



Investment Phase: Progress update

Bhutan

July 2026

Systematic Observations
Financing Facility

**Weather
and climate
data for
resilience**



General Information

Country	Bhutan	
Implementing Entity	UNEP	
Agreement effectiveness date	20 May 2024	
Duration	60	
Anticipated end date	20 May 2029	
Reporting period	From: 01 January 2026	To: 30 June 2026
Approved amount	Total: USD 4,624,024 UNEP: USD 4,228,124 WMO: USD 395,900	
Disbursed amount	Total: USD 3,514,452.67 UNEP: USD 3,382,499.2 WMO: USD 131,953.47	

Summary

Highlights of key achievements

The first half of 2026 marked a period of sustained progress for the SOFF Investment Phase in Bhutan, with implementation advancing across institutional strengthening, human capacity development, and the physical build-out of GBON-related infrastructure. The 2nd Project Steering Committee (PSC) meeting was convened during the reporting period, alongside 7 capacity-building and training activities delivered across technical and operational areas. On the infrastructure side, the Automatic Weather Station (AWS) upgrade at Damphu, Tsirang was completed, positioning the site to become Bhutan's first GBON-compliant station. Procurement of the Climate Data Management System (CDMS), Information Management System (IMS) servers, construction of the National Calibration Laboratory at Yusipang was finalized, and civil works commenced at the Upper-Air Observation Facility in Tsirang. Maintenance interventions were also carried out across more than 20 existing stations nationwide. Throughout the period, coordination among the United Nations Environment Programme (UNEP), the peer advisor Finnish Meteorological Institute (FMI), and the National Centre for Hydrology and Meteorology (NCHM) of Bhutan continued through regular technical and administrative exchanges, supporting coherence across all project components.

Under Output 1.1 – National consultations, including with civil society organizations and other relevant stakeholders, and Output 1.2 – NMHS institutional capacity development, the [2nd PSC meeting](#) was held on 27 January 2026 to review the previous year of implementation, formally endorse the workplan and procurement plan for this year, and approve corresponding budget adjustments to reflect operational needs. The meeting was co-chaired by UNEP with NCHM chairing the session and it brought together FMI and national stakeholders serving as PSC members, including the Bhutan InfoComm and Media Authority (BICMA), the Bhutan Civil Aviation Authority (BCAA), the Government Technology Agency, and the Department of Development Coordination and Debt Management Division, with a total participation of 18 members, comprising 14 men and 4 women. PSC members endorsed the 2027 workplan, procurement plan, and budget adjustments, and agreed to convene the 3rd PSC meeting in July 2026.

NCHM and FMI continued preparatory discussions for the planned gender workshop, with coordination support from UNEP. FMI will provide technical support for the workshop, currently scheduled for November 2026. Separately, UNEP also held a virtual procurement working session with NCHM on 4 May 2026 to advance procurement planning and introduce a new procurement management tool. Throughout the reporting period, NCHM Project Management Unit (PMU) continued to

provide day-to-day technical oversight across all components of the SOFF Investment Phase in Bhutan.

Under Output 1.3 – NMHS human capacity development, a series of capacity-building trainings and workshops progressed during the reporting period. NCHM held a national [WIS 2.0 workshop in Thimphu](#) from 2 to 3 March 2026, with the participation of 24 staff members, comprising 17 men and 7 women, introducing staff across divisions to the WMO Information System (WIS 2.0), a preparatory step ahead of the technical exchange in Japan. From 25 to 29 May 2026, NCHM engineers undertook the first phase of the [Japan technical exchange](#) in Tokyo, with the participation of 3 engineers, comprising 2 men and 1 woman, training with the Japan Meteorological Business Support Center (JMBSC) and the Japan Meteorological Agency (JMA) on the WIS 2.0 data standard, MQTT broker infrastructure, real-time international data exchange, and WMO Core Profile metadata requirements for GBON-compliant data submission. The exchange continued from 1 to 5 June 2026 with a second phase in Kyoto, where engineers trained at Oriental Electronics, Inc. on radiosonde sensor calibration against reference standards, upper-air data processing and TEMP message generation, safe balloon handling and launch procedures, and telemetry troubleshooting. This training directly supports preparations for the start of upper-air observations at Tsirang.

