

**NAVIGATING INTERNATIONAL LAW IN CROSS-BORDER CIVIL  
INFRASTRUCTURE PROJECTS  
NAVEGANDO EL DERECHO INTERNACIONAL EN PROYECTOS DE  
INFRAESTRUCTURA CIVIL TRANSFRONTERIZA**

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**ABSTRACT**

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In an increasingly interconnected world, cross-border civil infrastructure projects, such as dams, pipelines, and transport corridors, pose complex challenges for international law. This article explores how international legal norms regulate these endeavors, emphasizing the need to balance sovereign interests with environmental and human rights obligations. It analyzes the role of treaties like the United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses, and examines real cases in regions such as Central Asia, South America, and Europe. It is evident that climate uncertainty and power asymmetries between states complicate the implementation of transboundary environmental impact assessments and cooperation mechanisms. Additionally, it addresses how initiatives like China's Belt and Road affect shared water resources management, generating tensions that require adaptable legal frameworks. The methodology is based on a critical review of recent literature, integrating perspectives from hydropolitics and water diplomacy. Ultimately, it concludes that more inclusive governance, with an emphasis on public participation and equity, is essential to mitigate conflicts and promote sustainable development. This approach not only resolves immediate disputes but also strengthens resilience to global changes, although gaps persist in the practical application of these principles. It is suggested that states invest in regional institutions to overcome these limitations.

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**RESUMEN**

**Palabras clave:**

derecho internacional, recursos hídricos, evaluación del impacto ambiental, infraestructura civil, gobernanza ambiental

En un mundo cada vez más interconectado, los proyectos de infraestructura civil transfronteriza, como represas, gasoductos y corredores de transporte, representan desafíos complejos para el derecho internacional. Este artículo explora cómo las normas legales internacionales regulan estos emprendimientos, destacando la necesidad de equilibrar intereses soberanos con obligaciones ambientales y de derechos humanos. Se analiza el papel de tratados como la Convención de las Naciones Unidas sobre el Derecho de los Usos de los Cursos de Agua Internacionales para Fines Distintos de la

Navegación, y se examinan casos reales en regiones como Asia Central, América del Sur y Europa. Resulta evidente que la incertidumbre climática y las asimetrías de poder entre estados complican la implementación de evaluaciones de impacto ambiental transfronterizas y mecanismos de cooperación. Además, se aborda cómo iniciativas como la Iniciativa de la Franja y la Ruta de China influyen en la gestión de recursos hídricos compartidos, generando tensiones que requieren marcos legales adaptables. La metodología se basa en una revisión crítica de literatura reciente, integrando perspectivas de hidropolítica y diplomacia hídrica. En última instancia, se concluye que una gobernanza más inclusiva, con énfasis en la participación pública y la equidad, es esencial para mitigar conflictos y promover el desarrollo sostenible. Este enfoque no solo resuelve disputas inmediatas, sino que fortalece la resiliencia ante cambios globales, aunque persisten brechas en la aplicación práctica de estos principios. Se sugiere que los estados inviertan en instituciones regionales para superar estas limitaciones.

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## **Introduction**

Cross-border civil infrastructure projects have gained prominence in recent decades, driven by globalization and the need to integrate regional economies. Think of hydroelectric dams that cross shared rivers or gas pipelines that cross borders: these not only facilitate economic development, but also generate legal dilemmas that transcend national sovereignties. It is remarkable how international law, with its principles of cooperation and no significant harm, attempts to mediate in these scenarios, although it often clashes with unequal political realities. This article seeks to navigate these troubled waters, analyzing how international norms regulate such projects and what lessons can be drawn from recent experiences.

From a general perspective, one could argue that these ventures reflect the pulse of our era: a precarious balance between progress and sustainability. In regions such as Central Asia or Latin America, where water resources are vital, tensions arise not only because of scarcity, but also because of the lack of robust legal frameworks. For example, climate change exacerbates uncertainties, making old treaties seem obsolete. Here, contributions from diverse authors are integrated to offer an integral vision, varying approaches from hydropolitics to environmental diplomacy. The objective is not only to describe challenges, but also to propose ways for a more equitable governance that avoids conflicts and fosters cross-border collaboration. In my opinion, ignoring these aspects could lead to protracted disputes, as has been seen in several historical cases.

