



REPORT ON THE SCIENCE SEMINAR

Joint Celebration of World Day for Glaciers and World Meteorological Day

21st March 2025



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**National Centre for Hydrology and Meteorology
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1. Background

The National Center for Hydrology and Meteorology (NCHM), Ministry of Energy and Natural Resources organized a ***“Science Seminar for Joint Celebration of World Day for Glaciers and World Meteorological Day”*** on 21st March 2025. The United Nations General Assembly (UNGA) adopted a resolution in December 2022 to declare 2025 as the International Year of Glacier Preservation (IYGP) and proclaim the 21st March of each year as the World Day for Glaciers starting in 2025. This landmark resolution was adopted considering the critical role played by ice and snow in the climate system and hydrological cycle. It is also to raise awareness of the impending changes of the cryosphere and its impact on society. Bhutan proudly marks the first-ever World Day for Glaciers, recognizing the important role of glaciers in sustaining our rivers, ecosystems, and communities. As the glaciers in Bhutan Himalaya are experiencing accelerated retreat resulting in the formation of huge moraine dam glacial lakes and rapid disappearance of glaciers, it has a huge impact on the lives and properties of the vulnerable communities and national infrastructures downstream. The National Center for Hydrology and Meteorology (NCHM) remains committed to conducting scientific research on the cryosphere, monitoring glaciers and Potentially Dangerous Glacial Lakes (PDGL), and strengthening early warning systems in the country. While observing this day as the World Day for Glaciers in Bhutan, NCHM hopes to inspire everyone to take collective action to protect our glaciers for future generations.

In addition, World Meteorological Organization (WMO) Day is celebrated annually on 23rd March, commemorating the establishment of the WMO in 1950. Since the WMO day falls on weekends this year, the Center marked the 75th WMO Day on 21st March, coinciding with the World Glacier Day. WMO day highlights the critical role of meteorological and hydrological services in sustaining life, livelihoods, and ecosystems. Through advancing weather, climate, and water-related knowledge, the WMO supports global efforts to mitigate the impacts of natural hazards, protect communities, and ensure sustainable socio-economic development.

2. Participants

The event held under the themes of **“Glacier Preservation”** and **“Closing the early warning gap together”** brought together over 200 participants, including expertise, members of parliament, policymakers, environmentalists, teachers, students, and media to discuss the critical issues of glacial preservation, climate change, and sustainable development. More than 100 students from the College of

Natural Resources (CNR), College of Science of Technology (CST), Royal Thimphu College, Jigme Singye Wangchuck School of Law, Mothithang and Yangchenphug Higher Secondary School attend the seminar. The 75 females and 125 males participated in the one-day science seminar program.



Figure 1: Seminar participants

3. Objectives

A day-long “Science Seminar” with the objectives to:

- a) create awareness of the importance of glacier preservation in the light of changing climate,
- b) Role of WMO and National Meteorological and Hydrological Services (NMHS) and its contributions for the safety and well-being of the society and
- c) Share scientific information and research work with participants and stakeholders.

4. Brief Highlights of the Opening Session

His Excellency Lyonpo Gem Tshering, Ministry of Energy and Natural Resources, Royal Government of Bhutan graced the seminar's opening session.

- i) **Welcome Address by Mr. Karma Dupchu, Director, NCHM:** The Director of the National Centre for Hydrology and Meteorology (NCHM) warmly welcomed the Chief Guest, His Excellency, Minister of Energy and Natural Resources, along with

Dasho Paljor J. Dorji, Special Advisor to the National Environment Commission and Chairperson of the Environment and Climate Change Committee, National Assembly. He also extended greetings to Mr. Mohammad Yunus, Resident Representative of UNDP, as well as representatives from JICA, ADB, the Embassy of India, government officials, CSOs, NGOs, and students attending the event. The director highlighted the critical role of glaciers in Bhutan's water security and the importance of hydrometeorological services in disaster risk reduction. NCHM provided updates on advancements in glacier monitoring, early warning systems, and the 10-Year Hydromet Roadmap (2024-2034) to enhance climate resilience. However, challenges such as rapid glacial retreat, increasing climate-related disasters, and the need for stronger scientific capacity and international collaboration were emphasized as key areas.



