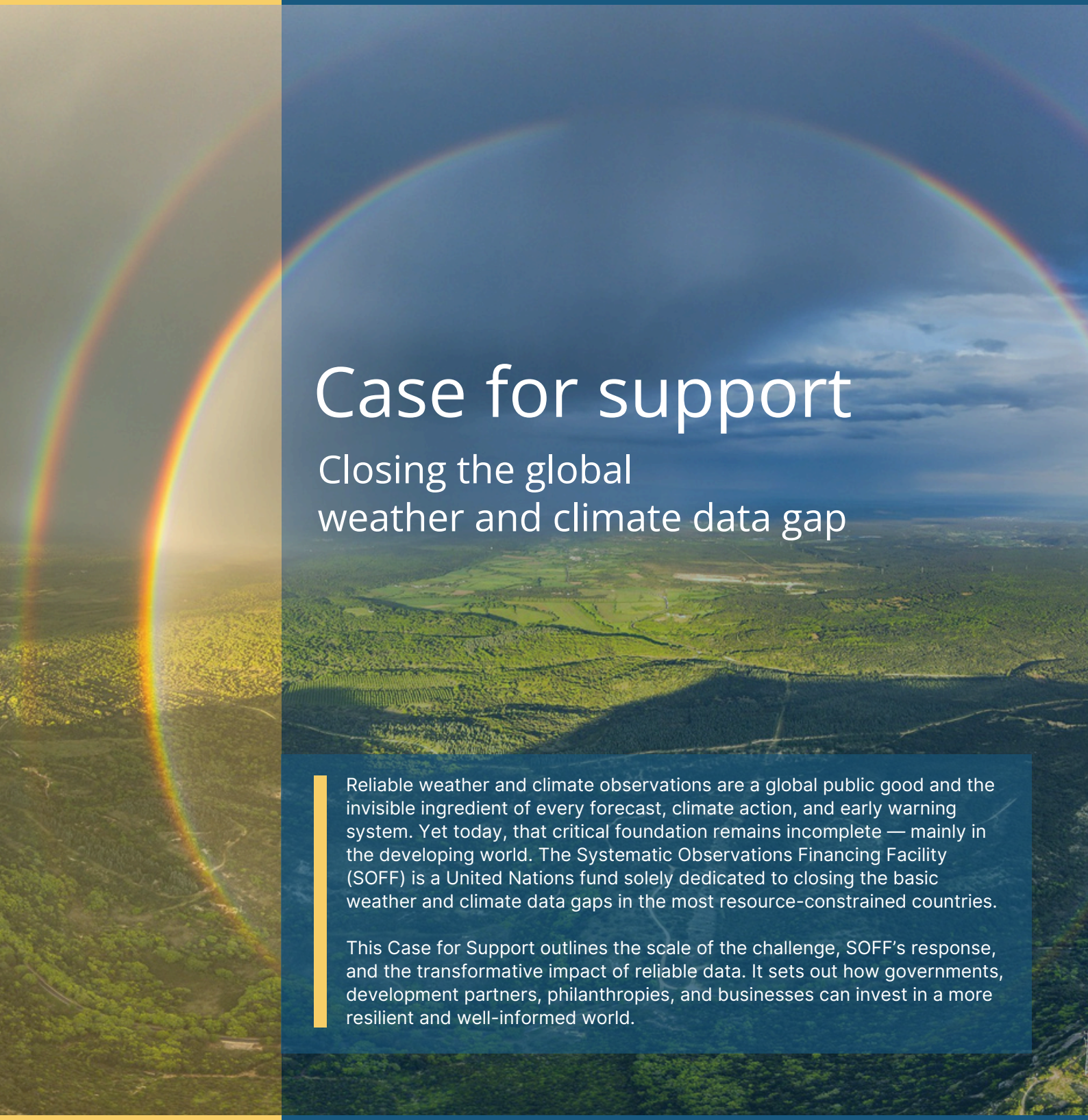
Systematic Observations Financing Facility



Case for support

Closing the global weather and climate data gap

Reliable weather and climate observations are a global public good and the invisible ingredient of every forecast, climate action, and early warning system. Yet today, that critical foundation remains incomplete — mainly in the developing world. The Systematic Observations Financing Facility (SOFF) is a United Nations fund solely dedicated to closing the basic weather and climate data gaps in the most resource-constrained countries.

