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RESEARCH PAPER

Water Security in South Asia: How Indo-Israeli Technological Cooperation Shapes the Future of the Indus Waters Treaty

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ABSTRACT

Under the evolving dynamics of Pakistan–India ties, this article attempts to examine IWT's future in light of the India's growing technological capability and shifting diplomatic policies after the 2025 Pahalgam incident. While the IWT has long been a symbol of resilience in South Asian water diplomacy, the legal regime of the treaty is now under pressure by new emerging issues which are difficult to solve under the provisions of the treaty. Under the umbrella of Indo-Israel cooperation the India's control over water flow in the western rivers of the Indus Basin is increasing, enabling India to influence downstream flow without evidently breaching the treaty provisions. Thus, the article adopts qualitative methodology to contextualize these developments in a geopolitical perspective asserting that India's post-Pahalgam discourse of "reconsideration" or putting on hold the IWT has led to the politicization of water as a weapon. Drawing on legal analysis, hydropolitical theory, and contemporary case studies—such as the Kishanganga and Ratle dam disputes—the article contends that Pakistan faces a complex set of risks: a legal limbo, technological divergence, and diplomatic isolation. In order to counter these threats, the paper recommends a multidimensional approach of treaty repurposing, water infrastructure development, regional cooperation formation, and narrative warfare. Conclusively, the author of the article focuses on the proposition that the Indus Waters Treaty's sustainability and the security of waters in South Asia can be defined not by legal compliance but by the reconceptualisation of hydro-strategy within a hi-tech region besieged by increasing political instability.

KEYWORDS Indus Waters Treaty, Indo-Israel Cooperation, Water Security, Hydro-politics, South Asia

Introduction

For long the water has been a critical rather understated dimension of security in South Asia where the Indus Waters Treaty (IWT) between India and Pakistan, dating back to 1960, has stood out as an exception to otherwise hostile bilateral relations. Formulated under the aegis of the World Bank, this treaty has survived several wars and diplomatic breakdowns, and provided a stable framework for the sharing of Indus River system (Wolf, 1998). Yet, in the aftermath of recent events, there appears to be a convergence of geopolitical, technological, and environmental factors that would threaten to unsettle this decades old agreement.

The latest source of tension emerged in the wake of the 2025 **Pahalgam terrorist attack**, which Indian officials publicly attributed to Pakistan-based militant networks.

In response, calls have resurfaced within Indian political and media circles to revisit, suspend, or even withdraw from the Indus Waters Treaty as a means of strategic retaliation and a punitive measure (Gupta, 2024). Though legal scholars emphasize the permanence of the IWT under international law (Salman, 2008), India's political posturing has added a new layer of pressure on Pakistan, framing water not just as a natural resource but as a tool of coercive diplomacy.

Compounding these tensions is India's expanding partnership with Israel in the domain of water technology. Since the deepening of bilateral ties post-2017, Israel has provided India with cutting-edge expertise in drip irrigation, desalination, water recycling, and smart agriculture (Ghosh & Singh, 2020). These technologies are being implemented in several Indian states, including sensitive regions like Jammu and Kashmir, enhancing India's capacity to utilize water resources more effectively—often without directly violating treaty obligations (Jacob, 2021). While this collaboration may not constitute a direct treaty violation, it empowers India with greater upstream control and operational flexibility, especially during crisis periods. Such developments could gradually alter the balance of water-sharing, placing Pakistan in a vulnerable downstream position—not through military coercion, but via technological superiority.

This article examines how Indo-Israeli water cooperation, combined with heightened political rhetoric following security incidents, is reshaping the strategic landscape of the Indus Basin. It suggests that Pakistan not only needs to understand the hydro-political risks emanating from the construction of Indian dams but also the shifting balance based on water technology that can threaten downstream security. In addition, it also outlines how Pakistan can adapt to this shift through legal, diplomatic, and technological policy pathways.

Literature Review

The Indus Waters Treaty (IWT), signed on September 19, 1960, between India and Pakistan, stands as one of the most enduring examples of water-sharing agreements in international diplomacy. Brokered by the World Bank, the treaty aimed to resolve the dispute that arose following the 1947 Partition of British India, which divided the Indus River system between the newly created nations (Salman & Uprety, 2002). The river system, comprising six rivers—Indus, Jhelum, Chenab, Ravi, Beas, and Sutlej—was essential for both countries' agriculture and livelihoods, and its sudden division posed grave risks of conflict.