Figure 2: Opening remarks by Director, NCHM and Resident Representative, UNDP Bhutan

- ii) **Opening Remarks by Mr. Mohammad Yunus, Resident Representative (RR) of UNDP:** He expressed UNDP's continuous commitment to supporting NCHM's early warning services project. He reiterated UNDP's dedication to addressing climate change and its impacts, particularly in the context of glacier monitoring and Glacial Lake Outburst Flood (GLOF) early warning systems. Reaffirming UNDP's commitment to supporting Bhutan's climate resilience efforts, he stressed the importance of collaboration between government agencies, international partners, and local communities in ensuring sustainable water resource management and disaster risk reduction.

- iii) **World Meteorology Day Video Message by Professor Celeste Saulo, Secretary General, WMO:** A video message from Professor Celeste Saulo, Secretary General of the World Meteorological Organization (WMO), was screened. Professor emphasizes the Theme – "*Closing the Early Warnings Gap Together*": highlighting the critical need to ensure that early warning systems reach all communities, aiming to enhance resilience against natural hazards and mitigate the impacts of climate-related disasters. She also introduced the International Year of Glaciers' Preservation 2025 initiative to raise awareness about the rapid melting of glaciers due to climate change, emphasizing their significance in climate regulation and freshwater supply, and the urgency of preservation efforts.
- iv) **The Voice from Youth on Glaciers and Climate Change:** Ms. Pema Yangchen Tshering, a student of Lungtenzampa Middle Secondary School narrated a story on the awareness of GLOF and the role of youth in addressing climate change. As a young advocate for climate action and environmental sustainability, she represents the voice of Bhutan's youth in the fight against glacier retreat, climate change, and its impacts on our future. The seminar observed the importance of youth participation in raising awareness of climate change and the role of youth in combating the climate change crisis in the future.



Figure 3: Voice from youth about the importance of Glacier & Climate Change

- v) **Keynote Address by Hon'ble Chief Guest, HE Lyonpo Gem Tshering, Minister, Ministry of Energy and Natural Resources (MoENR), Royal Government of Bhutan:** His Excellency emphasized Bhutan's vulnerability to climate change and the urgent need for scientific research, policy action, and early warning systems. The speaker highlighted Bhutan's 10-Year Hydromet Roadmap (2024-2034) and the Nu. 1.704 billion allocations in the 13th FYP to strengthen climate resilience. The WMO Day theme, **"Closing the Early Warning Gaps Together,"** underscored the need for enhanced disaster preparedness. Students were encouraged to pursue careers in climate sciences, ensuring future innovation and resilience. The Ministry reaffirmed its commitment to safeguarding Bhutan's water resources and called for continued international support in the sustainable and resilient development of Bhutan. His Excellency wished for a successful science seminar.



Figure 4: Keynote address by Chief Guest & Launching of Publications

- vi) **Launching of Publications:** The Centre launched two important publications during the opening session of the science seminar:
- a) **State of Climate Report of Bhutan (2024)** - This report provides a comprehensive assessment of Bhutan's changing climate, highlighting key trends, challenges, and impacts on the environment, society, and economy.
 - b) **Bhutan Hydro-Met Journal Vol. III (NCHM, 2025)** - Initiated by NCHM to foster scientific research in hydrology, meteorology, cryosphere studies, and

climate change. This journal presents cutting-edge research and data-driven insights to support informed decisions and sustainable developmental plans.

vii) **Award of Appreciation Certificates:** Certificates of appreciation were awarded to two special persons supporting the field team in the high-altitude field activities.

