



HYDRO-POLITICS AT THE BORDER: THE CASE OF ALIPURDUAR AMID INDIA-BHUTAN WATER DISPUTES

Bimal Roy

RESEARCH ARTICLE



Author Details:

Assistant Professor, Department of
Political Science, Alipurduar
University, West Bengal, India

Corresponding Author:

Bimal Roy

Abstract

The district of Alipurduar, located in the eastern part of West Bengal, holds a geographically strategic position, sharing a close proximity with the Bhutanese border. This location places Alipurduar at the heart of hydro-political tensions stemming from transboundary water management issues between India and Bhutan. Rivers such as the Torsa, Kaljani, and Raidak originate in Bhutan and flow downstream into Alipurduar, playing a vital role in the region's ecology, agriculture, and livelihoods. However, Bhutan's upstream interventions - like dam constructions, water diversions, and flood control measures - often have unintended downstream consequences, including flash floods, sedimentation, water scarcity, and ecological disruption in Alipurduar. This abstract explores the intersection of international hydro-politics and local-level vulnerability, highlighting how an otherwise peaceful bilateral relationship can become a source of contention due to shared water resources. It investigates how the absence of a formal water-sharing treaty between India and Bhutan exacerbates the unpredictability of water flows and leaves downstream communities vulnerable to both natural and human-induced hydrological changes. The study also examines the socio-economic and environmental costs borne by local communities in Alipurduar, particularly marginal farmers and forest-dependent populations. By analyzing existing river governance frameworks, local testimonies, and geopolitical dynamics, this paper aims to underscore the urgent need for a cooperative transboundary water management mechanism. It advocates for integrated water diplomacy that balances upstream development with downstream sustainability, ensuring water security and regional harmony for both nations and their border communities.

DOI:

<https://doi.org/10.70096/tssr.260404017>

Keywords: *Hydro-politics, Disputes, Water, Torsa, Kaljani, Raidak,*

Introduction

Transboundary hydro-politics, the politics of shared water resources, shape security and development in many regions. In South Asia, steep Himalayan Rivers cross borders unpredictably during the monsoon, posing acute challenges. Alipurduar district (West Bengal, India) lies on the Bhutan border, where dozens of mountain streams (e.g., Torsa, Kaljani, Raidak) fall each year. Repetitive floods and sediment loads from Bhutanese catchments have devastated agriculture, tea plantations, and villages in Alipurduar (and neighbouring Jalpaiguri) during monsoon. State officials note that "*we never get any weather report in advance from the Bhutan authority in advance*" - leaving them unprepared for sudden surges in river flow. This paper examines these cross-border waters: it outlines the problem (monsoon floods and sedimentation in Alipurduar linked to Bhutan's upstream interventions), reviews relevant hydro-political literature, profiles Alipurduar's geography and society, analyzes causes (hydropower projects, diversions, illegal mining in Bhutan), presents community impacts, and critically discusses governance gaps. We draw comparisons to India's agreements with Bangladesh and Nepal to highlight lessons. Finally, the paper proposes cooperative institutional and policy remedies to address this alarming crisis.

Literature Review

Hydro-politics studies how water scarcity, flood risk, and power asymmetries among states drive conflict or cooperation. In essence, it examines how riparian states use or withhold shared waters to serve strategic interests. Notably, Zeitoun and Allan's "hydro-hegemony" concept describes how an upstream state's economic and political dominance can translate into control over river flows. In South Asia, analysts often describe India as an emerging hydro-hegemony relative to its smaller neighbours. Elahi (2023) notes that bilateral water treaties with Nepal, Bhutan and Sikkim have been viewed as serving India's broader security objectives (not merely equitable water sharing). In this sense, the India-Bhutan context fits a global pattern: new dams and

diversions can generate downstream tensions unless balanced by strong joint institutions. Past studies emphasize that institutional capacity - formal treaties or commissions with flexible management rules - significantly reduces the risk of water conflict. On the other hand, regimes that lock in inequity without public input often exacerbate tensions.

In South Asia, transboundary water governance has evolved unevenly. India–Bangladesh relations, for example, involve an Indo-Bangladesh Joint Rivers Commission (JRC) (est. 1972) and formal water-sharing agreements (e.g., the 1996 Ganges Treaty at Farakka). Yet major disputes remain: Bangladesh has long sought a fairer share of the Teesta River, and even the Ganges Treaty is criticized for ignoring changing climate and upstream diversions. A recent Kushiara River pact (2019) illustrates these dynamics: it allows Bangladesh to withdraw limited dry-season water from a border river, but only after prolonged negotiations. India-Nepal cooperation has similarly combined ad hoc project treaties (e.g., Gandak 1959, Koshi 1954, amended 1966; Mahakali Treaty 1996) and periodic joint committees. These agreements support large barrages and hydropower, but critics note local discontent over fairness and environmental impact.