Under the IWT, the three western rivers (Indus, Jhelum, and Chenab) were allocated to Pakistan, while the three eastern rivers (Ravi, Beas, and Sutlej) were assigned to India, with limited usage rights granted across the divide (Wolf & Newton, 2008). India was permitted non-consumptive uses such as irrigation, hydropower generation, and navigation on the western rivers, provided that it did not alter their natural flow in ways that harmed Pakistan's interests downstream (Pochat, 2006). This allocation, while viewed as a significant compromise by India at the time, was considered crucial for Pakistan's water security and national survival.

The Treaty was designed to be "permanent" and binding regardless of the state of bilateral relations—a legal feature that has allowed it to survive multiple wars (1965, 1971, and 1999) and numerous military standoffs (Salman, 2008). It included provisions for a Permanent Indus Commission (PIC), dispute resolution mechanisms, and third-party arbitration through the World Bank in case of serious disagreements. Despite its

age, the IWT has generally functioned with remarkable resilience, often cited as a model for hydro-diplomacy globally (Khan, et. al., 2022; Zeitoun & Mirumachi, 2008).

Nevertheless, technical and political tensions have arisen over time. India's construction of hydroelectric projects on the western rivers—such as the Baglihar Dam on the Chenab and the Kishanganga Hydroelectric Project on the Jhelum—has provoked repeated objections from Pakistan. These projects as much as the Modi government argues that they do not violate the treaty rules have stirred up arbitration and inspection processes, thus revealing the growing difficulties in the management of the agreement in an era characterized by higher water demands and climate risks (Rizvi, 2012). As upstream riparian, India's ability to build "run-of-the-river" projects within treaty limits still gives it a degree of operational flexibility that Pakistan views with suspicion.

More difficulties have arisen in the last two decades because of unmitigating climate change, fluctuating glacial movements, and evolving water scarcity, which augment the geo-political implications of water control (Mustafa et al., 2017). Besides, by laying emphasis on quantity and flow rather than quality and climate variability, or even groundwater management, the current treaty instrument becomes more vulnerable to modern day realities of water security.

Therefore, while the IWT was once an instrument of water distribution it has soared to even greater heights– it is now an instrument to manipulate the geo politics between India and Pakistan. It does so as technological capacities develop and political discourse grows sharper and shriller, especially in the wake of security threats, the treaty is now subjected to stressors that its framers likely could not have contemplated.

Based on the above context, the current article proposes following research questions:

1. What impact does Indo-Israeli cooperation in water have on India's upstream position within the Indus Basin?

2. What challenges does Pakistan face as a downstream country given India's technological and political shifts?

Material and Methods

This study adopts a qualitative research methodology. It explores secondary evidence found in academic books, international arbitrations, treaty text, public statements from governments, and reports written by policy specialists. Hydropolitics and geopolitical lens are used to analyze the way water security, strategically used technology, and regional conflict are linked. Particular emphasis is placed on the Indo-Israeli partnership's implications for the Indus Waters Treaty and Pakistan's downstream vulnerability. This study brings together legal, technological and strategic views to give a complete picture of the hydro-diplomatic environment.

Results and Discussion

Recent Flashpoints in the Indus Waters Dispute

The implementation of IWT has faced different challenges over the years but the new century has seen quite a rise in technical and political matters of concerns wherein

India has initiated several hydropower projects over the western rivers that exclusively belong to Pakistan under the Treaty. The most contentious among these are the Kishanganga and Ratle Hydroelectric Projects, both located in the Union Territory of Jammu and Kashmir, and both alleged by Pakistan to violate the spirit—if not the letter—of the IWT (Rizvi, 2012; Mustafa et al., 2017).

Kishanganga Hydroelectric Project

Constructed in 2018 the 330 MW KishangangaHydroelectric Power Project has diverted the Neelum River (a tributary of the Jhelum) through a 23 km long tunnel to the Bonar Madmati Nallah in Bandipora distorting the natural flow of the river. Pakistan protested this diversion, arguing that it undermines its planned Neelum-Jhelum project downstream and violates Articles III and IV of the IWT (Salman & Uprety, 2002). While India defended the project as a run-of-the-river scheme permitted under the Treaty, Pakistan took the dispute to the **Permanent Court of Arbitration (PCA)** in The Hague in 2010. The Court's ruling in 2013 allowed India to proceed but prohibited it from reducing river flow below a minimum threshold during construction and operation (Permanent Court of Arbitration, 2013).

