

# Transboundary conflicts and water governance in the Paraguay River Basin – South America

*Conflitos e governança da água transfronteiriça na Bacia  
Hidrográfica do Rio Paraguai – América do Sul*

Flávia Darre Barbosa <sup>1</sup>

Wagner Costa Ribeiro <sup>2</sup>

<sup>1</sup> PhD in Environmental Sciences, Researcher, Laboratório de Geografia Política  
Universidade de São Paulo, São Paulo, SP, Brazil  
E-mail: flavia\_darre@yahoo.com.br

<sup>2</sup> PhD in Human Geography, Professor, Departamento de Geografia,  
Universidade de São Paulo, São Paulo, SP, Brazil  
E-mail: wribeiro@usp.br

doi:10.18472/SustDeb.v15n1.2024.52302

Received: 18/01/2024  
Accepted: 26/03/2024

ARTICLE-VARIA

## ABSTRACT

This article analyses the conflicts and the structure of water governance in the Paraguay River Basin – South America – based on a review of documentary sources, specialised literature, and interviews with key stakeholders operating in the basin. The study shows that the internal asymmetry of Brazil and between this country and Paraguay is crucial in the definition of water use in the Basin, thus resulting in conflicts. The results of the study highlight the need for advances in the implementation of agreements for the basin and the fact that these should include instruments that encompass new scales of management and cooperation opportunities from local stakeholders, who have been neglected in decisions despite the coexistence of informal agreements between the parts.

**Keywords:** Transboundary Waters. Paraguay River Basin. Water Governance. International Cooperation. Conflicts over water.

## RESUMO

*Este artigo analisa os conflitos e a estrutura da governança da água na Bacia do Rio Paraguai – América do Sul – com base em uma revisão de fontes documentais, literatura especializada e entrevistas com principais atores que atuam na bacia. O estudo mostra que a assimetria interna do Brasil, e entre este país e o Paraguai, é crucial na definição do uso da água na bacia, resultando assim em conflitos. Os resultados do estudo destacam a necessidade de avanços na implementação de acordos para a bacia e o fato de que estes devem incluir instrumentos que abranjam novas escalas de gestão e oportunidades de cooperação dos atores locais, que têm sido negligenciados nas decisões, apesar da coexistência de acordos informais entre as partes.*

**Palavras-chave:** Águas Transfronteiriças. Bacia Hidrográfica do Rio Paraguai. Governança Hídrica. Cooperação Internacional. Conflitos pela água.

## 1 INTRODUCTION

The Paraguay River Basin is part of the La Plata Basin – the second largest in the South American continent – and is facing a situation of water scarcity due to the intensification of extreme events, the environmental impacts caused by economic activities, and problems related to management and inadequate public water policies.

As an international Basin, it features a particular geomorphology composed of relationships between the plateaus surrounding it, which shelter the headwaters of the rivers located upstream and the plain areas located in the central portion and downstream. It has regional and international economic relevance, as its main watercourse, the Paraguay River, makes up the Paraná-Paraguay Waterway, a corridor that connects the central region of South America to the Atlantic Ocean, through which most agricultural and mineral commodities are transported, comprising the main export matrix on the continent. Additionally, fishing (artisanal, professional, and tourist) and livestock activities are also developed in the basin, and many of its water courses are used for hydropower generation. This set of economic activities characterises the private sector's stakeholders in the use of water resources in the basin. Different traditional communities also inhabit the river basin.

The social and environmental impacts are increasing as water use and land occupation intensify, varying highly at the regional level and being driven by local economies. In the Upper Paraguay Portion, located upstream of the river, the process of silting and sedimentation of watercourses increases as agricultural progress takes place, as shown by studies by Souza et al., 2017. In the area of the Pantanal shared between Brazil, Bolivia, and Paraguay, the impacts caused by the increasing fires reported in the last years have resulted in changes in the quality and quantity of water courses. The fires consumed approximately 4 million hectares of the biome in 2020 and more than 1 million hectares in 2021 (Lasa, 2022), directly affecting traditional communities. In the Chaco plain, deforestation caused by the expansion and intensification of agriculture to produce commodities – such as soy – has an excessive impact on biodiversity and many endemic species. These situations characterise threats and conflicts – real or potential, direct or indirect – over water use in the basin.

Governments and water and environmental management measures directly interfere in minimising or amplifying impacts on water. The discussion at the international level that the water crisis is, above all, a crisis of governance is widely acknowledged, comprising a concept that has become a benchmark on the agenda of agencies, domestic and international organisations, and research institutions such as the Water Governance Facility or the Daegu Multi-Stakeholder Declaration on the OECD Principles of Water Governance (CASTRO, 2007; RIBEIRO; JOHNSON, 2018).

In the case of transboundary waters, these tasks are even more difficult, as such waters are shared between nation-states, which makes the decision-making process in pursuit of common goals difficult (Ribeiro, 2012). Moreover, any actions produced in a riparian State fall on the others located in the basin, which may become a source of political tensions that can lead to conflict (Ribeiro, 2008b; Sant'Anna; Villar, 2014) The impacts on transboundary waters in an international water basin, such as that of the Paraguay River, can be of an economic, environmental or social nature, among others, and involve the power and sovereignty relations of riparian States (Ribeiro, 2008a, 2008b).

This article analyses the conflicts and structure of water governance in the Paraguay River Basin, focusing on the relations between Brazil and Paraguay.

## 2 METHODS

This study is based on a review of documentary sources on managing water resources in the Paraguay Basin. It also analysed the specialised literature on drainage basin, territory, conflicts, and water

governance. In order to complement gaps raised in the literature review and expand the understanding, in-depth individual interviews were carried out following the guidelines of Gil, 2008, featuring 11 key stakeholders who work in the basin, representatives of the segments of the public authority, and civil society, from July to September 2021, in the online format, based on the following structuring topics: context of the drainage basin – situation analysis and conflicts over water use; water governance – institutional arrangement/structure; management methods – instruments, mechanisms, etc.; and governance monitoring and evaluation.

