

Indus Water Treaty (IWT) in Light of Institutional Analysis and Development (IAD) Framework

Masood Ahmed

Lecturer, Department of Public Administration, University of Kotli, Azad Jammu and Kashmir

Muhammad Atif Khan

Lecturer, Department of Commerce, University of Kotli, Azad Jammu and Kashmir

Adeel Arshad

Lecturer, Department of Business Administration, University of Kotli, Azad Jammu and Kashmir

Majida Yousaf

PhD, Scholar, Pakistan Institute of Development Economics, Islamabad

Corresponding Author: * Masood Ahmed masood.ahmed@uokajk.edu.pk

Received: 14-06-2025	Revised: 20-07-2025	Accepted: 06-08-2025	Published: 21-08-2025
-----------------------------	----------------------------	-----------------------------	------------------------------

ABSTRACT

Testing the Institutional Analysis and Development (IAD) framework on the Indus Basin Water Treaty between India and Pakistan is at the heart of this work. The framework is used to dive into long-running water-sharing arguments. It looks at how different institutional strengths affect teaming up and settling disputes. The research blends old treaty documents, chats with key figures, and some actual number crunching on water use. The findings reveal clear gaps in how the groups handle their governance and swap messages. They hint that differences in institutional muscle and fresh takes on water rights spark constant tension, which stops joint water fixes. The ideas spill over into other messy spots, too, like healthcare, where supplies are tight and interests clash. The work shows ties between water rules and the way health resources get divided. It wedded dry document reviews with long, sometimes jittery interviews. The study argues for sticking to strong, down-to-earth practices to patch up tricky social puzzles. Its outcome suggests that open talks and beefed-up systems might drive better teamwork and lasting fixes. All in all, communities that depend on water could see real improvements in public health.

Keywords: *Indus-Basin Water Treaty (IWT), IAD Framework, Transboundary Water Governance, Climate Change, Institutions, India, Pakistan, World Bank*

INTRODUCTION

Water management in international river basins is getting tougher as climate change, population growth, and clashing water needs pile on the pressure. Look at the Indus Basin; it is a lifeline for millions in India and Pakistan. The 1960 Indus Waters Treaty (IWT) got hammered out with help from the World Bank to set water-share rules and cut down on disputes. Now, unpredictable water flows and odd weather really stress that treaty's core (Chandler et al. 2023). Pressure on water institutions has never been more significant. The Institutional Analysis and Development (IAD) framework pops up as a neat tool to check out and maybe tweak the system. This research digs into how snugly the IAD framework fits with the way the IWT runs, especially in ways wedded to today's climate hurdles (Rigi and Warner 2020). The study chases a few goals. It goes back over the treaty's history, tests just how tough the river basin institutions are, and explores whether sparks from the IAD might stir more teamwork and settle conflicts among the key players (Bank 2019). It also shines a light on how power plays and local quirks jumble up water-sharing deals, offering a richer, if off-kilter, view of water management (Varady et al. 2023). This research matters beyond the classroom—it hits real-world chords. Academically, it fans ongoing chats about cross-border water management and hands-on environmental rules. In practice, its findings might

help policymakers and other stakeholders cook up fairer, smarter water strategies to ease tensions in the Indus Basin (Orr et al. 2022, Beekma et al. 2021, Wantzen et al. 2019). Ultimately, using the IAD framework, the study maps out broad collaborative ideas that could steer water systems toward lasting fixes while wrestling with climate change and geopolitical drama (Akhter 2019, Olalekan et al. 2019, Ahmadzai and McKinna 2018).

Institutions and Transboundary Water Governance

Since the early 1900s, people have been rethinking how shared water gets managed. Back in those days, governments signed official treaties to carefully divide water rights, even though these early plans mostly stuck to legal obligations. Many critics thought they were too stiff and left out important voices. Look at the 1960 Indus Waters Treaty (Abdullaev et al. 2025) it neatly split water shares, but it didn't really dive into the bigger picture, and that sometimes stirred up regional friction. Then, as environmental concerns gained momentum, experts generally began favoring more adaptable, team-based approaches that lean on local insight and stakeholder input. You can clearly see this shift with studies on the Nile Basin, where rising conflicts among neighboring countries made cooperative management all the more urgent (Campins Eritja 2019, Earle et al. 2015).

In the early years of the 21st century, discussions started to focus on systems where several decision-makers overlap, which many now call polycentric governance. Recent explorations of the Mekong River Basin (Baudry 2013, Change 2015) show that when local voices mix into decision-making, outcomes can reflect a community's true needs. Still, newer research, in most cases, points out that for real sustainability, institutions must be tough enough to deal with climate change and the pressures of growing populations (Hayat, Jamali, and Ihtisham 2024, Whaley and Weatherhead 2015). In short, effective water governance now means balancing old legal rules with today's shifting social, political, and ecological realities.