By contrast, India-Bhutan water cooperation has focused almost exclusively on hydropower. Bhutan sells electricity to India through projects like Chukha, Tala and Mangdechhu, built with Indian investment. However, unlike Bangladesh or Nepal, no broad river-sharing treaty or commission exists between India and Bhutan. Bhutanese rivers were never subject to colonial-era water agreements, and India has not negotiated a comprehensive water treaty post-independence. In practice, the two countries coordinate loosely through technical committees and informal talks on flood relief, rather than binding legal frameworks. Scholars point out that this gap reflects both historical trust (Bhutan was viewed as a close ally) and India's strategic hedging against China. Elahi (2023) underscores that the absence of formal arrangements can store up problems for downstream regions. These lessons from regional cases highlight key themes: equitable *benefit-sharing*, timely *data exchange*, and robust institutions are essential in transboundary river basins. Where upstream and downstream interests diverge, hydro-political stability depends on mechanisms like joint commissions or treaties that adapt to variability. In the Alipurduar context, where extreme rainfall events have intensified, such mechanisms have been largely missing.

Geographic and Socio-Economic sketch of Alipurduar

Alipurduar district (established in 2014) lies in the foothills of the Eastern Himalaya in North Bengal. It is bordered to the north by Bhutan, to the west by Jalpaiguri, to the east by Assam, and the south by Cooch Behar. The district is landlocked and largely rural: over 80% of its 1.5 million people live in villages, with Scheduled Castes and Scheduled Tribes comprising a similar majority of the population. Many ethnic groups (Rajbanshi, Santhal, Bodo, Tamang, etc.) inhabit this culturally diverse region. Alipurduar's flat terrain is crisscrossed by dozens of fast-flowing rivers descending from the Bhutanese and Himalayan slopes. Major rivers include the Torsa and its tributaries (Kaljani, Jayanti), the Raidak (Wangchu) system, the Sankosh, Dima, Mujnai and others. These rivers yield rich alluvial soils, but also generate devastating floods during the monsoon.

Economically, Alipurduar's hinterlands rely heavily on tea plantations, agriculture and forestry. The area is dotted with tea gardens and paddy fields. Its humid subtropical climate brings heavy rainfall from June to September, which can replenish water tables but also triggers flash floods. Rural livelihoods are precarious: many households lack robust infrastructure, and remoteness near the border limits government presence. Poverty rates are high relative to urban Bengal, and basic services (health, education, treated water) are often inadequate. All these factors amplify vulnerability: when rivers overflow, farmland and homes are flooded, and communities struggle to recover. As one district official noted, the Dooars' landscape of rivers, streams, hills, tea gardens and forests makes it a picturesque but flood-prone zone.

In summary, Alipurduar is an agrarian frontier district with marginal communities living at the mouth of dozens of fast-flowing Bhutanese streams. Its economy depends on these waters (for irrigation and sustaining forests), yet hydrological variability and sediment influx from upstream make floods and droughts recurring hazards.

Upstream Interventions by Bhutan and Downstream Effects on Alipurduar

In short, Bhutan's unilateral actions (diverting channels, permitting mining, banning local dams) strained ties with Indian farmers whose livelihoods depended on shared waters. In 1993, Alipurduar town experienced one of its earliest major urban flood disasters when the Kaljani River breached its embankment, inundating large parts of the town. This flood was the result of unprecedented monsoon rainfall and high upstream discharge, exacerbated by poor embankment maintenance. Water from the Kaljani entered the town directly, submerging key localities such as Babupara, College Halt, and Railway Colony. Civic infrastructure collapsed temporarily, and thousands were displaced, with long-term impacts on housing, trade, and transportation. At the time, there was no coordinated flood management mechanism between India and Bhutan regarding upstream discharge, which intensified the local vulnerability.

