Investment Phase:
Annual Narrative Report

Kingdom of Bhutan
Year 1

Systematic Observations
Financing Facility

Weather
and climate
data for
resilience

General Information

Country	Kingdom of Bhutan	
Implementing Entity	United Nations Environment Programme (UNEP)	
Agreement effectiveness date	20 May 2024	
Duration	59.5 months	
Anticipated end date	01 May 2029	
Reporting period	**From:** 20 May 2024	**To:** 31 March 2025
Approved amount	• Total: USD 4,624,024 • Implementing Entity (UNEP): USD 4,228,124 • World Meteorological Organization: USD 395,900	
Disbursed amount	• Total: USD 3,514,453 • Implementing Entity (UNEP): USD 3,382,499 • World Meteorological Organization: USD 131,953	
Signature of Implementing Entity	JZ Jochem Zoetelief, UNEP, 30.04.2025	

Summary

Highlights of key achievements

Following the effectiveness of the SOFF Investment Phase agreement in May 2024, the signing of the legal instrument between UNEP and the Ministry of Finance was finalized in September 2024. A project coordination meeting was held on 3 December 2024 with participation from the National Center for Hydrology and Meteorology (NCHM), the leading executing entity for the SOFF-funded Investment Phase in the Kingdom of Bhutan; UNEP, the Implementing Entity; and the Finnish Meteorological Institute (FMI), serving as the Peer Advisor.

Following the coordination meeting, and **as part of Output 1.1—which focuses on national consultations, including with civil society organizations and other relevant stakeholders**—the formal inception workshop and the first Project Steering Committee (PSC) meeting were held on 28 January 2025 in Thimphu. These were

attended by representatives from key national agencies, including the Department of Air Transport (DoAT), Bhutan Civil Aviation Authority (BCAA), Bhutan InfoComm and Media Authority (BICMA), GovTech, as well as UNEP and FMI. The PSC endorsed the Terms of Reference for both the Steering Committee and the Project Manager. This was followed by a national stakeholder consultation on 29 January 2025, engaging 30 representatives from government, academia, civil society, and the private sector to align on project objectives, national priorities, and expected benefits—particularly those related to GBON implementation, weather forecasting, and climate resilience. The average gender participation across the workshops was 43% women. Key planning outputs included the endorsement of the annual work plan and agreement on procurement and HR procedures, as well as the establishment of the Project Management Unit (PMU).

As a follow up of the inception workshop, a Procurement Workshop for the NCHM Project Manager, Component Managers, and Procurement Staff was conducted from 10–13 March 2025, led by an expert from UNEP. The workshop focused on enhancing procurement systems, improving compliance and risk mitigation, and ensuring alignment with both UNEP and government procedures. Through case studies and practical exercises, the training strengthened capacity and preparedness for managing upcoming procurement under the SOFF-funded Investment Phase in the Kingdom of Bhutan.

As part of Output 1.2, which focuses on the institutional capacity of the National Meteorological and Hydrological Services (NMHS) required to operate the GBON network, activities commenced with the establishment of the PMU under NCHM. A Project Manager was appointed to oversee implementation, including procurement coordination, capacity-building, and stakeholder engagement.

As part of Output 1.3, which focuses on building human capacity within the NMHS to operate the GBON network, a basic training on the SmartMet system is scheduled for completion before the end of March 2025. The SmartMet software is already in operational use for generating 72-hour forecasts, which are disseminated nationwide through the NCHM website. Two NCHM professionals are currently undergoing hands-on training at the Finnish Meteorological Institute (FMI), serving as the Peer Advisor, specifically for the SmartMet system. Upon their return, they are expected to conduct in-house training for other relevant staff at the Centre, supporting knowledge transfer and internal capacity building. An advanced training session, planned to be held in Finland, is also under preparation to further strengthen technical expertise.