## 2.1 STUDY AREA

The Paraguay River Basin (Figure 1) covers four riparian nation states with its water courses – Brazil, Uruguay, Paraguay, and Argentina – and shelters the complex formation of the Pantanal region, with significant international social and environmental importance, as it comprises the largest wetland in the world, as well as being listed as National Heritage of Brazil and a Biosphere Reserve designated by Unesco (Rabelo *et al.*, 2021).

In the literature, the Paraguay River Basin is rarely studied in its entirety. Generally, it is presented as a division between the Upper Paraguay region (upstream of the Apa River) and the Lower Paraguay (drainage from the Apa River to downstream of Paraná River) or integrated with the La Plata Basin. It should be noted that the Upper and Lower Paraguay regions have -different impacts.

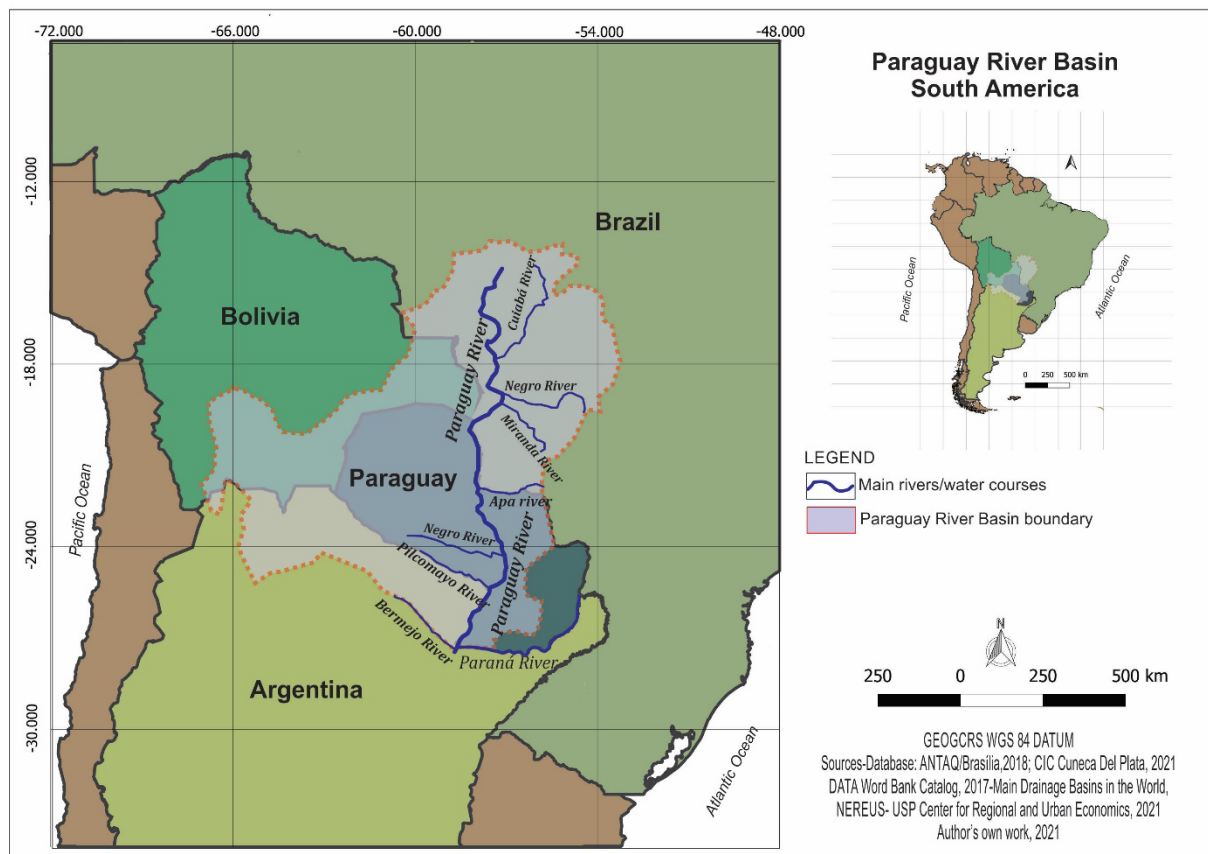


Figure 1 – Delimitation of the Paraguay River Drainage basin in South America.

Source: The authors (2021).

Studies by Rabelo *et al.* (2021) and Souza *et al.* (2017) have identified that deforestation, followed by the inappropriate use of land for cultivation and urbanisation, accelerate erosive processes,

modifying the river dynamics of the region (Upper Paraguay) and subsequently, causing an increase in sedimentation across several points and water courses. The advance of the agricultural frontier in the region, particularly towards the plateau areas, takes place with the cultivation of soy, corn, and beef cattle. Also, the dredging and diversion of river channels are responsible for silting watercourses. In Lower Paraguay, there is a prevalence of impacts related to erosion and river morphological changes, contamination by mineral activities, water contamination by urban and industrial activities and vulnerabilities caused by floods (CIC, 2017). In the Chaco Plain, deforestation caused by using land for the expansion and intensification of agriculture to produce commodities – such as soy – has a major impact on biodiversity and many endemic species (Semper-Pascual *et al.*, 2018).

### 3 INTERNATIONAL WATER BASIN: A SHARED TERRITORY?

A territory can be defined as an area appropriated by a social group where power is exercised (Ribeiro, 2008b; Sant’anna; Villar, 2014, 2015). Conversely, a drainage basin can be defined, based on a physical-natural understanding, as an area physically delimited by a topographic divider, in which all the water that falls on this area is drained into a main watercourse, which flows into an outlet, where it is possible to quantify the hydrological regime (Barbosa, 2019).