The 2017 flood marked a recurrence of the district's chronic vulnerability to Kaljani's aggression. This time, continuous heavy rainfall in Bhutan's foothills triggered high-volume runoff into North Bengal's rivers, including the Kaljani. The river again overflowed and breached sections of its banks, especially near Shalkumarhat and Hamiltonganj. Nearly 40,000 people were affected across Alipurduar I and II blocks. Several panchayats remained waterlogged for over a week. Government reports pointed to siltation, dolomite deposits from Bhutanese rivers, and encroachments along the riverbanks as key causes for riverbed rise and flooding. Relief camps were set up, but early warning systems were again found lacking.

These historic floods of 1993 and 2017 underscore that Alipurduar's flood vulnerabilities are not new, but the absence of institutional cooperation has made responses reactive rather than preventive. As rainfall intensity increases with climate change, the risks posed by such uncoordinated transboundary flows are likely to escalate further.

Bhutan's interventions

Over the past three decades, Bhutan has built multiple hydroelectric projects on rivers that flow into India (e.g., Chukha, Kurichhu, Mangdechhu, Tala). These projects are mostly run-of-river dams with limited storage, intended to generate peaking power for export. During normal flows, they regulate discharge somewhat, but in heavy rains, they cannot retain all the water. In June 2023, for example, a flash flood in Bhutan's Wangchu basin severely damaged the Mangdechhu plant and left villagers homeless - a stark reminder of the area's volatility. (Seven workers died when floods washed away a hydroelectric site in central Bhutan in 2023.)

Aside from hydropower, Bhutan's authorities have sometimes undertaken ad hoc measures to control floodwaters. In the aftermath of deadly floods in Bhutan's Sarpang district (2016-2017), the government diverted rivers away from settlements and even authorized stone mining from riverbeds to ease flood levels. However, those measures had unintended impacts downstream. In one case, Bhutan *forbade* the maintenance of a traditional Indian check-dam on the Sarlabhanga River (an irrigation structure built and managed by border villagers), arguing it blocked flow. Indian farmers strongly objected, since that diversion (the Jamfwi or Dongo system) was their main irrigation source. Without it, fields lay dry in winter. In short, Bhutan's unilateral actions (diverting channels, permitting mining, banning local dams) strained ties with Indian farmers whose livelihoods depended on shared waters.

Another important factor is sediment mining and transport. Southern Bhutan has rich dolomite deposits. Local officials admit that illegal open-pit mining continues despite bans. Every monsoon, tons of dolomite dust and rocks wash into streams and flow downstream. This sediment degrades water quality and raises riverbeds. Reports from Alipurduar's tea estates show 300-400 workers falling ill with diarrhea each monsoon, attributed to dolomite-contaminated stream water. The local Red Cross warns that many villages and gardens drink untreated water from these silty streams, so health crises recur annually.

In summary, Bhutan's upstream interventions have been twofold: (1) hydro-infrastructure that alters flow regimes, and (2) local activities (like mining, diversions) that change river dynamics. Their net effects on Alipurduar are stark. During the 2022 and 2023 monsoons, officials noted flash floods inundating Alipurduar's towns and farmlands whenever Bhutan's hills received intense rain. One irrigation minister observed "huge water" flowing down without warning and blamed floods on inadequately shared forecasts. The floods carry heavy loads of sand, pebbles and even boulders swept from Bhutan's deforested slopes. This sedimentation fills riverbeds (making them shallower), breaches banks, and reduces channel capacity. As Millennium Post reported, "*Sand, pebbles and stones flowing down from Bhutan's hills...fill riverbeds in the Dooars and reduce their capacity to manage high water levels*". In other words, rivers that should carry peak flows out to the Brahmaputra instead overflow their banks in the foothills.

The ecological disruption is also significant. Rapid fluctuations mean prolonged drought in winter (downstream springs dry up) and torrential floods in summer. Local villagers describe once-perennial streams vanishing in the cool season, destroying dry-season crops, and forcing women to walk miles for water. This volatility has raised alarms in Assam and West Bengal alike. Downstream Assam MPs warned that new dams in Bhutan could multiply flash floods and siltation. In sum, Alipurduar's flood hazards stem partly from climate variability, but much is aggravated by Bhutan's upstream hydrologic changes - large dam releases, denied diversions, and unchecked sediment flows all magnify the floods and sedimentation that afflict this border district.