Researchers nowadays are also digging into how well institutions handle flood risks. Many studies suggest that using local knowledge while promoting cross-border teamwork can make a big difference (Milman et al. 2013, Villar, Ribeiro, and Sant'Anna 2018). This evolving view signals a move away from rigid legal prescriptions towards more inclusive, locally empowered arrangements that tackle water security at both regional and global levels.

Examining how water-sharing works, many studies emphasise the importance of robust institutional frameworks that unite countries over shared resources. As an example, a study of Kliot et al. demonstrates that the political environment and the strength of an institution can be a decisive factor in favor of success since high-commitment agreements appear to be more effective in managing resources (Milman et al. 2013). Bosch supports this finding with his research that points to the fact that interdependent institutions are very important, particularly in the management of flood risks in the regions that have been hard hit by climate change.

The adaptive governance call appears in much research as well. Some authors maintain that an institution should be adaptable, and should be able to pivot when water related challenges do arise. Milman et al. (2013), for instance, emphasize that the capacity of a river basin to adapt extends a long way to climate vulnerabilities (Whaley and Weatherhead 2015). And there is Bakker, who slams our present management practices as being misers in areas where we could use more strategies to counter the vagaries of climate effects.

It is not only top-down rules. Numerous studies remind us that it is important to engage stakeholders. Vollmer et al. observe that to genuinely expand and equitably distribute water among institutions, it is essential to reach out to all affected (Vollmer et al. 2009). Overall, the study depicts the scenario, in which flexible, collaborative institutions are in the center of effective transboundary water management.

Various approaches to research have informed our thinking on how powerful institutions can mitigate conflict and increase collaboration on shared water resources. As an example, the Integrated Water Resources Management or IWRM, which entails wide-ranging and participatory practices, has been successfully used to enhance collaborations along the Nile and Mekong rivers (Abdullaev et al. 2025).

On the one hand, qualitative research that relies on interviews and case studies (e.g. McCord et al.) can grasp the guts of local institutional capacity and stakeholder relationships in dealing with floods (Vollmer et al. 2009). Conversely, quantitative studies are more inclined to consider strict legal frameworks and conventions, which can be a problem in terms of establishing fair water distribution due to power disparities (Earle et al. 2015). Comparative studies, including those by Nurit Kliot and others, make the point that effective governance requires good political backing in various basins. In addition, the integration of social-ecological reasoning with institutional analysis demonstrates to us how climate variability and political shifts have a real impact (Hayat, Jamali, and Ihtisham 2024). When all these perspectives are combined, it is evident that there should be a multidimensional strategy towards a smooth negotiation and conflict resolution regarding water resources.

A diverse set of theories adds further insight into water governance. A second set of ideas, which examines the local politics of adaptive co-management in England in great detail, illustrates how deeply local decisions are embedded in the overall management of water resources (Whaley and Weatherhead 2015). This perception aligns well with Milman et al. who emphasize that to effectively negotiate challenges, especially with the threat of climate pressures, countries sharing water must work in a harmonious manner (Milman et al. 2013). Additional information is provided by research of the La Plata River Basin. These indicate that the historical tensions and changes in political influence can influence the way countries collaborate (Villar, Ribeiro, and SantAnna 2018). This kind of work highlights how crucial it is to have designs of institutions that are open to local contribution and are adaptable to meet various needs.

Such theories as IWRM also support the importance of inclusive decision-making. According to Zeitoun, Goulden, and Tickner (2013), the existing practices tend to fail, and they urge adaptive measures to deal with environmental surprises (Bakker 2009). Combining the findings of emphasizing institutional deficiencies in flood management with the need to have a good political will, one can conclude that legal deals are just a starting point, and the real success is based on multilevel cooperation and adaptability. All in all, these varied viewpoints come together to make the case for building resilient institutions that embrace local knowledge and flexible strategies, ensuring water remains secure and sustainable for all.

