

Hydro-Hegemony and Water Security in South Asia: Reassessing the Indus Waters Treaty in the Twenty-First Century

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ABSTRACT

The Indus Waters Treaty (IWT), signed in 1960 between India and Pakistan with the mediation of the World Bank, has long been regarded as one of the world's most successful transboundary water-sharing agreements. Despite decades of military confrontations and political tensions, the treaty has remained operational, demonstrating remarkable institutional resilience. However, changing geopolitical realities, rapid population growth, climate change, increasing water scarcity, and extensive hydropower development have raised questions regarding its long-term sustainability. This article examines the evolving concept of hydro-hegemony in South Asia and analyzes how upstream–downstream power asymmetries influence regional water governance. Drawing upon hydro-political theory, international water law, and environmental security perspectives, the study explores the strategic implications of India's upstream position and Pakistan's dependence on the Indus River System. The research argues that while the treaty has successfully prevented large-scale water conflicts, emerging environmental and geopolitical challenges require institutional modernization and greater bilateral cooperation. Strengthening hydro-diplomacy, enhancing data sharing, and incorporating climate adaptation into treaty mechanisms are essential for ensuring sustainable water governance and regional stability.

Keywords: Hydro-hegemony, Indus Waters Treaty, Water Security, South Asia, Climate Change, Hydropolitics, International Water Law.

INTRODUCTION

South Asia is one of the world's most water-stressed and geopolitically sensitive regions. Its major river systems cross national boundaries, linking countries whose political and strategic relations are often characterized by mistrust and competition. The Indus, Ganges, and Brahmaputra river systems support hundreds of millions of people and provide water for agriculture, domestic consumption, industry, and energy production. Consequently, water management has increasingly become connected with questions of economic development, environmental sustainability, national security, and regional stability. The situation is particularly important in the Indus Basin, where India and Pakistan depend on a shared river system while simultaneously maintaining one of the world's most enduring geopolitical rivalries.

The Indus Waters Treaty (IWT) was signed by India and Pakistan in 1960 with the assistance of the World Bank. It divided the six major rivers of the Indus system between the two countries. India received primary rights over the eastern rivers—the Ravi, Beas, and Sutlej—while Pakistan received

primary rights over the western rivers—the Indus, Jhelum, and Chenab, subject to specified Indian uses. The treaty also established institutional mechanisms, including the Permanent Indus Commission, information exchange, inspections, and procedures for resolving disagreements.

The IWT has often been described as remarkably resilient because it survived several wars and periods of intense diplomatic confrontation. However, its survival does not necessarily mean that the treaty has completely resolved underlying hydropolitical inequalities. The concept of hydro-hegemony provides a useful analytical framework for examining this issue. Zeitoun and Warner (2006) define hydro-hegemony in terms of the control of transboundary water resources through combinations of power, geography, infrastructure, knowledge, institutions, and political influence. This approach shifts attention from the question of whether states cooperate or fight over water toward the more complex question of who has greater capacity to shape the distribution and governance of water.

This perspective is particularly relevant to the India–Pakistan relationship. India occupies an upstream position in relation to much of the Indus Basin and possesses greater economic and infrastructural capacity to develop dams and hydropower projects. Pakistan, as a downstream state, has greater dependence on predictable flows from the western rivers. This asymmetry creates a structural imbalance even though the IWT establishes legally defined rights.

The twenty-first century has introduced additional challenges. Climate change, glacier retreat, changing precipitation patterns, floods, droughts, population growth, urbanization, and increasing agricultural and energy demand are altering the context within which the treaty operates. The central argument of this article is that the IWT remains essential for regional water security but requires institutional adaptation to address these emerging pressures. The treaty should increasingly be viewed not simply as a mechanism for dividing rivers but as a platform for cooperative basin management and climate-resilient water governance.

Conceptualizing Hydro-Hegemony

The concept of hydro-hegemony has become an important contribution to the study of international water politics. Traditional approaches to transboundary water conflict often focus on scarcity and the possibility of "water wars." However, hydro-hegemony scholarship argues that conflict is only one possible outcome of unequal water relations. States can exercise power through control over infrastructure, knowledge, institutions, geography, and diplomatic influence without necessarily engaging in open conflict.