Community Impacts and Adaptation Strategies

Alipurduar's communities bear the brunt of these hydrological shocks. Flooded fields and homes are routine: every heavy monsoon, tea estates and villages (e.g., Birpara, Falakata, Kumargram) report submerged paddy, eroded gardens and collapsed river embankments. Farmers have lost crops repeatedly, and unreliable irrigation has made agriculture precarious. One local MLA, Suman Kanjilal, warned that "Bhutan's mountainous runoff - sand, gravel and water - has become a major challenge for flood management in the Dooars". His assessment reflects farmers' experience: the coarse debris washes their topsoil away, turning once-fertile land into gravel bars. After floods, scarred fields and silted ditches are common sights along the border villages.

Health impacts are equally severe. As reported in *The Economic Times*, illegal dolomite mining in Bhutan has contaminated drinking water downstream. Tea-garden labor leader Simon Toppo said his estate saw "*at least 400 labourers...suffering from diarrhea*" each monsoon, due to the white dust in the stream water. A Red Cross worker (A. Dutta) confirmed that many estates have no water treatment, so villagers "consume contaminated water and suffer" in a silent crisis every year. Aside from immediate illness, the sediment-laden flows damage aquatic habitat and possibly contribute to longer-term toxin exposure. Adaptation efforts by communities and authorities have been modest but telling. Villagers traditionally built and maintained small diversion-culverts (like the Jamfwi check dam) to irrigate rice fields from transboundary streams. When Bhutan banned one such structure on the Sarlabhanga River, Indian farmers protested fiercely, since that irrigation canal was their lifeline. This episode underscores how local solutions can clash with state policies in transboundary basins. More broadly, communities have

little alternative but to adjust what they can: some raise plinths on houses, plant flood-resilient crops, or migrate seasonally to higher ground. Financial constraints limit these options for poor tea labour and tribal families.

State agencies have begun more organized adaptations. After recent floods, West Bengal's Irrigation Department initiated dredging projects. Ministers noted that *"Except for the Teesta, no other river has received dredging clearance in the Dooars region,"* and have tasked the Bengal Mineral Development Corporation to dredge the smaller rivers. Embankment strengthening has also been planned: during a 2025 site visit, officials decided to renovate a vulnerable embankment stretch in the Alipurduar block. Importantly, in mid-2025, Bhutan's meteorological agency began supplying *72-hour rainfall forecasts* to West Bengal's flood controllers. This rare data-sharing lets local authorities issue timely flood alerts.

At the grassroots level, one success story comes from across the border in Assam's Chirang district. Farmers along the Saralbhanga River (which straddles the border) collaboratively maintain a traditional cross-border diversion canal known as the "Dongo" or Jamfwi system. Over 500 villagers from Bhutan and India repair this small check dam together, channeling shared waters into farms on both sides. This example of communities organizing bi-national river management offers a model for wider participation. It shows that when local stakeholders agree on the necessity of a structure (even across a contested border), they can sustain it to mutual benefit. Similar joint efforts (e.g., co-management of forests) exist in other Bhutan-border areas, hinting that Alipurduar's populations could engage in cross-border cooperation given facilitation.

Governance Gaps and Cooperative Mechanisms

Despite clear impacts, formal governance mechanisms are lacking between India and Bhutan on floodwaters. There is no legal water-sharing treaty or joint river commission as exists with other neighbors. State officials have repeatedly appealed for an "Indo-Bhutan River Commission" to manage common rivers, but New Delhi has not responded. The West Bengal government formally proposed such a commission, noting that India has one with Nepal but "no effort from the Centre to establish a similar mechanism with Bhutan". This vacuum means that bilateral dialogue on floods remains ad hoc, often only via technical committees or appeals through the central government. In late 2024, a Joint Technical Committee (comprising Indian and Bhutanese engineers) was convened to discuss Dooars flood control, but its recommendations are non-binding.

Key information gaps exacerbate the problem. Until 2025, India received essentially no real-time weather or discharge data from Bhutan. Irrigation Minister Partha Bhowmick bluntly stated: *"We never get any weather report in advance from Bhutan... many districts of North Bengal are facing flash floods"*. This lack of hydromet sharing left Bengal rain gauges and river sensors blind to upstream events. Only after sustained pressure did Bhutan's National Centre for Hydrology and Meteorology start sending 72-hour rainfall forecasts to West Bengal's irrigation control room. This small breakthrough underscores how Bhutan's cooperation on data has been inconsistent. "Normally, Bhutan had already responded to the WB Irrigation Department and sent rain predictions," one report said, but official sharing only became regular in June 2025.