- a) **Mr. Dorji** and his team of horses have been essential to NCHM's high-altitude field logistics, ensuring smooth operations in challenging conditions. His expertise, dedication, and willingness to go above and beyond have greatly contributed to our mission's success.
- b) **Mr. Chenchö Tshering** has been vital to glacier surveys, supporting scientists on high-altitude expeditions with logistics, data collection, and team well-being. His dedication and resilience in harsh conditions are invaluable to NCHM

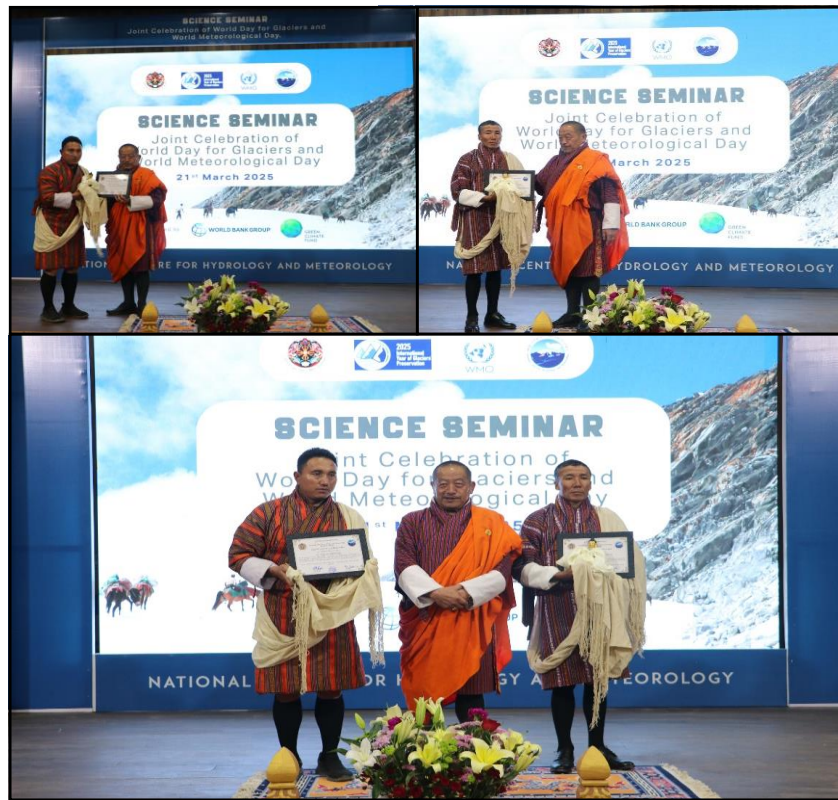


Figure 5: Recognition of special persons & award appreciation certificates

viii) **Vote of Thanks:** The opening session was officially closed with a vote of thanks by Dr. Singay Dorji, Chief Meteorological Services Division, NCHM expressing gratitude to all speakers and the participants for gracing the opening session of the science seminar.

5. Technical Sessions

- i) **Session I: Theme- Climate Change and Early Warning.** (Moderator: Dr. Singay Dorji, Chief of the Meteorological Services Division, NCHM)
- a) **State of the Climate 2024 and Climate Projection of Bhutan:** Mr. Ugyen Chophel Sr. Dy. Chief Stats. Officer, NCHM presented the *State of the Climate Report for 2024*, highlighting key climate and temperature trends observed in Bhutan. He presented climate projections for Bhutan, emphasizing impacts of climate change on temperature, precipitation, and extreme weather events.
- b) **Building Bhutan Climate Profile: Current Research and Future Data Needs:** Dr. Om Katel, Lecturer, College of Natural Resources, RUB presented the ongoing research efforts to build a comprehensive climate profile for Bhutan. He highlighted gaps in current data and limited research on the Himalayan region. He emphasized climate change has a lasting impact on economic and environmental aspects and that more research and data are required
- c) **Existing GLOF and Flood Early Warning System for Disaster Preparedness and Challenges in Bhutan:** Ms. Yeshi Choki, Senior Hydromet Officer, NCHM provided an overview of the existing Glacial Lake Outburst Flood (GLOF) and flood early warning systems in Bhutan. She outlined the operational mechanisms of these systems and their role in disaster preparedness. He also discussed the challenges faced, including technical limitations, resource constraints, and the need for community engagement to enhance the effectiveness of EWS.