Zeitoun and Warner (2006) conceptualize hydro-hegemony as the dominance of one actor over water resources in a transboundary basin. Such dominance can be maintained through several forms of power. Geographic power derives from an upstream position, while material power comes from economic resources, military capabilities, technology, and infrastructure. Bargaining power is related to diplomatic influence and political relationships, while ideational power involves shaping the narratives and perceptions surrounding water management.

Hydro-hegemony does not necessarily mean that the dominant state completely controls the river. Instead, it refers to the ability of a stronger actor to influence how water is allocated, developed, interpreted, and governed. Institutions can sometimes reduce these inequalities by creating legal rules and mechanisms for negotiation. However, institutions themselves may reflect historical power relations.

This theoretical approach is highly relevant to South Asia because water relations are embedded within broader geopolitical inequalities. India's larger economy, upstream position, technological capacity, and extensive infrastructure development provide it with significant hydropolitical capabilities. Pakistan's downstream position and heavy dependence on the Indus Basin create a

different strategic vulnerability. The IWT therefore operates within a broader structure of unequal capabilities.

Water Security in South Asia

Water security refers to the reliable availability of adequate quantities and acceptable quality of water for human well-being, economic development, ecosystems, and political stability. In South Asia, water security is increasingly challenged by demographic growth, urbanization, industrialization, agricultural demand, and climate change.

Agriculture remains a major consumer of freshwater throughout the region. Irrigation is essential for food production, especially in countries such as Pakistan and India where large populations depend on agriculture directly or indirectly. At the same time, expanding cities require increasing quantities of water for domestic and industrial purposes.

Climate change adds another layer of uncertainty. Changes in precipitation, temperature, snow accumulation, glacier behavior, and extreme weather events can influence the timing and volume of river flows. The Indus Basin is particularly sensitive because its water system depends on a combination of glacier and snowmelt, rainfall, and seasonal patterns.

The World Bank (2018) has highlighted serious water-management challenges facing Pakistan, including declining per-capita water availability, inefficient irrigation, groundwater depletion, and increasing climate-related pressures. These challenges demonstrate that water security cannot be understood simply in terms of the quantity of water entering a country. It also depends on storage capacity, infrastructure, management efficiency, agricultural practices, institutional effectiveness, and the predictability of future supplies.

The Indus Waters Treaty: Historical and Institutional Context

The partition of British India in 1947 created an immediate water-management problem because the irrigation infrastructure of the Indus Basin crossed the newly established international border. The dispute over canal-water supplies created tensions between India and Pakistan and demonstrated the difficulty of managing a shared river system following political partition.

After years of negotiations, the Indus Waters Treaty was signed in 1960. The treaty represented a compromise based largely on territorial river allocation. The eastern rivers were assigned primarily to India, while the western rivers were assigned primarily to Pakistan, with certain specified uses permitted to India.

The treaty also created the Permanent Indus Commission, which remains a key institutional mechanism for bilateral water communication. It provides a platform for technical discussions, information exchange, and inspection-related activities. Where disagreements cannot be resolved through the commission, the treaty provides additional dispute-resolution procedures involving a Neutral Expert or Court of Arbitration, depending on the nature of the issue.

The treaty's durability is one of its most significant characteristics. India and Pakistan fought wars in 1965, 1971, and 1999, yet the IWT continued to operate. This institutional resilience demonstrates that transboundary water cooperation can survive even in highly conflictual political environments.

However, durability should not be equated with perfection. The treaty was designed under the conditions of the mid-twentieth century. Contemporary challenges such as climate change, groundwater depletion, ecological degradation, population growth, and new hydropower technologies were not central considerations when the agreement was negotiated.

Hydro-Hegemony and the India–Pakistan Water Relationship

The India–Pakistan water relationship demonstrates several characteristics associated with hydro-hegemony. The most obvious factor is upstream–downstream asymmetry. India is geographically upstream in relation to Pakistan's major western rivers, while Pakistan is heavily dependent on the Indus system for irrigation and food production.

