

Satellites, Sensors, and Security: Monitoring China's Himalayan Dams and India's Hydro-Strategic Preparedness

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Abstract: *China's rapid development of hydropower projects and large-scale water diversion infrastructure in the Himalayan region has become a source of mounting concern for India. These initiatives, particularly on the Yarlung Tsangpo (Brahmaputra) river system, raise questions about ecological stability, disaster vulnerability, and the broader strategic balance between upstream and downstream states. As China consolidates control over transboundary river flows, the implications for India's water security and regional stability are profound. In this context, monitoring capabilities have emerged as a vital component of hydro-strategic preparedness. This article explores the role of advanced technologies viz., satellite imagery, remote sensing platforms, hydrological sensors, and big data analytics, in tracking and evaluating China's dam-building activities. It highlights how technological surveillance reduces information asymmetry, strengthens early warning systems, and supports disaster management, while also contributing to deterrence in a non-kinetic security environment. The study further assesses India's current monitoring infrastructure, identifying institutional limitations and technical gaps that constrain effective response. By examining opportunities for integrating emerging space-based and sensor-driven systems into a comprehensive national security framework, the article argues that while monitoring technologies cannot fully offset upstream power asymmetry, they significantly enhance India's ability to anticipate risks, shape diplomatic negotiations, and respond to slow-onset hydro-strategic challenges. Ultimately, the research underscores the importance of technological preparedness as a means of safeguarding ecological integrity and national security in an increasingly contested Himalayan river basin.*

Keywords: Hydro-hegemony, satellite surveillance, transboundary rivers, Brahmaputra, environmental security, non-kinetic threats

1. Introduction

Transboundary rivers have historically served as both bridges of cooperation and flashpoints of conflict among riparian states. While earlier disputes often revolved around overt territorial or resource competition, the contemporary politics of shared rivers increasingly manifests in subtler forms of control, through infrastructure dominance, data asymmetry, and technological superiority. This shift reflects a broader transformation in hydro-politics, where power is exercised not only through physical possession of water but also through the ability to monitor, regulate, and predict its flows. [1]

The Himalayan region exemplifies this transformation. China's extensive program of dam construction and water diversion on rivers flowing into South and Southeast Asia has generated profound strategic, ecological, and geopolitical concerns. Among these rivers, the Brahmaputra, known upstream as the Yarlung Tsangpo, occupies a central position in the emerging hydro-strategic landscape. Its vast discharge, seasonal variability, and ecological importance make it critical for downstream states, particularly India, which views upstream interventions with growing unease.

China's position as the upper riparian confers significant structural advantages. Through hydropower dams, reservoir systems, and potential diversion projects, Beijing can alter flow regimes, sediment transport, and seasonal water availability without crossing the threshold of armed conflict. These interventions occur in a context marked by limited transparency and non-binding data-sharing arrangements, leaving downstream states heavily dependent on indirect observation. India, in particular, faces challenges in accessing reliable hydrological information, which heightens its

vulnerability to both sudden disasters and slow-onset ecological shifts.

Consequently, surveillance and monitoring technologies have become indispensable tools for managing hydro-political risk. Satellites, ground-based sensors, and integrated data systems now play a pivotal role in reshaping India's capacity to monitor China's Himalayan dams and prepare for hydro-strategic contingencies. [2] These technologies are not merely technical instruments; they function as strategic assets that reduce information asymmetry, strengthen early warning mechanisms, and enhance India's ability to engage diplomatically from a position of informed preparedness.

This article situates technological monitoring within broader debates on environmental security, hydro-hegemony, and non-kinetic warfare. It argues that while such infrastructure cannot eliminate the fundamental asymmetry between upstream and downstream states, it significantly enhances India's resilience. By integrating space-based and sensor-driven systems into a national security framework, India can better anticipate risks, mitigate disaster impacts, and respond to the evolving hydro-strategic challenges posed by China's activities in the Himalayas.

Hydro-Hegemony and Information Asymmetry

The concept of hydro-hegemony offers a valuable framework for analyzing power relations in transboundary river basins. Unlike traditional resource conflicts that often rely on overt military coercion, hydro-hegemony operates through more subtle mechanisms. These include geographical advantage, material capacity, institutional influence, and, crucially, control over information. [3] By determining when, how, and what hydrological data is shared, upstream states can shape downstream outcomes without resorting to direct confrontation.