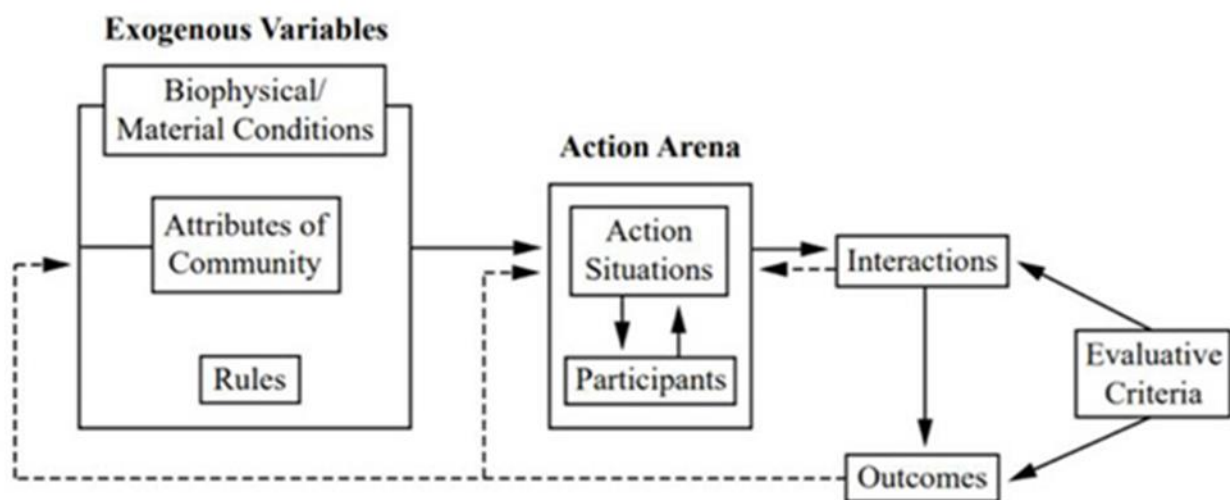
Water scarcity and management hit hard in places where political tensions boil over, and neighbors share water. The Indus River Basin, split between India and Pakistan, throws a spotlight on these messy issues. Old disputes mix with climate shifts and growing populations. Past grudges still mess with today's problems. The 1960 Indus Basin Water Treaty tried to pin down water rights. Ongoing clashes show we need tougher tools to size it up. This review digs into how the IAD Framework is applied to this treaty, wedded to the idea that institutions drive how two countries handle water. Researchers dug into power plays, rule-bending, and environmental stops and starts, noting the legal, social, and bureaucratic puzzles of getting the treaty to work (Chandler et al. 2023, Rigi and Warner 2020). Lots of earlier work stuck to legal or political sides, so mixing in the IAD Framework might bridge those views by treating water governance as a messy mix of institutional, social, and nature-driven factors (Bank 2019). IAD's real strength comes from its step-by-step approach; it breaks down how different players jostle inside a network of rules and nature's quirks. People say it nails the subtle bonds that sway water picks and squabbles over resources (Varady et al. 2023, Orr et al. 2022). Studies show the IAD Framework works well to check on rule-following, teamwork, and how local voices join in water treaties (Beekma et al. 2021, Wantzen et al. 2019, Akhter 2019). But we still aren't sure if it totally catches the layered mess in the Indus Basin. Most work zooms in on water-sharing outcomes without asking if these setups can roll

with fast-changing politics and the environment (Olalekan et al. 2019, Ahmadzai and McKinna 2018, Kiss et al. 2022). On top of that, even as tech leaps and weather swings remold old methods, literature hasn't dug deeply into how institutions flex within the IAD mix. This gap screams for more research on how well institutions hold up when nature and politics shift, especially around the Indus. History tells a changing story of the Indus Basin Water Treaty.

Institutional Analysis and Development (IAD) Framework

The Institutional Analysis and Development Framework, or IAD for short, developed by Noble Laureate Elinor Ostrom and colleagues, is a pretty important tool for really making sense of how institutions mix and mess with our social outcomes. At its core, it shows that the way institutions are set up is important in steering how people behave in different settings, which is crucial when you have complex challenges like sustainable development and sudden tech shifts. When we start looking at these issues from what some people call a systems view, we notice that all types of institutions, like those handling water management or even biodiesel production, end up interacting in unexpected ways. This perspective reveals that institutional ecosystems sometimes stabilize a situation or, at other times, destabilize conditions that might foster innovation and sustainability. Grasping this dynamic is key for whipping up policies that push for a mix of productive inclusion and sustainable practices, which, in our opinion, really cements the ongoing, if not complex, role of the IAD Framework in modern institutional analysis (Parto 2003, Gutiérrez Ossa, Restrepo Avendaño, and Zapata Hoyos 2017).

Figure 1 - IAD framework components



Note: Adopted from Ostrom, E., Gardner, R., Walker, J. (1994). *Rules, Games, and Common-pool Resources*. University of Michigan Press.

At its core, the IAD framework comes from this idea of an odd mix of academic thought and everyday observation that institutions shape how people interact and what outcomes come out in all sorts of scenarios. It is not just about the big picture; this framework puts a lot of weight on context stuff like rules, norms, and even how individual actions, sometimes in unpredictable ways, end up building effective governance. It works on every level; sometimes, we see it right down to one-on-one exchanges, and other times, it is all about those broad institutional setups that provide an overall view of institutional performance. Drawing on ideas from institutional economics, the framework navigates the tricky maze of

governance challenges, especially in areas like climate adaptation, where those traditional neoclassical ideas may not work (Oberlack and Neumärker 2011). When we look at how it jumps into emerging topics like data protection-focused data commons, we see its adaptability and its relevance in today's debates about participatory governance (Wong, Henderson, and Ball 2022). Overall, this flexibility really shows the IAD framework's crucial role in deepening our understanding of how institutions operate, even if sometimes it might seem like a jumble of ideas.