This geographical relationship creates a structural difference in vulnerability. India possesses greater opportunities to construct and operate upstream infrastructure, while Pakistan has fewer options to diversify its dependence on the Indus Basin. Consequently, even when India's activities remain within treaty provisions, Pakistan may interpret additional infrastructure development as strategically significant.

India's growing hydropower capacity also contributes to this asymmetry. Hydropower projects do not necessarily allow India to permanently deprive Pakistan of water because the treaty establishes restrictions on India's use of the western rivers. Nevertheless, the development of upstream infrastructure can generate concerns regarding the timing and predictability of flows.

The concept of hydro-hegemony helps explain why perceptions of control can be as politically important as actual physical control. Pakistan may become concerned about future Indian capabilities even if those capabilities cannot immediately or permanently alter Pakistan's water supply. Conversely, India may regard its hydropower development as legitimate economic development rather than an attempt to exercise coercive control.

This difference in perceptions can produce a security dilemma in the water domain.

Indian Hydropower Development and Pakistani Concerns

India has increasingly emphasized hydropower development in Jammu and Kashmir and other parts of the Himalayan river system. Hydropower projects can provide electricity, regulate flows, and support economic development. From India's perspective, such projects can therefore be understood as legitimate development initiatives.

Pakistan, however, has expressed concerns regarding several Indian projects on rivers allocated primarily to Pakistan under the IWT. The disputes over projects such as Baglihar and Kishenganga demonstrate the complexity of interpreting treaty provisions concerning permissible Indian uses of western rivers.

The Baglihar dispute was referred to a Neutral Expert, while the Kishenganga dispute eventually reached a Court of Arbitration. These cases demonstrate both the limitations and strengths of the treaty. On the one hand, disagreements indicate that the treaty does not eliminate competing interests. On the other hand, the fact that disagreements were subjected to institutional procedures rather than military confrontation demonstrates the value of the treaty.

From a hydro-hegemony perspective, these disputes also demonstrate how infrastructure becomes a form of power. Dams and hydropower projects are not simply physical structures; they influence perceptions of control, bargaining power, and future water availability.

Pakistan's Downstream Vulnerability

Pakistan's water security is closely tied to the Indus Basin. The country has developed one of the world's largest irrigation systems around the river network. Agriculture depends heavily on irrigation, while water availability also affects food security, hydropower, industry, and rural livelihoods.

This dependence creates a significant vulnerability. Unlike a diversified economy with multiple major river systems, Pakistan has limited alternatives to the Indus Basin. Therefore, even changes in perceptions about future water availability can produce significant political and economic concerns.

Pakistan's vulnerability is also related to climate change. Rising temperatures, glacier and snowmelt changes, altered precipitation, floods, and droughts may create greater uncertainty about future water supplies. These developments increase the importance of water storage, efficient irrigation, groundwater management, and institutional cooperation.

Pakistan's downstream vulnerability therefore represents an important component of the hydro-hegemonic relationship. The country seeks not simply greater quantities of water but predictable, reliable, and institutionally protected access to the Indus system.

Climate Change and the Future of the Indus Basin

Climate change is transforming the conditions under which the IWT operates. The Indus Basin is particularly sensitive to changes in temperature and precipitation because its hydrological system depends significantly on Himalayan glaciers and seasonal snowmelt.

Glacier dynamics are complex. Increased temperatures can accelerate melting in some periods while potentially reducing long-term ice reserves. Changes in snowfall, rainfall, and extreme weather events can further alter river flows.

Floods represent another major challenge. Pakistan's devastating floods have demonstrated how excessive water can be as damaging as scarcity. Effective water security therefore requires the management of both extremes—too little and too much water.

The IWT primarily focuses on the allocation and use of river waters rather than comprehensive climate adaptation. This creates an important institutional gap. A twenty-first-century water-security framework must incorporate climate forecasting, flood management, ecological sustainability, groundwater, sedimentation, and disaster-risk reduction.

Water Security and National Security

The securitization of water is increasingly visible in India–Pakistan relations. When water is presented as an existential national-security issue, technical disagreements can become politically sensitive.