From 11 to 15 May 2026, NCHM hosted a five-day [SmartMet Portal Technical Workshop](#) in Thimphu, facilitated by FMI, with the participation of 4 participants, comprising 3 men and 1 woman. The workshop followed up on the SmartMet training delivered in Finland in March 2025 and a subsequent onsite visit to Bhutan in January 2026 and focused on strengthening NCHM's technical capacity for product generation and portal customization. During the workshop, NCHM staff applied Dali scripting to automate the generation of Scalable Vector Graphics (SVG) weather maps and configured Web Map Service (WMS) geospatial overlays, while technical teams deployed live, cron-based data pipelines to ensure the continuous flow of meteorological information. The SmartMet portal now integrates nine distinct data feeds, including the Global Forecast System (GFS), the European Centre for Medium-Range Weather Forecasts (ECMWF) model, local Weather Research and Forecasting (WRF) model outputs, Himawari satellite imagery, and real-time CDMS surface observations, to automatically produce seven-day public forecast visualizations. FMI experts also worked with the NCHM team to resolve outstanding technical issues, refine SmartMet system configurations, and enhance the generation of specialized weather products.

In addition, from 25 March to 3 April 2026, NCHM held a [10-day refresher workshop on operational hydrology and meteorology](#) in Tsirang, with the participation of 33 site technicians and observers, comprising 23 men and 10 women. Co-funded by the SOFF Investment Project in Bhutan and the Government of India Flood Warning Programme, the workshop built on the [field observer training](#) held in Phuentsholing in December

2025. The training strengthened participants' skills in hydromet data observation accuracy, systematic data management, and instrumentation handling, while also reinforcing real-time monitoring and early-warning capabilities for flood events, extreme weather, and climate variability. As part of the training, participants visited the Punatsangchhu Hydroelectric Project Authority and the Tsirang upper-air site to observe how hydromet data supports the planning and operation of hydropower projects.

From 27 April to 8 May 2026, NCHM conducted a 10-day intensive [workshop on CDMS and IMS4 software applications](#) in Thimphu, in collaboration with MicroStep-MIS (Slovakia). The workshop was attended by 46 staff members, including 24 men and 22 women. The first week covered aviation meteorology, forecasting tools, Numerical Weather Prediction (NWP)-based synoptic analysis, and IMS Weather Studio operations, while the second week focused on CDMS system architecture, cluster management, database administration, API security, data integration, and system maintenance, including backup and recovery procedures. The training strengthened NCHM's capacity to operate and maintain the upgraded central CDMS server hardware delivered in June 2026.

NCHM also conducted an [ICT system integration workshop](#) in Thimphu from 26 to 30 January 2026, in collaboration with FMI, to strengthen technical capacity for configuring, integrating, and managing meteorological infrastructure. The training engaged 4 technical staff, with participation from 3 men and 1 woman. The training covered SmartMet server architecture, system migration, and data integration, resulting in the migration of operational services to a new primary server, while a second server was configured as both a public API server and backup to improve system redundancy. The SmartMet environment was also migrated onto dedicated Rocky Linux servers, and teams integrated additional datasets, including medium-range weather forecasting products and WRF model outputs, alongside automated data ingestion pipelines for national and international sources.

Furthermore, NCHM conducted a [Quality Management System \(QMS\) internal audit workshop](#) from 11 to 15 May 2026, in collaboration with FMI, aimed at strengthening aviation meteorological services. Participation in the workshop comprised 36 staff members, with 25 men and 11 women in attendance. The workshop built internal audit capacity and supported the development of an internal audit plan for aviation meteorological services, with participants conducting practical exercises and mock audits covering various ISO 9001:2015 scopes. These exercises also helped assess the current QMS implementation capacity across aviation, forecasting, and observation services.

Under Output 2.2 – Improved land-based stations and related equipment, ICT systems, data management systems, and standard operating practices in place, key infrastructure milestones were achieved during the reporting period. NCHM

completed the [upgrade of its Class A station at Damphu](#), Tsirang, on 17 June 2026. The upgraded station now features an AWS and will become Bhutan's first GBON-compliant station, enabling Bhutan to contribute high-quality, real-time weather observations directly to the WMO Global Basic Observing Network. The upgrade built on the AWS equipment and spare parts procured in August 2025, which arrived in Bhutan on 22 February 2026 and were inventoried, inspected, and staged at NCHM's central storage facility in Thimphu to support the ongoing rollout of field installations.