This Case for Support outlines the scale of the challenge, SOFF's response, and the transformative impact of reliable data. It sets out how governments, development partners, philanthropies, and businesses can invest in a more resilient and well-informed world.

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The issue: A gap in global resilience

The world is entering a new era of extremes. Storms, floods, droughts and heatwaves are no longer rare disruptions – they are defining features of our century. In 2024 alone, weather-related disasters caused losses of USD 320 billion, a sharp rise from the year before. Hurricane winds reached record strength, floods submerged entire regions and heatwaves claimed hundreds of thousands of lives

According to the World Economic Forum's Global Risks Report 2025, climate-related hazards and extreme-weather events are now among the top global threats in both likelihood and impacts. The message is clear: local climate shocks are driving systemic global risk.

Yet one of the most critical foundations of resilience – the world's basic weather and climate observation systems – remains incomplete. In many developing countries, the networks of surface-based and upper-air stations that feed every forecast have never been fully built, maintained or financed at the level required to serve their populations or the planet. This is not a failure of technology, but of equity and investment.

A global obligation, unequal means

Since 2023, all countries have been required under the World Meteorological Organization's Global Basic Observing Network (GBON) to share a minimum set of surface-based and upper-air weather and climate observations. This global standard – agreed by 193 governments – was set to ensure that every nation contributes to, and benefits from, a essential weather and climate data.

Yet many developing countries lack the resources and human capacity to meet these obligations, leaving vast regions of the world as data blind spots that weaken forecasts everywhere.

Across the 76 Least Developed Countries (LDCs) and Small Island Developing States (SIDS), nearly 90 per cent of required GBON observations are missing. These countries operate only one in ten of the stations they are obliged to maintain. The result is a global system that is structurally incomplete – and where the weakest links undermine resilience for all.

A weak link in a global chain

Weather and climate data captured nationally are part of a single, interconnected global network. When observations are missing in one region, the accuracy of forecasts is reduced everywhere. Gaps in data over the Caribbean weaken hurricane tracking across the Americas. Missing temperature and wind profiles from Africa distort models for Europe and Asia.

The human and economic costs of this global gap are mounting. In October 2023, Hurricane Otis intensified from a modest tropical storm to a Category 5 hurricane in just 24 hours, devastating Acapulco and causing losses of estimated USD 12 billion. Forecast models failed to capture its rapid evolution – not because of poor science, but because the regional data were missing.

The issue: A gap in global resilience

Similar pattern repeats across sectors:

- **Agriculture,** a USD 4 trillion global sector, depends on rainfall and temperature forecasts that are often weakest in food-insecure regions.
- **Extreme heat threatens 70 per cent of the global workforce**, yet many of the hardest-hit countries lack reliable observations to trigger timely warnings.
- **Insurance markets** face escalating volatility – insured losses reached USD 140 billion in 2024 – because data gaps amplify uncertainty.

Satellites alone cannot close the gap

Satellites now supply about 85 per cent of data used in modern forecasting – but they depend on surface-based observations for calibration and validation. These "ground truths" maximises billion-dollar investments in satellite programmes.

What are basic weather and climate observations?

Every weather forecast begins with direct measurements of the atmosphere. These are collected through two main types of observation stations:

- **Surface stations** — Located on land, they record conditions such as temperature, rainfall, humidity, wind speed, and air pressure.
- **Upper-air stations** — Launch weather balloons equipped with sensors that measure temperature, wind, and humidity at different heights through the atmosphere.

Together, these surface and upper-air observations form the backbone of basic global weather and climate data. They provide the "ground truth" needed to calibrate satellites, feed forecasting models, and issue reliable early warnings.

A global public good, not a private asset

The internationally agreed basic weather and climate observations are a global public good – freely shared, universally beneficial and fundamental to lifesaving early-warning systems. Yet because no single country captures the full return on its investment, this essential system has been chronically under-financed.

Closing this gap is therefore not a question of charity, but of global stewardship, shared security and climate justice. Until every nation can meet its GBON obligations, early warnings will remain uneven and resilience incomplete.