It is fascinating how these projects, which in theory unite nations, often uncover deep cracks in international relations. Imagine a bridge across a border river: it is not just concrete and steel, but a symbol of mutual trust that, if built without consensus, can become a point of friction. One cannot help but notice that, in a world where global trade depends on these connections, international law acts as an indispensable, albeit imperfect, arbiter. From a personal point of view, I believe that real progress lies in recognizing that sovereignty is not an absolute shield, but a flexible concept that must adapt to shared realities.

For instance, in Europe, where integrations such as the Union have facilitated rail corridors, we can see how legal harmonization can smooth out rough edges, but in other parts of the globe, such as Africa, colonial legacies complicate matters. On further reflection, it seems that climate change not only alters water patterns, but also forces a rethinking of entire treaties, turning what was stable into something volatile. In the end, this article is not meant to be exhaustive, but a starting point to understand how, through past lessons, we can forge a future where infrastructure serves all, not just a few.

## **Method**

This study adopts a qualitative approach based on an exhaustive review of specialized literature, focusing on academic publications in recent years. Key references dealing with international law applied to cross-border infrastructures were selected, prioritizing those that integrate empirical cases and theoretical analysis. The search focused on topics such as environmental impact assessments, human rights in water projects and regional institutional frameworks.

To ensure a balanced perspective, a thematic analysis was used, grouping the contributions into categories such as transboundary conflicts, legal mechanisms and governance lessons. This made it possible to identify recurring patterns, such as the

influence of power asymmetries in negotiations. Although no primary fieldwork was conducted, the synthesis of existing studies provides a solid base, complemented by critical reflections to enrich the debate.

As for the sources of information, the collection of articles was carried out mainly through recognized academic databases, such as Scopus, Web of Science and Google Scholar, which provided access to high impact indexed journals in areas such as environmental law, hydropolitics and international studies. For example, specific search terms such as "international law in transboundary infrastructure", "transboundary environmental impact assessment" and "governance of shared water resources" were used, combined with temporal filters to limit the results to publications between 2021 and 2025, ensuring current relevance. In addition, open repositories such as ResearchGate and Academia.edu were consulted for pre-print versions or open access articles, which broadened the diversity of geographic perspectives, including authors from underrepresented regions such as Central Asia and Africa.

Inclusion criteria included thematic relevance, methodological quality (prioritizing studies with empirical analyses or systematic reviews) and diversity of approaches, excluding those that were purely descriptive without critical contributions. This resulted in a selection of about 25 main references, which were iteratively analyzed to extract common themes and contradictions, such as the tensions between state sovereignty and global obligations. In my experience, this process not only guarantees rigor, but also allows for a smooth integration of ideas, avoiding biases when crossing sources from different disciplines. Other relevant details include the use of software such as Zotero to manage references, facilitating traceability, and a manual review to verify the validity of DOIs and links, although direct hyperlinks are avoided in the final text to maintain narrative flow. This methodology, in essence, seeks to capture the complexity of the issue without overloading it with quantitative data, focusing on qualitative perspectives that resonate with real challenges.

## Results

International law offers an arsenal of tools for managing civil infrastructure projects that cross borders, but their application is far from uniform. Principles such as equitable and reasonable utilization of water resources, enshrined in global treaties, serve as a guide, although they face practical obstacles. For instance, in contexts of climate uncertainty, it is crucial to adapt these frameworks to stabilize expectations between states (Kang, 2023). One cannot underestimate how these principles are evolving; originally intended for international rivers, they now extend to gas pipelines and road corridors, where no significant harm becomes an ethical cornerstone.

From a broader angle, these principles not only regulate the use of shared resources, but also promote mutual trust. Imagine a scenario where an upstream country builds a dam without consulting the downstream country: this is where rules such as prior notification and consultation come into play, which seek to prevent escalation. Authors agree that, without them, projects could lead to costly litigation, affecting not only economies, but entire communities. Moreover, these foundations are inspired by historical ideas, such as those derived from international custom, which emphasize reciprocity among nations. For example, in arid regions, where water is a scarce commodity, applying these principles rigidly could ignore local dynamics, leading to unnecessary stresses.

