

Water Security and Transboundary River Conflicts in South Asia

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Abstract: *Water security in South Asia is becoming a more multi-faceted and multi-layered problem due to the complexities of transboundary river disputes, climate change and growing geopolitical competition between riparian states, such as India, Pakistan, China, Bangladesh, Nepal, and Bhutan. The main river systems of the region—especially the Indus, Ganges–Brahmaputra–Meghna (GBM) and Brahmaputra—play a vital role in agricultural livelihoods, hydropower generation, and environmental sustainability, while simultaneously being the subject of ongoing strategic tensions. This paper makes a critical analysis of the changing hydropolitical dynamics in South Asia and believes that water has become a geopolitical asset and has been used strategically rather than a shared resource of the environment. The study uses a qualitative doctrinal method and based on the latest research in the field of 2020-2026, it examines the impact of hydrological uncertainty, climate change, the rapid expansion of infrastructure projects and the continuous lack of data from upstream to downstream states on the existing governance system. The results show that existing bilateral agreements are becoming less and less effective in dealing with water management challenges of multi-dimensional nature in the region. The paper concludes that there is a need for building cooperative governance structures at the basin-wide level, developing adaptive and climate responsive treaty mechanisms as well as improve transparency of hydrological data, to reduce mistrust and build regional stability for sustainable water security.*

Keywords: Water security, Transboundary rivers, South Asia, Hydropolitics, Indus Waters Treaty, Brahmaputra, Climate change, Water governance

I. INTRODUCTION

The transboundary river system of South Asia is one of the largest and most important in the world for its geographical and population characteristics, spanning multiple interconnected countries with a population of almost two billion. Major river basins like the Indus, Ganges, Brahmaputra and Meghna cross international boundaries and generate enormous ecological, economic and political interdependence between nations, like India, Pakistan, China, Bangladesh, Nepal and Bhutan. These river systems play a vital role in farming, irrigation, hydroelectric power generation, industry, conservation of biodiversity and socio-economic development of the region. Therefore, it is important that these shared water resources are managed effectively in order to ensure stability and sustainable development of the region.

However, transboundary river systems in South Asia are becoming increasingly stressed due to high population growth, urbanization, growth of industries, and higher water consumption. The pace of Himalayan glacier melting, changing monsoons and increased flood and drought frequency have further complicated water governance in the region due to the impacts of climate change. All of these environmental changes have increased the uncertainty for river flows and water availability, increasing the competition between the riparian states.

Water has increasingly become a geopolitical issue, more than a resource for development in recent years. Conflicts have been created between India and Pakistan over dam issues, hydropower projects, water diversion schemes and data sharing of hydrological information between India and China and India and Bangladesh. Upstream construction projects and the exercise of water resource control are seen by scholars as a tool of strategic leverage that can fuel mistrust and diplomatic tension. As pointed out by Godara et al. (2024), the combination of water governance and



national security with regional politics has rendered transboundary rivers as important centres for hydropolitical contestations in South Asia.

II. LITERATURE REVIEW

The rapid population growth, water resource inequalities, rising demand and poor institutional coordination in South Asia is creating considerable water insecurity, according to World Bank (2020).¹ The report expands the definition of water security from access to water to resilience to climate-related water risks, good governance and sustainable water management. It stresses the need for coherent national policies and integrated management strategies to tackle the problems of shared river basins. As a result, the World Bank proposes more robust regional cooperation, water governance practices and policy measures to achieve long-term water security and sustainable development for South Asia.

Singh and Yadav (2024)² examine the changing dynamics of water-related conflicts between India and China, particularly in the Brahmaputra River basin. The authors conclude that geographical advantage in the upstream regions of transboundary river systems is an important determinant of hydropolitical power. By controlling the Brahmaputra headwaters, China will have a significant strategic advantage in water governance and negotiations in the region. The researchers report that the lack of a comprehensive water-sharing agreement between the two countries has added to distrust and uncertainty. In addition, the lack of information sharing about hydrological data, especially in times of political conflict, raises concerns about flood forecasting, water management and regional security. The authors therefore suggest that better cooperation, transparency and institutionalized dialogue are vital to alleviate tensions and work towards sustainable transboundary water governance.

