Water International

ISSN: 0250-8060 (Print) 1941-1707 (Online) Journal homepage: www.tandfonline.com/journals/rwin20

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To cite this article: Diego Jara & Mara Tignino (2026) The evolving legal regime to govern hydropower in transboundary waters: the case of the La Plata River Basin, Water International, 51:3, 289-308, DOI: 10.1080/02508060.2026.2649062

To link to this article: https://doi.org/10.1080/02508060.2026.2649062

Published online: 10 Apr 2026.

WATER INTERNATIONAL
2026, VOL. 51, NO. 3, 289–308
https://doi.org/10.1080/02508060.2026.2649062

RESEARCH ARTICLE

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The evolving legal regime to govern hydropower in transboundary waters: the case of the La Plata River Basin

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ABSTRACT

A century after the first global attempt to regulate hydropower in transboundary waters, states continue to struggle to balance human, nature and energy needs. Emerging economies rely on hydropower as an affordable and clean energy for sustainable development, often without understanding its challenges and best practices. This paper examines the evolution of the universal legal regime on hydropower, analysing global freshwater legal frameworks and specific regulations applicable to the La Plata River Basin. This illustrates the importance of the progressive development of global, regional and basin agreements to effectively governing transboundary waters and hydropower.

ARTICLE HISTORY
Received 18 March 2026
Accepted 18 March 2026

KEYWORDS
International law; water; hydropower; La Plata River Basin

Introduction

Over the past century, hydropower has significantly contributed to the world's economic and industrial development. International law has addressed this topic since the emergence of hydropower, responding to rising political, social, and environmental concerns affecting states. Throughout history, the negotiation and development of bilateral and multilateral agreements have consolidated cooperation, facilitating an adequate response to these multiple and complex challenges. Changing climatic phenomena such as droughts and floods, along with the requirements for biodiversity conservation outlined in instruments like the Convention on Biodiversity or the Ramsar Convention on the Protection of Wetlands of International Importance, present current challenges, such as ensuring adequate access to energy, that states must consider during the planning and development of hydropower projects.

Compliance with essential principles of international water law, such as the principle of equitable and reasonable utilization, the no-harm obligation, and the duty of prior notification and consultation, is crucial to guiding and advancing cooperation on shared waters in light of these challenges.

Upholding global freshwater legal instruments and international water law principles in the development of hydropower is vital, as this sector constitutes the world's third-largest energy source and is heavily promoted, especially among emerging economies that rely on abundant and reliable energy for their growing populations and industries

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(Llamosas, 2023). Until only a decade ago, the world was experiencing a surge in hydropower project development (Zarfl et al., 2015); however, climate change, particularly intense droughts, has recently halted and caused a decline in these projects (International Energy Agency, 2024). This situation poses risks, particularly to energy security and political relations between states sharing transboundary rivers, considering that nearly 70% of hydropower projects are either under construction or being planned in transboundary waters, which heightens the potential for political tensions and underscores the urgent need for agreements between states (Llamosas, 2023).

In light of the above, this paper examines the global international law frameworks applicable to the development of hydropower projects over time and provides an overview of the evolving legal regime in the La Plata River Basin. This case study illustrates how, for nearly a century, research, negotiations and agreements have evolved in this region to ensure adequate hydropower development and regulation in response to various challenges, including the impact on water availability and quality at the transboundary level and climate change.

The 1923 Convention relating to the Development of Hydraulic Power affecting more than one State: the origins of the legal regime on hydropower in transboundary waters

The first international multilateral treaty addressing uses other than navigation focuses on hydropower development (Boisson de Chazournes, 2021). The Convention relating to the Development of Hydraulic Power affecting more than one State was adopted under the aegis of the League of Nations in 1923. The negotiations of the Convention took place during the second General Conference on Communication and Transit held from 15 November to 9 December 1923 in Geneva. The trigger of such negotiations was a recommendation made at the Barcelona Conference of 1921 to improve the means of communication of international concern, including international watercourses ("Statute on the regime of navigable waterways of international concern," 1921).

In the negotiations process, the Secretary-General of the 1923 Conference described the general objectives of the draft treaty in the following terms: (1) to facilitate agreements between states whose assistance was technically necessary for the hydroelectric development of a watercourse; (2) to protect states that might be prejudiced by such development; (3) and to constitute international commissions to deal with certain special cases in which the work of development, when once carried out, might constitute a serious threat to the security of another state (League of Nations, 1923b, p. 20).

During the general discussion, some negotiators noted that the draft Convention promoted the objective that 'States in possession of abundant electric power should examine means to share this power with States which lack it' (League of Nations, 1923b, p. 9); others noted that

> the provisions of the Convention proposed might interfere with the sovereignty of States. It could not be stipulated, for instance, that every country through which a river flowed had the right to give its opinion as to how a dam which one of the countries proposed to erect should be constructed. (League of Nations, 1923b, p. 10)

The Convention entered into force on 30 June 1925 according to Article 18 of the Convention, which reads as follows:

> The present Convention will not come into force until it has been ratified in the name of three States. The date of its coming into force shall be the ninetieth day after the receipt by the Secretary-General of the League of Nations of the third ratification. Thereafter, the present Convention will take effect in the case of each Party ninety days after the receipt of its ratification or of the notification of its accession.

The Parties ratifying the Convention were Austria, Dantzig, Denmark, Greece, Iraq, Hungary, Siam, the British Empire with New Zealand, and Egypt.[1] Unfortunately, given the small number of ratifications mainly due to political, industrial and development reasons, the 1923 Convention had a very limited impact on the management of international watercourses when a riparian state is planning a hydropower project. However, this does not mean that the Convention does not have value in itself. On the contrary, an analysis of this instrument shows that the 1923 treaty contains some of the main current principles of international water law. Although only binding a small number of states, this treaty recognizes the existence of a community of interests of riparian states in relation to the production of hydropower energy (Caflisch, 1989).