One might think that, in practice, these concepts act as a brake on unilateral ambition, forcing states to consider impacts beyond their borders. However, reality shows that, in many cases, national sovereignty takes precedence, diluting its effectiveness. Reflecting on this, it seems that the real challenge lies in translating these abstract ideals into concrete actions, especially when powerful economic interests are involved. Indeed, recent studies highlight how the evolution of these principles, influenced by climate change, requires constant reinterpretation to maintain their relevance (Mirumachi & Hurlbert, 2022). Ultimately, these fundamentals are not static; they are shaped over time, responding to global crises that demand deeper and more genuine cooperation.

### ***Transboundary Environmental Impact Assessment***

One of the pillars is the transboundary environmental impact assessment, which seeks to prevent significant damage. Authors such as An et al. (2024) argue the need for new mechanisms for cases such as the treated water disposal plan in Japan, where cumulative effects require further legal review. Similarly, Nelson & Shirley (2023) highlight the latent potential of cumulative effects concepts in national and international regimes, which could illuminate valuation decisions in large-scale projects.

In practice, these evaluations are not always rigorously implemented. Think of how a subsea pipeline could alter shared marine ecosystems: without a joint assessment, impacts accumulate silently, like pollutants traveling with the currents. The author considers that here lies a common failure: many states prioritize short-term economic considerations over long-term sustainability, which exacerbates climate vulnerabilities. Furthermore, integrating socio-cultural aspects, as in industrial fisheries (Nakamura et al., 2022), enriches these assessments, making them measure not only physical but also cultural damage. One might add that these tools, although theoretically sound, are often limited by the lack of shared data between countries, making the process a partial exercise. For instance, in projects such as dams on transboundary rivers, ignoring cumulative effects could lead to irreversible degradations, such as loss of biodiversity or alterations in migratory patterns of species.

From a personal perspective, I believe that strengthening these assessments would require not only stricter legal frameworks, but also incentives for transnational scientific collaboration. Additional studies suggest that incorporating technologies such as predictive modeling could anticipate risks, but this depends on political will that is not always present (An et al., 2024). In vulnerable regions, such as the Pacific, where marine pollution crosses oceans, these assessments become an ethical imperative, reminding us that the environment does not respect boundaries drawn by humans. In the end, its scope could mitigate not only environmental damage, but also diplomatic conflicts arising from it.

Before presenting the first table, it is worth noting how international treaties vary in their approach to cross-border infrastructures. Many incorporate principles of non-harm and cooperation, but their effectiveness depends on regional contexts. The following table lists some of the main ones, with references to authors who analyze them.

**Table 1***Main treaties and conventions in international law for transboundary infrastructures*

<b>Treaty/Convention</b>	<b>Year</b>	<b>Main focus</b>	<b>Key references</b>
United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses	1997	Equitable utilization, no significant harm	(Ziganshina, 2023; Kang, 2023)
Espoo Convention on Environmental Impact Assessment in a Transboundary Context	1991	Mandatory assessments for transboundary impacts	(An et al., 2024; Nelson & Shirley, 2023)
Energy Charter Treaty	1994	Protection of energy investments, including cross-border investments	(Cocciolo & Reins, 2025; Ekardt et al., 2023)
Agreement on the Use and Protection of Transboundary Rivers (Sino-Kazakhstan)	2001	Bilateral cooperation in shared basins	(Brassett et al., 2022; Janusz-Pawletta & Oravcová, 2025)
Southern African Development Community (SADC) Transport Protocol	1996	Integration of cross-border corridors	(Zajontz, 2022)

This table illustrates the diversity of legal instruments, from global to regional, that guide infrastructure projects. Below, it is explained that these treaties not only establish obligations, but also promote mechanisms such as bilateral commissions to resolve disputes. For example, the 1997 Convention has influenced arrangements in Central Asia, but its limited adoption by countries such as China highlights gaps in universality (Ziganshina, 2023). In essence, the table highlights how these frameworks are evolving, adapting to new challenges such as climate change, although their implementation varies according to the political commitment of the states involved.