Figure 6: Five speakers delivered their technical presentations

ii) **Session II: Theme- Snow and Glaciers.** (Moderator: Ms. Sonam Lhamo, Principal Met/Hyd. Officer, NCHM)

a) **Snow and Glacier Status in Bhutan, Highlighting Climate Change Impacts**

on Himalayan Glaciers and Water Resources: Mr. Phuntsho Tshering, Principal Met/Hyd Officer, NCHM presented the current status of snow and glaciers in Bhutan, emphasizing the impacts of climate change on the Himalayan cryosphere. He discussed the observed retreat of glaciers, changes in snow cover, and the implications for water resources, particularly for river systems and hydropower generation. The presentation called for sustained monitoring and research to better understand and mitigate these impacts.

b) **Permafrost in Bhutan and Its Impacts (Presenter:** Dr. Sonam Wangchuk, Cryosphere Specialist, ICIMOD) provided insights into the state of permafrost in Bhutan and its significance in the context of climate change. He explained the role of permafrost in stabilizing mountain slopes and its potential impacts on infrastructure and ecosystems as it thaws due to rising temperatures. Dr. Wangchuk highlighted the need for further research on permafrost dynamics and its integration into climate adaptation and disaster risk reduction strategies.

iii) **Session III: Panel Discussion Theme– “Vanishing Ice: Are We Doing Enough to Save Our Glaciers?”** (Moderator: Ms. Yangyel Lhaden, Reporter, Kuensel.)

This session brought together experts from various backgrounds and discussed the urgent need for intervention in glacier conservation and climate change issues. The panelists are:

1. *Mr. Karma Dupchu, Director of the National Center for Hydrology and Meteorology;*
2. *Mr. Khurshid Alam, Deputy Resident Representative of UNDP Bhutan;*
3. *Mr. Singye Dorji, Chief Finance Officer of the Bhutan Trust Fund for Environmental Conservation (BTF); and*
4. *Mr. Ugyen Penjore, Managing Director of Kuensel Corporation.*

The session began with a question about the inception of early warning projects in Bhutan. **Mr. Karma Dupchu, director, NCHM** appraised the session that these initiatives were launched in response to the growing threats of Glacial Lake Outburst Floods (GLOFs) and other climate-induced disasters. He highlighted the collaborative efforts between NCHM, UNDP, and other

partners in establishing robust early warning systems to safeguard communities and infrastructure.

Mr. Khurshid Alam elaborated on UNDP's role in enhancing early warning systems. He explained how UNDP has helped in establishing 96 ongoing early warning systems (EWS) in 40 different countries. He also emphasized UNDP's commitment to providing technical and financial support, particularly through projects aimed at strengthening disaster preparedness and climate resilience. He also underscored the importance of partnerships with local agencies and communities to ensure the sustainability of these systems.

Mr. Singye Dorji, Chief Finance Officer, BTFEC discussed the contributions of the Bhutan Trust Fund (BTFEC) for Environmental Conservation in supporting early warning initiatives, where BTF focuses on protected areas in adapting and mitigating climate change. He highlighted BTF's focus on developing innovative projects that address climate change impacts, including glacier monitoring and community-based adaptation programs.

Mr. Ugyen Penjore shared insights into Kuensel Corporation's approach to raising climate awareness through media. He stressed treating this matter as a serious and global issue. He explained how Kuensel has been actively reporting climate change issues, including glacier retreat and their impacts, to educate the public and policymakers. He emphasized the role of media in bridging the gap between scientific research and public understanding and advocating for urgent climate action.