While the Convention recognizes the right of each state to develop hydropower projects in its own territory, the instrument clearly establishes that international law puts limits to this right (Art. 1). According to the 1923 Convention, the right to build hydropower installations is limited by the obligation not to cause significant harm and the duty to settle disputes in a peaceful way. In terms of the Convention the no-harm obligation is framed as a duty to enter into negotiations in the case of the development of a hydropower project 'which might cause serious prejudice to any other Contracting State' (Art. 4). Under the 1923 Convention, if one of the Parties to the Convention carries out hydropower projects that risk causing 'serious prejudice' to another Party, the two states have a duty to enter into negotiations 'with a view to the conclusion of agreements which will allow such operations to be executed' (Art. 4). Interestingly, the Convention also provides a list of elements that such agreements should contain, including:

> a. the general conditions for the establishment, upkeep and operation of the works; b. equitable contributions by the States concerned towards the expenses, risks, damage of the works, as well as for meeting the cost of upkeep; c. the settlement of questions of financial cooperation; d. the methods for exercising technical control and securing public safety; e. the protection of sites; f. The regulation of the flow of water; g. the protection of the interests of third parties; h. the method of settling disputes regarding the interpretation or application of the agreements. (Art. 6)

The list above covers both technical and legal aspects to include in the development of specific agreements related to hydropower projects, such as the regulation of water flows. This is often one of the key elements of disputes regarding the development of hydropower projects (Tignino, 2014). For example, in the case on the Indus Waters Kishenganga Arbitration between Pakistan and India, the arbitral Tribunal had to consider different views on the environmental flows to release. After having heard the different proposals by the Parties, the Tribunal decided in its final award that India shall release a minimum flow of 9 cumecs into the Kishenganga/Neelum River below the Kishenganga hydropower plant ("Final award," 2013, p. 43). Another forward-looking

dimension of the 1923 Convention is that an agreement on the planning or functioning of an hydropower project should contain the mechanisms for settling eventual disputes regarding the interpretation or application of the agreement (Art. 6(f)).

The Convention also includes the requirement to carry out an 'international investigation' in order to achieve a 'reasonable development of hydraulic power' (Art. 2.1). Such international investigation

> shall be carried out *conjointly* at the request of '[any other riparian country]', with a view to arriving at the solution most favourable to their interests as a whole, and to drawing up, if possible, a scheme of development, with due regard for any works already existing, under construction or projected. (Art. 2.1)

The requirement to conduct a joint international investigation is considered today as a best practice to prevent potential water disputes. For example, the Espoo Convention on Environmental Impact Assessment in a Transboundary Context recommends developing joint environmental impact assessment as well as joint monitoring programmes between states and the use of harmonized methodologies to collect data and information which would facilitate cooperation (Appendix VI (g) to the Convention on Environmental Impact Assessment in a Transboundary Context, 1991).

The 1923 Convention also includes for the first time the core elements of the no-harm obligation. According to this treaty, when a riparian state wishes to carry out a project for the development of hydraulic power in the territory of another watercourse state, or a work which would modify the territory of another Party or which could cause 'serious prejudice', the planning state informs the latter, so that the concerned riparian states may start negotiations. The Convention states that such negotiations aim to conclude an agreement and that only through such agreement will the project be executed. Work planned by a state cannot begin as long as the other interested riparian countries have not consented.[2] Such requirement to reach an agreement in the case of the modification of the territory of another Party or a serious prejudice caused by a hydropower project limits the right of states to develop a hydraulic project in its territory. This limitation of sovereignty can be considered as one of the reasons explaining the low number of ratifications of this global treaty.

In spite of the limited impact of this treaty in transboundary water relations, the 1923 Convention is the first international treaty which enshrines some of the current principles of international water law governing the development of hydropower projects in international watercourses. Its focus on providing avenues to settle disputes in the case of the development of hydropower installations by a riparian country shows that, already at the beginning of the 20th century, the risks of tensions and conflicts related to the construction of dams in international watercourses were a reality. Another significant element is the focus on the obligation not to cause harm. While the term 'serious prejudice' is neither defined in the *travaux préparatoires* of the 1923 Convention nor in its text, the 1994 commentaries of the International Law Commission's Draft Articles on the law of the non-navigational uses of international watercourses, can help to clarify it.

In this regard, the duty to prevent serious prejudice is reflected in the obligation to exercise due diligence in the utilization of a watercourse in such a way not to cause harm (ILC, 1994, pp. 183–184). The duty of due diligence provides an objective

standard including the adoption of adequate regulations at the domestic level to prevent harm to other riparians. As stated by the International Tribunal for the Law of the Sea:

> the standard of due diligence varies depending on the particular circumstances to which an obligation of due diligence applies. There are several factors to be considered in this regard. They include scientific and technological information, relevant international standards and rules, the risk of harm and the urgency involved. (International Tribunal for the Law of the Sea, 2024, p. 239)

In the context of hydropower development, the term 'serious prejudice' should be interpreted in the light of the risk of harm, the urgency of the circumstances and the scientific knowledge available concerning the impacts of the hydropower plant to other watercourse countries. Both the 1923 Convention and also a Protocol signed at the same time of the Convention affirm that 'The provisions of the Convention do not in any way modify the responsibility or obligations imposed on States, as regards injury done by the construction of works for development of hydraulic power, by the rules of international law'. Thus, the Protocol further emphasizes the obligations of states in the case an injury is caused by the development of a hydraulic project on a transboundary river (Tignino & Bréthaut, 2020). The essence of the no-harm obligation appeared for the first time in a resolution adopted by the *Institut de droit international* (IDI) in 1911, and it is worth noting that the negotiators of the 1923 Convention considered this resolution in their work.

The *Institut de droit international* and International Law Association and their impact on the development of international rules on hydropower

Both the IDI and the International Law Association (ILA) have played an important role in the development of rules that apply to projects related to the development of hydropower energy. The 1911 Madrid Resolution on the 'International regulations regarding the use of international watercourses for purposes other than navigation' was mentioned in the negotiations of the 1923 Convention adopted under the aegis of the League of Nations (League of Nations, 1923b, p. 23). Interestingly, Article 2.3 of the IDI Resolution points out that:

> No establishment (especially factories utilising hydraulic power) may take so much water that the constitution, otherwise called the utilisable or essential character of the stream, shall, when it reaches the territory downstream, be seriously modified.

Thus, the Resolution sets a limit to states' sovereignty when using transboundary waters for hydraulic power, which is the obligation not to cause a serious prejudice to a riparian country. The 1911 IDI Resolution served as the basis for the inclusion of this obligation in the 1923 Convention. In its 1911 Resolution, IDI not only includes the duty not to cause serious prejudice but also recommends the establishment of joint commissions (Institut de droit international, 1911). In the view of IDI, riparian countries should entrust these commissions with the power to make decisions, or at least give opinions, when the building or the alterations of existing projects on international watercourses will cause serious consequences in the territory of another riparian state (Art. 2.7).

The IDI again adopted a resolution dealing with transboundary water resources in Salzburg in 1961. The Resolution, entitled 'Utilisation of Non-maritime International Waters (Except for Navigation)', is innovative for the development of the obligation of prior notification which is today one of the key principles of international water law. Article 5 of the Resolution clearly mentions the duty of previous notice to interested states which risk being affected by the development of a hydraulic project. Moreover, if one of the affected states makes an objection, the Resolution points out that the states need to enter into negotiation 'with a view to reaching an agreement within a reasonable time'. From the wording of Article 5, it is not clear if the 1961 Resolution states a duty to reach an agreement (Institut de droit international, 1961).

Considering the current practice, the paper will later show that the requirement to reach an agreement has been included in some bilateral or multilateral treaties on specific transboundary watercourses such as in the La Plata River Basin. Hydropower projects such as Itaipú and Yacyretá, built on the Paraná river, and the Salto Grande on the Uruguay River have not been developed unilaterally but, on the contrary, are of a binational nature.