For Pakistan, concerns about water security are closely connected with food security and economic stability. For India, water development is linked with energy security, regional development, and sovereignty over natural resources.

The danger is that water issues can become incorporated into broader military and political rivalries. In such circumstances, even a technically manageable disagreement may generate significant political reactions.

However, it is important not to exaggerate the relationship between water scarcity and conflict. Water scarcity does not automatically produce war. In fact, shared water resources can create incentives for cooperation because both states have an interest in maintaining predictable river systems. The IWT itself demonstrates that institutional cooperation can survive political conflict.

The key issue is therefore not whether water will inevitably cause conflict but whether weak institutions, political mistrust, and climate uncertainty can transform water disputes into strategic competition.

The Indus Waters Treaty and Regional Stability

The IWT has contributed to regional stability by maintaining a structured framework for bilateral water relations. Its significance extends beyond legal water allocation because it creates channels of communication between two states that frequently lack trust in other areas.

The Permanent Indus Commission has particular importance in this regard. Regular technical interactions can reduce uncertainty and create opportunities for clarification. Such mechanisms can function as confidence-building measures.

The treaty also provides an alternative to unilateral responses. Instead of immediately treating disagreements as national-security crises, the parties have historically had the option of using technical consultations, neutral experts, and arbitration.

From this perspective, the IWT represents an example of institutionalized interdependence. The treaty does not eliminate power asymmetries, but it can constrain the ways in which those asymmetries are exercised.

CHALLENGES TO THE TREATY IN THE TWENTY-FIRST CENTURY

Several factors are placing pressure on the IWT.

- **Climate Change:** Climate change is altering hydrological conditions that were relatively predictable when the treaty was negotiated.
- **Population Growth:** Growing populations increase demand for domestic, agricultural, and industrial water.
- **Agricultural Pressure:** Agriculture remains the largest consumer of water, making irrigation efficiency essential.
- **Hydropower Development:** Increasing demand for renewable energy is encouraging the development of hydropower infrastructure.
- **Political Relations:** Deteriorating India–Pakistan relations make technical water cooperation increasingly difficult.
- **Institutional Limitations:** The treaty does not comprehensively address groundwater, environmental flows, climate adaptation, basin-wide ecological sustainability, or modern data technologies.
- **Strategic Securitization:** Increasingly nationalistic political narratives may transform water disputes into broader security issues.

These challenges demonstrate that maintaining the treaty requires more than preserving its original legal text. It requires strengthening its implementation and adapting its institutional framework.

India's 2025 Decision and Emerging Hydropolitical Tensions

The India–Pakistan water relationship entered a new phase in 2025, when India announced that it was placing the Indus Waters Treaty in abeyance following the April 2025 Pahalgam terrorist attack and the subsequent deterioration in bilateral relations. Pakistan rejected India's position and maintained that the treaty could not be unilaterally suspended.

The development was strategically significant because the IWT had historically been insulated from many periods of bilateral confrontation. The decision therefore raised concerns about the future of institutional cooperation and the possibility of water becoming increasingly securitized.

At the same time, the immediate physical ability to substantially alter Pakistan's water supply remains constrained by geography, infrastructure, storage limitations, and the technical characteristics of the river system. Therefore, the most immediate impact is likely to be institutional and political rather than a sudden physical interruption of water flows.

Nevertheless, the development demonstrates how water institutions can become vulnerable when broader geopolitical relations deteriorate. It also reinforces the importance of examining hydro-hegemony as a political process rather than merely as physical control over water.

Hydro-Hegemony and the Security Dilemma

The hydro-hegemony perspective can be integrated with the security dilemma to explain the India–Pakistan water relationship. According to Jervis (1978), states may interpret defensive measures by another state as offensive because intentions cannot be observed with certainty.

This logic applies to hydropower infrastructure. India may consider a project necessary for electricity generation and economic development. Pakistan may nevertheless interpret the project as potentially increasing India's strategic control over river flows.

Pakistan may then respond through diplomatic protests, international legal action, military planning, or political pressure. India may interpret these responses as evidence of Pakistani hostility and strengthen its own water and infrastructure policies.