Another gap is institutional capacity. Unlike the Ganges Treaty (India-Bangladesh) or the Indo-Nepal River Commission, there is no permanent bilateral institution for India-Bhutan water. This means no joint monitoring, no agreed operating rules for Bhutanese dams during monsoon, and no common contingency plans. For example, Assam and Bengal have urged India to coordinate dam release schedules with Bhutan, but without a treaty or commission, this cannot be enforced. Civil society groups and local politicians argue that India has outsourced flood control to nature rather than negotiation. As one Assam expert observed (regarding Saralbhanga): Bhutanese objections to local diversions were *"dismissed in the past,"* reflecting a tendency for Bhutan's authorities to act unilaterally. In Alipurduar, downstream communities have essentially no voice in upstream decisions, highlighting the asymmetry in power and information.

Larger-scale river basin initiatives in South Asia offer parallels. The Brahmaputra-Bangladesh-India-Nepal (BBIN) dialogue and proposals for a regional river commission have often floundered over India's strategic hesitance. India perceives potential links between Bhutan's waters and Chinese interests (e.g., Bhutan buffers the Indian border with Tibet), which complicates open water diplomacy. As hydro-political analysts note, even treaties that exist often institutionalize inequity. Nevertheless, experts agree that some framework is needed: according to climate-security literature, basins with effective joint organizations are far more resilient to hydrological shocks. In the absence of formal links, floods are addressed by crisis management (relief funds, ad-hoc talks) rather than prevention.

West Bengal officials have pointedly criticized Delhi for shortchanging the Dooars. In 2025, the state's Irrigation Minister lamented that only ₹402 crore was allocated nationwide for river-related works in North Bengal - "grossly inadequate" given the damages. He pledged state resources (via the W.B. Mineral Development Corporation) to dredge silted rivers and rebuild embankments as a stopgap. Meanwhile, even within state machinery, Alipurduar lacked dedicated irrigation and engineering divisions for years, hampering preparedness. These administrative deficiencies compound the central neglect on the international front.

Recommendations

To break this cycle, a multi-pronged strategy is needed. First, formalize cooperation. India and Bhutan should establish an Indo-Bhutan River Commission (or similar joint authority) on the lines of the Indo-Nepal or Indo-Bangladesh JRCs. Such a commission could conduct shared flood forecasts, coordinate dam releases, and plan joint mitigation works. It should include hydrologists from both countries, empowered to meet annually and after major flood events. As one analysis notes, creating international basin institutions "reduces uncertainty and increases flexibility" in managing shared waters. In parallel, existing

technical committees should be given a permanent mandate and a standing secretariat. Formalizing dialogue would ensure that Indian states can request that Bhutan's releases or reserves be managed to minimize downstream impacts.

Second, expand data exchange. The recent 72-hour rainfall sharing by Bhutan is a positive step. This should be made continuous and automated, covering all major Bhutanese rivers that enter India. A real-time flood information portal (accessible to border districts' officials) could be jointly developed. Satellite and in-situ monitoring (gauges above the border) should be funded and maintained. Joint flood forecasting models – possibly aided by an Indo-Bhutan data cell – would improve early warning. International precedents (e.g., Mekong River Commission) show that shared data builds trust and resilience.

Third, invest in flood infrastructure cooperatively. Downstream states are dredging rivers and strengthening embankments unilaterally. But some upstream measures could help too. For example, Bhutan and India could collaborate on building small check dams or silt traps in Bhutan's foothills (with environmental safeguards) to catch debris before it flows into Dooars streams. Jointly managed sediment basins or plantings of buffer forests on vulnerable slopes could reduce landslide debris. Financing for such projects might be shared through a river basin fund, to which both governments contribute. The aim would be to mimic natural floodplain storage and slow sediment transport, benefiting communities on both sides.

Fourth, regulate harmful activities. Both sides need to crack down on illegal mining and deforestation that worsen floods. In Bhutan, stricter enforcement against unauthorized dolomite quarrying (now linked to diplomatic talks) should be paired with remediation of mined areas. India could offer technical assistance or alternate livelihoods to reduce pressure for such mining. Similarly, India's forest department should ensure that Bhutan's hill slopes (especially near rivers) are reforested to stabilize the soil. An environmental impact assessment protocol for major projects (e.g., roads, hydro sites) that considers cross-border effects would also help, following models of transboundary EIA advocated by experts.

Fifth, empower communities and local partnerships. The Saralbhangra example shows that grassroots water management can transcend borders. Indian and Bhutanese villagers can be encouraged to form joint river-user associations, with support from NGOs. Funding joint projects (like small irrigation channels that share water or culturally-linked fairs around river conservation) could build trust. At minimum, traditional systems such as the Bodo community's check dams should be preserved, recognizing that denying them led to hardship. Local knowledge on seasonal flow patterns should feed into official management plans.