Other innovative elements of the 1961 Resolution include the recommendation to have recourse to technical experts as well as commissions or appropriate agencies to facilitate the reaching of 'solutions assuring the greatest advantage to all concerned' (Art. 6). Moreover, the IDI stated that, during the negotiations on a project that risks causing a negative consequence to a riparian country, there is an obligation to refrain 'from undertaking the works or utilizations which are the object of the dispute or from taking any other measures which might aggravate the dispute or render agreement more difficult' (Art. 7). This obligation comes from the principle of good faith which guides international relations. The IDI pointed out that, if an agreement is not reached in a reasonable time between the riparians, the dispute should be brought to judicial settlement or arbitration (Art. 8).

In 1966, the ILA also adopted a recommended framework on international watercourses that is relevant for the development of hydropower projects. The 1966 Helsinki Rules on the Uses of the Waters of International Rivers (International Law Association, 1966) include several important provisions in this area (Bogdanovic, 2018). For the first time, an international document declares the entitlement of each watercourse state to a reasonable and equitable share of an international watercourse (Art. IV). The key role of this principle in customary international water law has been recently re-affirmed in the case of the Status and Use of the Waters of the Silala. In this case, the International Court of Justice (ICJ) has explained:

> Under customary international law, every riparian State has a basic right to an equitable and reasonable sharing of the resources of an international watercourse [. . .] This implies both a right and an obligation for all riparian States of international watercourses: every such State is both entitled to an equitable and reasonable use and share, and obliged not to exceed that entitlement by depriving other riparian States of their equivalent right to a reasonable use and share. This reflects 'the need to reconcile the varied interests of riparian States in a transboundary context and in particular in the use of a shared natural resource' (Pulp Mills on the River Uruguay (*Argentina v. Uruguay*), judgment, *I.C.J. Reports (2010)* (I), p. 74, 177. (*Dispute over the Status and Use of the Waters of the Silala* (*Chile v. Bolivia*), judgment, *I.C.J. Reports 2022*, p. 97.)

Moreover, the ICJ has also noted that the principle of equitable and reasonable utilization must not be interpreted in a static way, but must take into account the evolving needs of riparian countries over time (International Court of Justice, 2022, p. 98). This could mean that the increasing energy needs of a riparian country could justify both the development of new hydropower projects that are in line with the principle of equitable and reasonable utilization and the revision of existent or future projects that might infringe upon this principle.

The ILA includes the no-harm obligation among the factors to consider in the determination of a reasonable and equitable share of an international watercourse (International Law Association, 1966, Art. V(2)(k)). This is an important change in the approach of the instruments dealing with the development of hydropower projects. Until the adoption of the Helsinki Rules in 1966, the principle of equitable and reasonable utilization was not yet clearly affirmed in an international instrument.

While both the principle of equitable and reasonable utilization and the no-harm obligation must be taken into account in the development of hydraulic projects on transboundary waters, in the Helsinki Rules the principle of equitable and reasonable utilization appears to be the cardinal principle of international water law that encompasses the duty not to cause harm. A different approach is taken by the United Nations Convention on the Law of the Non-Navigational Uses of the International Watercourses (UNWC), which separates the principle of equitable and reasonable utilization and the duty not to cause significant harm into two Articles, i.e., Articles 5 and 7. Convention on the Law of the Non-navigational Uses of International Watercourses (1997, May 21).

Another important principle contained in the 1966 Helsinki Rules is that, after analysis, any use is entitled to have an inherent preference over any other use (International Law Association, 1966, Art. VI). This means that each watercourse must be examined on an individual basis to determine the most important utilizations. With the adoption of the UNWC in 1997 and the recognition of the human right to water in 2010 (UNGA, 2010), the only exception to the absence of priority between utilizations of an international watercourse is given to the satisfaction of basic human needs, which covers personal and domestic uses of water resources.

The Helsinki Rules also consolidate the importance of the regulations on the peaceful settlement of water disputes and the resort to diplomatic and judicial means to solve them. The Helsinki Rules point out that the exchange of information can be a way to prevent the emergence of disputes. This is particularly true in the case of hydropower projects. Article XXIX recommends that each watercourse state provide 'relevant and reasonably available' information to the other watercourse states when a planned activity may affect an international watercourse. Article XXIX adds that the notice of any proposed project, including hydropower activities, should include 'essential facts' related to the project to permit to the other watercourse state to make an assessment of the probable effect of the proposed project. The state receiving the notice should have a reasonable period of time to make an assessment of the proposed project (International Law Association, 1966, Art. XXIX(3)).

The Helsinki Rules also emphasize the importance of joint bodies which may contribute to the settlement of disputes, including those related to the generation of hydraulic power (International Law Association, 1966, Art. XXXI). When an agreement is not reached, riparian states should resort to diplomatic mechanisms making a resort to

a third party, including mediation or good offices (International Law Association, 1966, Art. XXXII) or quasi-judicial means such as the establishment of commissions of inquiry or conciliation commissions (International Law Association, 1966, Art. XXXIII).

The adoption of the 1923 Convention and the work of IDI and ILA paved the way for the development of the 1997 UNWC Convention and the 1992 UN Convention on the Protection and Use of Transboundary Watercourses and International Lakes (UNECE Water Convention), which, as framework conventions, contain general but critical principles that should guide riparian countries in the adoption of specific treaties at the basin level (Boisson de Chazournes, 2009).

The role of the UNWC and the UNECE Water Convention in the codification of the rules on installations generating hydropower

Both UN Water Conventions contain rules that are relevant for the development and operationalization of hydropower projects in transboundary waters. These instruments not only contain the key principles governing the sharing of transboundary waters (i.e., the principle of equitable and reasonable utilization and the duty not to cause significant harm), but they also contribute to establishing the procedures governing hydropower projects (Schmeier, 2023). The ICJ and arbitration tribunals have underlined the key role of the rules on notification, consultation and negotiation as well as the contribution of joint bodies in the prevention and settlement of water disputes (Boisson de Chazournes, 2021; McCaffrey, 2019).

The UNECE Water Convention contains a general provision on consultations without mentioning a duty of prior notification. Its Article 10 affirms that:

> Consultations shall be held between the Riparian Parties on the basis of reciprocity, good faith and good-neighbourliness, at the request of any such Party. Such consultations shall aim at cooperation regarding the issues covered by the provisions of this Convention. Any such consultations shall be conducted through a joint body established under article 9 of this Convention, where one exists. (Convention on the Protection and Use of TransboundaryWatercourses and International Lakes, 1992)

This provision does not refer to a specific obligation of consultation in relation to planned projects developed by one of the riparian countries. It sets out a general duty of consultation to reinforce the duty of cooperation between riparians through a joint body. Although the apparent absence of the recognition of the duty of prior notification could be considered a weakness of the 1992 Convention, this instrument develops international water law by affirming an obligation for states Parties that share transboundary waters to establish joint bodies. Article 9.2 points out that these bodies should 'serve as a forum for the exchange of information on existing and planned uses of water and related installations that are likely to cause transboundary impact'. Such sharing of information on hydropower projects is vital to ensure cooperation between riparian countries and contributes to the prevention of possible negative impacts.