Ratle Hydroelectric Project

The currently under construction, 850 MW Ratle project, located on the Chenab River in Kishtwar district, has reignited legal contestation. Pakistan has raised concerns over the design of the dam's spillways and gated structure, which it argues could allow India to manipulate water flow during periods of tension or conflict. These concerns echo those raised during the Baglihar dispute, in which India's designed modifications were later assessed by a World Bank-appointed neutral expert in 2007 (Salman, 2008). Pakistan insists that Ratle's cumulative impact with Kishanganga could severely compromise its downstream water security (Rizvi, 2012).

Pakistan's 2023–2024 Legal Action and World Bank Mediation

In January 2023, following unsuccessful bilateral dialogue under the auspices of the Permanent Indus Commission, Pakistan formally requested the World Bank to resume arbitration proceedings concerning both Kishanganga and Ratle. This move came after years of stalled efforts and India's consistent objections to third-party involvement, particularly the establishment of a Court of Arbitration and the appointment of a neutral expert simultaneously—something India argued violates the IWT's dispute resolution procedure (World Bank, 2023). However, in July 2023, the Court of Arbitration was formally constituted to adjudicate Pakistan's claims regarding Indian project designs (Dawn, 2023).

India refused to participate in the arbitration hearings and reiterated its position that such proceedings are legally untenable under the Treaty's Article IX. It also emphasized that its right to build run-of-the-river projects for hydropower, as long as they do not obstruct water flow, is clearly protected under the Treaty (Jacob, 2021). Nonetheless, the Court of Arbitration has proceeded, with Pakistan presenting detailed technical objections and seeking rulings that would restrain India's future dam construction practices on the western rivers.

These developments underscore the growing complexity of the IWT in an era of heightened nationalism, energy demands, and legal divergence. The current dispute is

no longer a mere technical disagreement—it reflects a broader breakdown in mutual trust and a shift in India's regional posture. The political will to adhere to dispute resolution mechanisms is weakening, as evidenced by India's non-participation, and the Treaty's reliance on cooperative spirit appears increasingly fragile.

This deterioration is particularly dangerous when viewed alongside India's expanding technological capabilities and its evolving strategic rhetoric—especially in the aftermath of events like the 2025 Pahalgam attack. As the next section will show, these security-linked flashpoints are accelerating India's tendency to frame water not just as a resource, but as a strategic instrument of pressure.

The Pahalgam Attack and India's Water Rhetoric Shift

In April 2025, a deadly terrorist attack in Pahalgam, a prominent tourist and pilgrimage site in Indian-administered Jammu and Kashmir, killed several security personnel and civilians. Indian authorities promptly attributed the attack to Pakistan-based militant groups, specifically citing Lashkar-e-Taiba as the alleged perpetrator. Though Pakistan denied involvement and condemned the violence, the incident sparked a surge of nationalist sentiment in India and rekindled long-standing debates about the utility and fairness of the Indus Waters Treaty (IWT) in the face of persistent cross-border militancy (Gupta, 2025).

Importantly, Pakistan responded by demanding a neutral international investigation into the Pahalgam incident, highlighting what it described as India's habitual pattern of assigning blame without credible evidence. This response was diplomatically calculated to both deflect accusations and expose India's lack of transparency in handling such crises (Kugelman, 2025; Rehman, 2025. It also sought to checkmate India's efforts to unilaterally escalate tensions, using international norms and investigative standards as a shield against politicized narratives (Ahmed, 2025).

The Pahalgam incident nevertheless triggered political calls to reassess or suspend India's participation in the IWT, framing the Treaty as an outdated concession to a hostile neighbor. Indian news outlets and political leaders questioned why India should uphold a water-sharing agreement that benefits Pakistan while receiving "terror in return" (The Hindu, 2025). These voices revived earlier post-Uri and Pulwama sentiments (2016, 2019 respectively), when the Indian government also considered tightening its grip on river waters flowing to Pakistan under the IWT framework (Singh, 2020).

Observers noted that such post-crisis narratives often coincide with India's electoral calendar, wherein hostile posturing toward Pakistan has been politically mobilized to consolidate domestic support (Ganguly & Kapur, 2019; Palshikar, 2022). The weaponization of national security rhetoric, especially in relation to water and cross-border terrorism, has been a consistent electoral strategy in Indian politics, enabling governments to present a muscular foreign policy image to the public (Jaffrelot, 2021; Chatterji & Acharya, 2023).