In parallel, procurement of central server infrastructure was completed, with all hardware already delivered to Bhutan. 2 CDMS servers, procured on 27 February 2026, were delivered on 18 June 2026, with installation scheduled for 24 August 2026. 3 IMS servers, procured on 20 February 2026, were delivered on 12 June 2026, with installation across 3 designated locations scheduled between 15 and 30 November 2026. All servers are configured with redundancy to support continuous operation, and the SmartMet server infrastructure was expanded to process additional regional and international datasets.

Moreover, NCHM completed the procurement of the calibration laboratory and, on 15 April 2026, held the [groundbreaking ceremony for the new National Weather and Flood Warning Centre \(NFWFC\)](#) at Yusipang, Thimphu, which will house the SOFF-funded National Calibration Laboratory within its main headquarters building. The laboratory is essential for maintaining the metrological traceability and sensor accuracy required for GBON compliance. The NFWFC is a flagship initiative under Bhutan's 13th Five-Year Plan, financed primarily by the Government of India under its Project Assistance mechanism, with co-financing and administrative support from the Royal Government of Bhutan, reflecting a shared commitment to strengthening climate and disaster resilience and improving flood forecasting and early warning services. The 5-acre Yusipang campus will also house a 24-hour national command hub for weather and flood monitoring, ICT infrastructure for climate and flood modelling, and an education centre. As of June 2026, site earthworks had reached 25% completion and the structural framework 15% completion, keeping the laboratory on track for completion by 2029.

Under Output 2.3 – New upper-air stations and related equipment, ICT systems, data management systems, and standard operating practices in place, construction continued on the [Tsirang Upper-Air Sounding Facility](#), Bhutan's first upper-air observation station, designed to conduct systematic atmospheric profiling in support of national forecasting and GBON data contributions. Following a competitive procurement process, the construction contract was awarded on 27 February 2026, with site handover on 4 March 2026 and a groundbreaking ceremony held on 13 March 2026. As of June 2026, the site boundary wall had reached 70% completion and the administrative building 10% completion. On 10 April 2026, the project also approved the installation of an onsite hydrogen generator to support self-sufficient daily sounding operations, with safety zones verified through technical inspections in May

2026. Once operational, the station will launch weather balloons twice daily to collect temperature, humidity, pressure, and wind data up to an altitude of approximately 40 kilometres, contributing to improved weather forecasting, disaster warning, aviation safety, climate monitoring, and international data sharing. The facility remains on track for its first operational sounding flight in the 3rd quarter of 2027.

Under Output 3.1 – GBON land-based stations' commissioning period, NCHM carried out maintenance and compliance field visits across the national observation network to maintain, troubleshoot, and upgrade automatic weather stations and snow stations, supporting continuous and accurate data transmission from remote sites to the central IMS server. Field visits covered high-altitude stations in Paro Dzongkhag, including Soe, Lingzhi, and Cheykha, where snow sensors were re-calibrated and offline servers restored, as well as more than 20 stations across South-Eastern Bhutan, including Pemagatshel, Zhemgang, and Sarpang, serviced in early 2026. Additional maintenance was carried out at snow, Class C, and Agro stations in Gasa, Punakha, and Wangdue, along with network troubleshooting at Phobjikha, Khotokha, Bajo, Tsimalakha, Darla, and Rinchendhing. The Singyedzong station, non-operational since its installation in 2023, was fully restored through the replacement of its battery and data logger. Across these visits, NCHM carried out datalogger firmware upgrades, migrated SIM connections from postpaid to IoT-based services to improve data transmission, replaced aging data loggers, charge controllers, batteries, and deteriorated Class C Stevenson screens, and conducted sensor calibration and cleaning. Historical data from offline loggers was also manually retrieved to prevent gaps in the national climate record.

Challenges and Lessons Learned

Grid connection delays with the Bhutan Power Corporation in December 2025 stalled procurement for the Yusipang Calibration Laboratory, requiring bidding documents to be re-published in January 2026, with the construction contract subsequently signed in March 2026. This experience underscored the importance of early coordination with utility providers to ensure site readiness ahead of construction. Monsoon-season conditions also continue to pose a risk of timeline slippage at both the Yusipang and Tsirang construction sites, a risk NCHM is managing through adjusted works schedules and close monitoring of the construction critical path.