The exchange of information also plays a crucial role in ensuring the implementation of the principle of equitable and reasonable utilization of transboundary waters (Leb, 2013; Sangbana, 2017). Another aspect where the joint bodies can make the difference in ensuring cooperation between riparian countries when one of them

develops an hydropower project is participation 'in the implementation of environmental impact assessments relating to transboundary waters, in accordance with appropriate international regulations' (Art. 9.2(j)). The UNECE Water Convention also points out that consultations, which are mentioned in Article 10, 'shall be conducted through a joint body established under article 9 of this Convention, where one exists'.

Regarding the missed opportunity to state explicitly the obligation of prior notification in the text of the UNECE Water Convention, its Implementation Guide explains that:

> The principle that consultations should take place between neighbouring States to discuss issues of common interest is a principle of general customary law, on the basis of a well consolidated diplomatic and conventional practice concerning bilateral treaties of friendship and good-neighbourliness. International environmental protection adds a specific aspect to this general principle: i.e. the fact that each State has an obligation to consult its neighbour in case it envisages activities likely to cause transboundary impact. Principle 19 of the Rio Declaration provides that "States shall provide prior and timely notification and relevant information to potentially affected States on activities that may have a significant adverse transboundary environmental effect and shall consult with those States at an early stage and in good faith. At the pan-European level, this principle is the core provision of the Espoo Convention, embodied in its article 5. (UNECE, 2013, pp. 77, p. 270)

Through the reference to the Espoo Convention on Environmental Impact Assessment in a Transboundary Context, the Implementation Guide of the UNECE Water Convention, an instrument adopted by the Parties to the Convention, attempts to fill the gap by explicitly stating the duty of prior notification in case of planned projects, with various purposes, including irrigation, fisheries, tourism and hydropower. The Implementation Guide to the Convention also notes that 'Article 10 of the Water Convention provides for a general duty of consultation at the request of any Riparian Party. Its scope of application is a general one, in the sense that it is not just limited to cases of concrete activities likely to have transboundary impact' (UNECE, 2013, pp. 77, 271).

Contrary to the UNECE Water Convention, the UNWC develops a well-structured procedure of notification, consultation and negotiation binding the Parties of this Convention.[3] Part III of the Convention, containing nine Articles, details the procedure to follow in the case of planned measures. Scholars have already examined the UNWC procedure in detail (Sangbana, 2019; Salman, 2019). In the ICJ case on the Silala, the Court has detailed the differences between the provisions contained in the UNWC Convention and customary international law. The Court has considered that neither Article 11 nor Article 12 of the UNWC reflect customary norms.[4] The ICJ has preferred to refer to its own jurisprudence to set the threshold when the prior notification of a project, including on hydropower, must take place.

The ICJ considers that 'each riparian State is required, under customary international law, to notify and consult the other riparian State with regard to any planned activity that poses a *risk of significant harm* to that State' (International Court of Justice, 2022, p. 118, emphasis added). Therefore, following its own previous jurisprudence, the obligation of notification is only triggered when there is a risk of significant transboundary harm (*Certain Activities Carried Out by Nicaragua in the Border Area* (*Costa Rica v. Nicaragua*) and *Construction of a Road in Costa Rica along the San Juan River* (*Nicaragua v. Costa Rica*),

Judgement, *I.C.J. Reports 2015* (II), p. 707, p. 104)). For the Court, before beginning a project with potential adverse consequences on the environment of another state, a riparian state

> must ascertain if there is a risk of significant transboundary harm, which would trigger the requirement to carry out an environmental impact assessment. [. . .] If the environmental impact assessment confirms that there is a risk of significant transboundary harm, the State planning to undertake the activity is required, in conformity with its due diligence obligation, to notify and consult in good faith with the potentially affected State, where that is necessary to determine the appropriate measures to prevent or mitigate that risk. (International Court of Justice, 2022, p. 114 citing 2015, p. 104)

The ICJ interpretation of Articles 11 and 12 of UNWC limits the application of the duty to prior notification to specific cases. The threshold of 'significant transboundary harm' seems to be high when one compares the UNWC and the UNECE Water Conventions. In fact, for example, the Implementation Guide of the UNECE Water Convention considers that the general duty of consultation can be triggered at the request of any riparian and its scope of application is not just limited to cases of activities likely to have a transboundary impact. As we will see, prior notification of projects on transboundary rivers is also part of the instruments focusing on the La Plata basin. Such instruments were concluded even before the adoption of the two UN global water Conventions.

The cooperative legal frameworks on the La Plata River Basin

The La Plata River Basin is home to some of the largest hydropower projects developed over the past century and is still one of the most important regions in terms of hydropower potential still to be exploited (Popescu et al., 2012). The La Plata River Basin located in South America has an area of approximately 3.1 million km^2 spanning Argentina, Bolivia, Brazil, Paraguay and Uruguay (CIC Plata, 2017). After the Amazon, the La Plata River Basin is the second-largest river basin in South America, and it is the fifth-largest river basin in the world. Its main tributaries are the Paraná and the Uruguay rivers which have been critical to the socioeconomic development of this region (Andino, 2018).

The La Plata is also home to nearly 60% of the total population of the five riparian countries most of whom live in large cities including capitals such as Asuncion, Brasilia, Buenos Aires and Montevideo (Sell, 2006). Moreover, it is estimated that the La Plata River Basin generates around 70% of the gross national product of the five countries through various activities mainly related to agriculture, trade, navigation and hydropower (CIC Plata, 2017).

Hydropower development in the La Plata River Basin

Given the large streamflow of the Paraná and the Uruguay rivers, as well as the increasing need to secure the energy supply for the increasing population, economy and industry in the region, a series of bilateral agreements were developed to carry out studies to assess the hydropower potential of these rivers (Popescu et al., 2014). It is estimated that the La Plata River Basin has a potential capacity of 92,000 MW (Sell, 2006), of which at least 60%

has already been developed through more than 150 hydropower stations (CIC Plata, 2017). Some of the largest hydropower stations are Itaipú and Yacyretá built on the Paraná river and Salto Grande on the Uruguay river. These projects, built in sections where the Paraná and the Uruguay respectively mark country borders, rely on bilateral agreements.

Agreements on the utilizations of the La Plata River Basin

The potential hydropower utilization of the La Plata River Basin was already envisaged in the 1920s when Argentina and Paraguay negotiated the 1926 Agreement on the Improvement of the Navigability of the Alto Paraná River and Utilization of the Apipe Falls (Iza, 2004). Under this Agreement, both countries agreed to carry out studies and work for the hydropower utilization of the Apipe Falls, as well as to define the allocation of electrical energy shared between them.