The solution: Sustained data flow

The world has long recognised that reliable surface-based observations are essential for accurate forecasts and effective climate action. Yet a mechanism to provide sustained support was missing until 2022, when – at the request of 193 governments – the World Meteorological Organization (WMO), UNDP and UNEP established the Systematic Observations Financing Facility (SOFF).

A model that sustains results

SOFF is the United Nations fund solely dedicated to closing the weather and climate data gaps in the most resource-deprived regions. Its mandate focuses on the 76 Least Developed Countries (LDCs) and Small Island Developing States (SIDS), which have the lowest capacity to generate and share essential weather and climate observations.

Closing these gaps delivers the greatest benefits for local resilience and for the accuracy of the global forecasting system. SOFF provides grants, peer-to-peer technical support and results-based funding to help national meteorological services meet the requirements of the Global Basic Observing Network (GBON) and ensure a continuous flow of high-quality data into the global system.

SOFF's three-phase approach ensures that data flow is continuous, reliable and nationally owned:

- **Readiness Phase:** Countries identify observation gaps and prepare GBON contribution plans.
- **Investment Phase:** Grants fund the installation or rehabilitation of surface-based and upper-air stations, supported by training and institutional strengthening.
- **Compliance Phase:** Results-based funding secures ongoing operation, maintenance and sustained data sharing.

  Support is tied to verified outcomes – financing continues when data are generated and exchanged through the WMO Information System. This accountability keeps the model efficient and affordable.

SOFF's delivery model also relies on strong partnerships. More than 70 partners operate within a single framework:

- **Peer Advisors** – 20 active advanced national meteorological services – provide peer-to-peer technical support and share operational expertise.
- **Implementing Entities –** including UNDP, UNEP, the World Food Programme (WFP) and development banks – manage country grants and embed them in broader resilience programmes.
- **WMO** serves as the Technical Authority, verifying GBON compliance and monitoring global data flow.

The solution: Sustained data flow

SOFF is a cornerstone of the global drive for climate resilience. It forms the observation backbone of the United Nations Early Warnings for All (EW4All) initiative and works hand in hand with the Climate Risk and Early Warning Systems (CREWS) Initiative and major climate funds to turn global commitments into coordinated action on the ground.

From concept to results

Backed by 12 initial funding partners, SOFF has moved from design to delivery with exceptional speed. In just over three years, it has demonstrated proof of concept that its model works – at low cost and with measurable results.

By October 2025, more than 100 countries have requested SOFF support, and 66 have already been programmed. Of these, 61 are in the Readiness Phase and 18 are entering the Investment Phase, backed by USD 116 million in approved funding. This rapid progress confirms that SOFF channels resources efficiently and turn plans into operational data flow.

Data are already flowing from SOFF-supported stations in countries such as Rwanda and Mozambique, where new and rehabilitated GBON-compliant stations are transmitting observations through the WMO Information System.

In Rwanda, upgraded surface stations now feed continuous data that improve national forecasts and strengthen the Water at the Heart of Climate Action initiative. In Mozambique, previously silent stations are back online, powering earlier cyclone warnings and supporting regional preparedness across southern Africa.

Across other regions, SOFF is tailoring its approach to national and regional priorities. Some examples:

- **In Bhutan,** the country's first upper-air station is being established with SOFF support, providing data over complex Himalayan terrain where none existed before.
- **In Cabo Verde**, a "triple-sensor" approach integrates citizen data with automated stations and satellite readings, while advancing gender inclusion through training and engagement of women's groups.
- **In Tanzania**, investments in new upper-air and surface stations will improve forecasts for the Lake Victoria region and supporting safer navigation and early-warning systems for fishers.
- **In the Caribbean**, SOFF will explore supporting small island states to pool resources for procurement and maintenance of shared upper-air stations – a cooperative model that lowers costs and builds collective resilience across the region.
- **In the Amazon region,** SOFF is enabling countries such as Guyana, Ecuador and Suriname to strengthen observation networks that support regional fire-danger forecasting and rainfall monitoring, providing data essential to protect the world's largest tropical forest.

These examples show that SOFF's flexible model adapts to each national context while contributing to a single global goal: sustained, high-quality data flow that benefits all.