Godara et al. (2024)³ provide a study of the hydropolitical dynamics among the three countries of China, India and Pakistan in transboundary river governance. The study reveals that dam building, development of hydropower, and infrastructure projects on rivers are now considered not only as means of economic development but also as means of geopolitical influence and strategic control. The authors contend that water resources are increasingly a part of national security agendas, especially within countries with historical political rivalry. The study also underscores that current governance systems and treaties do not necessarily meet the needs of balancing divergent development interests with security issues. This has led to some tensions between regions and less opportunities for water basin governance.

Mishra et al. (2020)⁴ have used climate model predictions from the Coupled Model Intercomparisons Project (CMIP6) to examine the potential future consequences of climate change on hydrological systems across South Asia. From their study, they found that there was a significant rise in monsoon variability, the glacier retreat in the Himalayan region and increase in extreme hydrological events like floods and droughts. The projected alteration of the river flow and decrease in river flow predictability is likely to be present in the major river basins, and this change is expected to be driven by these climatic changes. It is projected that these climatic changes will lead to changes in river flow patterns and decrease in predictability of river flow across major transboundary river basins. The authors find that climate change is a significant source of uncertainty and non-stationarity in river systems, and that this poses a major challenge for water management approaches. Water-sharing agreements previously negotiated as a function of historical hydrological conditions may thus become less effective and adaptive water management frameworks and flexible water policies are required.

¹World Bank. (2020). *Water security in South Asia: Challenges and opportunities*. Washington, DC.

²Singh, N., & Yadav, H. G. (2024). Beyond the border: Water tensions between India and China. *Discover Global Society*. <https://doi.org/10.1007/s44282-024-00089-x>

³Godara, H., Pathania, J. M., & Kumar, G. (2024). Hydro-political dynamics between China–India–Pakistan. *Journal of Asian Security and International Affairs*. <https://doi.org/10.1177/23477970241263154>

⁴Mishra, V., Bhatia, U., & Tiwari, A. D. (2020). CMIP6 climate projections for South Asia. *arXiv*. <https://arxiv.org/abs/2006.12976>



Ikram (2026)⁵ examines the nascent water political issues in South Asia and highlights the militarization of water governance issues. The study demonstrates that water infrastructure projects like water dams, hydropower stations, barrages and reservoirs have been securitised as strategic assets that can be used to affect regional power relations. The author states that this change has made the transboundary water management a cooperative developmental problem to a geopolitical issue. Mistrust has been growing, especially among countries sharing large river basins, due to the perception that upstream nations use water resources for their own strategic interests. As a result, there has been a decrease in opportunities for joint governance and joint resource management. The study suggests that improving institutional cooperation, improving transparency and strengthening confidence building measures are critical to lessen tensions and guarantee sustainable water security in South Asia.⁶

III. RESEARCH METHODOLOGY

3.1 Research Design

The study uses a qualitative research design namely doctrinal and analytical approach to analyse the dynamics of water security and transboundary river conflicts in South Asia. The doctrinal approach is applied to understanding current legal structures, policy documents, and treaties, and scholarship on hydropolitics and water governance. The analytical dimension is used to analyse the interdependencies between climate change, infrastructure development and geopolitical tensions in large river basins. The research is mainly library-based and secondary sources are systematically reviewed to draw conceptual and thematic insights. This design has particular relevance for the comprehension of complex and multi-layered problems such as transboundary water conflicts for which empirical field access across the borders is limited. The study uses doctrinal interpretation and analytical evaluation to facilitate structured understanding of the legal-institutional arrangements, and of changing geopolitical conditions impacting water security in South Asia.⁷

3.2 Data Sources

The study uses secondary data sources that have been gathered from credible academic, institutional and policy based sources. These include peer-reviewed journal articles published between 2020 and 2026, international reports, e.g. World Bank and United Nations reports, and relevant government documentation, e.g. treaties, policy statements related to transboundary water governance. To provide a multidisciplinary perspective on hydrology and political science and environmental governance, additional data from reputable academic databases like Springer, Sage Journals, ResearchGate, and arXiv were collected. The sources present empirical observations as well as theoretical bases to analyse issues of water security in South Asia. The literature's "relevance" is assessed through a set of criteria that includes: recentness, impact, and thematic suitability, and a ranking based on these conditions is placed on the articles. The criteria used for the selection of literature has been the 'relevance' of the literature, including its recentness, its impact and its thematic suitability, and a ranking has been given to the articles based on these criteria to ensure that literature is presented as is relevant and contemporary from the analytical perspective of the evolving hydropolitical conditions across the major river basins.⁸