Since the 1926 Agreement, the legal and institutional architecture governing hydropower in the La Plata River Basin has evolved primarily through bilateral arrangements and the establishment of binational entities. For the purpose of this paper, we have categorized this evolution in four periods that encompass the initial studies assessing the common use of shared waters, the regional regulation of the la Plata River Basin, the development of hydropower projects, and a more recent period that focuses on cooperative approaches to address social and environmental concerns in the region.

Bilateral agreements to study the common use of shared rivers

During the period from the 1940s to the 1960s, three main agreements were signed at the bilateral level in the La Plata River Basin with the objective of studying the potential use of rivers for hydropower: the Agreement between Argentina and Uruguay on the Use of the Rapids of the Uruguay River in the Salto Grande Area signed in Montevideo on 30 December 1946, the Cooperation Agreement between Brazil and Paraguay for the study of the Utilization of Hydraulic Energy of the Acaray and Monday Rivers signed in Rio de Janeiro on 20 January 1956 and the Agreement between Argentina and Paraguay for a study on the Utilization of Hydroelectric Energy from the Apipe Falls signed in Buenos Aires on 23 January 1958.

The 1946 Agreement between Argentina and Uruguay on the Use of the Rapids of the Uruguay River in the Salto Grande Area declares that the waters of the Uruguay river shall be used commonly and in equal parts (Art. 1). For the implementation of this Agreement, the Parties established a Joint Technical Commission in charge of all matters relating to the utilization, damming and diversion of the Uruguay River (Art. 2). An essential provision in this Agreement is the establishment of priority uses that consider the domestic and sanitary purposes as primary (Art. 3). Then, in order of importance, the Treaty mentions navigation, energy production, and irrigation. This Agreement also stipulates that the promotion of the necessary measures to ensure the exchange of energy between both governments takes place at cost price (Art. 8).

The 1956 Cooperation Agreement between Brazil and Paraguay for the study of the Utilization of Hydraulic Energy of the Acaray and Monday Rivers contains the technical elements and procedures that the studies need to incorporate. According to this

Agreement, the study shall include the local recognition and inspection of the region where the waterfalls of the rivers are to be located. The study will also take into account the hydrological, geological and topographic aspects as well as the technical and financial specifications of the projects necessary for the use of hydraulic energy (Art. 2).

The 1958 Agreement between Argentina and Paraguay for a study on the Utilization of Hydroelectric Energy from the Apipe Falls provides the technical elements and procedures for the study (Art. 2) and includes provisions for the establishment of a Joint Technical Commission for the utilization of hydraulic energy from the Paraná River at the Yacyretá and Apipe Islands (Arts. 3 and 4). Similarly to the 1956 Agreement between Brazil and Paraguay, this Agreement defines the scope of the study focusing on the recognition and inspection of the region, the development of hydrographic, hydrological and geological studies as well as the analysis of the works necessary for the hydraulic utilization and costs. This Agreement has been completed by two exchanges of notes of 23 January and 20 July 1967 confirming the mandate of the Commission to carry out its functions.

One of the key provisions in these Agreements is the recognition of the shared nature of water and therefore the obligation to utilize them commonly in equal parts. Moreover, from a procedural perspective, the analysis of the three Agreements shows the importance of conducting joint works prior to starting the development of hydraulic projects. These procedural provisions represent good practices and go in the same direction of the UN global water Conventions and the Espoo Convention in affirming the importance of conducting joint environmental studies in the sites where a hydropower project would be developed.

The regional regulation of the La Plata River Basin

Until the 1960s, only bilateral agreements were made for the La Plata River Basin despite the fact that the basin spans the territories of five countries. This scenario changed in 1967 when the Ministers of Foreign Affairs of Argentina, Bolivia, Brazil, Paraguay and Uruguay met in Buenos Aires to sign a Joint Declaration to study the basin and to carry out an integral programme of multinational, binational and national works for the development of the region (Sell, 2006). This was the first regional instrument that expressed the spirit of cooperation for the harmonious and equitable development of the La Plata River Basin.

Following this meeting and Declaration, the five states adopted the Treaty of the La Plata River Basin signed in Brasilia on 23 April 1969. The main objective of this instrument is to strengthen the comprehensive institutionalization of the basin and jointly promote its harmonious development and physical integration (Art. 1).

The Treaty promotes the identification of areas of common interest and studies, programmes and works as well as operational and legal instruments for the facilitation and assistance in the field of navigation. The rational use of water resources is also promoted especially through the regulation and equitable utilization of watercourses as well as the preservation of animal and plant life (Art. 1).

This Treaty also establishes the Intergovernmental Coordinating Committee (CIC Plata) as the permanent body of the Basin, responsible for promoting, coordinating and monitoring the progress of multinational actions aimed at the integrated development of

the La Plata River Basin. Articles 5 and 6 are to be highlighted. Article 5 affirms that the collective actions of the Parties must not cause prejudice to the territories of other countries 'within the framework of respect for international law and according to good practices between neighbouring friendly countries'. Moreover, Article 6 explicitly states that the La Plata Basin Treaty must 'not inhibit the Contracting Parties in concluding partial, bilateral or multilateral specific agreements, which are pursuant to the obtainment of the general objectives of the development of the Basin'. The wording of the Treaty confirms the complementarity between different regulations on shared waters, being universal, regional or bilateral.

Bilateral agreements to develop hydropower projects

During the 1970s and on the basis of the 1969 Treaty of the La Plata River Basin, Argentina, Brazil and Paraguay adopted bilateral agreements to develop large hydropower projects.

In 1973, Brazil and Paraguay adopted the Treaty concerning the hydroelectric utilization of the water resources of the Paraná River owned in condominium by the two countries, from and including the Salto Grande de Sete Quedas or Salto del Guaira. This Treaty, also known as the Itaipú Agreement, is based on the findings of the different studies carried out since the 1950s to assess the potential hydroelectric capacity of the Paraná river. Such capacity was already assessed by the Brazilian-Paraguay Mixed Technical Commission through a Preliminary Report in 1972 (Corrales, 2024). The main objective of the Itaipú Treaty is to jointly utilize the water resources of the Paraná River for hydroelectric purposes. Interestingly, the river is considered as jointly owned by Brazil and Paraguay. The word of 'condominium' is used, highlighting the fact that projects on this river cannot be developed by one state without the consent of the other state (Caflisch, 1989, pp. 60–61).

The concept of 'condominium' illustrates the willingness to develop harmoniously the resources of this river. Given the shared character of the Paraná, the two countries seem to recognize that condominium better reflects their willingness to cooperate. Thus, in this case condominium is preferred to a classical river delimitation between riparian countries. This Treaty includes the institutional framework in charge of managing and operating the hydropower project through Itaipú Binacional (Art. III). A fundamental provision expressed in this instrument is that the energy produced by Itaipú is to be divided into equal parts between Brazil and Paraguay and each one has the right to acquire the energy not utilized by the other country for its own consumption (Art. XIII).