### ***Transboundary Water Resources Cooperation***

In the water sector, which dominates many of these projects, cross-border cooperation is key. Ziganshina (2023) examines legal frameworks in Central Asia, where infrastructure such as interstate dams require customized arrangements for operation and maintenance. There, river basin organizations facilitate data exchange, motivated by mutual needs (Mukuyu et al., 2023). An emblematic case is the ITAIPU Binational Entity between Brazil and Paraguay, which demonstrates how international law can balance multiple uses of shared rivers, even in the face of climate-induced droughts (Gwynn, 2023).

However, this cooperation does not come out of the blue; it requires trust built up over years. Consider how in Africa, shared basins motivate information exchanges not out of altruism, but out of pragmatic interests: a downstream state needs data to plan, while the upstream state gains legitimacy (Mukuyu et al., 2023). The author believes that an opportunity lies here: by formalizing these exchanges in treaties, uncertainty is reduced, allowing projects such as dams to generate mutual benefits rather than rivalries. In contexts such as the Nile or the Mekong, cooperation has evolved from mere bilateral agreements to regional networks, where joint commissions monitor flows and resolve disputes before they escalate.

One might note, however, that factors such as water nationalism complicate this, leading to situations where countries accumulate water to the detriment of neighbors. On reflection, it appears that the success of these cooperations depends to a large extent on shared economic incentives, such as hydropower trading, which transforms potential conflicts into productive alliances. Further studies reveal that integrating climate data into these mechanisms could predict shortages, fostering proactive diplomacy (Kang, 2023). In dry regions, this cooperation becomes a lifeline, reminding us that water, more than a resource, is a link that unites national destinies. Digging deeper, we see that gaps

in implementation, such as the lack of effective sanctions, undermine these efforts, suggesting the need for more robust international forums to mediate.

### ***Power asymmetries and Implementation Challenges***

But all is not harmony; power asymmetries complicate matters. Palmer (2023) reflects on how infrastructure reveals patterns in international law, using examples such as cross-border highways that expose gaps in regulation. In Europe, the case of Nord Stream 2 illustrates limitations in European Union action, where shared competencies and conflicting preferences constrain coherent actions (Batzella, 2022).

These asymmetries manifest themselves in unequal negotiations, where economic powers impose terms. For example, in post-colonial contexts, weaker states cede sovereignty over resources to attract investment, which generates long-term resentment. One could argue that international law, although neutral in theory, is biased towards the strong if there are no built-in equity mechanisms. In Central Asia, countries such as China exert influence through massive projects, marginalizing neighboring nations in key decisions on shared rivers (Ziganshina, 2023). From a personal viewpoint, this evokes ethical concerns, as such imbalances perpetuate cycles of dependency, where the development of one is at the expense of the other.

Studies show that equity clauses in treaties, such as minimum water quotas or financial compensation, are needed to counteract this, but their application is irregular. Moreover, in South America, cases such as ITAIPU reveal how, even in binational alliances, historical asymmetries influence the distribution of benefits (Gwynn, 2023). One cannot ignore how climate change amplifies these challenges, causing powerful states to hoard scarce resources. On reflection, it seems imperative to foster supranational institutions that level the field, promoting fairer implementation. In the end, these asymmetries not only erode trust, but undermine the very essence of international law as a tool of global balance.

### ***Global Initiatives and their Impact on Water Management***

In addition, global initiatives such as the Belt and Road Initiative influence transboundary water management. Brassett et al. (2022) analyze impacts in Sino-Kazakhstan, where sanctioned discourse limits effective negotiations, suggesting solutions in water-energy-food nexus. Janusz-Pawletta & Oravcová (2025) emphasize legal bases for public participation in international rivers, such as the Ili, promoting inclusiveness to resolve disputes.

These initiatives, while ambitious, often overlook local voices. Imagine riverside communities excluded from decisions that affect their livelihoods: that's where public participation becomes crucial, transforming taxing projects into collaborative ones. Varady et al. (2023) offer a critical review of the scholarship on transboundary governance, identifying frameworks such as hydropolitics and water diplomacy that help navigate these complexities.

In public procurement, which finances many infrastructures, Van Assche et al. (2024) explore implications for international business, while Khorana et al. (2024) measure transparency in electronic systems, crucial for cross-border projects. Transparency reduces corruption risks, ensuring that funds are used equitably. In the context of the Belt and Road, these projects have generated massive infrastructure, but also environmental stresses in watersheds such as the Irtysh, where altered flows affect downstream ecosystems (Brassett et al., 2022). One might observe that, while promoting connectivity, they often ignore cumulative impacts, which calls for legal frameworks that incorporate periodic reviews.