3.3 Analytical Approach

This study is an analytical study that uses a thematic analysis, comparative basin analysis and a geopolitical interpretation approach. Recurring patterns of transboundary water conflicts, including climate change, infrastructure projects and institutional deficiencies, are uncovered through the use of thematic analysis. Comparative basin analysis

⁵Ikram, N. (2026). Navigating strategic waters: Hydropolitical disputes in South Asia. *European Scientific Journal*. <https://doi.org/10.19044/esj.2026.v22n37p57>

⁶UN Water. (2023). *World water development report*. United Nations.

⁷Zeng, X., Bracco, A., & Tagklis, F. (2021). River plume dynamics in South Asia. *arXiv*. <https://arxiv.org/abs/2112.11252>

⁸ScienceDirect. (2020). Hydro-energy cooperation in South Asia. <https://www.sciencedirect.com/>



helps to conduct a systematic comparative analysis of the Indus, Ganges–Brahmaputra–Meghna (GBM) and Brahmaputra river system to identify the similarities and differences in relation to governance structure, intensity of conflict and cooperation mechanism. A geopolitical interpretation framework is also utilized to evaluate the impact of state interests, power differences and strategic factors on water-sharing arrangements and enforcement of treaties. The multi-layered analytical approach enables a holistic perspective of environmental and political aspects of water security. It also allows for the integration of legal, ecological and strategic views, which further enrich the explanatory value of the study.⁹

3.4 Limitations

There are some limitations to this study that should be noted. First, it is purely secondary based and has no primary empirical data collection like stakeholder consultation or interviews, or field surveys. This constrains the perception of water conflict and local governance practices from the ground level. Secondly, this research relies on published sources, which can be both institutional or academic and may not always accurately mirror current political reality or the classified and confidential nature of diplomatic discussions. Third, detailed hydrological and strategic information is limited and access is not always possible, including information from upstream states, so as to effectively assess the river flow dynamics at a comprehensive quantitative level. Fourth, geopolitical relations in South Asia are evolving quickly and some of the conclusions may be subject to changes in the years to come. The study is nonetheless a rigorous academic research as it provides multiple credible sources for triangulation and a systematic analytical interpretation.

IV. RESULT

Table 4.1: Relative Significance of Major Drivers of Transboundary Water Conflicts in South Asia

Conflict Driver	Relative Significance (%)
Climate Change & Hydrological Variability	30
Dam Construction & Hydropower Projects	25
Geopolitical Rivalry	20
Data Asymmetry & Information Gaps	15
Treaty and Institutional Limitations	10