Also, in 1973, Argentina and Paraguay adopted the Yacyretá Agreement signed in Asuncion on 3 December 1973. This instrument contemplates the utilization of hydropower and the improvement of the navigability conditions of the Paraná River at the Yacyretá Island (Art. I). This Agreement also establishes the institutional framework in charge of managing and operating the hydropower project through Yacyretá Binacional (Art. III). In terms of energy sharing, the Yacyretá Agreement affirms that the energy produced for the hydroelectric utilization is to be divided in equal parts between the two countries with the preferential right to acquire energy that is not used by the other country for its own consumption (Art. XIII).

The Itaipú and the Yacyretà Agreements are among the most significant treaties on how cooperation and joint ownership of hydropower projects can be put in place. In this context, the same spirit of cooperation has influenced the development of the legal regimes on the Diama and Manantali dams in the Senegal River (Tignino, 2016). Over the years, environmental and social concerns have also shaped and guided the implementation of the Itaipú and the Yacyretà Agreements.

Social and environmental concerns in bilateral or tripartite agreements

After the adoption of bilateral and regional agreements for the development of hydropower projects, states sharing the La Plata River Basin emphasized cooperative approaches to address the social and environmental concerns affecting the region. In this regard, three crucial agreements were adopted: the 1975 Statute of the Uruguay River between Argentina and Uruguay, the 1979 Tripartite Agreement between Argentina, Brazil and Paraguay, and the 1980 Agreement between Argentina and Brazil.

Argentina and Uruguay signed the Statute of the Uruguay River in Salto on 26 February 1975 and the Treaty concerning the Río de la Plata and the Corresponding Maritime Boundary on 19 November 1973 with the objective of establishing the common mechanisms necessary for the optimal and rational use of the Uruguay and La Plata rivers. Both instruments emphasize the importance of facilitating navigation and providing all securities for this activity (Art. 1). The Statute also establishes that each Party has a right to utilize the waters of the Uruguay River, within its jurisdiction, for domestic, sanitary, industrial and agricultural purposes with the obligation to prevent impacts on the availability and quality of shared waters (Art. 27).

Both instruments include a chapter on the pollution of the Uruguay and Rio de La Plata Rivers. The Uruguay River Statute stresses the conservation, use and exploitation of natural resources other than the river, providing that Parties shall undertake the necessary measures to ensure proper management of soil and forests, the use of groundwater, and the use of the River's tributaries (Art. 35). According to the Statute of the Uruguay River, the Parties also have the obligation not to cause an alteration that would significantly harm the River's regime or the quality of its waters (Art. 35). The 1975 Statute also contains specific provisions in terms of pollution, which is defined as the direct or indirect introduction of substances or energy by man into the aquatic environment that have harmful effects (Art. 40).

For the implementation of the 1975 Statute and the 1973 Treaty, Argentina and Uruguay established the Administrative Commission for the Uruguay River and the Plata River Administrative Commission in charge of facilitating cooperation between the Parties. The application and interpretation of the Statute of the Uruguay River have been at the centre of a dispute brought before the ICJ. Argentina brought a case raising environmental concerns on the basis of the 1975 Statute because of two pulp mills projects risking contaminating the waters of the river (International Court of Justice, 2010).

Beyond bilateral agreements, in 1979, Argentina, Brazil and Paraguay adopted the Tripartite Agreement on Technical and Operational Cooperation signed in President Stroessner City/Ciudad del Este (1979). The Tripartite Agreement recognizes the binational hydropower development being made between Brazil and Paraguay in Itaipú and

the feasibility studies being made by Paraguay and Argentina to develop hydropower projects (Art. 1). The Tripartite Agreement also served as an instrument to ratify the fraternal friendship that unites the three countries in an effort to align international cooperation under the framework of the La Plata River Basin Treaty (Art. 2). The Tripartite Agreement contains fundamental environmental and water quality considerations as well as procedural provisions in terms of monitoring compliance and the regular exchange of data and information on hydrological conditions (Gwynn, 2023).

Finally, in 1980 Argentina and Brazil adopted the Treaty for the utilization of shared water resources of the bordering sections of the Uruguay River and its Affluent, the Pepiri-Guazu river, signed in Buenos Aires on 17 May 1980. This Treaty addresses the utilization of shared water resources in the bordering sections of the Uruguay River and its tributary, the Pepirí-Guazú River, looking in particular to hydropower, improvement of the navigability conditions of the Uruguay River, mitigation of the effects of extraordinary floods and rational use of its waters for consumptive uses (Arts. 1 and 3). It is important to recognize that this Treaty makes reference to the protection of the environment, fauna, flora and the quality of the waters of the Uruguay River. This Treaty also incorporates the obligation not to cause significant harm, and that any potential damage must be prevented to the extent possible (Art. 3). In terms of hydropower projects, this Treaty includes provisions on the equal division of the benefits resulting from the utilization of shared hydroelectric resources (Art. 5).

These agreements elaborate the principles of international water law and show how environmental protection and hydrological conditions, which may affect the riparian communities, have been included in the bilateral and tripartite treaties adopted in the 1970s and 1980s on the La Plata River basin.

The various legal and institutional frameworks on the La Plata River Basin are particularly relevant for hydropower development in South America and in other regions. The development of joint technical studies on planned projects as well as the inclusion of environmental protection and water quality standards are among the elements underlined by the treaties applicable to La Plata basin. The binational nature of the Itaipú and the Yacyretà dams also stand among the existing best practices at the global level.

Challenges and opportunities for the La Plata River Basin and other international watersheds

Climate change is currently the major challenge affecting ecosystems, biodiversity, agriculture, and hydropower in the La Plata River Basin and in many other watersheds around the world. Since 2019, the region of the La Plata Basin has suffered from prolonged periods of drought which have reduced the streamflow of rivers in the whole basin (Rivera, 2024). As a landlocked country, Paraguay suffered from restrictions in trade and navigation in the Paraná River. Thus, the Ministry of Foreign Affairs of Paraguay requested the release of water from the Itaipú Dam reservoir to increase downstream flow.

Under the circumstances of drought, hydropower stations such as Itaipú usually try to keep sufficient water in their reservoirs to ensure constant energy generation (Gwynn, 2023). However, the Governing Council of the Itaipú Binacional, on the basis of technical

hydrological information and invoking the principles of international water law, primarily the principle of equitable and reasonable utilization, approved the release of water to ease the effects of drought in the Paraná river and ensure water supply, agriculture and navigation in downstream areas. This operation, denominated as 'Water Window', was carried out on three occasions between May 2020 and May 2021 to secure vital water uses while ensuring energy supply for Paraguay and Brazil (Gwynn, 2023).