The drainage basin has become the ideal territory for managing water and water resources from the local to the international level, particularly since the 1990 Dublin Summit (Davidson; De Loë, 2014; Ribeiro, 2008b). Abers and Keck (2017) and Barbosa (2019) argue that the drainage basin is a suitable territorial unit for water management and implementation of a management system for its uses, as it enables the integration of multidisciplinary research and activities, having a physical boundary that can be well defined at different scales, and allowing the interrelationship between natural, social, economic and cultural components. In turn, authors such as Davidson and De Loë (2014), Furlong (2006), Warner *et al.* (2014) and Zeitoun *et al.* (2014) argue that this scale for water management may obscure policy issues. According to them, stakeholders’ responses to management occur as they perceive their interests, regardless of the natural dimension of the basin. Warner *et al.* (2014) argue that the drainage basin is not an administrative political unit containing the social segments’ political links. Therefore, adopting it as a political scale masks the political importance of water.

In the case of the international drainage basin, it appears as a truncated territory since, in addition to the specific social and political characteristics of each country, it reflects the power relations between countries and within them, which should determine the use of water, as the territory is also understood as the result of power relations (Haesbaert, 2021). It is clear that power relations do not only involve the use of water. Nevertheless, it is essential to remember that all productive sectors, from irrigation to construction, rely on the licensing or granting of water, such as in the Brazilian case. This truncated territory would be related to the territorial trap that Furlong (2006) cited. According to the author, if the State separates foreign policy from domestic policy, it can assign to multilateral international institutions the responsibility for maintaining cooperation between riparian States. Zeitoun *et al.* (2011) note that soft power can be important for international cooperation but not consistently enough, leading to possible tensions and conflicts that may involve the use of force in the international basin. In other words, hard power would prevail.

The discussion on the management of international basins and transboundary waters, as Furlong (2006) addressed, has been guided by hegemony and realistic rationalities, in which the “coloniality of power” is a key element. In the South American case, this coloniality calls into question the very existence of original or traditional communities (Haesbaert, 2021). In the case of water management in an international river basin, the approach by the States, which predominates, especially in poor/peripheral countries, follows a top-down realistic dynamic. Zeitoun *et al.* (2014) argue that the treaties signed in these basins tend to be mostly utilitarian, as they aim at efficiency and greater benefit to the hegemonic States, even though it costs their people dearly. It is also important to identify the dominant

hegemonic power to prevent national and international organisations from ordering the territory of the basin, which is usually disguised as conflict mediation and disregards local and institutional cultures, as Furlong (2006) discussed.

All action occurs in space-time, a fundamental geographic category for understanding any process. The time of social actions in a drainage basin is different from the time of the physical dynamics of the drainage basin. In an international basin, one must still consider other times that involve the sovereignty of riparian States in contrast to the time of traditional communities, which, for example, subsist on artisanal fishing on the banks of rivers, sharing the same waters in territories of different States, as well as on the margins of water management decisions, simultaneously subject to a certain degree of “deterritorialisation,” reaching “terricide,” a term borrowed from Haesbaert (2021). Conversely, there is the power of private sectors to dominate localities and the struggles of internationalised riverside populations. Therefore, it is possible to think of overlapping times when constructing the same space-territory of the international basin. This process may have a rationality imposed or constructed in a shared and collaborative, institutional or informal way.

In a basin shared between countries, it is necessary to understand how they are organised and the form and regime of governments, which comprise factors that affect the governance structure and water management instruments. The basin can be understood as a water management territory, and its control contributes to the search for sovereignty (Ribeiro, 2012).

#### 4 CROSS-BORDER WATER GOVERNANCE: SOVEREIGNTY, COOPERATION OR INTEGRATION?

Two situations may occur between riparian states involving transboundary waters: dispute/conflict and cooperation. These situations, we add, do not depend on the existence of an international treaty and may even coexist (Espíndola; Ribeiro, 2020; Sant’anna; Villar, 2015; Zeitoun; Warner, 2006), in the same space-time frame. Espíndola and Ribeiro (2020) discuss the understanding that these waters should be understood as shared waters, even though they are under the sovereignty of States. Providing equitable access to water, without the power relations between States interfering with water security, should be a premise for agreements between countries.

The analysis of the structure and governance model adopted in an international basin becomes important for the search for equitable access to water by neighbouring States. According to Zeitoun *et al.* (2011), there will always be winners and losers in power and sovereignty relations between States, and some stakeholders may change their interests to seek the best of a given situation in their favour. Based on these authors’ analysis of power and sovereignty, it is possible to envision an initial moment in which water governance can be structured from a foundation of hard power, in which actions and discussions will be centred exclusively on the State, not yet corresponding to a State policy, but rather to a government policy, which can make decisions more unstable. In turn, the governance structure can be based on soft power, which can be used to promote cooperation or, if even softer, integration.

In this discussion, governance cannot be reduced to an instrument for implementing public policy but rather understood as the political process formed by the exercise of asymmetrical power between political stakeholders for decision-making based on values. It is asymmetrical because the stakeholders participating in the process have different proportions of political power and knowledge (Castro, 2007), and all the elements of this political process – power relations between the stakeholders involved, knowledge, and values – will lead to a certain governance structure, which comprises cooperation, integration, or centralisation.

For transboundary waters, governance generally occurs through the formalisation of management instruments, such as agreements and treaties, as well as organisations of joint institutions between



riparian States, even if respecting the territorial autonomy of a given State (Villar *et al.*, 2018). Despite that, countries face difficulties in moving towards cooperation. Therefore, to understand the strength and consent between stakeholders in an international river basin, considering the context and power relations, it is essential to understand how agreements are signed and structured in these basins. Zeitoun *et al.* (2014) have obtained data showing that most agreements between countries have a basis of justice arising from the utilitarian theory, favouring efficiency. Zeitoun and Carrasco Vintimilla (2020, p. 44) note that “one must seek and interpret how attempts have been made – both by non-hegemonic and hegemonic stakeholder, to resolve – or manage – the conflict, whether it is moral, legal, market-related, or technocratic.” It should be noted that, in the Paraguay River Basin, several cooperation instruments exist between Brazil and Paraguay for water management, which will be discussed later.