In parallel, **under Outputs 2.2 and 2.3—which focus on the installation and upgrading of land-based and upper-air meteorological stations and related ICT and data management systems**—technical preparation activities advanced. The open tendering for SmartMet servers and related accessories is set to be launched in March 2025. The servers are expected to arrive and be installed by June 2025. A Terms of Reference was also developed for a consultancy assignment for the planning, design,

and estimation—including a Bill of Quantities (BoQ)—for the establishment of upper-air observation infrastructure at Tsirang. The tender is expected to be issued in March 2025 following clearance from the Ministry of Finance.

Throughout the reporting period, coordination among NCHM, UNEP, FMI, and the Ministry of Finance was maintained through regular meetings and technical exchanges.

Challenges and Lessons Learned

Procurement of specialized equipment, particularly from international suppliers, requires navigation through complex regulatory procedures and coordination among multiple government entities. International tendering, documentation requirements, and customs clearance processes can be time-intensive, particularly for technical systems such as SmartMet servers and AWS components. While these factors have not caused delays to date, they represent logistical and procedural challenges that require close management to maintain alignment with the project workplan.

While NCHM is actively advancing technological capacity, the maintenance and configuration of systems such as AWS and SmartMet require highly specialized skills that remain limited within the national workforce. This may increase reliance on external expertise in the short term and highlights the need for sustained internal capacity development to ensure long-term system sustainability.

Geographic access to remote infrastructure is another factor affecting implementation. Bhutan's mountainous terrain and the location of meteorological stations in hard-to-reach areas present logistical difficulties for both routine maintenance and emergency response. In some cases, reaching stations requires extended travel or air support, and adverse weather—particularly during monsoon periods—can further limit access.

To address these challenges, NCHM has initiated several mitigation measures. A procurement workshop held in March 2025, led by UNEP, supported the enhancement of procurement systems and risk management practices. Targeted training activities are being implemented to strengthen technical expertise in AWS maintenance and SmartMet system operations, with knowledge transfer built into the training approach. Plans are also underway to establish regional maintenance teams, which will improve response times and reduce logistical constraints by decentralizing support to remote station sites.

Next Steps

During the upcoming implementation period, the project will prioritize procurement, technical training, infrastructure development, and operational capacity enhancement in line with the approved workplan. The National Center for Hydrology and Meteorology (NCHM) will lead the procurement of key equipment, including SmartMet and CDMS servers, backup generators, and uninterruptible power supply (UPS) units.

These will support the upgrade of the Integrated Meteorological System (IMS) at three regional centers—Bumthang, Yongphula, and Gelephu—and improve data integration and automated forecasting capabilities. Installation of the dedicated SmartMet server is expected by June 2025.

To standardize operational capacity, NCHM will initiate the development of a competency framework, observer guidelines, and standard operating procedures (SOPs) to improve observation accuracy and forecasting consistency. Annual maintenance of AWS will be conducted with the support of regional teams to ensure continuity of data collection, and spares will be procured to support existing stations. One additional AWS is scheduled to be installed in Tsirang by June 2026.

Capacity development will continue through multiple technical trainings. A workshop on meteorological instrumentation and AWS calibration is scheduled for December 2025. Additional hands-on training on AWS configuration will be delivered in collaboration with MicroStep, Slovakia, during Q2 2025, focusing on data logger management and system integration. Engineers will also undergo AWS operation and hardware system training at MicroStep to support future sustainability. Training on WIS 2.0 will be delivered in coordination with FMI or Japan-based experts to enhance real-time data exchange in line with WMO standards. Hydro-meteorological maintenance training and a workshop on climate data management and system integration are also planned to strengthen institutional capacity.

The tendering process for the construction of the calibration laboratory at Yusipang is underway, with construction tentatively scheduled to begin in Q1 2026. Additionally, the Terms of Reference for the consultancy on the upper-air observation infrastructure in Tsirang have been finalized, with the tender planned for release by the end of March 2025, pending approval from the Ministry of Finance.