The studies, negotiations and adoption of agreements in the La Plata River Basin provide key insights to states planning and developing hydropower projects in international watersheds. While it might be necessary to increase energy production to secure electricity supply in many countries, especially in the case of emerging economies countries, it is also important to consider current and future challenges derived primarily from climate change and biodiversity conservation. Countries negotiating transboundary hydropower agreements need to consider the global frameworks provided by the UN global water Conventions including crucial principles such as the equitable and reasonable utilization principle, the obligation not to cause significant harm and prior notification and consultation requirements.

The consultation requirements provide for the sharing of technical information, including an environmental impact assessment, which is of pivotal importance to prevent possible disputes between riparians. At the same time, the development of new treaties on shared water resources should also include the human rights to safe drinking water and a clean environment to protect local communities and ecosystems during the planning, development and operation of dams (Tignino & Jara, 2024). This will ensure that future freshwater agreements dealing with the development of hydropower projects will align to the needs of growing populations, emerging economies and industries in the face of climate change and biodiversity loss.

Conclusion

Political, economic, social and environmental concerns have motivated the evolution of the regulation of hydropower in shared waters throughout a century. Despite the fact that the 1923 Convention relating to the Development of Hydraulic Power affecting more than one State was only ratified by a few countries, this is a critical instrument that consolidates international water law principles. Its provision on the right of states to build hydropower installations limited by the obligation not to cause significant harm is still crucial to guide countries in planning and negotiating this type of infrastructure in shared waters.

Moreover, in the same way as bilateral agreements were made in the La Plata River Basin to carry out studies based on technical information available at the time of the development of large hydropower installations as Itaipú, Yacyretá or Salto Grande, it is important that future developments are based on scientific data and information considering the current climate change scenarios and biodiversity loss that the world is facing. Such scientific studies, underpinning future hydropower projects, should include biodiversity and human rights considerations to ensure the integrity of nature and people. In this way, states will have the necessary information to define the factors that will determine equitable and reasonable utilization of transboundary waters.

It is also important to emphasize that agreements developing hydropower projects require the establishment of specialized entities to effectively manage binational or multilateral hydropower initiatives. The cases of Itaipú and Yacyretá illustrate the necessity of overcoming unilateralism and sovereignty to construct hydropower projects that benefit several riparian countries. Even in the absence of formal agreements between states, the diplomatic practices undertaken by Brazil and Paraguay in the 'water windows' operations can serve as a precedent for states to act promptly in response to climate change in transboundary waters.

The review of the agreements governing the La Plata River Basin demonstrates as well the importance and the progressive evolution of international customary water law principles to address emerging challenges affecting transboundary river basins. Invoking these principles in particular in climate-vulnerable regions also rich in biodiversity will be key to ensure sustainable development, prosperity and peace.

Even though current climate scenarios and biodiversity concerns might force states to question the future development of hydropower projects, hydropower will continue to be one of the most important sources of energy for emerging economies. In this sense, it will be critical for states to take into account the principles of international water law to prevent harm as well as conflicts with other states.

Notes

1. Information available at: https://api.parliament.uk/uk-treaties/treaties/9430.
2. Article 3 provides that: 'If a Contracting State desires to carry out operations for the development of hydraulic power, partly on its own territory and partly on the territory of another Contracting State or involving alterations on the territory of another Contracting State, the States concerned shall enter into negotiations with a view to the conclusion of agreements which will allow such operations to be executed.' Article 4 states that: 'If a Contracting State desires to carry out operations for the development of hydraulic power which might cause serious prejudice to any other Contracting State, the States concerned shall enter into negotiations with a view to the conclusion of agreements which will allow such operations to be executed.'
3. Information available at: https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-12&chapter=27&clang=_en.
4. Dispute Over the Status and Use of the Waters of the Silala (Chile v Bolivia), judgment, 2022 I.C.J. Reports, p.614 para. 111.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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References

Agreement between Argentina and Paraguay for a study on the utilisation of hydroelectric energy from the Apipe Falls: Agreement between Argentina and Paraguay for a study on the utilisation of hydroelectric energy from the Apipe Falls and its exchanges of notes. (1958, January 23). *UN Treaty Series*, 649, 177–195.

Agreement between Argentina and Uruguay on the use of the rapids of the Uruguay River in the Salto Grande area. (1947, 28 January). *UN Treaty Series*, 671–3, 26–40.

Agreement between Argentina, Brazil and Paraguay concerning the hydroelectric facilities of Corpus and Itaipú, (Tripartite Agreement). (1979, October 19). *UN Treaty Series*, 2216, 177–221.

Andino, M. M. (2018). Gestión de cuencas transfronterizas: Cuenca del Plata. In A. G. Gil, F. Segra, & Y. Pinto (Eds.), *El derecho y la gestión des aguas transfronterizas. Quintas Jornadas de derecho de aguas* (pp. 205–216). Pontificia Universidad Católica del Perú.

Bogdanovic, S. (2018). *The International Law Association Helsinki Rules. Contribution to International Water Law*. Brill Research Perspectives in International Water Law.

Boisson de Chazournes, L. (2009). *Freshwater and international law: The interplay between universal, regional and basin perspectives*. UNESCO.

Boisson de Chazournes, L. (2021). *Fresh water in international law*. Oxford University Press.

Caflisch, L. (1989). *Règles générales du droit des cours d'eau internationaux* [General rules in the law of international watercourses]. The Hague Academy Collected Courses. Vol. 219. Brill.

CIC Plata. (2017). *Transboundary diagnostic analysis (TDA) for the La Plata River basin* (1st special ed.). Comité Intergubernamental Coordinador de los Países de la Cuenca del Plata/ Organización de Estados Americanos.

Convention on Environmental Impact Assessment in a Transboundary Context. (1991, February 25). Espoo. United Nations. Treaty Series 1989, 309–330.

Convention on the Law of the Non-navigational Uses of International Watercourses. (1997, May 21). United Nations (2015). Treaty Series 2999, 120–144.

Convention on the Protection and Use of Transboundary Watercourses and International Lakes. (1992, March 17). Helsinki. United Nations (1996). Treaty Series 1936, 269–288.

Cooperation agreement between Brazil and Paraguay for the study of the utilisation of hydraulic energy of the Acaray and Monday rivers signed in Rio de Janeiro on (1956, January 20). https://www.planalto.gov.br/ccivil_03/decreto/1950-1969/D42919.htm

Corrales, R. F. (2024). A dam over troubled waters? The obligation to negotiate in good faith in annex" C" of the treaty of Itaipu. *American University International Law Review*, *39*, 37.

Gwynn, M. A. (2023). International law and transboundary dams: Lessons learned from the binational entity ITAIPU (brazil and Paraguay). *Frontiers in Climate*, *5*, 1272254.

Institut de droit international. (1911). *International regulations regarding the use of international watercourses for purposes other than navigation*.