It should be noted that an agreement cannot resolve all conflicts in an international basin, let alone involve all interested stakeholders (Villar *et al.*, 2018). Nevertheless, they can move forward and establish a governance structure, goals and financial resources, which are key items to facilitate cooperation and legitimation of actions that may occur. The importance of state capacities is highlighted for this purpose.

Abers and Keck (2017) study the importance of capacities, especially at the state level, which ranges from the physical structure of institutions to the forms of dialogue with society. This discussion can be adapted when considering the governance of international basins. In this case, State capabilities would not only be the bureaucratic attributes of States but also conditions for their actions, showing what the state is capable of mobilising. This, however, is not about the total hegemony of the State or the State as a container, as mentioned by Furlong (2006). The State, or its representative, cannot exercise its isolated desire but rather the people’s collective desire, with laws that must be formulated based on the collective desire (Barbosa, 2019; Ribeiro, 2012). In this sense, an ideal governance model in the international basin should simultaneously include States (and their capacities), agreements between international organisations, and local or subnational demands, including a collective construction of water management practices. When each riparian State reaches this level of organisation, the agreements and decisions will have advanced to a higher level of governance, thus making it necessary to verify first the extent to which the institutions are operating to enable a later understanding of governance in its complexity.

While formal institutional interaction is challenging, interaction with non-formal aspects is an even greater challenge in transboundary water management, particularly regarding the interaction with communities and local stakeholders. The construction of the formal institutional apparatus in international basins, which includes agreements, is not an easy task, as it requires the engagement of all public or private stakeholders. Involving the local community is even more difficult, as agreements fail to provide for the possibility of including these stakeholders (Villar *et al.*, 2018), which restricts participation to specific groups, such as large corporations. As Villar *et al.* (2018) suggested, an analysis focused on the State ignores other existing relationships, such as those at the local level. Interstate relations are the most widely analysed in studies on transboundary basins. Conversely, other relationships and stakeholders at subnational or local scales are neglected, which justifies the importance of studies considering other scales. Furlong (2006) makes this same observation when studying international relations and water in the South African context.

## 5 WATER POLICY IN BRAZIL AND PARAGUAY

The State is the first prominent stakeholder in the governance of transboundary waters since it holds political and territorial sovereignty. Therefore, it is important to understand its organisation in riparian countries with different regulations for the domain and competency over water, involving different institutions, instruments, and management bodies.

The Brazilian State is organised as a federative republic that comprises the Union (Federal Government), the States, the Federal District, and the Municipalities, all operating autonomously (Brasil, 1988). All of them are responsible for “registering, monitoring and inspecting the concessions of rights to research and exploration of water and mineral resources in their territories” (Brasil, 1988, Item XI, Chapter II, Article 23). Paraguay is organised in a social State governed by law, being Unitary, indivisible, and decentralised. The Paraguayan territory is divided into 17 departments, composed of 254 districts (municipalities) with their own administration and autonomy in the collection and application of resources (Paraguay, 1992). Surface and groundwater are in the public domain. The country’s Constitution does not mention transboundary water management, coordinated by the Ministry of Foreign Affairs (Brito; Missio, 2019) alongside the Ministry of the Environment and Sustainable Development (Mades).

## 5.1 WATER POLICIES

In Brazil, water governance is related to the public-private domain, which results in a dispute over its multiple uses in light of organised sectoral interests (Barbosa, 2019). The basin is the fundamental territorial unit to apply the management instruments, as stipulated and implemented by the National Water Resources Policy (PNRH), Federal Act 9,433 of 1997, which has a decentralised and participatory character, aiming to promote, among other things, the rational and integrated use of water resources. The Water Resources Policy was constructed based on a diversified scenario. On the one hand, some stakeholders reinforced the centralised and technocratic model of water resources management in the country of the previous decades, when these resources were considered properties of private domain. On the other hand, some stakeholders discussed the need to strengthen horizontal, decentralised, participatory and integrated management, as discussed in the global scenario (Barbosa, 2019). Nevertheless, one of the main political events that allowed the discussion of new principles applied in the PNRH was the process of (re-) democratisation of the country, culminating in the 1988 Constitution.

In Brazil, until 2018, there was a Permanent Technical Chamber for the Management of Transboundary Water Resources in the context of the National Water Resources Council. In 2019, this Chamber was terminated, and its agenda was transferred to the Technical Chamber of Integration with Environmental and Territorial Management. Such changes may further remove local or subnational stakeholders from decision-making, and new conflicts over water use may be activated.

According to Facetti (2014), water governance has been uncoordinated in Paraguay since the 1990s. He points to interference by international institutions, including the World Bank, Unesco, and the Inter-American Development Bank, in an attempt to reach an institutional arrangement that made each stakeholder’s responsibility clear. The result was the drafting of the Regulatory Framework for drinking water and sanitation services and the creation of a National Environmental System in the year 2000 and, later, the Water Resources Act, established by Act 3,239 of 2007 – ten years after the implementation of the Water Resources policy in Brazil – in a process that involved civil society organisations that pressured the government for its formulation. Despite Act 3,239, there is great difficulty in establishing its regulation and implementation. There is no agreement between economic sectors to define values for the use of water for companies.

According to interviews carried out for this study, the private sector aims to continue using water without paying fees or charges. One of the core principles of Paraguayan law on water resources states that the State must guarantee water – with quality and quantity – for the population while highlighting the river basin as a decentralised, participatory management unit with a gender perspective (Paraguay, 2007). In Paraguay, the movement by society, which reached the government for the formulation of Act 3,239, acted for the recognition of water as a human right, which could not be privatised, predating Resolution A/RES/64/292 of 2010 – which declared clean water and sanitation a human right (UN, 2010). Privatisation was stopped for the sanitation sector, and according to Facetti (2014) and some interviewees, with support from the World Bank.