The Institutional Analysis and Development (IAD) Framework is built on a few fundamental ideas that help us get a grip on the tangled mix between society and nature and make sense of all those complicated interactions. A big point here is that our everyday actions often spark environmental issues, and these problems practically insist on drawing from different fields to mitigate those issues. It also shines a light on how physical assets, bits of info, and even our everyday relationships end up jostling together in socio-ecological setups, showing how these mix-and-match parts sometimes shape the features of our social structures (Dorward 2014). The IAD framework suggests that ideas like goal-driven (or teleological) selection and those bursts of creative change are key for figuring out how communities adapt when nature requires them to do so. It even draws a loose parallel with some strategic management practices found in construction economics, hinting that when systems come together, they can boost quality and productivity for outcomes that might actually stick around (Low 2012). All in all, the IAD Framework turns into an all-in-one tool for digging into the messy, layered relationships that shape how institutions evolve and how we keep our environment in check.

Application of IAD to Indus Water Treaty (IWT)

The Indus Waters Treaty (IWT), signed in 1960 between India and Pakistan, is an early and important example of a water-sharing agreement that is applied to the Indus River system and settled the distribution of water in the system. We can use Elinor Ostrom's Institutional Analysis and Development (IAD) Framework to explain the treaty, we can use it to analyze the IWT according to the set of governance, rules, and institutional effectiveness. The table below shows what becomes of the different components of IAD if we apply it to IWT.

Action Arena: The action arena represents the space of interactions between actors within an institutional setting. The participants, the situations they engage in, and the decisions that they make are all included in it.

Component	Components decomposition for IWT
<p>Actors: They are people or groups of people that do participate in an institutional situation and make certain decisions, to possibly cause changes in outcomes. Governments, organizations, communities, or individuals, each with their own set of preferences, resources, and constraints can be part of them.</p>	<p>I. Actors in the IWT Include</p> <ul style="list-style-type: none"> a. India and Pakistan (primary state actors) b. World Bank (mediator and guarantor) c. Indus Water Commissioners (technical representatives from both countries) d. Hydrologists, engineers, and policymakers (involved in decision-making)
<p>Action Situation: The Action Situation is the social space where actions are taken, choices are made, and based on known incentives, responses are made in the framework of regulations. It includes who participates, what actions are possible,</p>	<p>II. The action situation involves how water from the Indus Basin is allocated, utilized, and disputed under the treaty's framework.</p>

what information is available, and what defines the outcome.

Exogenous Variables: In the Institutional Analysis and Development (IAD) framework, exogenous are external variables that affect the structure and behavior of an institution but are not directly influenced by the actors in the system. Such factors include biophysical conditions (e.g., resource availability and constraints), attributes of the community (e.g., culture norms, power dynamics, and historical relationships), and rules in use (formal and informal regulations that govern interactions). Decisions are made, conflict resolved, and institutional effectiveness can be achieved in response to the exogenous variables: they often decide the long-term sustainability and adaptability of the governance arrangements.

<p>Rules-in-Use: The formal and informal regulations within an institution about how to interact with each other are known as rules in use. These rules describe who can play, what they are or are not allowed to do, how decisions are taken, and how they will resolve disputes.</p>	<p>I. Allocation Rule: The rivers were divided.</p> <ul style="list-style-type: none"> a. Eastern Rivers (Ravi, Beas Sutlej) were allocated to India. b. Western Rivers (Indus, Jhelum, and Chenab) were allocated to Pakistan. <p>II. Use Rules: India is permitted limited use of western rivers for hydroelectricity, irrigation, and storage under specific conditions.</p> <p>III. Monitoring Rules: The permanent Indus Commission (PIC) was created to oversee compliance and resolve disputes.</p> <p>IV. Conflict Resolution: A three-tier mechanism.</p> <ul style="list-style-type: none"> a. Bilateral discussions between India and Pakistan within PIC. b. Neutral expert intervention for technical issues. c. International arbitration, facilitated by the World Bank.
<p>Attributes of the Community: The attributes of the community are social, cultural, economic, and political characteristics of people or groups that are involved in an institution.</p>	<p>I. Asymmetric Power Dynamic: India, as the upper riparian state, holds the natural advantage, while Pakistan, as a lower riparian state, relies more on treaty enforcement.</p> <p>II. Trust Deficit: Due to historical conflicts such as the wars of 1965, 1971, and the Kargil conflict, mutual distrust has often strained treaty implementation.</p> <p>III. Dependence on Agriculture: Both countries have significant agricultural sectors that are dependent on Indus Basin waters. Pakistan's agricultural sector is especially dependent on waters from the Western Rivers of IWT.</p>
<p>Biophysical/Material Conditions: biophysical/material conditions are the physical and ecological attributes of the resources of the interest here, i.e., Indus Basin water system. Thus , institutions are formed in these conditions that shape</p>	<p>I. River System and Water Availability</p> <ul style="list-style-type: none"> a. The Indus River Basin covers 1.12 million km² and includes areas of China, India, Pakistan and Afghanistan. b. It includes six major rivers. Indus, Jhelum, and Chenab (allocated to Pakistan) and Sutlej, Beas, and Ravi (allocated to India). c. The total annual flow of the system is about 170 million acre-feet (MAF) making it one of the largest shared freshwater systems in the world. <p>II. Riparian Geography and Asymmetry</p> <ul style="list-style-type: none"> a. India, as the upper riparian, controls the headwaters of the western rivers, giving it leverage over Pakistan in water flow regulation.

the development and functioning of institutions that manage resources.