Although the IWT is a legally binding international treaty registered with the United Nations, the increasing politicization of water as a strategic tool has introduced volatility into a previously stable legal framework. While legal scholars stress that unilateral withdrawal from the Treaty would violate international norms and invite global scrutiny (Salman, 2008), Indian political rhetoric has begun to frame water not

just as a right but as a retaliatory instrument. The idea of "reviewing" the Treaty post-Pahalgam gained significant traction in nationalist discourse, even if not officially declared as policy.

This shift in narrative is concerning for multiple reasons. First, it blurs the lines between legal water-sharing obligations and national security responses, thus weakening the Treaty's neutrality. Second, it introduces strategic uncertainty for Pakistan, as even the perception of future disruptions to water flow can impact agricultural planning, investment, and food security (Mustafa et al., 2017; Wolf & Newton, 2008). Third, the rhetorical framing sets a precedent for future crisis moments—wherein any major militant incident could trigger calls to weaponize water access (Salman & Uprety, 2002).

The rhetoric around the Pahalgam attack must also be viewed alongside India's increasing technical capacity to control and store water through Israeli-assisted technologies. Unlike the past, when India lacked the infrastructure to meaningfully restrict flow, today it is better equipped than before—with improved hydrological monitoring, precision irrigation, and upstream storage systems Ghosh & Singh, 2020; Jacob, 2021. However, it is crucial to note that India still lacks the capability to completely block or divert the western rivers without breaching treaty limits or incurring significant diplomatic costs (Salman, 2008; Paliwal, 2020). This gap between rhetoric and capacity offers Pakistan a temporary buffer but also highlights the need for strategic preparedness.

As the following sections will demonstrate, such developments call for a reconceptualization of hydro-politics in South Asia—where technology, security, and diplomacy are increasingly intertwined, and water is no longer an apolitical domain.

India's Strategic Water Partnership with Israel

India's bilateral relationship with Israel has undergone a dramatic transformation since the early 1990s, evolving from low-profile military cooperation to a broad-based strategic partnership. Among the key sectors in this partnership is water technology, which has become increasingly central in India's domestic and foreign policy matrix. Driven by the country's growing water insecurity and agricultural demands, India has turned to Israel's globally recognized expertise in water management, positioning it as a crucial technological ally in addressing domestic hydrological challenges (Ghosh & Singh, 2020).

Israel, with its semi-arid geography, has emerged as a global leader in water efficiency, particularly in drip irrigation, desalination, wastewater recycling, and precision agriculture. These technologies have enabled Israel to reuse nearly 90% of its wastewater— the highest globally—and to maintain agricultural productivity with minimal freshwater usage (Tenne, 2010). Recognizing this potential, India began systematically deepening its water ties with Israel after Prime Minister Narendra Modi's visit to Tel Aviv in 2017, the first-ever by an Indian head of government.

One of the flagship initiatives stemming from this partnership is the India-Israel Agricultural Cooperation Project, under which 29 Centers of Excellence (CoEs) have been established across Indian states such as Haryana, Maharashtra, Gujarat, and Rajasthan. These centers provide training and demonstration of Israeli irrigation technologies tailored to local conditions, enabling farmers to maximize crop yield with

minimal water input (Embassy of Israel in India, 2022). The partnership has been further strengthened by memoranda of understanding (MoUs) between Israeli firms and Indian ministries, promoting joint ventures in water filtration, smart water grids, and drought-resilient seeds (Ghosh & Singh, 2020).

This technical collaboration has also been recognized in academic literature. In 2021, Vinay Kaura pointed out that India and Israel are working together in agriculture not just to transfer technology, but also to build up Indian agricultural resilience, especially in water-stressed areas. In a similar vein, Alik Naha (2022) contends that the implementation of Israeli irrigation techniques and innovation frameworks not only increased India's water-use efficiency but also benefited its long-term strategic sustainability. Their evaluations confirm that the Centers of Excellence (CoEs) are tools of hydro-strategic alignment rather than just agricultural projects. Moreover, ample literary evidence suggests that the cooperation between India and Israel goes beyond agriculture and technology, with both nations often seeing Pakistan as a shared opponent. Their convergence, while framed in development and innovation narratives, has serious implications for Pakistan's regional security posture (Farid & Adnan, 2021).