Figure 7: Panel discussion on Vanishing Ice

6. Exhibition displays

i) Posters

Various posters were displayed at the entrance of the seminar venue, providing participants with insightful information on key messages. In addition, tower branding with critical message content for “**World Day for Glaciers**” conveys a powerful visual tool to raise awareness. The display emphasized the crucial role that snow and glaciers play in sustaining ecosystems, supporting livelihoods, and ensuring water security for communities. It also highlighted the alarming impact of global warming, which accelerates glacier retreat, posing severe threats to freshwater availability, biodiversity, and climate stability. By showcasing these messages, the branding aimed to foster a deeper understanding of the urgent need for climate action to protect glaciers and mitigate the long-term consequences of their loss.

Another tower branding prominently displayed key messages related to the observance of “**World Meteorology Day**” in connection to the theme “*Closing the Early Warning Gap Together*”. The display highlighted the critical role of weather and climate monitoring, showcasing how data is observed, collected, and analyzed using innovative platforms and advanced technologies. Additionally, the posters provided critical insights into the development and operation of robust end-to-end Glacial Lake Outburst Flood (GLOF) and rainstorm-induced flood early warning systems. These messages emphasized the importance of timely and accurate forecasting in enhancing disaster preparedness and response, ultimately helping to safeguard downstream communities during emergencies. By raising awareness about these crucial aspects, the branding aimed to foster greater collaboration and commitment toward strengthening early warning systems and building climate resilience.



Figure 8: Display of tower branding posters

ii) Scientific Equipment

The Center also displayed different types of instruments



Figure 9: Display of weather, climate & water level monitoring equipment and instrument

The center also displayed weather, and hydrological monitoring equipment/instruments during the Science Seminar to provide a critical platform for technical knowledge sharing and stakeholder engagement. The technical staff demonstrated real-time monitoring instruments that enable policymakers, researchers, and disaster management agencies to assess their role in data-driven decision-making. Accurate meteorological and hydrological data support early warning systems, disaster preparedness, and water resource management. Showcasing instruments, sensors, and analytical tools highlight the commitment to enhancing forecasting precision, improving climate information, and strengthening national hydrometeorological services provision.

For students and technical professionals, hands-on exposure to monitoring instruments fosters a deeper understanding of data acquisition, processing, and application in climate science. Demonstrating high-precision sensors, telemetry systems, and data visualization tools enhances awareness of modern hydrometeorological monitoring techniques. The exhibition reinforces the role of scientific instrumentation in operational forecasting, extreme event monitoring, and risk assessment. This exhibition attracts significant participant interest during the seminar and provides opportunities for direct interaction with the technical staff of the center.

iii) Photobooth

Another highlight of the seminar was the photo booth, set up at the venue to capture group and individual photos, allowing participants to preserve memorable moments from the event. Beyond serving as a keepsake, the booth also functioned as an interactive platform to raise awareness about glaciers and climate change. The backdrop and themes were designed to emphasize the importance of glacial ecosystems, climate resilience, and the need for sustainable environmental actions. Through this engaging experience, the booth helped reinforce key messages on climate change while fostering greater participant engagement.



Figure 10: Participants take memories at the photo booth station

7. Conclusion

i) *Closing Remarks*

Mr. Karma, a Specialist from the Cryosphere Services Division (CSD), delivered the closing remarks, extending heartfelt gratitude to all speakers, participants, and organizers for their valuable contributions to the successful session completion. He acknowledged the insightful discussions, knowledge-sharing, and collaborative efforts that enriched the event, emphasizing the importance of such engagements in advancing climate awareness and resilience-building initiatives. He also commended the dedication of the organizing team in ensuring a well-structured and impactful session. In his concluding words, Mr. Karma encouraged continued dialogue, collaboration, and proactive actions to address climate challenges, reinforcing the collective responsibility to foster sustainable solutions for a more resilient future. Each interactive sessions were closed remarks by the session moderators.



Figure 11: Session moderators delivered the remarks at the end of each session



Figure 12: Seminar coordinators, NCHM at the end of a session

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