Paraguayan law proposes, at different times, the integrated water management with environmental management, which is a positive factor, especially to advance in a governance that considers the importance of ecosystems and wetlands in the Paraguay basin based on sustainable management. In turn, Brito and Missio (2019) present an overview demonstrating that the water management structure in Paraguay is still dispersed and uncoordinated.

Brazilian law states that transboundary waters will be represented by the Ministry of Foreign Affairs when River Basin Committees exist, yet it does not mention how water will be managed. On the other hand, Paraguayan law indicates that water management in shared basins will be carried out through agreements, treaties, and agreements but does not specify the role of representatives or the collegiate instance in which the management will take place. Such a situation can be an obstacle to the advancement of cooperation agreements for the management of the Paraguay Basin, mainly because this basin still has no International Committee. It should be noted that neither of the two legislations provides for International River Basin Committees. Additionally, despite the two legislations establishing the Basin Plan as a management instrument, there is also no provision for International Basin Plans.

Differences between the preparation and implementation of management instruments provided for in legislation can also hinder cooperation between countries for the management of international waters, particularly in contiguous rivers, such as the establishment of the grant to withdraw water from these rivers.

## 6 PARAGUAY BASIN: CONFLICTS AND MAIN POLITICAL SUBJECTS

Water conflicts can be defined as the different forms resulting from tensions generated by water use disputes (Espíndola; Ribeiro, 2020; Houdret, 2005; Le Billon; Duffy, 2018; Martinez-Alier, 1995; Nincic; Weiss, 2016; Ribeiro *et al.*, 2019; Ribeiro; Santanna, 2014). In the case of a basin, they may gain a supranational dimension, as discussed in this article, which also reflects each country's territorial organisation.

In Brazil, the Paraguay River Basin is part of the Paraguay Hydrographic Region (Paraguay HR), one of the twelve hydrographic regions for water management. It occupies part of the Federation Units of Mato Grosso (MT) and Mato Grosso do Sul (MS). In 2018, the Water Resources Plan for the Paraguay Hydrographic Region (PRH) was defined, despite lacking an Interstate CBH, as the result of an articulation between the National Water and Sanitation Agency (ANA), the National Water Resources Council (CNRH), the Secretariat of Water Resources and Environmental Quality (SRHQ), and civil society, started in 2012, given the social and environmental urgency, particularly in the Pantanal region. The Monitoring Group accompanied the entire discussion for the Preparation of PRH Paraguay (GAP). In 1996, the Upper Paraguay Pantanal River Basin Integration Committee (CIBHAPP) was implemented and demobilised in 1999. The reasons for the discontinuation of this Committee included the failure to describe its physical area of operation, lack of frequency of meetings, and lack of operational and legal compliance (Engecorps; ANA, 2017). The implementation of a new Committee in the Upper Paraguay Region is a matter of discussion, according to the interviewees, especially among representatives of public bodies from MT and MS, who argue that charging for the use of water is the main difficulty in establishing a consensus. The territories of MT and MS are important because they are home to the headwaters of the watercourses of the Paraguay Basin, which gives special attention to the subnational policies of water resources and the environment of these Federation Units and to the national territory itself, resulting in an asymmetrical power relationship in the basin in relation to Paraguay. According to the interviewees, effective actions have failed to advance, and there are no discussions on the subject in the CBHs.

In the Brazilian portion of the Paraguay basin, there are three major economic sectors that politically influence decisions: agribusiness, which exerts great pressure on water resources and land use and



occupation through deforestation, mainly in the plateau areas of Paraguay HR; the hydropower sector, which is impacting upstream areas in the Paraguay HR with pressure for the construction of new Small Hydropower Power Plants (SHP) that could cause changes in the hydrological regimes of water courses and fish reproduction; and the waterway sector of the Paraguay-Paraná Waterway, which includes a project to expand the North Section in MT and MS, which do not have good navigation conditions. All uses impact the Pantanal, which is highly susceptible to impacts that the projects can generate.

Conversely, the Paraguay HR includes traditional communities with an interdependent relationship with water, such as riverside dwellers, Pantanal dwellers, artisanal fishermen, indigenous peoples, and *quilombolas* (settlers comprising descendants of former African slaves). These stakeholders do not have great decision-making power in the face of State hegemony, although they are often the ones closest to dialogue with other communities in neighbouring countries. Water resource demand and multiple uses also involve other stakeholders: the sanitation sector, fisheries, aquaculture, and tourism.

The inter-municipal consortium is a major player in the Paraguay HR. At least two consortia have been established whose sector of activity is the environment and water (Cidema – Intermunicipal Consortium for the Integrated Development of the Miranda and Apa River Basins; and Cointa – Intermunicipal Consortium for the Sustainable Development of the Taquari River Basin) (Engecorps; ANA, 2017). The consortia are legal entities and comprise alternatives that involve local stakeholders in water management, being able to promote partnerships with municipalities in neighbouring countries in border regions, as has been the case with the Consortium of the Apa River Basin. Sant’Anna and Villar (2014, p.1110) observe that “consortia play an essential role in the process of governance and management of transboundary water resources,” as they provide a role “greater than that of national institutions and regional integration processes underway, even if they have special programs for border regions.” Nevertheless, the Consortia face challenges such as restrictive legislation or lack of institutional support (Engecorps; ANA, 2017).

Paraguay’s territory is in two distinct hydrographic regions, which have highly particular characteristics in ecological terms and for the application of legislation and governance structure. One of them is the eastern region, more densely populated, with plains irrigated by the Paraguay River and part of the Paraná River Basin, occupied by the Atlantic Forest, where the largest concentration of wetlands is located, and featuring a diversity of economic activities aimed at agribusiness and agroindustry, production forestry, among others. This portion presents a few remnants of natural areas, which are pressured by irrigators that generate water stress. The other is the western region, composed mainly of the Chaco-Seco region, which is the least inhabited in the country, integrating the Paraguay River Basin, but with impacts generated by extensive cattle ranching and the advance of soy production and deforestation, affecting indigenous communities that directly use the rivers. It should be noted that Act 422 of 1973 states that rural properties larger than 20 hectares must keep 25% of their surface covered by continuous natural forests.