This cycle does not require either side to deliberately seek conflict. It can emerge from uncertainty and reciprocal threat perceptions.

Therefore, transparent information sharing and institutionalized communication are critical for reducing the hydropolitical security dilemma.

Reassessing the Indus Waters Treaty

The IWT should not simply be abandoned or replaced. Its historical success demonstrates the value of maintaining an institutional foundation for India–Pakistan water relations. However, the treaty should be reassessed in light of twenty-first-century realities.

First, greater emphasis should be placed on climate adaptation. The treaty should support joint assessment of changing hydrological patterns, glacier dynamics, floods, droughts, and extreme weather.

Second, data sharing should be modernized. Satellite observations, remote sensing, real-time hydrological monitoring, and digital data systems could improve transparency.

Third, the parties should strengthen joint scientific cooperation. Independent scientific institutions and universities could provide shared assessments of climate and water trends.

Fourth, water management should increasingly incorporate ecosystem sustainability. River systems should not be treated only as economic resources; ecological flows, biodiversity, groundwater, and environmental health should also be considered.

Fifth, the treaty's dispute-resolution mechanisms should remain functional even during broader political crises. Maintaining technical communication during periods of diplomatic hostility is particularly important.

POLICY RECOMMENDATIONS

The following measures could strengthen water security and reduce hydro-hegemonic tensions:

1. **Strengthen the Permanent Indus Commission:** Regular meetings and technical communication should continue regardless of broader political tensions.
2. **Establish a Climate and Hydrology Mechanism:** India and Pakistan could establish a specialized scientific mechanism for jointly assessing climate-related changes in the Indus Basin.
3. **Expand Real-Time Data Sharing:** Modern hydrological and satellite technologies should be used to improve transparency regarding river flows and infrastructure.
4. **Develop Joint Flood and Drought Management:** The two countries should cooperate on early-warning systems, flood forecasting, and drought preparedness.
5. **Protect Dispute-Resolution Mechanisms:** Technical and legal mechanisms should remain available even when diplomatic relations deteriorate.
6. **Promote Basin-Level Cooperation:** Water governance should gradually move beyond narrow river allocation toward integrated basin management.
7. **Separate Water from Political Retaliation:** Water cooperation should be insulated as much as possible from unrelated political and security disputes.
8. **Strengthen Third-Party Technical Assistance:** International institutions and neutral scientific bodies can assist with data, climate modeling, and technical assessments without replacing bilateral ownership of the treaty.

CONCLUSION

Hydro-hegemony provides an important framework for understanding the complex water relationship between India and Pakistan. The Indus Waters Treaty has successfully managed one of the world's most politically sensitive transboundary river systems for more than six decades, demonstrating the value of legal institutions, technical cooperation, and structured dispute resolution. However, the treaty operates within an unequal hydropolitical environment characterized by India's upstream geographical position, greater economic and infrastructural capacity, and Pakistan's substantial downstream dependence on the Indus Basin.

The twenty-first century has introduced challenges that were not fully anticipated when the treaty was negotiated. Climate change, glacier and snowmelt dynamics, population growth, agricultural demand, hydropower development, groundwater stress, environmental degradation, and deteriorating bilateral relations are transforming the water-security environment. These pressures do not make conflict inevitable, but they can increase uncertainty and strengthen the securitization of water.

The central challenge is therefore to preserve the treaty while adapting its institutional practices to contemporary realities. The IWT should evolve from a primarily allocation-oriented framework toward a broader model of **cooperative, climate-resilient, and environmentally sustainable basin governance**. Greater data sharing, scientific cooperation, climate adaptation, institutional

communication, and effective dispute resolution can reduce uncertainty and mitigate the security dilemma.

Ultimately, the future of the Indus Basin will depend not simply on who controls water but on whether India and Pakistan can develop institutions capable of managing their unequal interdependence. Hydro-hegemony does not have to result in conflict. Institutionalized cooperation can constrain the exercise of power and create incentives for mutually beneficial management. Reassessing and strengthening the Indus Waters Treaty is therefore essential not only for water security but also for wider regional stability in South Asia.

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