Female participation across project trainings and workshops averaged 36%, remaining below the project's 50% target. In response, NCHM's Project Management Unit adopted a set of gender action measures for 2026–27, including the application of a gender lens in participant selection, a mentorship programme, and the introduction of gender indicators into the Work Plan monitoring matrix.

NCHM also reported operational challenges in maintaining the national observation network, including rapid battery depletion at high-altitude sites with limited solar

recharging capacity, data loggers exceeding their operational lifespan, unreliable telecom connectivity in remote areas, and demanding terrain requiring multi-day treks to reach some stations. Two stations, Drugyel and Jomotshangkha, have been identified for relocation due to nearby construction interference and inconsistent site readings.

Next steps

Looking ahead to the second half of 2026, construction is expected to continue on both the Tsirang Upper-Air Sounding Facility and the Yusipang National Calibration Laboratory. At Tsirang, the remaining civil works are anticipated to be completed alongside procurement for the supply, installation, testing, training, and commissioning of the upper-air observation system, keeping the facility on track for its first operational sounding in the 3rd quarter of 2027. Complementary training programmes on upper-air observation sounding and upper-air operations and maintenance are also planned to support operational readiness. At Yusipang, structural works for the calibration laboratory are set to continue, together with the procurement of calibration equipment and the engagement of experts for installation, configuration, and related technical workshops.

On the AWS network, NCHM intends to implement outsourced maintenance arrangements, procure manual meteorological instruments and spare parts, and deliver training on the operation and maintenance of manual instruments. Nationwide weather station field installations are expected to begin in the 3rd quarter of 2026 and continue through mid-2027. The CDMS servers are scheduled for full installation and configuration on 24 August 2026, while the IMS servers are planned for deployment and integration across three designated locations between 15 and 30 November 2026. Corresponding training modules on ICT networking and security, Linux system administration, and data collection and delivery are anticipated to follow alongside this rollout.

3rd PSC is scheduled for 22 July 2026. Work is also expected to continue on developing a competency framework and guidelines for observers, along with training on quality management and data-sharing guidelines and policies. The gender workshop, with technical support from FMI, also planned for November 2026.

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	Number of workshops per year (1.1.1)	1	1	1	1	2	3	1				Achieved	Inception workshop and first PSC meeting completed on Jan 28, 2025; national stakeholder consultation on Jan 29, 2025; Procurement Workshop held Mar 10-13, 2025 2nd PSC meeting was held on 27 January 2026		
	Percentage of female engagement in workshops <i>(please also indicate the actual number in brackets)</i> (1.1.2)	50	50	50	50	50	47% (8) 36% (9) 27% (4)	22% (4)				On-track	Inception workshop and 1 st PSC meeting: 47% were women (8 female/ 9male). Stakeholder Workshop: 36% were women (9 female/16 male) Procurement Workshop: 27% were women (4 female/11 male) 2 nd PSC meeting: 22% were women (4 female/ 14 male) Across other capacity-building trainings and workshops conducted in the first half of 2026, average female participation was 36%.	Female participation in the 2nd PSC meeting was 22% (4 of 18 participants), reflecting the current gender composition of PSC members. Across capacity-building trainings and workshops conducted in the first half of 2026, average female participation was 36%. The project will continue to encourage increased participation of women in upcoming activities, including the planned gender workshop.	
	Number of targeted gender workshops (1.1.3)	0	1	1	0	0						On-track	NCHM and FMI, with coordination support from UNEP, continued preparations for the gender workshop, which		

Output	Indicator	Target					Actual					Status	Milestones achieved	Challenges and risks
		Y1	Y2	Y3	Y4	Y5	Y1	Y2	Y3	Y4	Y5			
													is scheduled for November 2026.	
1.2 NMHS institutional capacity required to operate the GBON network developed	Number of activities for strengthening institutional capacity (1.2.1)	0	1	1	0	0	1					On-track	Throughout the reporting period, the NCHM Project Management Unit, including the Project Manager recruited in February 2025, continued to oversee project implementation. NCHM, FMI and UNEP continued preparations for the gender workshop scheduled for November 2026. On 4 May 2026, UNEP held a virtual procurement working session with NCHM to support procurement planning.	Note: The Project Manager's recruitment, previously reported under Year 2, has been moved to Year 1 (20 May 2024–19 May 2025), as the Project Manager was recruited in February 2025.
1.3 NMHS human capacity required to operate the GBON network developed	Number of trainings (1.3.1)	2	2	2	2	2	1	10	1			Achieved	two-day consultation workshop from 13 to 14 May 2025 intensive eight-day in house training on AWS configuration from 27 May to 4 June 2025 Hands-on training at FMI focusing on the use of the SmartMet system on 23 June 2025 AWS operations and maintenance factory training from 8 to 19 September 2025. Meteorological Observation and	