From a critical perspective, these initiatives reflect a new geopolitical order, where emerging powers redefine rules, but at the cost of equity. Additional studies propose integrating multi-sectoral linkages, such as water-energy, to mitigate risks (Janusz-Pawletta & Oravcová, 2025). In Africa and Asia, where such projects proliferate, the lack of transparency in contracts exacerbates inequalities, suggesting that electronic systems could democratize the process (Khorana et al., 2024). On reflection, it seems that the real impact of these initiatives depends on how they are aligned with local principles, preventing them from becoming tools of subtle domination. Digging deeper, it becomes clear that fostering public participation is not a luxury, but a necessity to legitimize these global efforts.

### ***Integration of Human Rights and Energy Aspects***

Moving forward, human rights emerge as a crucial axis. Tignino & Jara (2024) explore its application in transboundary hydropower developments, emphasizing the right to drinking water and indigenous rights. Nakamura et al. (2022) extend this to socio-cultural assessments in large-scale industrial fisheries.

In energy, the Energy Charter Treaty faces criticism for perpetuating fossil dependencies, disconnected from Anthropocene challenges (Cocciolo & Reins, 2025). Ekardt et al. (2023) propose reinterpretations aligned with the Paris Agreement and human rights, limiting compensation claims. Sun (2025) discusses coastal jurisdiction over acts against subsea pipelines, using lessons from the Nord Stream sabotage.

These aspects reveal how the law must evolve: not only to protect investments, but also ecosystems and vulnerable populations. The author believes that ignoring human rights is tantamount to sowing seeds of future conflict. In hydroelectric projects, displacing communities without consultation violates not only treaties, but basic principles of dignity (Tignino & Jara, 2024). One could add that integrating socio-cultural assessments, as in fishing industries, enriches the analysis, considering impacts on ancestral traditions (Nakamura et al., 2022).

In the energy sector, outdated treaties such as the Energy Charter prioritize corporate profits over green transitions, calling for urgent reforms (Ekardt et al., 2023). Cases such as Nord Stream expose vulnerabilities, where ambiguous jurisdictions allow hostile acts without clear answers (Sun, 2025). From a personal viewpoint, this underscores the need for a holistic approach, where human rights act as an ethical compass. Studies show that aligning with climate goals, such as the Paris Agreement, could limit abusive litigation (Cocciolo & Reins, 2025). In indigenous regions, such as the Amazon, these aspects become vital, protecting not only people, but also cultural heritages. In the end, this integration strengthens international law, making it more resilient to modern pressures.

#### **Transportation corridors and regional governance**

For transportation corridors, Ansong et al. (2022) discuss integrated marine spatial planning, with perspectives from Germany, Poland and Ireland. Knorr & Eisenkopf (2022) propose alternative regulatory approaches for long-distance rail services, focused on Germany, but applicable cross-border. Zajontz (2022) criticizes Southern Africa, where territorialized realities hinder corridor governance. Bois (2025) points out mismatches between regulatory ideals and implementation in the single European railway area.

Grigg (2023) evaluates functionality of transboundary water compacts in the U.S., offering lessons for international contexts. Mirumachi & Hurlbert (2022) reflect on two decades of agreements, synthesizing perspectives on governance. Ghossein et al. (2021) integrate public procurement with the Belt and Road Initiative, highlighting regional integration.



Before the second table, note that the case studies reveal common patterns in legal challenges. The following table lists key examples, with their implications.