Notably, several of Israeli-supported initiatives are also being implemented in sensitive regions such as Jammu and Kashmir, amplifying their geopolitical implications. Although the projects are framed as developmental, their long-term impact includes greater Indian upstream control over water resources and improved capability to manage flows during periods of tension. The use of satellite-based irrigation planning, real-time hydrological monitoring, and climate-adaptive water storage is particularly important in enhancing non-confrontational control over the Indus tributaries (Jacob, 2021).

This technological dimension complicates Pakistan's traditional interpretation of the Indus Waters Treaty, which was primarily framed around infrastructure projects like dams and barrages. While the Treaty outlines specific restrictions on the construction of storage and hydroelectric structures, it does not address soft control mechanisms like water conservation or precision diversion through efficient irrigation (Salman & Uprety, 2002). Indian adoption of Israeli technologies therefore enables it to get more out of its water under the treaty while making it strategic to alter flow variability in Pakistan. From a security perspective, the partnership on water projects between India and Israel is one of the many cooperation models that exist between the two states in the fields of counter-terrorism and insurgency, intelligence sharing, and border security. The use of technologies originating from Israel in internal security management in India— ranging from drone-based monitoring to thermal imaging— parallels the use of water tech as a strategic enabler (Jaffrelot, 2021). As such, Israeli assistance in water management cannot be viewed in isolation; instead, it should be appreciated as a part of a broad-spectrum strategic repertoire that adds to India's capability to wield power for both domestic and regional advantage.

For Pakistan this partnership implies a subtle but serious shift of the balance of power in the region. It challenges conventional thinking that water dispute will only appear in relation to the construction of a dam, or if a treaty has been violated. But the prevailing circumstances demonstrate how such change gradually transforms the process of water control into an asset especially when supported by politics and security narratives as seen after the Pahalgam incident.

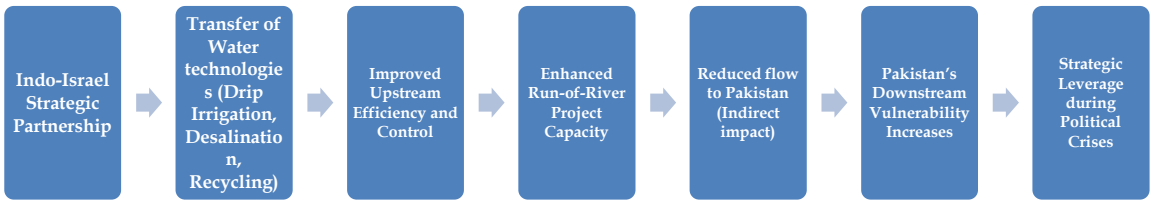

Figure 1: How Indo-Israeli Water Cooperation Enhances India's Strategic Leverage

Technology-Driven Leverage in the Indus Basin

India's increasing reliance on Israeli water technologies has not only improved domestic water efficiency but also introduced a subtle transformation in the regional hydro-political landscape. Unlike traditional forms of hydro-dominance, such as dam construction or canal diversion—which are easily quantifiable and often contestable under treaty provisions—technological enhancements provide India with non-obstructive, treaty-compliant means of upstream advantage (Jacob, 2021). These include tools for precision irrigation, automated flow monitoring, smart storage systems, and advanced weather forecasting, which collectively alter the balance of control over the Indus River system.

Among the most significant of these technologies is drip irrigation, a method pioneered by Israel and widely adopted across Indian states. This technique allows crops to receive water directly at the root level, reducing wastage by up to 70 percent compared to traditional flood irrigation (Tenne, 2010). When scaled across tens of thousands of hectares, this water-use efficiency means India can extract more agricultural value from the same volume of water, thereby reducing the perceived need to release excess water to Pakistan. In sensitive basins like the Jhelum or Chenab, such conservation measures, though technically legal, effectively reduce water availability downstream, especially during lean flow periods.

Equally impactful is India's deployment of hydrological monitoring systems, including real-time flow sensors and satellite-based weather tracking. Israeli firms like Netafim and Mekorot have partnered with Indian agencies to integrate digital dashboards that allow instantaneous data on river flow, rainfall, and dam storage levels (Ghosh & Singh, 2020). This capability grants India superior control over release timings, enabling it to store water during peak rainfall and delay discharges in drier months—again, without necessarily violating the Indus Waters Treaty, which restricts only large-scale storage but not short-term regulatory control (Salman & Uprety, 2002).