Output	Indicator	Target					Actual					Status	Milestones achieved	Challenges and risks
		Y1	Y2	Y3	Y4	Y5	Y1	Y2	Y3	Y4	Y5			
													Instrumentation Refresher Workshop from 22 to 27 December 2025 WIS 2.0 workshop in Thimphu from 2 to 3 March 2026 Japan technical exchange in Tokyo from 25 to 29 May 2026 SmartMet Portal Technical Workshop in Thimphu from 11 to 15 May 2026 10-day refresher workshop on operational hydrology and meteorology in Tsirang from 25 March to 3 April 2026 workshop on CDMS and IMS4 software applications in Thimphu from 27 April to 8 May 2026 ICT system integration workshop in Thimphu from 26 to 30 January 2026 Quality Management System (QMS) internal audit workshop from 11 to 15 May 2026	
	Number of recruited staff (1.3.2)	4	4	4	4	4	1	2				Achieved	A project manager was recruited in February 2025	NCHM requested a budget reallocation from the staff recruitment budget to the upper-air infrastructure budget to address the

Output	Indicator	Target					Actual					Status	Milestones achieved	Challenges and risks
		Y1	Y2	Y3	Y4	Y5	Y1	Y2	Y3	Y4	Y5			
													A Junior Engineer was appointed on 1 July 2025 An ICT Associate was also recruited on 9 December 2025	funding gap for upper-air activities. The request was endorsed by the Project Steering Committee, with the Royal Government of Bhutan agreeing to fund the recruitment of all technical staff from its own budget. UNEP approved the budget reallocation.
2. GBON infrastructure in place														
2.1 New land-based 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	0	0	0	0	0						Select an item		
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 (2.2.1)	0	1	0	0	0			1			Achieved	NCHM completed the upgrade of its Class A station at Damphu, Tsirang , on 17 June 2026. The upgraded station now features an AWS and will become Bhutan's first GBON-compliant station, enabling Bhutan to contribute high-quality, real-time weather observations directly to the WMO Global Basic Observing Network. The peer advisor FMI is supporting transmission of data to the global broker to be continued this year. procurement of central server infrastructure was completed, with all	

Output	Indicator	Target					Actual					Status	Milestones achieved	Challenges and risks
		Y1	Y2	Y3	Y4	Y5	Y1	Y2	Y3	Y4	Y5			
													hardware already delivered to Bhutan. 2 CDMS servers, procured on 27 February 2026, were delivered on 18 June 2026, with installation scheduled for 24 August 2026. 3 IMS servers, procured on 20 February 2026, were delivered on 12 June 2026, with installation across 3 designated locations scheduled between 15 and 30 November 2026 NCHM completed the procurement of the calibration laboratory and, on 15 April 2026, held the groundbreaking ceremony for the new National Weather and Flood Warning Centre (NWFWC) at Yusipang, Thimphu	
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 (2.3.1)	0	0	1	0	0						On-track	Construction of the Tsirang Upper-Air Sounding Facility commenced in March 2026, reaching 70% completion of the boundary wall and 10% of the administrative building by June 2026.	
2.4 Improved upper air stations and related equipment, ICT systems, data management systems and	# of stations improved as per the GBON National Contribution Plan	0	0	0	0	0						Select an item		

Output	Indicator	Target					Actual					Status	Milestones achieved	Challenges and risks
		Y1	Y2	Y3	Y4	Y5	Y1	Y2	Y3	Y4	Y5			
standard operating practices in place														
3. Sustained compliance with GBON														
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 (3.1.1)	0	0	0	0	6						On-track	NCHM conducted maintenance and compliance visits to more than 20 observation stations across the national network, including high-altitude and snow stations, restoring the non-operational Singyedzong station and improving data transmission from remote sites to the central IMS server.	
3.2 GBON upper air 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 (3.2.1)	0	0	0	0	1						Not yet started		

Attachment: [Bhutan SOFF Investment Phase Annual Narrative Report 2025](#)