**Table 2**

*Case studies of transboundary projects and legal challenges*

Case	Region	Project	Main challenges	Key references
ITAIPU	South America	Brazil-Paraguay Binational Dam	Balance of multiple uses, climate impacts	(Gwynn, 2023)
Nord Stream 2	Europa	Russia-Germany gas pipeline	EU-State competences, international sanctions	(Batzella, 2022; Sun, 2025)
Ili and Irtysh Rivers	Central Asia	Management under the Belt and Road Initiative	Asymmetries of power, sanctioned discourse	(Brassett et al., 2022; Janusz-Pawletta & Oravcová, 2025)
Walvis Bay-Ndola-Lubumbashi Corridor	Southern Africa	Transportation corridor	National territoriality vs. regional integration	(Zajontz, 2022)
Hydroelectric projects in shared basins	Global	Transboundary dams	Human rights, environmental assessments	(Tignino & Jara, 2024; Ziganshina, 2023)

This table summarizes cases illustrating real stresses. Below, it is detailed that these examples show how international law can mediate, but often requires supranational institutions to overcome national barriers. For example, in ITAIPU, operations such as "water windows" during droughts demonstrate adaptability, although they depend on bilateral cooperation (Gwynn, 2023). The table also highlights global patterns, such as how asymmetries in Central Asia perpetuate inequalities, suggesting that local solutions, such as public participation committees, could mitigate these problems in similar contexts. In corridors such as the African corridor, imaginaries of fluidity collide with local realities, where fragmented sovereignties impede progress (Zajontz, 2022).

One might note that alternative regulatory approaches, such as those proposed for European railroads, could inspire hybrid models that combine efficiency with equity (Knorr & Eisenkopf, 2022). In marine planning, integrating boundaries as in the Baltic promotes shared governance, but requires constant coordination (Ansong et al., 2022). On reflection, these corridors not only connect economies, but expose failures in regional governance, where European ideals contrast with African practices. Studies on covenants in the U.S. offer transferable lessons, such as flexible monitoring mechanisms (Grigg, 2023). In this study, it can be seen that contracting in global initiatives could optimize these projects, promoting integration without sacrificing sovereignty (Ghossein et al., 2021). In short, regional governance emerges as an essential bridge, linking global aspirations with local realities.

### ***Dispute Resolution Mechanisms in Cross-Border Disputes***

When disagreements arise in cross-border projects, resolution mechanisms become the lifeline to avoid further escalation. These include international arbitration or bilateral commissions, which seek to mediate based on principles such as no harm. For example, in water disputes, authors such as Grigg (2023) evaluate the functionality of covenants in the U.S., highlighting lessons for global arrangements where flexibility is key. One might think that these mechanisms, although formal, often rely on good faith, which makes them vulnerable in scenarios of distrust.

From a closer perspective, the author believes that ignoring these processes is tantamount to inviting chaos, as seen in cases where protracted litigation paralyzes developments. In Europe, the mismatch between ideal regulations and actual practice, as in railroads, highlights the need for specialized courts to speed up resolutions (Bois, 2025). On reflection, it appears that integrating elements of preventive diplomacy, such

as early data exchanges, could reduce the burden on these mechanisms (Mukuyu et al., 2023). In regions such as Southern Africa, where corridors confront territorialities, these systems reveal gaps, suggesting reforms to include local voices (Zajontz, 2022).

Upon closer examination, it is clear that its success lies in its adaptability, preventing minor disputes from escalating into diplomatic crises. Additional studies propose hybrids between arbitration and mediation, balancing fairness with efficiency (Palmer, 2023). In essence, these mechanisms not only solve, but also educate, fostering a culture of dialogue in an interdependent world.

### ***Role of International Organizations in Governance***

International organizations play a pivotal role in orchestrating the governance of cross-border infrastructures, acting as neutral facilitators. For instance, entities such as the UN or the EU provide platforms for negotiations, as in environmental assessments where common standards are promoted (An et al., 2024). One cannot underestimate their influence; they often fill gaps where states fail to cooperate.

In hydropolitics, these organizations stabilize expectations under uncertainty, as proposed by Kang (2023), by providing forums to share data and mitigate climate risks. From a personal point of view, I believe that their strength lies in the legitimacy they bring, although they sometimes suffer from excessive bureaucracy. In energy, critiques of the Energy Charter Treaty highlight how such bodies need to be updated to align with human and climate goals (Ekardt et al., 2023). On reflection, in Central Asia, their role in shared basins could be expanded to counteract asymmetries (Ziganshina, 2023). In the end, these institutions not only regulate, but inspire, promoting governance that transcends national borders.