When analysing the two areas, it is possible to verify that the country’s economic matrix is based on agribusiness. Paraguay has been the sixth-largest producer and fourth-largest exporter of soy and the ninth-largest exporter of beef since 2012. These activities coexist alongside family and peasant farming, which supplies the cities, confirming the demand for water for irrigation in the country and creating points of tension of territorial dispute between large producers and peasants (Sili, 2019). Another highlight are the demands of traditional communities with their own territorial claims. These are major stakeholders that must be considered for governance in the basin. Companies in the area include transnational economic groups from Brazil and Paraguay, such as CNH (Case IH and New Holland), AGCO (AGCO, Valtra and Massey Ferguson); Cargill and ADM (operating throughout the U.S. chain), Agrotec and Grupo Favero (Brazil), and the Gimenez Family, who own the largest chain of port terminals in Paraguay (Dos Santos; Wesz Junior, 2018). Because its territory does not have an outlet to the sea, waterways mainly transport production and the Paraguay River stands out as the main transport and integration route. In this sense, new stakeholders enter the scene, such as the Gimenez Family group,

owner of the largest chain of port terminals in Paraguay (Dos Santos; Wesz Junior, 2018). It should be noted that approximately 75% of ports in the country are privately owned (Silveira et al., 2019).

The Paraguay basin also includes Hydropower Generation Plants (HGP), Hydropower Power Plants (UHE) and Small Hydropower Plants (SHP), mainly upstream. The construction of the projects has the financial support of the BNDS for companies such as Itiquira Energética and Energética Ponte Alta S.A., Arapucel Ombeira S.A., and Santa Gabriela Energética S.A. Brenndand Energia Gerem. Both the waterway sector and the energy sector are involved in conflicts over the use of water, even though the use of water for these sectors is non-consumptive. These conflicts involve issues related to traditional communities and impacts on riverbeds and ecosystems. The sanitation sector, another major stakeholder in water governance, is distributed among public, private, and mixed-capital entities. It should be noted that more than 13% of the population in the country, especially in rural areas, are supplied by the so-called *aguateros* (water carriers), and approximately 36% of water and sewage services come from the Environmental Sanitation Councils, both comprising private operating systems (Brito; Missio, 2019), whose permission and concession of use is regulated by Act 3,239.

Furthermore, various international stakeholders contribute to producing or disseminating data on governance and water management in Paraguay, such as the Global Water Partnership, Data for Now/Cepei, and the UN/UNDP. It is necessary, however, to question the rationale behind the intentions of these institutions and programs. These institutions must promote a participatory diagnosis, considering local communities and civil society, which would allow for a counterpoint to the segments of large water users, part of them multinational, which have a direct interest in water use for the maintenance of the productive sector.

## 6.1 CONFLICTS AND AVENUES FOR COOPERATION

Conflict and cooperation relations coexist between Brazil and Paraguay in the Paraguay Basin despite agreements and treaties between the countries. For the interviewees who have addressed this topic, cooperation is unsatisfactory.

An asymmetry between countries affects decisions on cross-border issues and impacts agreements and treaties, as analysed by Zeitoun et al. (2014). The Brazilian state has been hegemonic in the relationship. One must consider the power asymmetries between Brazil and Paraguay for new agreements. Furthermore, in the Brazilian case, decisions on the management of water resources are coordinated by the Ministry of Foreign Affairs, which is alien to the country's water management systems.

Both countries are part of the Intergovernmental Coordinating Committee for the La Plata Basin (CIC), the La Plata Basin Treaty, and the RAMSAR Convention on Wetlands of International Importance (CIC, 2017), which was widely cited by respondents, especially regarding the situation of the serious water scarcity that affected the Pantanal at the time of the interviews. The CIC and the Treaty are considered the landmark of the creation of an institutional framework to manage transboundary water resources in the La Plata Basin, but they have assumed a biased position towards energy production. The Treaty formalised the river basin as a water management unit, promoted international cooperation and established a major financial mechanism, the Financial Fund for the Development of the La Plata Basin (Fonplata). The CIC, in turn, was created to achieve the Treaty's goals. According to Villar et al. (2018), cooperation between the countries based on the Treaty has focused on contiguous rivers, and this is due to the principle of sovereignty that States would have in the border strip. They would have a joint sovereignty in contiguous rivers that they would not have in successive rivers. The Treaty stipulated the legal framework for advancing transboundary management in the La Plata basin, but actions are taking place slowly. This process is even slower in the sub-basins, which have far fewer bilateral agreements.

The interviewees did not identify the role of the CIC in the Paraguay Basin, although one of the areas of interest to them is the Upper Paraguay-Pantanal sub-basin due to the value of its wetland ecosystem and the key role it plays in the water regulation of the La Plata Basin set (CIC, 2017). The composition of the CIC is centred on the Ministries of Foreign Affairs, a government body responsible for signing international treaties and addressing foreign policy issues (Sant’anna; Villar, 2015). These hampers decentralised actions for the La Plata sub-basins, which are directed to governments’ interests and the discussion on energy use, being restricted to formal diplomatic agents. Sant’Anna and Villar (2015) argue that the CIC is structured as a supranational organisation and does not have mechanisms to include the participation of subnational bodies and civil society in the La Plata sub-basins. Therefore, despite being a regional cooperation mechanism, the CIC does not resolve local conflicts.