In the Brahmaputra basin, information asymmetry has become a defining feature of Indo-China hydro-politics. China provides limited hydrological data to India under annual memoranda of understanding, focusing primarily on monsoon-season flood flows. However, these arrangements exclude critical information such as real-time reservoir operations, dam construction timelines, and long-term diversion plans. The absence of transparency is further underscored by episodes of suspended data sharing during periods of political tension, most notably during the 2017 Doklam standoff.

This opacity magnifies downstream vulnerability. Without timely and reliable information, India faces significant constraints in flood forecasting, dam safety assessments, environmental impact evaluations, and disaster preparedness. The lack of dependable upstream data forces India to rely on indirect observation methods, which often lag behind the pace of Chinese infrastructure development. As a result, India's hydro-strategic posture is weakened, leaving it exposed to both sudden disasters and slow-onset ecological disruptions.

Independent monitoring technologies have therefore emerged as indispensable counterbalances to upstream informational dominance. Satellite imagery, remote sensing platforms, and ground-based sensors provide India with alternative means of tracking dam construction, reservoir levels, and flow variability. When integrated with advanced data analytics, these tools reduce information asymmetry, strengthen early warning systems, and enhance India's ability to anticipate risks. Beyond their technical utility, such monitoring infrastructures function as strategic assets, enabling India to engage diplomatically from a position of informed preparedness and resilience.

The Strategic Geography of Himalayan Dams

The Himalayan region presents a set of unique challenges for hydrological monitoring and infrastructure development. High altitude, rugged terrain, extreme weather conditions, and frequent seismic activity complicate both the construction of dams and the surveillance of their impacts. China's hydropower projects on the Yarlung Tsangpo are situated in some of the world's most inaccessible landscapes, including the deep gorges near the Great Bend, where the river makes a dramatic turn before entering India. These geographic features not only increase engineering complexity but also limit the ability of downstream states to observe and assess upstream activities.

China's portfolio of projects includes run-of-the-river dams, large reservoirs, extensive tunneling systems, and ancillary infrastructure such as roads and transmission lines. While Chinese authorities often emphasize the non-consumptive nature of hydropower, scholars have demonstrated that even run-of-the-river projects can significantly alter flow timing, sediment dynamics, and ecological processes when deployed at scale. [4] The cumulative effects of multiple dams along a single river stretch can reshape hydrological regimes in ways that extend far beyond local boundaries.

For India, the strategic concern lies not only in the absolute quantity of water but also in its variability and unpredictability. Sudden reservoir releases, filling during lean

seasons, or cascading operations across multiple dams can amplify flood risks or exacerbate drought conditions downstream. These risks are magnified by the absence of transparent, real-time data sharing, leaving India dependent on indirect monitoring methods. The uncertainty surrounding upstream operations thus translates into heightened vulnerability for downstream communities, particularly in Assam and Arunachal Pradesh, where seasonal floods already pose significant challenges. [5]

Monitoring infrastructure has therefore become essential to detect changes that may not be formally communicated. Satellite imagery, remote sensing technologies, and ground-based sensors provide India with alternative means of tracking dam construction, reservoir levels, and flow variability. When integrated into broader national security frameworks, these tools reduce information asymmetry and enhance India's capacity to anticipate hydro-strategic contingencies. Ultimately, the geography of Himalayan dams underscores the inseparability of environmental processes and geopolitical dynamics, making technological surveillance a critical component of India's hydro-political resilience.

Satellite Imagery as a Tool of Strategic Awareness

Satellite imagery has become one of the most powerful instruments for monitoring upstream water infrastructure in contested transboundary basins. The ability to observe developments from space has transformed hydro-strategic awareness, particularly in regions where physical access is limited or upstream states restrict information flows. High-resolution optical satellites, synthetic aperture radar (SAR), and multispectral sensors now enable analysts to track dam construction, reservoir filling, land-use change, and river morphology in near real time. [6] These technologies provide downstream states with independent verification mechanisms that reduce reliance on upstream disclosures and enhance preparedness.

Optical imagery is especially effective for identifying visible structures such as dam walls, spillways, powerhouses, and diversion tunnels. It allows analysts to document construction progress and operational status with remarkable clarity. SAR technology, by contrast, offers unique advantages in the monsoon-prone Himalayas. Because SAR can penetrate cloud cover and operate at night, it ensures uninterrupted monitoring of reservoir water levels, surface deformation, and even subtle ground movements that may signal structural stress. Multispectral sensors add further analytical depth by detecting changes in vegetation, soil moisture, and sediment transport, thereby linking hydrological processes to broader ecological impacts.