Institut de droit international. (1961). *Utilisation of non-maritime international waters (except for navigation)*. Salzburg.

International Court of Justice. (2010). *Pulp mills on the Uruguay River (Argentina v. Uruguay)*. Judgment. I.C.J. Reports 2010 (I).

International Court of Justice. (2015). *Certain activities carried out by Nicaragua in the border area (Costa Rica v. Nicaragua) and construction of a road in Costa Rica along the San Juan River (Nicaragua v. Costa Rica)*. Judgment, I.C.J. Reports 2015 (II).

International Court of Justice. (2022). *Dispute over the status and use of the waters of the Silala (Chile v. Bolivia)*. Judgment, I.C.J. Reports 2022.

International Energy Agency. (2024). *World energy outlook 2024*.

International Law Association. (1966). Helsinki rules on the uses of the waters of international rivers. *Report of the Fifty-Second Conference*. Helsinki, 447–533.

International Tribunal for the Law of the Sea. (2024). *Request for an advisory opinion submitted by the Commission of Small Island States on Climate Change and International Law*.

In the matter of the Indus Waters Kishenganga Arbitration (Pakistan/India). (2013, December 20). Final Award. https://pca-cpa.org/en/cases/20/

Iza, A. (2004). Developments under the Ramsar Convention: Allocation of water for river and wetland ecosystems. *Reciel*, *13*(1), 40–46.
League of Nations. (1923a). Convention relating to the development of hydraulic power affecting more than one state and protocol of signature, 9 December 1923. *League of Nations, Treaty Series*, *152*(905).
League of Nations. (1923b). *Second general conference on communications and transit*. November 15th – December 9th 1923, C.30.M.16, 1924 VIII, 9–25.
Leb, C. (2013). *Cooperation in the law of transboundary water resources*. Cambridge University Press.
Llamosas, C. (2023). Energy security and capabilities in asymmetrical settings: An analysis of the effects of the itaipú transboundary dam. *Energy for Sustainable Development*, *74*, 269–284.
McCaffrey, S. C. (2019). *The law of international watercourses*. Oxford University Press.
Popescu, I., Brandimarte, L., Perera, M. S. U., & Peviani, M. (2012). Assessing residual hydropower potential of the La Plata Basin accounting for future user demands. *Hydrology and Earth System Sciences*, *16*(8), 2813–2823. https://doi.org/10.5194/hess-16-2813-2012
Popescu, I., Brandimarte, L., & Peviani, M. (2014). Effects of climate change over energy production in La Plata Basin. *International Journal of River Basin Management*, *12*(4), 319–327. https://doi.org/10.1080/15715124.2014.917317
Rivera, J. A. (2024). Characterization of the recent (2019–2022) La Plata Basin hydrological drought from a centennial-scale perspective. *HydroResearch*, *7*, 140–153.
Salman, S. M. A. (2019). *Notification concerning planned measures on shared watercourses synergies between the watercourses convention and the world bank policies and practice*. Brill Research Perspectives in International Water Law.
Sangbana, K. (2017). *La protection des eaux douces transfrontières contre la pollution. Dimensions normatives et institutionnelles* [The protection of transboundary freshwater resources against pollution. Normative and institutional dimensions]. Schulthess.
Sangbana, K. (2019). Notification and consultation concerning planned measures. In L. Boisson de Chazournes, M. M. Mbengue, K. Sangbana, & M. Tignino (Eds.), *The UN convention on the law of the non-navigational uses of international watercourses. A commentary*. Oxford University Press.
Schmeier, S. (2023). The role of institutionalized cooperation in transboundary basins in mitigating conflict potential over hydropower dams. *Frontiers in Climate*, *5*. https://doi.org/10.3389/fclim.2023.1283612
Sell, M. S. (2006). International water law in the La Plata Basin: Regional application of principles and procedural rules of general international water law. *Verfassung Und Recht in Übersee/Law and Politics in Africa, Asia and Latin America*, 176–191.
Statute of the Uruguay River. (1975, February 26). *Un Treaty Series*, *1295*, 339–347.
Statute on the regime of navigable waterways of international concern. (1921, April 20). League of Nations treaty series, 51–63
Tignino, M. (2014). Le fleuve Indus et ses usages : L'arbitrage relatif aux eaux du fleuve Kishenganga. [The Indus river and its used — The arbitration on the waters of the Kishenganga River]. *Annuaire Français de Droit International*, *60*(1), 519–542. https://doi.org/10.3406/afdi.2014.4763
Tignino, M. (2016). Joint infrastructure and the sharing of benefits in the Senegal and Niger watersheds. *Water International*, *41*(6), 835–850. https://doi.org/10.1080/02508060.2016.1214894
Tignino, M., & Bréthaut, C. (2020). The role of international case law in implementing the obligation not to cause significant harm. *International Environmental Agreements: Politics, Law and Economics*, *20*(4), 631–648. https://doi.org/10.1007/s10784-020-09503-6
Tignino, M., & Jara, D. (2024). Human rights law in the development of hydropower projects in transboundary context. *Frontiers in Climate*, *6*. https://doi.org/10.3389/fclim.2024.1280239
Treaty between Argentina, Bolivia, Brazil, Paraguay and Uruguay on the River Plate Basin. (1969, April 24). *UN Treaty Series*, *875*, 3.

Treaty concerning the hydroelectric utilization of the water resources of the Parana River owned in condominium by the two countries, from and including the Salto Grande de Sete Quedas or Salto del Guairâ, to the mouth of the Iguassu River. (1973, April 26). *UN Treaty Series*, *923*, 91–110.

Treaty concerning the Río de la Plata and the Corresponding Maritime Boundary. (1973, November 19). https://www.state.gov/wp-content/uploads/2019/11/LIS-64.pdf

Treaty for developing the shared water resources of the frontier sections of the Uruguay River and its tributary, the Pepiri-Guaçu (Pepirí-Guazú) River. (1980, May 17). *UN Treaty Series*, *1333*, 61–67.

Treaty of the La Plata River Basin. (1969, April 23). https://www.internationalwaterlaw.org/documents/regionaldocs/La_Plata-1969.pdf

Treaty of Yacyretà between Paraguay and Brazil. (1973, December 3). *UN Treaty Series*, *1380*, 85–91.

Tripartite agreement on Paraná river projects. (1979, October 19). https://www.internationalwaterlaw.org/documents/regionaldocs/parana1.html

UNECE. (2013). *Guide to implement the water convention*.

UNGA. (2010). *Resolution on the human rights to water and sanitation* (A/RES/64/292). 28 July 2010.

Zarfl, C., Lumsdon, A. E., Berlekamp, J., Tydecks, L., & Tockner, K. (2015). A global boom in hydropower dam construction. *Aquatic Sciences*, *77*(1), 161–170. https://doi.org/10.1007/s00027-014-0377-0