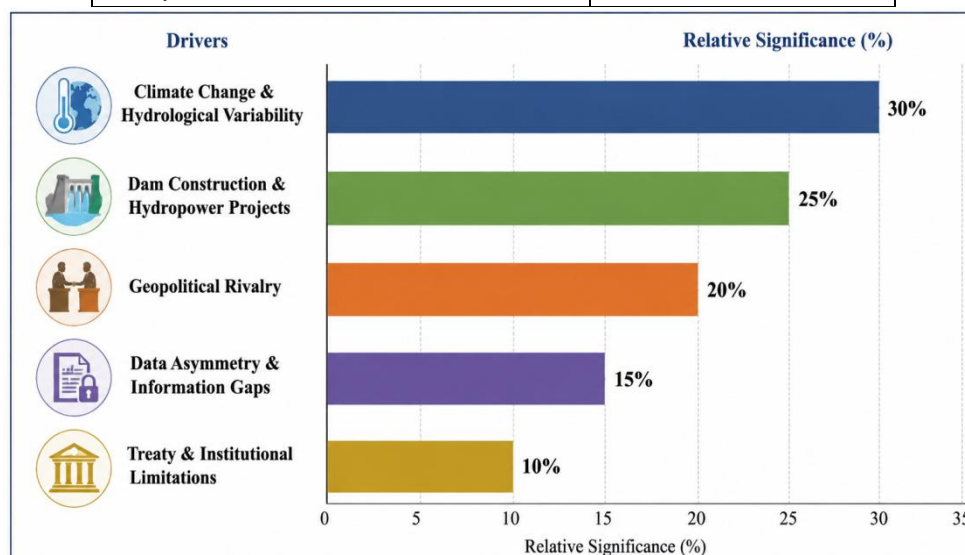


Figure 4.1: Major Drivers of Tran boundary Water Conflicts in South Asia

⁹Hasson, S. U., Lucarini, V., & Pascale, S. (2020). Hydrological cycle over South Asia. *arXiv*. <https://arxiv.org/abs/1301.0020>



Interpretation

Thematic analysis suggests that climate change and hydrological variability are the most crucial factors in triggering transboundary water disputes in South Asia, contributing about 30% of the factors found in the literature reviewed. The second greatest influence (25%) is dam construction and hydropower development, indicating the increasing concerns by upstream projects that involve dam construction. The impacts of geopolitical rivalry among riparian states and data asymmetry and insufficient information sharing are significant contributors to water-related tensions (20% and 15% respectively). The remaining 10% are due to Treaty and institutional restrictions, indicating a need for greater governance flexibility and basin-wide arrangements. The figure shows that the current hydropolitical context in South Asia is the product of the interplay of environmental and geopolitical factors.¹⁰

V. WATER RESOURCES AND PRODUCTS

5.1 Indus Basin

One of the most important transboundary river systems of South Asia is the Indus Basin, which is shared between, mainly, India and Pakistan. The basin is one of the longest running cases of international water cooperation was mentioned as such by the Indus Waters Treaty (1960). The eastern rivers (Ravi, Beas, and Sutlej) are mainly allocated to India, while the western rivers (Indus, Jhelum and Chenab) are mostly allocated to Pakistan. Even though the treaty was historically resilient, it has faced growing pressures in light of the current political and environmental landscape. The construction of hydropower on the western rivers has raised worries along the border as water supplies may be affected. These are further exacerbated by the heavy reliance of Pakistan on the Indus system for agriculture and food security. Also, political issues and domestic dynamics around Kashmir often affect treaty negotiations and implementation of water. Water governance issues in the basin are becoming complex as disputes have arisen over run of the river projects like Kishanganga and Ratle and have caused an impasse that has necessitated arbitration and litigation. The contribution of climate change and glacier retreat in the Himalayas has increased the uncertainty, and in the current context, cooperative management is highly relevant for the region's stability and sustainable development.¹¹

5.2 Ganges–Brahmaputra–Meghna (GBM) Basin

The Ganges–Brahmaputra–Meghna Basin is one of the biggest and most populated river systems in the world and covers parts of India, Bhutan, China, Nepal and Bangladesh. Agriculture, fisheries, transportation and livelihoods activities within the basin sustain the lives of several hundred million people. But it suffers from considerable governance problems and conflicting national interests. Bangladesh being a downstream country, is often affected by seasonal scarcity of water due to the withdrawal of water by the upstream countries. The diversion of water by India from important and sensitive water bodies and water resources has always been a cause of worry for the downstream communities. The outstanding Teesta River issue between India and Bangladesh presents one of the most difficult challenges to broadened cooperation, and the issue has not been resolved. Additionally, governance in the basin is not well coordinated, there are several bilateral governance arrangements, but little coordination among basin-wide institutions. Overcoming the challenges of climate change, rising population pressure and rising water demand further increase the challenges of management. This makes the GBM Basin a good example of the difficulties associated with balancing development, environmental sustainability and equitable resource allocation in the presence of multiple riparian states.