India has increasingly relied on satellite data from both domestic and international platforms to track developments on the Yarlung Tsangpo. Open-source intelligence analysts, academic institutions, and strategic think tanks have used satellite imagery to document construction progress on Chinese dams long before official announcements were made. This capability has proven particularly valuable during periods of political tension, when formal data-sharing arrangements have been suspended or limited. By providing independent verification, satellite imagery reduces

information asymmetry and strengthens situational awareness. [7]

Beyond technical monitoring, satellite imagery functions as a strategic asset. It enhances India's ability to anticipate risks, supports disaster preparedness, and informs diplomatic engagement. The integration of satellite data into national security frameworks underscores the growing convergence of environmental monitoring and strategic intelligence. In this sense, satellite imagery is not merely a scientific tool but a cornerstone of hydro-strategic resilience. By enabling India to respond proactively to upstream interventions, it contributes to deterrence in a non-kinetic security environment and reinforces India's broader hydro-political posture.

Remote Sensing and Hydrological Analysis

Beyond visual observation, remote sensing technologies provide quantitative data that deepen understanding of hydrological processes in complex river basins. Satellite-based altimetry, for example, can measure river and reservoir water levels with high precision, offering insights into seasonal fluctuations and storage dynamics that are otherwise inaccessible in remote Himalayan terrain. [8] Thermal sensors add another dimension by detecting changes in water temperature associated with altered flow regimes, which can reveal ecological stress or shifts in aquatic habitats. Multispectral imagery further enhances analysis by assessing sediment concentration, vegetation health, and wetland dynamics downstream, thereby linking hydrological changes to broader environmental outcomes.

These datasets are particularly valuable for understanding cumulative impacts. While a single dam may produce limited observable effects, multiple projects operating in coordination can fundamentally reshape basin-wide hydrology. Remote sensing enables longitudinal analysis, allowing researchers to identify long-term trends in flow variability, erosion, and ecological stress across decades. Such temporal depth is critical for distinguishing between natural variability and anthropogenic interventions. By integrating diverse sensor outputs, analysts can construct a more holistic picture of how upstream infrastructure alters downstream systems. [9]

For India, the strategic importance of remote sensing lies in its ability to compensate for limited upstream transparency. China's hydropower projects on the Yarlung Tsangpo often proceed without detailed disclosure, leaving downstream states vulnerable to sudden operational changes. Remote sensing data, when integrated into national water management systems, enhances predictive capacity by enabling authorities to anticipate flood peaks, assess erosion risk, and evaluate ecological consequences of upstream interventions. This capacity is especially vital in flood-prone regions such as Assam, where timely forecasting can save lives and reduce economic losses.

Moreover, remote sensing strengthens India's hydro-strategic posture by reducing information asymmetry. It empowers policymakers to engage diplomatically from a position of informed awareness, while also supporting disaster preparedness and environmental management. In this sense,

remote sensing is not merely a technical tool but a strategic asset. By providing independent, verifiable data, it enhances resilience against upstream opacity and contributes to India's broader hydro-political security framework.

Ground-Based Sensors and Early Warning Systems

Satellite monitoring is most effective when combined with robust ground-based sensor networks. River gauges, rainfall monitors, seismic sensors, and automated weather stations provide real-time data that complement space-based observations, creating a layered system of hydrological intelligence. In India's northeastern states, where monsoon floods and seismic activity pose recurring threats, such systems play a critical role in flood forecasting, disaster response, and community resilience. [10]

However, the effectiveness of these networks depends heavily on upstream data inputs. Without information on reservoir releases or dam operations, downstream sensors may detect rising water levels only after critical thresholds are crossed. This lag reduces response time and increases human and economic losses, as seen in past flood events where sudden surges overwhelmed local preparedness. The absence of transparent, real-time communication from upstream states magnifies downstream vulnerability, underscoring the importance of independent monitoring systems.

Expanding sensor coverage, improving data transmission, and integrating artificial intelligence for predictive modeling can partially offset these constraints. Advanced algorithms can analyze rainfall patterns, soil saturation, and river discharge to forecast flood peaks with greater accuracy. When combined with satellite-derived indicators of upstream activity, such as reservoir filling or dam construction progress, ground-based sensors enhance early warning capabilities and strengthen resilience.

