Bhutan's Melting Glaciers and Water Management

By Nick Sheffield, Ratana Ly, and Victor V. Ramraj

The Takeaway

Between February 22 and 24, 2025, Jigme Singye Wangchuck School of Law (JSW) in Paro, Bhutan, hosted the Paro Forum, an international climate conference aimed at bringing together scientists, academics, activists, industry representatives and policy makers to discuss and address pressing environmental issues, particularly in the Hindu Kush Himalaya (HKH) region. Famous for its status as a carbon-negative state and its unique use of Gross National Happiness (GNH) rather than Gross National Product as a development indicator, Bhutan now faces some of the most acute impacts of climate change, including extreme weather events, rapid de-glaciation, water shortages, and changes to the vital monsoon cycle. Recognizing that much of Bhutan's economy is dependent on hydroelectric power generation and agriculture, the Paro Forum sought to unite experts and stakeholders from Bhutan and around the world to share their insights on responding to these pressing issues. The University of Victoria's Centre for Asia-Pacific Initiatives (CAPI) then organized a follow-up workshop in Victoria on June 16, 2025, to explore opportunities for Canada-Bhutan co-operation.

In Brief

- The Paro Forum is a biennial conference hosted by JSW aimed at uniting both global and local expertise to address legal, political, and social issues related to climate change. The inaugural forum was held in 2023.
- The theme of this year's Paro Forum was water management and climate change, with a particular focus on climate resistance in water management policy. The forum consisted of nine expert panel discussions followed by a plenary session aimed at providing guidance on water management policy to the Bhutanese government.
- The forum took place in the context of increasing pressure on Bhutan to rapidly develop water resources, particularly in support of the hydroelectric and agricultural sectors, to counteract the economic impact of an exodus of working-age Bhutanese citizens seeking employment abroad. Bhutan has historically adopted a cautious approach to resource development, with legal protections and cultural norms favouring environmental protection over economic exploitation.
- Issues surrounding water management in the HKH region are highly contentious, as the glaciers of this mountainous region supply the major rivers of the Indian subcontinent and South Asia, providing water to over 1.4 billion people. As such, actions related to water management taken by Bhutan or other states in the HKH region carry an inherent risk of transboundary consequences for more populous downstream states such as India and Bangladesh, which are already facing regular water shortages.

- India is Bhutan's largest trading partner and has provided both financing and technical assistance to develop Bhutan's hydroelectric sector. Together, hydroelectric power and agriculture account for the majority of Bhutan's exports to India, providing a vital source of foreign currency that is ultimately dependent on Bhutan's water supply.
- The Forum took place against the backdrop of the King's announcement in 2024 that Bhutan would be launching the Gelephu Mindfulness City, a special administrative region along Bhutan's southern border with India, intended to serve as a vibrant and sustainable economic hub.
- Faced with shared challenges of glacial melt and water governance in an era of rapid climate change, Canada and Bhutan are uniquely placed to work together on these issues.

Implications

Facing both immediate environmental and economic pressures, Bhutan is attempting to avoid the errors made by other states in developing and exploiting its water resources. Over the course of the Forum, speakers from India, Canada, Australia, and the United States , as well as Bhutanese civil society organizations, cautioned against treating Bhutan's abundant water resources as a windfall, particularly in light of the increasingly harsh effects of climate change on the region.

Glacial meltwater forms the source of rivers which flow from the HKH region, supporting both hydroelectric power generation and agriculture as they wind through multiple states on their way to the Indian Ocean. With climate change accelerating de-glaciation and transforming the annual monsoon cycle, which deposits snow across the glaciers of the HKH, it is increasingly vital to anticipate and fully understand the long-term changes and incorporate climate-resilient measures into water management policies. However, a current lack of scientific data regarding both historical and contemporary water supplies presents a challenge to policymakers, industry actors, and environmentalists alike.

Experts at the Forum raised similar cautions regarding the development of groundwater, particularly for use in Bhutan's agricultural sector. While Bhutan has historically relied on surface water (e.g., water from lakes, rivers and other watercourses) to meet its domestic and agricultural needs, issues of access due to topography, coupled with the increasingly erratic monsoon cycle, have led to water shortages in recent years, with an increasing number of wells being drilled to access subterranean aquifers. While groundwater is currently thought to be plentiful, hard data on Bhutan's aquifers is virtually non-existent, while over-exploitation and mismanagement of groundwater in India's neighbouring Assam state have rapidly depleted local aquifers and exacerbated water shortages, serving as a stark warning against unchecked development.

As with Bhutan's surface water, the exploitation of groundwater, particularly along the southern border with India, may present significant transboundary challenges to Bhutan's policymakers, who must balance domestic needs with the demands of its vastly larger neighbour to the south.

What's Next

Informing decision-makers

The Paro Forum concluded with a plenary session aimed at informing Bhutanese policymakers and donor organizations on potential priorities for water management efforts. Speakers highlighted the need for a centralized database for existing information pertaining to ground and surface water, as well as enhanced capacity for research, data collection, monitoring, and modelling to inform government policy. The discussion also highlighted the need to consolidate authority over domestic water resources under a single authority and to harmonize both development policies and regulations related to groundwater and surface water.

While Bhutan's lack of infrastructure and human capital present persistent challenges to implementing effective water management policies, delegates at the forum stressed the potential benefits of collaborating with local communities and incorporating traditional knowledge and management practices into development plans as a means of mitigating these shortfalls. Additionally, organizers highlighted the potential benefits of focusing on low-cost, proven technologies for water management projects, such as expanding the use of piping in agricultural irrigation and upgrading existing urban water infrastructure.

Challenges and opportunities for international co-operation

With water scarcity becoming an increasingly pressing issue for Bhutan's downstream neighbours, delegates at the Paro Forum stressed the need to revive long-moribund treaty negotiations regarding transboundary waterways in South Asia. In particular, the construction of new hydroelectric dams in Bhutan has the potential to significantly impact the flow and timing of water to India and Bangladesh, making international co-ordination between these states vital for the lives and livelihoods of tens of millions.

Regarding the development of domestic water infrastructure, delegates, including student representatives from JSW, encouraged the Bhutanese government to explore public-private partnerships to encourage both foreign and local investment. This would mark a significant departure from Bhutan's status quo, where water resources are held by the state and generally provided free of charge.

Canada and Bhutan can co-operate on many levels. Both face water-related challenges and have shared interests in addressing critical issues of water governance, allocation, and shortage. Both value mutual respect, trust, transparency, and the free flow of information.

Canada's renewed focus on the Indo-Pacific creates an opportunity for experts from both countries to share technical, legal, and scientific knowledge in areas of common concern, including on the dangers of unconstrained development. Canadian universities can provide Bhutanese students the opportunity to pursue research on water-related fields; Bhutan's newly launched graduate degree in climate change and environmental law offers Canadian students an opportunity to learn about Bhutan's distinctive approach to law and governance, embedded in its GNH framework, drawing inspiration for Canada's own approach to sustainability in a time of accelerating climate change.

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