5.3 Brahmaputra Basin

It is believed that the Brahmaputra Basin is the most geopolitically sensitive transboundary river system in South Asia. The river begins in Tibet as the YarlungTsangpo and then passes through the territories of China, India and Bangladesh where it merges into the Ganges system. Strategic importance has been added to the basin by the recent Chinese

¹⁰BIISS. (2020). Water conflicts in South Asia. *BIISS Journal*. <https://biiss.org/article/water-conflicts-in-south-asia-indias-transboundary-river-conflicts>

¹¹Reuters. (2025). China's mega dam raises regional concerns. <https://www.reuters.com/>



investment in hydropower and dam projects in the upstream sections. These changes have raised concerns in India about changes in river flow patterns, environmental effects, and future water diversion projects. In contrast to the Indus Basin, there is no overall water sharing agreement between China and India for the Brahmaputra. There is a considerable institutional void in regard to the Brahmaputra, unlike the Indus Basin, where the comprehensive water sharing agreement exists. The other is the lack of hydrological data sharing, especially in times of political tension, that can have a negative impact on flood forecasting and disaster management in downstream areas. Formalized governance mechanisms have been absent, which has raised uncertainty and raised mistrust amongst riparian states. Given the increasing variability of extreme weather events and glacier melt in the Brahmaputra Basin, it is expected to continue to be a flash point of hydropolitical conflict in the region, and greater regional cooperation and confidence-building is needed.¹²

VI. DISCUSSION

The results of this study indicate that geopolitical, environmental and institutional factors are becoming more important for water security in South Asia. The most important is the shift of water from shared natural resource to a geopolitical strategic tool. The big projects such as dams, barrages and hydropower are frequently seen as a development project rather than just national security and strategic ones. This has made regional cooperation increasingly difficult and has led to increasing distrust between riparian states.¹³

Climate change exacerbates these challenges as a conflict multiplier. Uncertainties in river flows and water availability have arisen from variation in monsoon patterns, increased glacial melt and increased frequency of floods and droughts. This environmental instability undermines the current water-sharing arrangements and can raise the risk of interstate tensions. The study also emphasizes the high level of institutional fragmentation in the region. Existing bilateral agreements rarely include climate adaptation clauses, exchange of hydrological information in real time, or enforcement or monitoring agreements, which reduces their usefulness in overcoming new problems.

The other key result relates to the importance of power asymmetry in transboundary river governance. This is because the upstream countries like China and India have more control over the river flows and development than the downstream countries like Bangladesh and Pakistan, giving them strategic power over the latter. While there is not likely to be any large-scale water wars, there are reasons to be more concerned about hydropolitical instability in the future, including escalating diplomatic conflicts, growing controversy over water infrastructure, and local conflicts. Therefore, enhanced regional collaboration and governance systems are crucial for water security in South Asia.¹⁴

VII. CONCLUSION

The future of transboundary river governance in South Asia is at a critical juncture due to the multifaceted nature of climate change, increasing water demand, geopolitical rivalry and institutional constraints. The Indus, Ganges, Brahmaputra and Meghna rivers are crucial for agriculture, power generation, preserving ecosystems and providing livelihoods for millions. But water is now becoming a pivotal geopolitical asset due to major uncertainties in supply and demand, along with the rapid pace of infrastructure construction and ongoing political conflicts.

Historically, existing water-sharing arrangements and bilateral treaties have proven to be effective in averting conflicts of large proportions, but they are now falling short of what is needed to meet the challenges of the current era. Traditional governance models have been shown to be inadequate because of the variability of river flows driven by climate change, the power imbalance between upstream and downstream communities, and poor data sharing practices. In addition, increasing water infrastructure securitisation and hydropower projects have helped build mistrust between riparian states and hampered long-term cooperation.

¹²Ghosh, K. (2026). Water-sharing frameworks in South Asia. *International Journal of River Basin Management*. <https://doi.org/10.1080/15715124.2026.2628910>

¹³The Guardian. (2026). Rise in water-related violence globally. <https://www.theguardian.com/>

¹⁴Springer Nature. (2024). Water tensions between India and China. <https://link.springer.com/article/10.1007/s44282-024-00089-x>



South Asian countries need to shift from bilateral water management to a basin-wide, multilateral governance framework to ensure water security in the long-term. The future policies must include legal frameworks, which are climate adaptable, transparent sharing systems of hydrological information, joint monitoring bodies and cooperative management of transboundary water resources. Supporting regional dialogue and minimizing political tensions around water-related issues is also critical in promoting trust and stability. If important institutional changes and cooperation are not achieved, the region will face more hydropolitical tensions, environmental vulnerabilities, and threats to regional peace and sustainable development.¹⁵

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