Progress of implementation

Output	Indicator	Target					Actual					Status	Milestones achieved	Challenges and risks
		Y1	Y2	Y3	Y4	Y5	Y1	Y2	Y3	Y4	Y5			
1. GBON institutional and human capacity developed														
1.1 **National consultations**, including with CSOs and other relevant stakeholders conducted	# of workshops held	1	1	1	1	2	2					On-track	The inception workshop and first Project Steering Committee (PSC) meeting took place on 28 January 2025 in Thimphu, where the PSC endorsed the Terms of Reference for both the Steering Committee and Project Manager. A national stakeholder consultation followed on 29 January, engaging 30 representatives from key sectors to align on project goals, GBON implementation, weather forecasting, and climate resilience priorities. As a follow up of the inception workshop, a Procurement Workshop for the NCHM Project Manager, Component Managers, and Procurement Staff was conducted from 10–13 March 2025, led by an expert from UNEP.	
	% female participation in the stakeholder workshops	50	50	50	50	50	42.3					On-track	PSC meeting: 46% were women. Stakeholder Meeting: 41% were women.	Since NCHM has a higher ratio of men compared to women, it has actively encouraged equal participation from both genders. As a result, an average of 42.3% female

Output	Indicator	Target					Actual					Status	Milestones achieved	Challenges and risks
		Y1	Y2	Y3	Y4	Y5	Y1	Y2	Y3	Y4	Y5			
													Procurement Workshop: 40% were women.	participation has been observed across meetings, workshops, and trainings.
	# of targeted gender workshops		1	1								Not yet started		
1.2 **NMHS institutional capacity** required to operate the GBON network developed	# of activities for strengthening institutional capacity		1	1			1					On-track	A Project Manager under NCHM was appointed to oversee implementation, including procurement coordination, capacity-building, and stakeholder engagement.	
1.3 **NMHS human capacity** required to operate the GBON network developed	# trainings	2	2	2	2	2	1					On-track	Two NCHM professionals are currently undergoing hands-on training on the SmartMet system at the Finnish Meteorological Institute (Peer Advisor). Upon their return, they will lead in-house training sessions for other relevant staff at the Centre, supporting knowledge transfer and capacity building.	
	# of recruited staff	4	4	4	4	4	1					On-track	A Project Manager under NCHM was appointed to oversee implementation, including procurement coordination, capacity-building, and stakeholder engagement.	
2.1 **New land-based stations** and related equipment, ICT systems, data management	# of new stations installed as per the GBON National Contribution Plan			1								Not yet started		

Output	Indicator	Target					Actual					Status	Milestones achieved	Challenges and risks
		Y1	Y2	Y3	Y4	Y5	Y1	Y2	Y3	Y4	Y5			
systems and standard operating practices in place														
2.2 **Improved land-based stations** and related equipment, ICT systems, data management systems and standard operating practices in place	# of stations improved as per the GBON National Contribution Plan		1									On-track	The open tendering process for SmartMet servers and related accessories is scheduled to launch in March 2025, with delivery and installation expected by June 2025.	Approval delays from GovTech and the Ministry of Finance impacted the initial timeline. Nevertheless, the installation of the SmartMet servers remains on schedule for completion by the end of June 2026.
2.3 **New upper air stations** and related equipment, ICT systems, data management systems and standard operating practices in place	# of new stations installed as per the GBON National Contribution Plan			1								On-track	The Terms of Reference (ToR) for the consultancy works have been finalized, with the open tender set to be launched by the end of March 2025.	
2.4 **Improved upper air stations** and related equipment, ICT systems, data management systems and standard operating practices in place	# of stations improved as per the GBON National Contribution Plan				1							Not yet started		
3.1 **GBON land-based stations' commissioning period completed**, country-specific standard cost for operations and maintenance established, and data sharing verified by WMO Technical Authority	# of stations commissioned as per the GBON National Contribution Plan					6						Not yet started		
3.2 **GBON upper air stations' commissioning period completed**, country-specific standard cost for operations	# of stations commissioned as per the GBON National Contribution Plan					1						Not yet started		

Output	Indicator	Target					Actual					Status	Milestones achieved	Challenges and risks
		Y1	Y2	Y3	Y4	Y5	Y1	Y2	Y3	Y4	Y5			
and maintenance established, and data sharing verified by WMO Technical Authority														

Gender

During the reporting period, NCHM ensured the integration of gender considerations across SOFF-supported activities. Women's participation was actively encouraged in all coordination, consultation, and training activities. Gender-disaggregated data show that women comprised 46% of participants at the Project Steering Committee meeting, 41% at the national stakeholder consultation, and 40% at the procurement workshop conducted in March 2025. These figures reflect continued progress toward gender-balanced participation in project governance and technical capacity-building.