India has begun integrating sensor networks into broader disaster management frameworks, linking local monitoring stations with national agencies to ensure rapid dissemination of alerts. This integration not only improves technical forecasting but also supports coordinated evacuation and relief operations. By embedding sensor data into national security planning, India can better anticipate hydro-strategic risks and reduce dependence on upstream disclosures.

Ultimately, ground-based sensors function as more than technical instruments; they are strategic assets in the hydro-political landscape. Their ability to provide independent, real-time verification of hydrological conditions empowers India to engage diplomatically from a position of informed awareness, while also safeguarding vulnerable communities against sudden disasters. [11]

Space Power and National Security

Space-based surveillance has become an integral component of contemporary national security strategy. Traditionally associated with military reconnaissance and strategic deterrence, satellite monitoring now plays a central role in addressing non-traditional threats, including environmental degradation, disaster risk, and resource insecurity. The evolution of space power reflects a broader shift in security thinking, where technological capabilities are leveraged not

only for defense but also for resilience against ecological and hydro-political challenges. [12]

For India, investments in earth observation satellites serve multiple strategic objectives. These assets support disaster management, climate adaptation, infrastructure planning, and strategic intelligence. In the context of the Brahmaputra basin, space-based monitoring enables India to observe upstream activities beyond its borders without violating sovereignty or escalating tensions. This capacity is particularly significant given the limited transparency in China's hydropower development. By relying on independent surveillance, India reduces its dependence on upstream disclosures and strengthens its ability to anticipate risks.

Space power also aligns with the logic of non-kinetic deterrence. By demonstrating the capacity to observe and document upstream actions, India signals awareness and preparedness, potentially discouraging risky behavior. Such signaling is subtle but important: it contributes to stability by reducing uncertainty and reinforcing the perception that downstream states are not passive recipients of upstream decisions. In this way, surveillance functions as both a technical instrument and a strategic message.

Moreover, the integration of satellite data into national security frameworks enhances India's resilience. Earth observation systems, when combined with ground-based sensors and predictive analytics, provide a comprehensive picture of hydrological dynamics. This integration supports early warning systems, informs diplomatic engagement, and strengthens India's bargaining position in transboundary negotiations. The ability to independently verify upstream activities also empowers India to contest or corroborate claims in international forums, reinforcing its credibility. [13]

Ultimately, space power in the hydro-strategic domain underscores the convergence of environmental monitoring and national security. Investments in satellite technology are not merely about scientific advancement; they represent a deliberate strategy to safeguard sovereignty, reduce vulnerability, and project deterrence in a non-kinetic environment. Thus, the capacity to monitor and interpret upstream actions is itself a form of strategic influence, shaping the balance of power in contested river basins.

Institutional Integration and Policy Challenges

Despite remarkable technological advances in satellite monitoring, remote sensing, and sensor networks, institutional integration remains a persistent challenge. Monitoring data are often dispersed across multiple agencies responsible for water resources, disaster management, space research, and national security. This fragmentation leads to siloed information flows, where valuable datasets are not systematically shared or analyzed in a coordinated manner. As a result, the strategic utility of surveillance capabilities is diminished, and opportunities for timely intervention are lost.

Effective hydro-strategic preparedness requires centralized data fusion, inter-agency coordination, and clear protocols for translating intelligence into actionable policy. Without such integration, even the most sophisticated monitoring systems may fail to inform decision-making at critical moments. For

example, flood forecasting in India's northeastern states depends not only on satellite imagery but also on hydrological models, ground-based sensors, and communication networks. If these systems are not harmonized, early warning signals may be delayed or misinterpreted, increasing human and economic losses.

Institutional challenges also extend to bureaucratic inertia and overlapping mandates. Agencies often compete for jurisdictional authority, which can slow down the adoption of integrated frameworks. Scholars argue that hydro-strategic resilience requires not only technological innovation but also governance reforms that prioritize collaboration and transparency. Establishing joint task forces, interoperable platforms, and standardized protocols for data exchange could significantly enhance India's ability to respond to upstream interventions.

Furthermore, reliance on technological monitoring raises ethical and diplomatic considerations. While satellite surveillance is legal under international law, its use in politically sensitive contexts must be managed carefully to avoid misinterpretation or escalation. Publicizing satellite findings without diplomatic engagement may be perceived as accusatory, potentially straining bilateral relations. Conversely, withholding data for strategic reasons may undermine trust domestically and internationally. Balancing transparency with strategic discretion is therefore essential.

