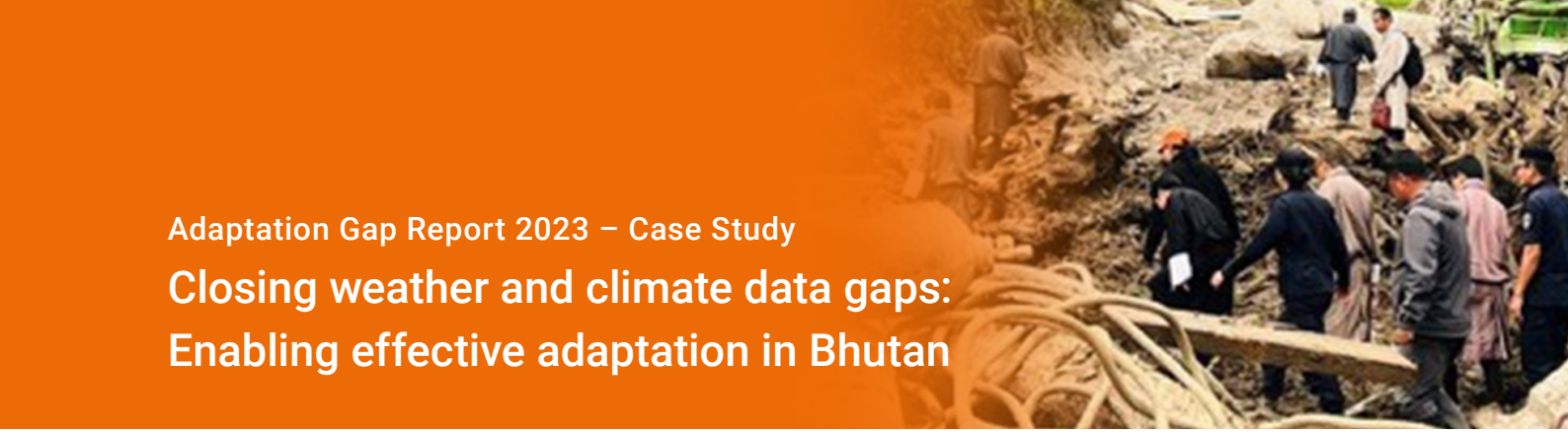

Adaptation Gap Report 2023 – Case Study

Closing weather and climate data gaps: Enabling effective adaptation in Bhutan

This case study is part of the publication "Adaptation Gap Report 2023: Underfinanced. Underprepared. Inadequate investment and planning on climate adaptation leaves world exposed" (ISBN No: 978-92-807-4092-9). Suggested citation: United Nations Environment Programme (2023). Closing weather and climate data gaps: Enabling effective adaptation in Bhutan. An online resource of *Adaptation Gap Report 2023: Underfinanced. Underprepared. Inadequate investment and planning on climate adaptation leaves world exposed.* Nairobi. https://doi.org/10.59117/20.500.11822/43796

Early warnings offer a cost-efficient and effective means of adaptation. However, warnings are only as good as the data they are built upon. Currently, gaps in basic weather and climate data undermine effective adaptation in many countries, due to a scarcity of technical and financial resources.

With the support of the United Nations, Bhutan is demonstrating how to bridge the gap between weather and climate data. This not only allows for more effective adaptation within the country's borders, but also enables Bhutan to participate in global efforts to provide weather data that are then used for early warning systems, saving lives and minimizing loss and damage resulting from the climate crisis.

In 2021, the World Meteorological Congress defined the Global Basic Observing Network (GBON), which sets out the basic weather and climate data that all countries must generate and exchange at the international level. For any location on Earth, weather and climate prediction beyond three to four days requires data from across the globe, making closing the GBON data gaps fundamental to effective adaptation.

Unfortunately, due to a scarcity of technical and financial resources, small island developing States and least developed countries generate and exchange less than 10 per cent of the mandated GBON data. The Systematic Observations Finance Facility (SOFF) is a new, specialized United Nations fund that has been co-founded by the World Meteorological Organization (WMO), United Nations Development Programme (UNDP) and United Nations Environment Programme (UNEP), supporting 62 developing countries to close the GBON data gaps by providing grants and technical peer-to-peer assistance.

The susceptibility of Bhutan to climate impacts is heightened by its mountainous terrain – the Tibetan Plateau – as well as significant economic dependency on climate-sensitive sectors and a small population. As a result, it is facing increasingly frequent weather- and climate-related hazards. With a warming rate higher than the global average, the region has been identified as one of the most vulnerable regions on Earth to changes in the environment and climate.

Recently, in July 2023, a flash flood in eastern Bhutan resulted in the tragic loss of 23 lives. While the recorded rainfall at the nearest meteorological stations did not appear alarming for the prevailing rainy season, it triggered a sequence of events that culminated in this devastating event. The Prime Minister of Bhutan described the event as "the biggest loss of lives and properties in recent memory and shook the core of the nation." Similarly, in 2022, another flash flood in the same region, again triggered by seemingly light rainfall, killed five people and destroyed the livelihoods of an entire village.

Due to a lack of sufficient data from local stations on the ground, Bhutan relies on global data sets for its daily weather forecast. However, these are unable to properly capture the weather events that often lead to such hazards in mountainous regions.

Closing the basic weather and climate data gap in Bhutan and other vulnerable countries will improve global weather models substantially, leading to better local forecasts and more effective early warnings – a key element of effective adaptation and of saving lives.

By working to develop a GBON National Gap Analysis, a GBON National Contribution Plan and Country Hydromet Diagnostics in the first of three SOFF phases, Bhutan is ensuring adequacy and effectiveness, two cornerstone concepts used in climate negotiations.

To improve weather and climate-prediction products, Bhutan is targeting easy fixes by rehabilitating and restoring existing stations, maximizing country knowledge and experience, and creating leverage through resources and programmes from UNEP, such as its partnership with the Regional Integrated Multi-Hazard Early Warning System for Africa and Asia.

While the occurrence of flash floods and landslides cannot be prevented, the amount of loss and damage can be reduced significantly with timely early warning services. To assist with this, SOFF is seeking to connect data from the ground to global weather and climate-service centres in a sustained manner.

Furthermore, local data enrich global data sets, amplifying their accuracy and depth. In turn, this boosts local weather prediction, helping decision makers to provide timely and accurate weather and climate information. Additionally, it makes economic sense, as every United States dollar invested in generating accurate GBON weather data creates socioeconomic returns of at least US$25 (Kull *et al.* 2021).

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Flash floods in Lhuntse, Bhutan, July 2023.

Photo: Government of Bhutan

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