Finally, integrate planning and climate adaptation. With climate change making monsoons more erratic, India and Bhutan should link water cooperation to disaster management. Joint flood contingency plans could include coordinated evacuations, shelter provisions, and post-flood relief distribution across borders (possibly under an East Himalayan Flood Management pact). At the diplomatic level, including water-sharing goals in broader bilateral talks (e.g., revising power cooperation agreements to include flood clauses) may raise the issue's profile. Both governments should consider signing the UN Watercourses Convention, signaling a commitment to equitable use and notification of projects (though India's stance on this is uncertain).

In addition, bridging the current hydro-political gap requires institutionalizing cooperation, sharing information, and jointly investing in resilience. Experience in South Asia teaches that such measures, though challenging to negotiate, are essential. As one review concludes, "*institutions... able to manage effects of rapid or extreme change*" are key to reducing water conflicts. In the case of Alipurduar, state and district advocacy has finally yielded some attention (e.g., weather data, dredging funds), but a lasting solution rests on forging a trust-based bilateral water regime.

Conclusion

Alipurduar's plight illustrates how transboundary hydro-politics can impact local lives. Bhutan's border streams, once benign sources of irrigation, have become volatile foes under unchecked development and climate stress. Without serious cooperation, floods and pollution will continue to ravage North Bengal's plains every monsoon. This study has shown that the root causes lie not only in heavy rains but in a lack of shared management. Addressing Alipurduar's challenges, therefore, requires moving beyond blame and into joint action. By establishing cooperative mechanisms (river commissions, data sharing) and engaging border communities, India and Bhutan can transform their shared rivers from flashpoints into engines of stability and development. In an era of increasing climate uncertainty, such partnerships are not optional - they are a necessity for human security in the Himalayan region.

Acknowledgment: No

Author's Contribution: Bimal Roy: Literature Review, Data Collection, Methodology, Analysis, Drafting, Referencing

Funding: No

Declaration: The author has given consent for the publication.

Competing Interest: No

References:

1. Bhutan National Centre for Hydrology & Meteorology. (2025, June 30). *72-hour advance weather update for West Bengal's irrigation dept to mitigate floods*. APAC News Network. <https://apacnewsnetwork.com/2025/06/bhutan-72-hour-advance-weather-update-for-west-bengal-irrigation-department-to-mitigate-floods/>

2. District Administration, Alipurduar. (2025). *About the district*. Alipurduar District, Government of West Bengal. <https://alipurduar.gov.in/about-district/>
3. Elahi, S. (2023, May 3). Hydro-politics and hydro-hegemony in South Asia. *Australian Outlook (Australian Institute of International Affairs)*.
4. Jones, A. (2017, July 26). Hydropolitics: Transboundary river basins and political tensions. *Climate-Diplomacy.org*.
5. Livemint. (2023, July 18). North Bengal flood: West Bengal irrigation minister blames Bhutan's rivers for flash floods. *Livemint.com (Story from ANI)*.
6. Millennium Post (MPost). (2025, June 6). About 76 Bhutan-origin rivers wreak havoc in North Bengal; Min urges Centre to act. *MillenniumPost.in*.
7. Millennium Post (Team MP). (2024, December). India-Bhutan joint committee to address the Dooars flood crisis. *MillenniumPost.in*.
8. Press Trust of India. (2023, July 18). N Bengal floods due to Bhutan rivers, the centre should have noticed: Minister. *BusinessStandard.com*.
9. Sarkar, D. (2012, July 5). Monsoon flow of dolomite-contaminated water from the Bhutan hills creates havoc in the WB foothills. *The Economic Times*.
10. West Bengal Mineral Development & Trading Corp. (2023). *Annual flood report 2023*. Government of West Bengal.
11. World Meteorological Organization. (2023). *Atlas of mortality and economic losses from weather, climate and water extremes (1970–2022)*.
12. Yashwant, S. (2018, September 11). Villagers in Bhutan and India come together to share the river. *Climate-Diplomacy.org* (originally published in *The Third Pole*).

Publisher's Note

The Social Science Review A Multidisciplinary Journal remains neutral with regard to jurisdictional claims in published data, map and institutional affiliations.

©The Author(s) 2026. Open Access.

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>