India's integration of space-based and sensor-driven monitoring into national security frameworks illustrates both the promise and the complexity of institutional coordination. By embedding technological intelligence into policy processes, India can strengthen deterrence, improve disaster preparedness, and enhance diplomatic leverage. Yet, without institutional reforms, these capabilities risk remaining underutilized. Ultimately, the challenge lies in transforming fragmented data governance into a coherent system that supports both national resilience and regional stability. [14]

Limits of Monitoring and the Persistence of Asymmetry

While satellites, sensors, and advanced analytical tools significantly enhance downstream awareness, they cannot fully eliminate the structural asymmetry inherent in transboundary river politics. Monitoring technologies reveal what is happening upstream, but they do not grant downstream states the ability to control water flows. China, as the upper riparian, retains the sovereign authority to operate dams, adjust releases, and shape hydrological outcomes within its territory. This reality underscores the limits of technological surveillance as a substitute for political leverage.

Moreover, technical data often require careful interpretation. Natural variability, extreme weather events, and the accelerating impacts of climate change complicate attribution, allowing upstream actors to maintain plausible deniability regarding downstream disruptions. For instance, sudden floods or droughts may be explained as natural phenomena, even when upstream reservoir operations contribute to their severity. This ambiguity reduces the ability of downstream states to hold upstream actors accountable,

highlighting the persistence of power asymmetry despite enhanced monitoring.

India's reliance on satellite imagery and remote sensing provides valuable situational awareness but cannot substitute for cooperative mechanisms. Monitoring can identify dam construction, reservoir filling, and flow variability, yet it does not compel upstream transparency or guarantee timely communication of operational decisions. As a result, India must complement technological surveillance with diplomatic engagement, legal advocacy, and regional cooperation to mitigate risks.

Diplomatic channels remain essential for building trust and establishing protocols for data sharing. Legal instruments, such as bilateral agreements or regional frameworks, can institutionalize transparency and accountability. Regional cooperation, meanwhile, offers opportunities to transform hydro-politics from a zero-sum contest into a platform for shared resilience. Without these complementary measures, monitoring risks becoming a reactive tool rather than a proactive strategy. [15]

Ultimately, the persistence of asymmetry reflects the broader dynamics of hydro-hegemony. Technology can reduce uncertainty and strengthen preparedness, but it cannot alter the fundamental distribution of power between upstream and downstream states. For India, the challenge lies in integrating monitoring into a comprehensive strategy that combines technical intelligence with diplomatic negotiation and cooperative security frameworks.

Toward a Comprehensive Hydro-Strategic Framework

Monitoring technologies, while indispensable, should be embedded within a broader hydro-strategic framework that integrates environmental security, diplomacy, and regional governance. Surveillance tools such as satellites, sensors, and remote sensing platforms provide critical data, but their strategic value depends on how effectively they are linked to institutional processes and cooperative mechanisms. For India, this means moving beyond technical observation toward a holistic approach that combines resilience-building at home with proactive engagement abroad.

Strengthening data-sharing mechanisms with downstream neighbors is one important step. India's position as both a downstream state vis-a-vis China and an upstream state for Bangladesh places it at the center of complex hydro-political dynamics. Transparent data exchange can reduce uncertainty, build trust, and foster cooperative management of shared rivers. At the same time, investments in domestic water resilience, such as improved storage, efficient irrigation, and adaptive infrastructure, are essential to mitigate vulnerabilities created by upstream interventions.

Advocating for multilateral norms on transboundary river management represents another pillar of a comprehensive framework. International law provides limited guidance on non-navigational uses of rivers, and many agreements remain non-binding. By championing regional governance structures, India can help establish principles of equitable use, prior notification, and ecological sustainability. Such norms

would not eliminate asymmetry but could constrain unilateral actions and promote accountability.

Equally important is the framing of monitoring technologies. If surveillance is presented as a confrontational tool, it risks escalating tensions. However, when positioned as a mechanism for transparency and risk reduction, it can support cooperative outcomes while safeguarding national interests. [16] India's ability to demonstrate preparedness through technological capacity signals deterrence without aggression, aligning with the logic of non-kinetic security.