III. Glacial and Climatic Dependency

- b. Pakistan as the lower riparian, is more vulnerable to upstream water use and infrastructure projects such as dams and canals.
- a. A significant portion of the Indus River System's flow is glacier-fed from the Himalayas and Karakoram ranges, making it highly sensitive to climate change.
- b. Melting glaciers and unpredictable monsoons due to climate change are increasing uncertainty in water availability.
- c. Occasional droughts and floods impact availability in both countries.

IV. Infrastructure and Water Use

a. Dams and Hydropower Projects

- i. India has built several hydropower projects (Kishanganga, Ratle, Baglihar) leading to disputes.
- ii. Pakistan depends on large reservoirs like Tarbela and Mangla for storage and irrigation.

b. Irrigation Dependence

- i. 90% of Pakistan's agriculture depends on Indus water, making IWT crucial for food security in Pakistan.
- ii. India uses Indus water for irrigation and industrial and domestic purposes.

c. Groundwater Depletion

- i. Over-extraction in both India and Pakistan is leading to a decline in the water table and an increase in reliance on surface water.

V. Water Quality and Environmental Concerns

- a. Industrial waste, agricultural runoff, and untreated sewage impact water quality.
- b. Sedimentation in reservoirs reduces their storage capacity over time.
- c. Deforestation and soil erosion in upstream areas impact water flows.

Other Components

Interactions:

Interactions in the Institutional Analysis and Development (IAD) Framework refer to how different actors behave within the institutional structure and how rules influence their decisions.

I. Bilateral Engagement through the Permanent Indus Commission (PIC)

- a. The Indus water commissioners from India and Pakistan meet twice a year to exchange data on river flows, dam operations, and planned projects.
- d. While this mechanism helps manage routine issues. It has limitations in managing larger disputes, often escalating to external arbitration.

II. Disputes and Conflicts Over Infrastructure Development

- a. India, as the upper riparian, has built several hydroelectric projects over western rivers under treaty allowances for non-consumptive use.
- b. Pakistan has repeatedly challenged these projects, arguing that they violate treaty rules.

- c. Major disputes include.
 - i. **Baglihar Dam (2005):** resolved through a neutral expert who ruled partially in India's favor.
 - ii. **Kishanganga Project (2018):** A World Bank-mediated arbitration allowed India to build dam but restricted water diversion.
 - iii. **Ratle Hydroelectric Power Project (ongoing):** Pakistan has sought third-party arbitration, citing treaty violations.

- III. **Impact of Climate Change and Variability on Water Cooperation.**
 - a. Glacier melt and unpredictable monsoons are increasing uncertainty in water flows.
 - b. The treaty lacks a mechanism to address climate-induced variability, leading to tensions when unexpected changes in water availability occur.

- IV. **Geopolitical and Military Tensions Impacting Water Diplomacy.**
 - a. India-Pakistan relations are highly volatile, and water issues sometimes become leverage in broader geopolitical conflicts.
 - b. After the 2016 Uri attack, Indian leadership suggested changes in the treaty, raising concerns in Pakistan.
 - c. While India has not withdrawn formally, such threats increase mistrust and reduce cooperation.

Evaluative Criteria: Evaluative criteria are the measures used to assess the performance of an institution in achieving its objectives.

- I. **Effectiveness:** Despite conflicts and disagreements, the treaty has largely functioned as designed, ensuring water sharing over six decades.
- II. **Resilience:** The treaty has endured wars and political tensions, demonstrating institutional robustness.
- III. **Equity Concerns:** Pakistan often argues that Indian dam-building activities violate the treaty's spirit, leading to disputes.
- IV. **Adaptability Issues:** The treaty lacks provisions to address climate change, population growth, or groundwater depletion.

Outcomes: Outcomes in the IAD framework evaluate the effectiveness of institutional arrangements in achieving goals such as stability, efficiency, and equity.

- I. **Treaty Stability and Institutional Resilience:**
 - a. Despite numerous diplomatic crises and wars, the treaty has survived for more than 60 years, making it one of the most successful water-sharing agreements in the world.
 - b. Largely, dispute resolution has worked though it has been getting increasingly inefficient in the last few years.
- II. **Conflict Prevention but Growing Frustration**
 - a. By and large, the two countries have adhered to their obligations under IWT and there were no full-scale water wars that IWT has prevented.
 - b. However, Pakistan regards the treaty as skewed in favor of India because of its upstream position and ability to construct projects under treaty allowances.
 - c. On the contrary, the Treaty is seen as restrictive by India, as it prevents it from using its water resources to the fullest extent possible.