India has also enhanced its run-of-the-river hydroelectric infrastructure, particularly in Jammu and Kashmir, with design inputs drawn from Israeli and European engineering consultancies. These projects, while technically not obstructive, feature gated spillways and flexible intake structures that permit short-term water retention. Such capabilities can be used to modulate flow rates during strategic periods, such as after diplomatic breakdowns or cross-border incidents. As seen in the Baglihar and Kishanganga disputes, India has previously leveraged the ambiguity in the Treaty's design provisions to its advantage, and now, with enhanced infrastructure, it can do so with greater efficiency and plausible deniability (Mustafa et al., 2017).

Moreover, wastewater recycling and reuse technologies, another hallmark of Israeli expertise, allow India to reuse treated water for agriculture, industry, or urban needs, thereby preserving the volume of freshwater in upstream reservoirs (Tenne, 2010; Ghosh & Singh, 2020). This, in fact, adds to topping up of the buffer stock of water in India without compromising with the flow rates. Pakistan, in contrast, lacks such large-scale reuse systems and remains vulnerable to reduced freshwater discharge during dry spells or delayed snowmelt cycles (Mustafa et al., 2017).

This technological advantage gives India a leverage where it can effectively control the flow of rivers without technically violating the IWT. Although each advancement may seem trivial in isolation, the compound effect of these actions is large and impactful. For Pakistan, the challenge lies in the invisibility of these mechanisms within the legal framework of the IWT, making it difficult to mount successful diplomatic or legal objections at international forums (Rizvi, 2012).

Table 1
Comparative Water Technology Capabilities of India and Pakistan

Domain	India	Pakistan
Wastewater Recycling	Advanced systems in multiple states; Israeli-assisted reuse tech	Minimal infrastructure; limited reuse at municipal level
Drip & Precision Irrigation	Widely adopted in Rajasthan, Gujarat, Punjab; supported by Israeli CoEs	Very limited; mostly traditional flood irrigation
Hydrological Monitoring	Real-time monitoring via satellite & sensor grids	Lacks comprehensive real-time data systems
Water-Efficient Agriculture	Smart irrigation, drought-resistant seeds, Israeli R&D collaboration	Experimental stage; limited investment
Upstream Flow Regulation (Dams)	Multiple run-of-the-river projects with flexible spillway designs	Downstream only; limited dam storage capability
International Partnerships	Strong Israel collaboration; MoUs with global firms	China support via CPEC; limited strategic diversification

Source: Compiled from *Ghosh & Singh (2020); Mustafa et al. (2017); Tenne (2010); Jacob (2021)*

In addition, during the crises like the present post-Pahalgam political climate, Indian technological superiority offers it the outlet for expressing threats rhetorically in form of short-term responses which may well include holding back or slowing water releases, and managing its mastery over the reservoir in politically sensitive ways. While India cannot yet shut off the western rivers which could lead to treaty violation and international condemnation (Paliwal, 2020), the growing toolkit gives it enough margin to pressure Pakistan while remaining within legal bounds.

The occurrences under this article pose the need for Pakistan to reassess the legal approach adopted in understanding the IWT and to adapt to a future where the management of water and security is progressively determined by technological advancement as opposed to treaty violation. This raises the question of how the Treaty will behave as an instrument for conflict regulation; as India's leverage increases, it seems that the relevance of legal formulas will decrease and it will all depend on the relative ability to manage the hydrology of the water systems.

Table 2
Key Hydrological Concepts

Hydrological Concept	Brief Explanation
Precision Agriculture	An advanced farming technique that uses data, sensors, and automation to deliver water and nutrients to crops exactly when and where they are needed, minimizing waste.

Run-of-the-River Projects	Hydropower projects that generate electricity without large dams or reservoirs; they use the natural flow of rivers, with minimal water storage.
Satellite Imagery for Water Usage	Use of satellites to observe and analyze patterns of water use in agriculture, reservoirs, and river basins, enabling better planning and conservation.
Smart Storage Systems	Technology-enhanced reservoirs and storage tanks that optimize water retention and release based on real-time data and predicted demand.
Wastewater Recycling	The process of treating used water from homes, agriculture, or industry so it can be reused for irrigation or industrial processes, reducing freshwater demand.
Real-Time Hydrological Monitoring	Digital systems using sensors and telemetry to monitor water flow, river levels, and usage in real time, improving water management and early warning systems.