Ultimately, a comprehensive hydro-strategic framework must integrate technical, institutional, and diplomatic dimensions. Monitoring technologies provide the foundation, but their effectiveness depends on governance reforms, regional cooperation, and strategic signaling. By embedding surveillance within a broader vision of environmental security and regional stability, India can transform hydro-politics from a source of vulnerability into an arena of resilience and influence. [17]

2. Conclusion

The rise of hydrological engineering in the Himalayas has transformed water from a shared natural resource into a strategic variable with profound security implications. In the Brahmaputra basin, China's upstream infrastructure projects, ranging from large dams to diversion schemes, generate uncertainty that cannot be addressed through traditional deterrence or legal mechanisms alone. The asymmetry of power between upstream and downstream states persists, but the tools available to manage that asymmetry are evolving.

In this context, satellites, sensors, and data analytics emerge as critical instruments of hydro-strategic preparedness. These technologies provide India with independent verification of upstream activities, reduce information asymmetry, and strengthen disaster management capabilities. By integrating space-based monitoring with ground-based sensors and predictive modeling, India can anticipate risks more effectively and respond to sudden hydrological shifts with greater resilience.

Yet, technological surveillance alone is insufficient. Monitoring reveals what is happening but does not confer control over flows or compel upstream transparency. Natural variability, extreme weather, and climate change complicate attribution, allowing upstream actors to maintain plausible deniability. As such, monitoring must be complemented by diplomatic engagement, legal advocacy, and regional cooperation. These dimensions transform surveillance from a reactive tool into a proactive strategy for stability.

For India, the challenge lies in embedding technological intelligence within a comprehensive hydro-strategic framework. This entails strengthening domestic water resilience, advocating for multilateral norms on transboundary river governance, and framing monitoring as a tool for transparency and risk reduction rather than confrontation. Such framing allows India to leverage its technological capacity to support cooperative outcomes while safeguarding national interests.

As non-kinetic threats increasingly shape the security landscape, integrating technological surveillance into national strategy is not optional but essential. Space power, remote sensing, and sensor networks are no longer peripheral scientific tools; they are strategic assets that enhance deterrence, reduce vulnerability, and empower informed diplomacy. Ultimately, while monitoring technologies cannot erase upstream power asymmetry, they significantly expand India's capacity to anticipate risks, manage disasters, and engage diplomatically from a position of awareness and preparedness.

References

- [1] Wolf, A. T. (2007). *Shared waters: Conflict and cooperation*. Washington, DC: Island Press.
- [2] Rajagopalan, R. (2019). Satellite monitoring and Indian security. *Strategic Analysis*, 43(3), 215–229.
- [3] Zeitoun, M., & Warner, J. (2006). Hydro-hegemony: A framework for analysis of transboundary water conflicts. *Water Policy*, 8(5), 435–460.
- [4] Magee, D. (2011). China's hydropower expansion in the Himalayas. *Asian Survey*, 51(6), 1084–1105.
- [5] Chatterjee, B. (2013). Flood forecasting in Assam. *Economic and Political Weekly*, 48(31), 56–63.
- [6] NASA. (2020). Earth observation satellites and water monitoring.
- [7] Nithyanandam, Y. (2020). Using satellite imagery to track Chinese infrastructure on the Brahmaputra. *The Diplomat*.
- [8] Reeve, R. (2011). Water security and geopolitics. *International Affairs*, 87(3), 601–617.
- [9] Vorosmarty, C. et al. (2010). Global threats to human water security. *Nature*, 467.
- [10] Baruah, S. (2012). *The Brahmaputra: Water politics and security*. New Delhi: Oxford University Press.
- [11] Talukdar, S. (2018). Floods in Northeast India. *Disaster Studies Journal*, 12(1), 77–95.
- [12] Zawahri, N. A. (2009). International river disputes. *Journal of Peace Research*, 46(5), 637–654.
- [13] Swain, A. (2016). Data asymmetry and transboundary rivers. *International Journal of Water Resources Development*, 32(4), 600–613.
- [14] Hanasz, P. (2014). Hydro-hegemony in South Asia. *Water Policy*, 16(1), 19–33.
- [15] Verghese, B. G. (1990). *Waters of hope: Himalayan-Ganga cooperation for people's development*. Oxford University Press.
- [16] Biswas, A. K. (2008). Management of transboundary rivers. *International Journal of Water Resources Development*, 24(4), 549–558.
- [17] Mirumachi, N. (2015). *Transboundary water politics in the developing world*. Routledge.

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