Still on the regional scale, there is the Mercosur Framework Agreement on the Environment, whose environmental actions are hampered by the bloc’s institutional problems (Ribeiro, 2008b; Sant’anna; Villar, 2015; Villar; Ribeiro, 2011). Other institutional organisations in the Paraguay River Basin are the Intergovernmental Committee of the Paraguay-Paraná Waterway (CIH) and the River Transport Agreement for the Paraguay-Paraná Waterway. The waterway is a major navigation axis in South America, and an important part of its course is in the Paraguay River. Improvements in the waterway are the responsibility of the States in their respective branches. Nevertheless, the agreement allows for the possibility of obtaining funds for Fonplata or the Inter-American Development Bank (Sant’anna; Villar, 2015). In the Brazilian portion of the waterway, there are tensions between the State and the private sector, on the one hand, and between civil society groups and non-governmental organisations, on the other, who defend the non-expansion of the waterway to the northern section, as it would impact the Pantanal.

There is no effective integration for the management of the Paraguay River Basin and the transboundary waters between the two countries. Instead, legislation is enforced with a top-down approach and closed actions in the territories of each of the countries, which fail to incorporate the idea that the international basin should have actions aimed at cooperation and integration. In fact, the two countries have asymmetry in the management and institutional frameworks concerning water resources policies, as systematised in Table 1.

**Table 1 – Comparison between the Water Policies – Brazil and Paraguay**

	Brazil	Paraguay
<i>Act/Year</i>	<i>Act 9,433 of 1997</i>	<i>Act 3,239 of 2007</i>
Management System and Hierarchy	<ul style="list-style-type: none"> <li>• Ministry of Regional Development (MDR) National Water Resources Council (CNRH)</li> <li>• Water Security Secretariat</li> <li>• State Water Resources Councils River Basin Committees (CBH)*</li> <li>• Bodies/entities with competencies related to water resources management</li> <li>• Basin Agencies and National Water and Sanitation Agency (ANA)</li> </ul>	<ul style="list-style-type: none"> <li>• Ministry of Environment and Sustainable Development (MADES)</li> <li>• General Board for the Protection and Conservation of Water Resources (DGPCRH) – This is the managing and coordinating body of the Water Councils</li> <li>• Water Councils**</li> </ul>
Management instruments	<ul style="list-style-type: none"> <li>• Water Resources Plans</li> <li>• Classification of bodies of water according to the main water uses</li> <li>• Granting of rights for the use of water resources; Charge for the use of water resources</li> <li>• Water Resources Information System</li> </ul>	<ul style="list-style-type: none"> <li>• National Water Resources Plan***</li> <li>• National Water Inventory National Water Resources Registry, to regulate the demand, considering the Water Balance for permission or not of grants-concessions (Paraguay, 2007)</li> <li>• Granting – permissions and concessions</li> </ul>

	Brazil	Paraguay
Act/Year	Act 9,433 of 1997	Act 3,239 of 2007
Transboundary waters – direct mention in the law	“On the River Basin Committees of boundary and transboundary river basins of shared management, the Union’s representation must include a representative of the Ministry of Foreign Affairs” (Article 39, § 2).	“The management of water resources shared with other countries shall be governed and regulated by treaties, agreements and international covenants that are approved and ratified by the National Congress and are in force” (Article 8).

Source: The authors (2024)

\* There are 6 state committees in the Paraguay Hydrographic Region.

\*\* 18 councils were created for aspects of the Paraguay River Basin.

\*\*\* As of the article’s writing date, it has not yet been prepared.

This situation impacts the cooperation between the countries. In the Paraguay River Basin, between Brazil and Paraguay, the 2006 Cooperation Agreement for Sustainable Development and Integrated Management of the Apa River Basin (CIC, 2017) and the Apa River Mixed Commission, which cover the border area, stand out as the main highlights. Mobilisation for the Working Group began in 1998 when the Intermunicipal Consortium for the Integrated Development of the Miranda and Apa River Basins (Cidema) was formed. The Rio Apa Agreement came into force in 2009 (Sant’anna; Villar, 2015) and was the result of a movement organised by several Brazilian and Paraguayan stakeholders and municipalities to share the waters and banks of the Apa River, as well as the need for these municipalities to address water management and the environmental situation of the basin. Despite being a transboundary agreement, it has been driven by local mobilisation, influencing national institutions (Sant’anna; Villar, 2015) and reaching the local management scale. It is noted, however, that given the failure to establish effective governance, with delegation of responsibilities to the institutions, the Agreement has failed to advance in some of its objectives, such as the development of specific projects of mutual interest or the raising of the socioeconomic level of the inhabitants of the Basin.

Many agreements signed with stakeholders on a local scale in the Paraguay River Basin are not institutionalised. Nevertheless, most respondents mentioned the importance of these agreements in water management.

## 7 CONCLUSIONS

This article confirms that governance in an international basin is a complex process, as it involves different scales and levels of development of social segments and the power relations between the States that make up the basin. In the relations between Brazil and Paraguay, the first is hegemonic in relation to decisions on water management in the Paraguay River Basin. This scenario results in conflicts between stakeholders and water disputes that are reflected internally and between the two countries.

The few existing agreements in the Paraguay River Basin do not have a governance structure. They are not prepared to incorporate the initiatives of local stakeholders at the legal or institutional level, who solve immediate and urgent problems informally resulting from localised conflicts. Two of the agreements identified are included in the Paraguay River Basin area: the Rio Apa Agreement and the Rio Apa Commission. Other agreements cover the La Plata Basin or on an international scale and end up covering the Paraguay Basin indirectly, namely, CIC La Plata; Treaty of the La Plata Basin; RAMSAR Convention on Wetlands of International Importance; Mercosur Framework Agreement on the Environment; and the River Transport Agreement for the Paraguay-Paraná Waterway.

The asymmetries between Brazil and Paraguay must be reduced to advance the governance structure of transboundary waters. Paraguay should advance in implementing the instruments of its Water Policy, while Brazil is left with the need to consider other matrices in its foreign policy aimed at

transboundary waters, which consider social and environmental dimensions. The analysis showed that the predominant rationality between the two countries for the management of transboundary waters is the economic one, which aims to support only large enterprises and corporations in a process that weakens attempts at agreements for development based on the rationality of social and environmental sustainability of the Paraguay River Basin and results in internal and international conflicts, even if small, but which may increase in intensity and regularity.