UNEP and FMI led a session on gender as part of the stakeholder workshop.

Additionally, the project promotes women's involvement in meteorological and hydrological services through targeted capacity development. Gender-sensitive climate adaptation considerations are embedded in project planning.

Social and environmental safeguards

UNEP, as the Implementing Entity, applies its Environmental and Social Sustainability Framework (ESSF) to ensure that all project activities under the SOFF Investment Phase in Bhutan are aligned with international best practices and institutional safeguard standards. The framework supports the identification and management of environmental and social risks and promotes responsible and sustainable implementation.

During the reporting period, NCHM confirmed that environmental and social considerations are integrated into the planning and preparation of infrastructure activities. Site selection and installation approaches for meteorological infrastructure are designed to avoid disruption to local ecosystems and to ensure long-term environmental sustainability. Efforts are made to align technical planning with ecological conditions, particularly in remote or environmentally sensitive areas.

Community consultations were conducted to incorporate local environmental and social perspectives into project design. These engagements support inclusive decision-making and help ensure that planned activities are aligned with both community priorities and national environmental standards. UNEP continues to provide oversight to ensure safeguard measures are applied consistently across implementation activities and partner roles.

Civil society and private sector participation

Engagement with civil society, academic institutions, and private sector actors is being integrated into the implementation of the SOFF Investment Phase in Bhutan.

Collaboration with private sector suppliers has supported procurement planning for AWS, SmartMet systems, and ICT infrastructure, contributing to the adoption of current technologies and operational tools.

In parallel, academic partnerships with the College of Natural Resources and the College of Science and Technology have supported knowledge exchange and innovation in the fields of meteorology and hydrology.

Complementary financing and leverage

The SOFF Investment Phase in Bhutan is complemented by a number of ongoing national and international initiatives that support hydrometeorological development and climate resilience. The Green Climate Fund (GCF) is providing co-financing for improvements to hydrometeorological infrastructure, while the World Bank's Climate Resilience Program supports broader climate adaptation and risk reduction activities.

The Government of Bhutan contributes financial and logistical support to sustain AWS maintenance and enhance forecasting capabilities. In addition, the ECRUL Project is a partner in strengthening numerical weather prediction and advancing climate adaptation programming. These complementary efforts contribute to technical coherence and reinforce the sustainability of SOFF outcomes.

Implementation of grievance redress mechanism

No formal grievances have been reported regarding SOFF implementation in Bhutan during the reporting period.

The grievance redress mechanism follows UNEP's sustainability framework, which provides stakeholders with an avenue to raise concerns regarding project activities. This mechanism is structured under UNEP's Stakeholder Response Mechanism (SRM), managed by the Independent Office for Stakeholder Safeguard-related Response (IOSSR). Stakeholders adversely affected by the project can file complaints through the online project concern form, by email, or by mail to the IOSSR.

At the national level, the National Center for Hydrology and Meteorology (NCHM) has also established a grievance mechanism accessible via its official website and during stakeholder meetings. Informal concerns raised during implementation are addressed promptly and documented as part of NCHM's internal procedures.

Success stories

- The enhanced 72-hour weather forecasting capability through SmartMet has already delivered benefits across agriculture, aviation, and disaster preparedness.

- Female participation in forecasting services has increased, supporting gender equity in science and technology.
- NCHM's Website: www.nchm.gov.bt
- Media Features: Bhutan's advancements in meteorology have been featured in several national newspapers and online media platforms.

Attachments:

- 2025 Semi-Annual Progress Update
- Country Peer Advisor Report