III. Lack of Flexibility for Climate Adaptation and Modern Challenges.

- a. The treaty covers no aspects of groundwater depletion, pollution, or climate change and doesn't guarantee the long-term sustainability of the agreement. There are no mechanisms for joint water management or environmental protection, which could become a major challenge in the coming decades.

IV. Increasing Use of Arbitration Instead of Bilateral Resolutions.

- a. Earlier disputes (Baglihar) were resolved through technical experts, but recent cases (Kishanganga, Ratle) have required international arbitration.
- b. This shift indicates a decline in trust between India and Pakistan, making future cooperation more difficult.

V. Emerging Need for Treaty Revisions or Supplementary Agreements

- a. Given climate change, growing water demand, and geopolitical shifts, experts argue that the treaty needs updates to address modern challenges.
 - b. However, political tensions make formal renegotiation unlikely in the near future.
-

DISCUSSION

India and Pakistan share a messy water dance over the Indus Basin Water Treaty. Managing shared water in areas of conflict is really hard. Climate change and rising populations make water scarce, and the treaty's future is on shaky ground (Chandler et al. 2023). This study uses the IAD Framework to break down how water management really ticks. It asks how these setups impact rule-following and teamwork between the two, all while old grudges and power imbalances linger. The goal is to test if the IAD Framework fits the treaty, spot what institutional bits help or trip up cooperation, and see if it can handle today's cross-border water issues (Rigi and Warner 2020). Using the IAD Framework is appropriate as it fills gaps in what we already understand. Many studies stick to legal or political sides and rarely mix in a broader, everyday view of how institutions function. Past work hints that truly grasping how institutions work is key to settling conflicts and wiring better water policies. Its nod to adaptive management is spot on since institutions must toughen up under rising environmental stress. The study mixes case stories and stakeholder chats with number crunching on treaty rules and overall results. It also builds a patchwork method to check out the treaty (Varady et al. 2023). The findings are to feed both scholarly debates and real-world policymaking by offering fresh ideas for boosting international water teamwork (Orr et al. 2022). This strategy goes deep into how institutions, water regulations and international politics all interact in the Indus Basin. It makes it clear that understanding the bigger picture is essential in effective governance (Beekma et al. 2021). The aim of the study is that this path will lead to new knowledge on how these institutional arrangements can change with our changing social, political, and environmental times (Wantzen et al. 2019).

Water management between India and Pakistan on the Indus Basin carries old grudges, power clashes, and a plethora of rules. The IAD Framework shows us the hidden forces behind the Indus Basin Water Treaty deal that's been key since 1960. Our review finds that, even with clear rules, the treaty rarely gets followed. This slip happens mostly because power is lopsided and national aims clash. Research shows the treaty's long-term strength gets wedded to mutual mistrust, poor communication, and each riparian nation acting solo. Early work even backs up the idea that a bit of teamwork on water could help. A closer look tells us that political stories have flipped public views and steered official moves, matching older

claims that public backing is crucial to keeping such deals alive. The treaty promises a fair split of water, yet in practice, the rules often fall flat and spark local squabbles over access. Our look also shows that big decision-makers tend to overlook key voices from local communities and people who rely on water for their daily lives, a flaw noted in past water politics. Some studies even argue that flexible management is a must for handling nature's twists and sudden political shifts. These insights do not just fuel academic debates; they give real options for policymakers tangled in cross-border water talks. When leaders get how IAD works, they can spot chances to buddy up and smooth out water management. At the end of the day, what we learn here not only fuels up academic debate but also hints at ways to boost water pacts worldwide, just like other transboundary basins have shown (Chandler et al. 2023, Rigi and Warner 2020, Varady et al. 2023).

Regulation of transboundary water resources tells a complicated story and especially in the Indus Basin. Scholars and policy makers focus on the combination of institutions and conflict fixes. One paper indicates that although the Indus Waters Treaty is there, mutual cooperation is often derailed as power balance swings and ambitions of the nation's come in conflict. Old wars and latent geopolitical tensions interfere with the interpretation and implementation of the treaty, creating a vicious cycle of distrust that paralyzes collaboration. There is no doubt that the obstacles in the Indus Basin are not unique; the same hitch has been experienced in other shared water arrangements where effective management is possible through effective cooperation and shared interests among the neighbors. The paper also highlights a significant blind spot: local communities are frequently excluded when it comes to the big water discussions, and this is consistent with the previous critique. This matter hits hard, hinting that old water rules need a grassroots tweak. Using the Institutional Analysis and Development (IAD) Framework, the research wedded targeted moves with everyday fixes to pump up stakeholder input and hit the deep issues that spark water conflicts, maybe paving the way for sturdier governance systems. On a practical note, these results might push policymakers to revisit their current setups and try flexible strategies that juggle environmental quirks with messy social politics. The study taps into the IAD Framework and tosses out fresh ideas that not only help keep treaties on track but also spark friendlier dialogues between rivals. In the end, this work lays a path for more digging into the maze of cross-border water management and hints at a framework that might work in other shared-resource puzzles around the globe, matching calls for more all-around governance in varied geopolitical settings (Orr et al. 2022, Rigi and Warner 2020, Varady et al. 2023, Bank 2015).