Source: Definitions adapted from *Ghosh & Singh (2020), Mustafa et al. (2017), Salman & Uprety (2002), and Tenne (2010).*

Risks to Pakistan's Downstream Security and Legal Constraints

Pakistan, as the lower riparian in the Indus River system, has long depended on the guaranteed flow of water from India under the Indus Waters Treaty (IWT). However, recent developments—particularly India's strategic use of Israeli water technologies—have introduced new forms of vulnerability that fall outside the traditional parameters of treaty violations. These emerging risks are not necessarily tied to massive infrastructure projects or diversions but stem from incremental reductions, altered timing of flows, and optimized upstream use, all of which erode Pakistan's water security without triggering clear legal redress mechanisms.

One of the most pressing risks is the variability in seasonal flow caused by India's enhanced storage and regulation capabilities. While the IWT permits limited run-of-the-river hydropower development by India on the western rivers, the cumulative effect of multiple such projects—like Kishanganga, Baglihar, and the ongoing Ratle—combined with precise flow management technologies, allow India to manipulate water discharges within technically legal bounds (Rizvi, 2012; Salman & Uprety, 2002). These practices can significantly affect Pakistan's water availability during crucial agricultural cycles, especially in provinces like Punjab and Sindh, which depend heavily on uninterrupted river flows for irrigation.

Additionally, Pakistan's lack of technological parity compounds its vulnerability. Unlike India, which has adopted water-saving and flow-monitoring technologies in partnership with countries like Israel, Pakistan's water management infrastructure remains outdated and underfunded (Mustafa et al., 2017). The absence of large-scale wastewater reuse, precision agriculture, and real-time river monitoring limits Pakistan's ability to adapt to upstream changes. This gap is especially dangerous during drought years or in the context of accelerated glacial melt, which further destabilizes seasonal flows.

The legal framework of the IWT, although historically resilient, is increasingly inadequate in addressing these newer forms of pressure. The Treaty primarily focuses on volumetric allocations, dam design specifications, and defined categories of permissible use. It does not address soft interventions such as water-use efficiency, climate-adaptive planning, or indirect flow modification through upstream conservation (Salman, 2008). This normative vacuum places Pakistan at a disadvantage when attempting to challenge India's practices at international forums, as they rarely constitute a direct breach of treaty articles.

Moreover, the Treaty's dispute resolution mechanism—while robust on paper—has shown signs of erosion in practice. India's rejection of third-party arbitration in recent cases, such as the Kishanganga and Ratle disputes, reflects a growing reluctance to adhere to multilateral norms of water diplomacy (World Bank, 2023). Indian officials have increasingly argued that simultaneous initiation of neutral expert review and arbitration violates the procedural integrity of the IWT, creating deadlock (Salman, 2018). Scholars warn that such behavior not only sets a problematic precedent but also undermines the World Bank's role as a guarantor of the Treaty's legal viability (Kugelman, 2022). Without mutual trust and willingness to engage in arbitration, the institutional integrity of the Treaty is weakened, reducing Pakistan's options to seek recourse in times of hydrological crisis.

Beyond legal limitations, there are strategic and political costs as well. Water insecurity contributes to internal instability, heightens regional inequalities, and undermines Pakistan's agricultural productivity—especially in provinces like Sindh and Baluchistan, where irrigation systems are already fragile (Mustafa et al., 2017; Shah, 2021). As domestic consumption and population pressures grow, Pakistan's dependence on a predictable and politically uncontested water supply becomes more precarious (Waseem & Abbasi, 2020). In this context, India's ability to exploit even marginal reductions or timing delays in water release translates into a form of hydrological leverage—subtle, deniable, but impactful (Paliwal, 2020; Wolf & Newton, 2008).

In sum, Pakistan faces a complex matrix of risks: legal, technological, and strategic. The traditional mechanisms of treaty enforcement are no longer sufficient to safeguard its downstream interests. Future security will depend not just on treaty preservation, but on technological modernization, proactive diplomacy, and expanded legal frameworks that reflect the realities of 21st-century water politics.

Conclusion

The Indus Waters Treaty, signed in 1960 and considered as one of the most successful examples of cooperative relations between New Delhi and Islamabad, is however, far from what used to be in terms of precipitation and is more critically placed at the crossroads of political transformations and the advancement in technology. Although the Treaty has in the past played the role of a stabilizer in the context of recurring wars, the Treaty is less suited for managing 21st-century water challenges due to its limited legalist principles and assumptions about states' behavior.