### ***Adaptation to Climate Change in Shared Infrastructure***

Climate change imposes an additional layer of complexity, requiring adaptations in cross-border infrastructure to deal with unpredictable droughts or floods. Authors such as Gwynn (2023) illustrate this in ITAIPU, where operational adjustments respond to climatic variability, balancing multiple uses. One could argue that, without these adaptations, viable projects quickly become obsolete.

In water contexts, integrating climate projections into treaties stabilizes expectations, reducing conflicts (Kang, 2023). The author considers that here lies an ethical challenge: states must prioritize resilience over immediate gains. In pipelines such as Nord Stream, climate vulnerabilities expose jurisdictional gaps (Sun, 2025). On reflection, it seems that regional organizations could take the lead in promoting joint plans to mitigate impacts. In global regions, this adaptation is not optional; it is imperative for a sustainable future.

### ***Transparency and Contracting in International Projects***

Transparency in public procurement is vital to avoid corruption in cross-border infrastructure, ensuring that funds are distributed equitably. Khorana et al. (2024) measure this through indices, highlighting the role of electronic systems in improving accountability. One is not unaware of how opacity aggravates inequalities, especially in global initiatives.

From a broad perspective, governments as buyers influence international business, as explored by Van Assche et al. (2024), where transparency attracts ethical investments. The author believes that, without it, projects are diverted to elites. In the Belt and Road, integrating contracting with regional integration could balance benefits (Ghossein et al., 2021). On reflection, this transforms opaque processes into inclusive

ones, strengthening trust. In the end, transparency is not an ornament; it is the foundation of just governance. In contexts where international funds flow to developing countries, lack of clarity generates suspicions that erode partnerships. Imagine a million-dollar contract for a gas pipeline: without open audits, rumors of favoritism can unleash diplomatic scandals.

One could add that digital tools, such as electronic platforms, not only speed up processes, but also democratize access, allowing small suppliers to compete. From a personal angle, I believe this empowers civil societies, which demand accountability. Studies reveal that transparency indexes correlate with project success, reducing cost overruns (Khorana et al., 2024). In regions such as Europe, where strict regulations are in place, a replicable model is seen, but in Africa, cultural and technological barriers complicate its adoption. It seems that fostering training and public-private partnerships could close gaps, turning contracting into an engine of equity. In essence, without transparency, procurement becomes a risk, but with it, a catalyst for inclusive development.

### ***Lessons Learned from Historical Reviews***

Historical reviews offer valuable lessons for future transboundary projects, synthesizing two decades of water agreements (Mirumachi & Hurlbert, 2022). One might notice recurring patterns, such as the evolution of frameworks to include sustainability.

In governance, critical reviews identify hydropolitical framings that guide decisions (Varady et al., 2023). The author believes that ignoring history condemns one to repeat mistakes, as in underestimated environmental assessments (Nelson & Shirley, 2023). Cases such as Nord Stream teach about jurisdictions (Batzella, 2022). On reflection, these lessons not only inform, but transform, promoting adaptive approaches. In short, history is a silent master in this field. Think of how past agreements, such as those of post-war Europe, laid the foundations for current integrations, but failed to foresee climate impacts. One cannot help but see parallels with Asia, where ancient water disputes inform modern treaties, avoiding escalation (Ziganshina, 2023).

From a personal viewpoint, I believe these reviews reveal a pattern: success comes from learning from failure, as in watersheds where ignoring local voices led to protests. Additional studies show that incorporating lessons from two decades accelerates progress, such as in water diplomacy that prioritizes equity (Mirumachi & Hurlbert, 2022). In global regions, this means rethinking approaches, integrating sustainability from the outset. When delving deeper, it is noted that historical gaps, such as in Africa, underscore the need for cultural contexts to be revised. It seems that, without these lessons, projects repeat vicious cycles, but with them, they open the way to lasting innovations.

## **Discussion and Conclusions**

The discussion reveals that, although international law provides a solid foundation, its effectiveness depends on political will. It is striking how asymmetries, such as in the Belt and Road Initiative, create discourses that limit solutions (Brassett et al., 2022). Personally, one could argue that integrating human rights, as proposed by Tignino & Jara (2024), adds an essential ethical layer, preventing projects that benefit only elites. In addition, underestimated cumulative effects in environmental assessments call for reforms (Nelson & Shirley, 2023). In procurement, e-transparency could mitigate corruption, but needs comprehensive frameworks (Khorana et al., 2024).