Each new GBON-compliant observation strengthens local resilience and improves the accuracy of global forecasts within hours.

What makes SOFF unique?

1. A peer-powered model

SOFF is the first global climate fund to apply a peer-to-peer support system, where technical assistance is provided by advanced national meteorological and hydrological services (Peer Advisors) guide and mentor their counterparts in developing countries. This model combines South–South and North–South cooperation, building trust, accelerating learning and ensuring that expertise remains within the global meteorological community.

2. Sustainability at its core

Unlike short-term projects, SOFF provides long-term, results-based support to ensure that weather and climate data continue to flow. Funding is tied to verified performance: countries receive continued financial assistance when observations are generated and shared internationally. This approach makes sustainability measurable and guarantees that every investment endures

3. A global public good with local value

Every observation financed by SOFF strengthens national services and the global forecasting system. By linking local action to global benefit, SOFF delivers one of the highest returns in climate investment – improved early warnings, reduced losses and enhanced resilience for all.

The impact: Global dividends of better data

As the European Center for Medium-Range Weather Forecasts SOFF Impact Experiments have shown, adding surface-based and upper-air observations in data-sparse regions reduces forecast uncertainty by more than 30 per cent in Africa and by up to 20 per cent in the Pacific.

By closing the weather and climate observation gap in the most resource-constrained countries, the volume of internationally shared data will increase up to ten times, feeding the models that drive global forecasting. This growing stream of reliable information will make the planet safer and better informed – enabling governments, businesses and communities everywhere to benefit from earlier warnings, more resilient economies and shared security.

Saving lives, preserving livelihoods

The dividends of better data begin with lives protected and livelihoods preserved. Reliable observations are the foundation of every life-saving weather alert. As more data flow through SOFF-supported networks, early warnings become faster, more precise and more inclusive.

Evidence from World Bank shows that just 24 hours of additional warning can reduce damage by up to 30 per cent, and that countries with strong early warning systems experience disaster mortality rates nearly six times lower than those without them.

Scaling heat-health early warning systems in 57 countries could save almost 100 000 lives each year, but these systems depend on reliable, local observations. SOFF-financed data feed directly into those networks, turning science into prevention.

Reliable data will enable a stronger anticipatory action—acting before a hazard hits. In 2024, the humanitarian community implemented 121 anticipatory activations in 45 countries, reaching 17 million people ahead – each of those actions began with a weather forecast.

When forecasts improve, everyday livelihood decisions improve too - from farmers in Africa to fishers on Lake Victoria. Better data will also indirectly impact forced migration. When forecasts are local and trusted, communities can adapt in place—protecting livelihoods instead of moving in crisis.

Economic dividends —catalyzing prosperity

Better data not only saves lives – they also strengthen economies. As sustained observations flow, governments, businesses and households make more informed decisions, optimize resources and protect investments.

A joint World Bank and WMO report shows that meeting the GBON standard delivers among the highest returns in climate investment. High-quality and timely forecasts made possible by robust observation systems could generate USD 160 billion in benefits every year. That represents a significant cost-benefit ratio—for every dollar invested, countries gain over USD 25 in economic and social value.

The impact: Global dividends of better data

The economic dividends appear across every sector that depends on the weather. Some examples include:

- **Agriculture and food systems**: Reliable forecasts allow farmers to plan ahead and invest confidently. In Senegal, advance forecasts of a drier-than-average season increased farm incomes by 13.8 per cent; in Peru, improved frost warnings created USD 100 million in benefits over ten years. The same data support food companies and agribusinesses in managing sourcing and supply chains, reducing losses and stabilising prices across markets.

- **Energy and water**: Observation-driven forecasting will help hydropower plants, grids and reservoirs operate more efficiently, protecting infrastructure and integrating renewable energy sources.

- **Transport and logistics**: Better forecasts will reduce delays and maintenance costs, keeping trade and supply chains moving. In the Caribbean for instance, SOFF's support for a shared upper-air observation network is improving aviation and maritime forecasts that keep regional trade and tourism moving.

- **Finance and insurance**: Consistent local observations make risk models more reliable. Better data will enable fairer premiums and more stable financial markets.

SOFF's results-based model ensures that these benefits endure. Funding continues when countries keep their systems running and share data internationally, creating a virtuous cycle of stronger institutions, sustained data flow and predictable returns.

