR project design support, to improve hydromet information services.

Supporting hydrometeorological service delivery in Mozambique requires flexibility due to a complex institutional landscape, including a national meteorological service, five regional water authorities, the national water resource directorate, and a national disaster management agency that oversees the country's early warning systems. Benefitting from GFDRR implementation support, the project will help build capacity at relevant government agencies, while also working with them on coordination, information exchange, and early warning delivery.

*GFDRR provided training and technical assistance to the staff of Moldova's State Hydrometeorological Service to strengthen their ability to forecast severe weather. Photo: Proteuss/Flickr.*

**As of FY2014, GFDRR has provided**

**53 grants in 35 countries**

**to improve the accuracy and timeliness of forecasting and early warning systems. GFDRR has supported major hydromet modernization investments in every World Bank operational region.**

## Lessons Learned

**Modernization programs must identify and secure sustainable financing of operations and maintenance to be transformative.**

Evidence suggests that well-functioning national meteorological and hydrological services, when matched with appropriate resources, provide substantial socioeconomic benefits, well in excess of their costs. However, investments in hydrology, meteorology, and climate services require sustained financing of operations and maintenance costs, as well as a highly-skilled and motivated professional work force. While these costs are not large, ample evidence worldwide shows that they are often neglected. In Mozambique, for example, the government received two Doppler radars in 2006 without provision for ongoing financing. Within a few years, both radars had stopped working.

**Public recognition of the value of services helps build sustainable resource streams and client bases.**

When the users of hydrometeorological services—from specific industries to the general public—do not understand the value of the services offered, they will not use them or pay for them. The best means of mitigating this risk is to accurately assess and demonstrate the benefits of hydromet services, and to initiate and maintain dialogue with national citizens and stakeholders.

In the Republic of Yemen, GFDRR-backed analytical work provided evidence for a $19 million Pilot Program for Climate Resilience hydrometeorology modernization project. As a result, the Ministry of Finance committed to increasing the country's hydromet services budget for at least five years. Similarly, in Nepal, analytical evidence also helped secure budget increases from the Ministry of Finance, while efforts to involve farmers and to recognize their importance as clients has improved the ability of Nepal's meteorological and hydrological services to deliver more useful services.

## Advancing Knowledge on Hydromet Services

GFDRR supports research, knowledge sharing, and practitioner peer-to-peer learning:

- In July and October 2013, GFDRR organized workshops at the Shanghai Meteorological Service, serving participants from Cambodia, Ethiopia, Ghana, Indonesia, Lao, Mozambique, Nepal, Philippines, Sri Lanka, Vanuatu, and Vietnam. Participants observed the operations of Shanghai's Multi-Hazard Early Warning System Center, presented country case studies related to disaster risk management and national meteorological and hydrological services, and discussed specific national concerns.
- In September 2013, GFDRR published the flagship study "Weather and Climate Resilience: Effective Response through National Meteorological and Hydrological Services," highlighting how national meteorological and hydrological services can reduce the impact of natural hazards and improve national economic performance.[3]
- In June 2013, GFDRR, the United States National Weather Service, and the WMO organized an international workshop called "Sustaining National Meteorological Services—Strengthening WMO Regional and Global Centers." It brought together 50 professionals from regional and global weather centers with representatives of national meteorological and hydrological services from more than 25 countries, including many GFDRR priority countries.

## Looking Ahead

Continuing its focus on helping countries improve their hydrometeorological services, GFDRR will:

- Work toward a GFDRR-based hydromet information exchange, a web-based global database of projects in the hydromet sector aimed to simplify and encourage the entry of new partners for the hydromet sector;
- Prepare a guide for assessing the socio-economic benefits of meteorological and hydrological services, tentatively titled "Forecast Value: Economic Assessment of Meteorological and Hydrological Services," with an estimated publication date of early 2015;
- Prepare a global assessment on the status of national hydrological services (NHS) and recommendations for improvement of NHS performance, with an estimated publication date of late 2015;
- Provide ongoing support for the preparation of projects in Ethiopia, Rwanda, Myanmar, Peru, Uganda, Haiti, Sahel, Burkina Faso, and Mali, and conduct exploratory work toward additional projects;
- Provide ongoing support for the implementation of projects in Yemen, Mozambique, Nepal, Central Asia, Russia, India, Sao Tome and Principe, and Brazil;
- Strengthen partnerships with donors, WMO, and leading meteorological and hydrological agencies; and
- Strengthen its relationship and alignment with the Global Framework for Climate Services (GFCS).

As GFDRR continues to develop its monitoring and evaluation framework, it will work with the World Bank and other partners to evaluate whether the projects it supports have successfully:

- Increased accuracy and timeliness of weather forecasts and early warning systems, and
- Increased satisfaction of both the general public and specific economic sectors with hydrometeorological services offered.

## Global Framework for Climate Services (GFCS)

The GFCS is an international partnership of governments and organizations that produce and use climate information and services. It seeks to enable researchers to join forces with information producers and users to improve the quality and quantity of climate services worldwide, particularly in developing countries.

GFDRR supports projects that are planned and implemented according to the Global Framework's principles and that contribute to its goals. GFDRR will promote alignment between its own operations and any existing or planned GFCS projects and serve as the World Bank's focal point in the Project Oversight Board.

GFDRR's support of development climate services in a number of GFCS focus countries, including Burkina Faso, Kyrgyz Republic, Nepal, Myanmar, and Sahel, demonstrates its support of the GFCS principles of reducing the vulnerability of society to climate-related hazards through better provision of climate services, while building relationships between providers and users of these services at both the technical and decision-making levels.

## Strategic Partners

China Meteorological Administration

Finnish Meteorological Institute

Climate Investment Funds (CIF), including Pilot Program for Climate Resilience

Global Framework for Climate Services

Korean Meteorological Administration

World Meteorological Organization

MeteoSwiss

The United Kingdom's Met Office

United States National Oceanic and Atmospheric Administration through the National Weather Service

**"For more than 60 years, the [WMO] has been leading international cooperation to enhance weather and climate services globally and especially in least developed countries and Small Island Developing States. Today, thanks to the [Hydromet Program of GFDRR] more countries will receive support for modernizing their hydro-meteorological infrastructure to better deliver adequate weather and climate services. … We are committed to reinforce this cooperation further for the benefit of hydro-meteorological services in those countries where it is most needed."**

**—Michel Jarraud, Secretary-General, WMO**

**NOTES**

[1] World Bank, GFDRR, Government of Japan (2012). The Sendai Report: Managing Disaster Risk for a Resilient Future.

[2] Hallegatte, S. (2012). A Cost Effective Solution to Reduce Disaster Losses in Developing Countries: Hydro-Meteorological Services, Early Warning and Evacuation. World Bank Policy Research Paper #6058. All monetary amounts are in US dollars unless otherwise indicated.

[3] Rogers, David P. (2013). Weather and Climate Resilience: Effective Preparedness Through National Meteorological and Hydrological Services.

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**GFDRR PILLAR:** Preparedness

People in vulnerable countries will be better protected through more accurate and timely early warning, and through civil protection agencies capable of mobilizing a fast response in the event of a disaster.