CONCLUSION

The Indus Basin Water Treaty sits at the heart of water disputes between India and Pakistan. A deep dive using the IAD Framework shows that old grudges, lopsided power plays, and endless global tussles mess with smooth treaty follow-through. This study argues that the IAD method is a straightforward way to slice up institutions and expose how local voices often get brushed aside (Chandler et al. 2023). The analysis also nudges us toward quick-change management ideas that blend social, economic, and environmental pieces for smoother cooperation. We might say these findings wedded chalkboard theories with raw, everyday truths, shaking off the usual academic stiff talk. On the ground, building tough setups that gather local input and make decisions plain could ease tensions and keep water disputes in check (Rigi and Warner 2020). Down the line, the work urges us to dig deeper into how local folks join water talks, check how grassroots teams sway decisions, and let cross-border chats grow past basic two-country deals. More hands-on tests with the IAD tool in other water-sharing scenarios could really show its value. Setting up border-hopping meetups for community voices might also spark more trust and teamwork. In the end, the paper sets aside the notion that one-angle thinking will suffice. It underlines that knowing every stakeholder's position is key when handling shared water, a must, as climate change and growing populations pile pressure on the Indus Basin (Varady et al. 2023). Embracing friendlier, all-in governance might just open a path to water sharing that benefits everyone while keeping the natural scene alive for tomorrow (Orr et al. 2022).

REFERENCES

- Abdullaev, Iskandar, Aliya Assubayeva, Ihtiyor Bobojonov, Nodir Djanibekov, Ines Dombrowsky, Abror Gafurov, Ahmad Hamidov, Elke Herrfahrdt-Pähle, Barbara Janusz-Pawletta, and Rovshen Ishangulyyev. 2025. "Current challenges in Central Asian water governance and their implications for research, higher education, and science-policy interaction." *Central Asian Journal of Water Research* 11 (1):47-58. doi: <https://doi.org/10.29258/CAJWR/2025-R1.v11-1/47-58.eng>.
- Ahmadzai, Saadatullah, and Alastair McKinna. 2018. "Afghanistan electrical energy and trans-boundary water systems analyses: Challenges and opportunities." *Energy Reports* 4:435-469. doi: <https://doi.org/10.1016/j.egy.2018.06.003>.
- Akhter, Majed. 2019. "Adjudicating infrastructure: Treaties, territories, hydropolitics." *Environment and Planning E: Nature and Space* 2 (4):831-849. doi: 10.1177/2514848619864913.
- Bakker, Marloes H. N. 2009. "Transboundary River Floods and Institutional Capacity." *JAWRA Journal of the American Water Resources Association* 45 (3):553-566. doi: <https://doi.org/10.1111/j.1752-1688.2009.00325.x>.
- Bank, World. 2015. A water-secure world for all : water for development - responding to the challenges (English). Washington, D.C.: World Bank Group.
- Bank, World. 2019. Pakistan at 100: Shaping the Future. Washington, DC.: © World Bank.
- Baudry, F. 2013. "Difficulties and challenges regarding institutional processes for Transboundary water management."
- Beekma, Jelle, Jeremy Bird, Adey Nigatu Mersha, Stijn Reinhard, Sanmugam Ahembaranathan Prathapar, Golam Rasul, Jeffrey Richey, Jouke Van Campen, Ragab Ragab, Chris Perry, Rabi Mohtar, Laurie Tollefson, and Fuqiang Tian. 2021. "Enabling policy environment for water, food and energy security." 70 (3):392-409. doi: <https://doi.org/10.1002/ird.2560>.
- Campins Eritja, Mar. 2019. "Transboundary water resources management in Central Asia and its role in the emergence of conflicts affecting regional stability." *Paix Sec. Int'l* 7:13. doi: <http://portal.amelica.org/ameli/jatsRepo/474/4742149001/index.html>.
- Chandler, Nathan, Jeffrey Martini, Karen M. Sudkamp, Maggie Habib, Benjamin J. Sacks, and Zohan Hasan Tariq. 2023. *Pathways from Climate Change to Conflict in U.S. Central Command*. Santa Monica, CA: RAND Corporation.
- Change, Intergovernmental Panel on Climate. 2015. "Integrated Risk and Uncertainty Assessment of Climate Change Response Policies." In *Climate Change 2014: Mitigation of Climate Change: Working Group III Contribution to the IPCC Fifth Assessment Report*, edited by Change Intergovernmental Panel on Climate, 151-206. Cambridge: Cambridge University Press.
- Dorward, Andrew R. 2014. "Livelihoods a conceptual framework integrating social, ecosystem, development, and evolutionary theory." *Ecology and Society* 19 (2).
- Earle, Anton, Ana Elisa Cascão, Stina Hansson, Anders Jägerskog, Ashok Swain, and Joakim Öjendal. 2015. *Transboundary water management and the climate change debate*: Routledge.