The aftermath of the 2025 Pahalgam attack, and India's ensuing rhetoric on reviewing or suspending the IWT, highlights a dangerous trend: the militarization of water debate to be used as a strategy in the process of power assertion. Coupled with India's strategic adoption of Israeli water technologies, this shift enables upstream flow control through legal ambiguity and technical precision, complicating Pakistan's capacity to respond within existing treaty mechanisms.

Pakistan, in turn, faces a dual challenge: navigating the legal constraints of a treaty that no longer fully protects its interests, and addressing its own technological lag in water management. The lack of meaningful action through both legal frameworks and technological improvements and strategic diplomatic initiatives will transform Pakistan into a nation which must accept decisions about water management from upstream countries yet not losing its protection of interests.

The way to change will not be achieved by merely maintaining the status of the existing treaty. It requires legal adaptation, regional coalition-building, and technological modernization. Most importantly, it calls for a reframing of water security not as a bilateral contest, but as a matter of regional peace, stability, and environmental justice. This is the only way that Pakistan can begin to counter India or at least safeguard its downstream rights as the Indus Basin becomes an object of growing rivalry.

Recommendations

Given the evolving strategic, technological, and legal challenges associated with the Indus Waters Treaty (IWT), Pakistan must adopt a multidimensional policy framework to safeguard its downstream water security. The recommendations outlined below focus on four key areas: legal adaptation, technological modernization, regional diplomacy, and narrative-building in international forums.

Expand Legal Interpretation and Treaty Modernization

Pakistan must reinterpret the IWT in light of 21st-century hydro-political realities. The Treaty, while robust in its original design, does not adequately address indirect flow manipulation, upstream conservation technologies, or wastewater reuse practices. Islamabad should advocate for a supplementary legal framework or interpretive protocols—ideally facilitated by the World Bank or neutral third parties—that clarify how modern technologies and cumulative projects impact downstream rights (Salman, 2008; Wolf & Newton, 2008). At the very least, Pakistan should formalize diplomatic objections to India's technological interventions through regular submissions to the Permanent Indus Commission.

Invest in Water Technology and Infrastructure

To counterbalance India's growing technological edge, Pakistan must prioritize investment in modern water infrastructure, particularly in wastewater recycling, micro-irrigation, flood control, and real-time hydrological monitoring. Partnerships with countries like China, Turkey, or even Israel (via indirect technology transfer) could accelerate capacity-building (Mustafa et al., 2017). China, in particular, has already extended technical support in dam construction and water resource management under the China-Pakistan Economic Corridor (CPEC), which can be leveraged further to upgrade Pakistan's hydrological capacity (Ali, 2020; Mustafa et al., 2017). Domestic innovation should be supported through targeted research funding for public universities and water-focused think tanks. Furthermore, Pakistan's National Water Policy (2018) should be operationalized with clear timelines, resource allocations, and monitoring mechanisms (Afzal, et. al., 2020; Waseem & Abbasi, 2020).

Revitalize Regional Water Diplomacy

Rather than limiting water diplomacy to bilateral mechanisms under the IWT, Pakistan should adopt a regional approach by aligning itself with other South Asian lower riparian states such as Bangladesh and Nepal. A South Asian Water Security Forum could be established to share data, monitor upstream behaviors, and collectively lobby for equitable river governance. Simultaneously, Islamabad should re-engage with the World Bank and other international mediators not just reactively during disputes, but proactively to establish transparency protocols and monitoring systems (Kugelman, 2022).

Strengthen Strategic Communication and Narrative-Building

Pakistan must improve its narrative control in global forums, emphasizing the asymmetry of technological capacity and the risks of water weaponization in a nuclearized region. Engaging international media, think tanks, and UN bodies with well-documented briefs on water insecurity and treaty circumvention can help reframe the issue from a bilateral dispute to a regional peace and stability concern (Ghosh & Singh, 2020). Track II diplomacy, involving academics, retired diplomats, and technical experts, can also serve as a backchannel to reduce misperceptions and promote transparency.

In a nutshell, Pakistan must go beyond defensive diplomacy and adopt a forward-looking strategy that integrates legal vigilance, technological preparedness, and regional coalition-building. Water security is no longer just about river allocations—it is about who controls knowledge, infrastructure, and timing. The longer Pakistan delays a systemic response, the more strategic ground it will cede to an increasingly advancing upstream India.

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