Observations generated with SOFF support underpin climate-resilience investments— from renewable-energy planning to risk-informed agriculture and infrastructure development.

Why closing the weather and climate data gap matters for donors?

- **For government donors,** sustained data flow protects lives and infrastructure, reduces humanitarian response costs, and limits climate-related migration by helping communities adapt in place.

- **For business and corporate partners,** accurate forecasts strengthen planning, reduce operational risks in agriculture, insurance, energy and transport, and power technology firms that produce and use forecast data.

- **For philanthropies,** each contribution is a force multiplier that amplifies the impact of climate, development and humanitarian investments.

By closing the data gap, donors create shared global value — protecting people, markets and the planet.

The opportunity: Accelerating impact

SOFF proves that sustained data flow is achievable, affordable and transformative. The mechanism is operational, in high demand and delivering results. Now, momentum must turn into scale.

A decisive moment to scale up

Across the 76 Least Developed Countries (LDCs) and Small Island Developing States (SIDS) at the core of its mandate, 32 countries are close to enter the Investment Phase, but resources are missing. An additional USD 200 million is urgently needed by 2026 to launch these programmes and respond to country demand. A further USD 200 million will then be required to complete the Readiness and Investment Phases for the remaining countries — bringing the total investment need to USD 400 million.

Once these networks are in place in all countries, up to USD 50 million annually will be needed to sustain operations through the Compliance Phase, ensuring that data continue to flow reliably for decades to come.

This investment will be a major contribution to the global observing system that underpins every forecast, early warnings and climate-risk management, closing the major data gaps and ensuring that every nation contributes to – and benefits from – a safer, more predictable world.

Different ways to invest in resilience

1. **Direct grants:** fast, direct impact

Direct contributions to the SOFF UN Fund are the most immediate way to accelerate delivery. They finance the installation and modernisation of observing systems, training and peer-to-peer technical support, enabling SOFF to act quickly on the pipeline of countries awaiting Readiness or Investment Phase entry.

Benefits for partners
Visible results; contribution to global priorities such as Early Warnings for All and national adaptation plans; and clear traceability from investment to verified outcomes.

2. **Innovative finance:** leveraging capital for global good

The new Systematic Observation Impact Bond introduces a pioneering way to mobilise capital for a global public good. It combines investor capital with public and private donor commitments to frontload financing where it is most needed, linking repayment to verified results: new GBON-compliant data shared through WMO systems.

Benefits for partners
The Bond enables catalytic mobilization of private finance, transparent, results-based accountability, and engagement in the SOFF Innovative Finance Advisory Council—a platform bringing together donors, investors, and experts to advise on the Bond's design, guide SOFF's innovative finance work, and strengthen collaboration across the global climate finance architecture.

For both options it is possible to either provide a single contribution or offer predictable, multi-year or annual commitments. The latter gives SOFF the stability to maintain observing networks and keep data flowing once systems are operational. Sustained finance ensures that forecasting improvements and early-warning benefits endure.

Every dollar invested in SOFF generates value far beyond national borders. As verified data flow into the global system, forecasts improve everywhere—reducing losses, protecting lives and strengthening economies. SOFF's results-based framework, verified by WMO, guarantees transparency and accountability for every contribution.

What makes the Systematic Observation Impact Bond an innovative solution?

The Systematic Observation Impact Bond is a new climate finance mechanism designed to mobilize institutional and private capital for a global public good—the essential weather and climate data that underpin every forecast and early warning.

Its innovation lies in the combination of three key features:

- **Frontloading resources** – It combines investor capital with donor guarantees to enable countries to act quickly where data gaps are most critical and avoid cost of inaction.
- **Partnership** – It builds a broad public–private coalition of governments, development agencies, philanthropies and businesses to strengthen global resilience through improved weather and climate observations.
- **Verified results** – It links finance to new GBON-compliant data generated and internationally shared, independently verified by WMO.

In this mechanism, investor capital will be guaranteed through binding donor commitments. Both donors and investors would be invited to join a SOFF Innovative Finance Advisory Council to strengthen collaboration, promote coordination across the global climate finance system, and foster continuous dialogue.

SOFF
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