- Gutiérrez Ossa, Jahir Alexander, Rubén Darío Restrepo Avendaño, and John Stivens Zapata Hoyos. 2017. "Formulación, implementación y evaluación de políticas públicas desde los enfoques, fines y funciones del Estado." *CES Derecho* 8 (2):333-351.
- Hayat, Shakeel, Hameed Jamali, and Yamna Ihtisham. 2024. "Transboundary Water Governance through the Lens of International Relations." *Journal of Higher Education and Development Studies (JHEDS)* 4 (1):77-89. doi: 10.59219/jheds.04.01.50.
- Kiss, Bernadett, Filka Sekulova, Kathrin Hörschmann, Carl F. Salk, Wakana Takahashi, and Christine Wamsler. 2022. "Citizen participation in the governance of nature-based solutions." *Environmental Policy and Governance* 32 (3):247-272. doi: <https://doi.org/10.1002/eet.1987>.
- Low, Sui Pheng. 2012. "Strategic development of the built environment through international construction, quality and productivity management." University of Birmingham.
- Milman, Anita, Lisa Bunclark, Declan Conway, and William Neil Adger. 2013. "Assessment of institutional capacity to adapt to climate change in transboundary river basins." *Climatic Change* 121 (4):755-770. doi: 10.1007/s10584-013-0917-y.
- Oberlack, Christoph, and Bernhard Neumärker. 2011. Economics, institutions and adaptation to climate change. University of Freiburg, Department of Economic Policy and Constitutional Economic Theory.
- Olalekan, Raimi Morufu, OO Adedoyin, Adedipe Ayibatobira, B Anu, OO Emmanuel, and ND %J International Journal of Hydrology Sanchez. 2019. "Digging deeper" evidence on water crisis and its solution in Nigeria for Bayelsa state: a study of current scenario." 3 (4):244-257. doi: 10.15406/ijh.2019.03.00187.
- Orr, A., Ahmad, B., Alam, U., Appadurai, A., Bharucha, Z. P., Biemans, H., ... & Wescoat Jr, J. L. (2022). Knowledge priorities on climate change and water in the Upper Indus Basin: A horizon scanning exercise to identify the top 100 research questions in social and natural sciences. *Earth's Future*, 10(4), e2021EF002619. doi: <https://doi.org/10.1029/2021EF002619>.
- Parto, Saeed. 2003. Transitions: An Institutional Perspective. Maastricht University, Maastricht Economic Research Institute on Innovation and Technology (MERIT).
- Rigi, Hanifeh, and Jeroen F. Warner. 2020. "Two-level games on the trans-boundary river Indus: obstacles to cooperation." *Water Policy* 22 (6):972-990. doi: 10.2166/wp.2020.090 %J Water Policy.
- Varady, Robert G., Tamee R. Albrecht, Sayanangshu Modak, Margaret O. Wilder, and Andrea K. Gerlak. 2023. Transboundary Water Governance Scholarship: A Critical Review. *Environments* 10 (2). doi:10.3390/environments10020027.
- Villar, Pilar Carolina, Wagner Costa Ribeiro, and Fernanda Mello Sant'Anna. 2018. "Transboundary governance in the La Plata River basin: status and prospects." *Water International* 43 (7):978-995. doi: 10.1080/02508060.2018.1490879.
- Vollmer, Ruth, Reza Ardakanian, Matthew P. Hare, Jan Leentvaar, Charlotte van der Schaaf, and Lars Wirkus. 2009. "Institutional Capacity Development in Transboundary Water Management."
- Wantzen, Karl M., Carlos B. Alves, Sidia D. Badiane, Raita Bala, Martín Blettler, Marcos Callisto, Yixin Cao, Melanie Kolb, G. M. Kondolf, Marina F. Leite, Diego R. Macedo, Obaidullah Mahdi, Moana Neves, M. E. Peralta, Vincent Rotgé, Guillermo Rueda-Delgado, Andres Scharager, Anna

- Serra-Llobet, Jean-Louis Yengué, and Aude Zingraff-Hamed. 2019. Urban Stream and Wetland Restoration in the Global South—A DPSIR Analysis. *Sustainability* 11 (18). doi:10.3390/su11184975.
- Whaley, Luke, and Edward K. Weatherhead. 2015. "Using the politicized institutional analysis and development framework to analyze (adaptive) comanagement farming and water resources in England." *Ecology and Society* 20 (3).
- Wong, Janis, Tristan Henderson, and Kirstie Ball. 2022. "Data protection for the common good: Developing a framework for a data protection-focused data commons." *Data & Policy* 4:e3. doi: 10.1017/dap.2021.40.
- Zeitoun, Mark, Marisa Goulden, and David Tickner. 2013. "Current and future challenges facing transboundary river basin management." *WIREs Climate Change* 4 (5):331-349. doi: <https://doi.org/10.1002/wcc.228>.