Going deeper, let us consider the implications of climate uncertainty: treaties such as the 1997 Convention seem insufficient in the face of unpredictable droughts, where states must dynamically renegotiate terms (Kang, 2023). In Central Asia, water infrastructures reveal how fragile institutional frameworks allow powers to dominate, marginalizing smaller nations (Ziganshina, 2023). One cannot ignore how this erodes trust; for example, in the Ili River, lack of public participation generates local protests that could escalate into interstate disputes (Janusz-Pawletta & Oravcová, 2025).

Another critical aspect is the intersection with human rights: transboundary hydropower projects often displace indigenous communities without adequate compensation, violating basic principles (Tignino & Jara, 2024). The author believes that, without integrating socio-cultural assessments, as in fisheries (Nakamura et al., 2022), these ventures perpetuate historical inequalities. In energy, the Energy Charter Treaty, criticized for its fossil focus, needs urgent reinterpretations to align with global climate goals (Ekardt et al., 2023; Cocciolo & Reins, 2025). Cases such as Nord Stream highlight ambiguous jurisdictions, where sabotage exposes legal vulnerabilities (Sun, 2025).

In transportation, corridors in Southern Africa show how imaginaries of integration clash with territorial realities, where national sovereignties take precedence over regional benefits (Zajontz, 2022). Similarly, in Europe, rail regulations reveal mismatches between ideals and practice, limiting cross-border efficiency (Bois, 2025; Knorr & Eisenkopf, 2022). The scholarship on water governance, reviewed by Varady et al. (2023), suggests that hydropolitical approaches could solve this by fostering inclusive diplomacy.

In addition, data sharing in shared basins, motivated by mutual needs, could be extended to other domains such as energy (Mukuyu et al., 2023). However, asymmetries in public procurement, where governments act as buyers, complicate equitable investments (Van Assche et al., 2024; Ghossein et al., 2021). In ITAIPU, lessons of climate balance offer replicable models, but require cultural adaptation (Gwynn, 2023).

In sum, this discussion underscores persistent gaps: international law is robust in theory, but weak in application. One could propose that, to overcome this, specialized regional courts are needed, integrating hydropolitics perspectives to anticipate conflicts. Ignoring these elements not only aggravates environmental tensions, but also undermines sustainable development, leaving vulnerable populations in limbo.

Navigating international law in cross-border infrastructures requires adaptability and fairness. Lessons from the cases reviewed suggest prioritizing inclusive governance to overcome climate and political challenges. Although gaps persist, a progressive reinterpretation of treaties, aligned with human rights and sustainability, offers hope. It is imperative that states strengthen mechanisms such as watershed organizations, fostering mutual development. In short, these projects not only build physical bridges, but also weave legal networks for a shared future.

One must recognize that success depends on collective will: without it, treaties such as the Espoo Convention remain a dead letter, unable to prevent cumulative damage (An et al., 2024; Nelson & Shirley, 2023). In regions such as Europe and Asia, where asymmetries dominate, initiatives such as the Belt and Road could become positive catalysts if they incorporate genuine public participation (Brassett et al., 2022; Janusz-Pawletta & Oravcová, 2025). The author believes that investing in water diplomacy, as suggested by Mirumachi & Hurlbert (2022), is key to stabilizing expectations under uncertainty (Kang, 2023).

Looking ahead, recommendations include: first, reform energy treaties to prioritize green transitions (Ekardt et al., 2023; Cocciolo & Reins, 2025); second, improve transparency in contracting to attract ethical investments (Khorana et al., 2024; Ghossein

et al., 2021); third, integrate human rights in all phases, protecting communities (Tignino & Jara, 2024). Cases such as ITAIPU and Nord Stream illustrate that, with adaptability, risks can be mitigated (Gwynn, 2023; Batzella, 2022).

Ultimately, these projects represent opportunities to redefine sovereignty: not as barriers, but as platforms for collaboration. If states adopt inclusive approaches, varying from hydropolitics to spatial planning (Ansong et al., 2022; Varady et al., 2023), they could not only resolve current disputes, but prevent future ones. Challenges remain, as in Africa and South America, but with robust frameworks, international law could lead to resilient and equitable development.

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