## ACKNOWLEDGEMENTS

This work was funded by the Coordination for the Improvement of Higher Education Personnel Foundation (Capes) and the National Council for Scientific and Technological Development (CNPq), process 302046/2022-4.

## REFERENCES

- ABERS, R. N.; KECK, M. E. **Autoridade Prática: ação criativa e mudança institucional na política das águas do Brasil**. 1. ed. Rio de Janeiro: Fiocruz, 2017. v. 1
- BARBOSA, F. D. **Comitês de Bacias Hidrográficas, representação e participação: desafios e possibilidades à gestão da água e dos recursos hídricos no Brasil**. (Tese de Doutorado) São Carlos: Universidade Federal de São Carlos (UFSCar), 9 maio 2019.
- BRASIL. **Constituição da República Federativa do Brasil**. Presidência da República, 1988.
- BRITO, A. R.; MISSIO, F. J. Regulação e hidropolítica na fronteira Brasil-Paraguai. **Desenvolvimento e Meio Ambiente**, v. 52, 2019. DOI: <http://dx.doi.org/10.5380/dma.v52i0.65310>
- CASTRO, J. E. Water governance in the twentieth-first century. **Ambiente & Sociedade**, v. 10, n. 2, p. 97–118, dez. 2007. DOI: <https://doi.org/10.1590/S1414-753X2007000200007>
- CIC. **Análise Diagnóstico Transfronteiriço da Bacia do Prata – ADT**. Estados Unidos: 2017.
- DAVIDSON, S. L.; DE LOË, R. C. Watershed Governance: transcending boundaries. **Water Alternatives**, v. 7, n. 2, p. 367–387, 2014.
- DOS SANTOS, W.; WESZ JUNIOR, V. J. Concentração empresarial nas exportações do complexo soja no Paraguai (2000-2016). **Desenvolvimento em Debate**, v. 6, n. 1, p. 1–18, 2018.
- ENGEORPS; ANA. **PRODUTO PARCIAL PP-06**. Plano de Recursos Hídricos da Região Hidrográfica do Paraguai – PRH Paraguai. Brasília: 2017.
- ESPÍNDOLA, I. B.; RIBEIRO, W. C. Transboundary waters, conflicts and international cooperation – examples of the La Plata basin. **Water International**, v. 45, n. 4, p. 329–346, 18 maio 2020. DOI: <https://doi.org/10.1080/02508060.2020.1734756>
- FACETTI, J. F. La reforma del sector hídrico en el Paraguay: una tarea inconclusa. **Debate. Revista Digital de Políticas Públicas**, v. 1, n. 1, 2014.
- FURLONG, K. Hidden theories, troubled waters: international relations, the ‘territorial trap’, and the Southern African Development Community’s transboundary waters. **Political Geography**, v. 25, n. 4, p. 438–458, maio 2006. DOI: <https://doi.org/10.1016/j.polgeo.2005.12.008>



GIL, A. C. **Métodos e técnicas de pesquisa social**. 6. ed. São Paulo: Atlas, 2008. v. 1

HAESBAERT, R. A corporificação “natural” do território: do terricídio à multiterritorialidade da Terra. **GEOgraphia**, v. 23, n. 50, 15 mar. 2021. DOI: <https://doi.org/10.22409/GEOgraphia2021.v23i50.a48960>

HOUDRET, A. La goutte d’eau qui fait déborder... Coopération et conflit autour de l’eau au niveau international et national. **GÉOCARREFOUR**, v. 80, n. 4, p. 285–295, 2005.

LASA. **Alerta rápido de área queimada**. 2023.

LE BILLON, P.; DUFFY, R. Conflict ecologies: connecting political ecology and peace and conflict studies. **Journal of Political Ecology**, v. 25, n. 1, 3 jan. 2018. DOI: <https://doi.org/10.2458/v25i1.22704>

MARTINEZ-ALIER, J. Indicadores de sustentabilidad y conflictos distributivos ecológicos. **Ecología Política**, v. 10, p. 35–43, 1995.

NINCIC, M.; WEISS, M. The Future of Transboundary Water Conflicts. **Political Science Quarterly**, v. 131, n. 4, p. 717–748, dez. 2016. DOI: <http://www.jstor.org/stable/45175751>

PARAGUAY. **Constitución Nacional de la República del Paraguay**. La Constitución Nacional. Gobierno Paraguay. Convención Nacional Constituyente, 1992.

PARAGUAY. **Ley Nº 3239 / de los Recursos Hídricos del Paraguay**. Gobierno Paraguay. Congreso Nacional. Biblioteca y Archivo Central del Congreso Nacional, 2007.

RABELO, M. O. *et al.* Participação social no diagnóstico e prognóstico do Plano de Recursos Hídricos da Região Hidrográfica do Paraguai. **Research, Society and Development**, v. 10, n. 10, 17 ago. 2021. DOI: <https://doi.org/10.33448/rsd-v10i10.18137>

RIBEIRO, N. B.; JOHNSON, R. M. F. Discussions on water governance: patterns and common paths. **Ambiente & Sociedade**, v. 21, n. 0, 8 out. 2018. DOI: <https://doi.org/10.1590/1809-4422asoc0125r2vu18L1AO>

RIBEIRO, W. C. **Geografia política da água**. 1. ed. São Paulo: Annablume, 2008a.

RIBEIRO, W. C. Aquífero Guarani: gestão compartilhada e soberania. **Estudos Avançados**, v. 22, n. 64, p. 227–238, 1 dez. 2008b. DOI: <https://doi.org/10.1590/S0103-40142008000300014>

RIBEIRO, W. C. Soberania: conceito e aplicação para a gestão da água. **Scripta Nova Revista Electrónica de Geografía y Ciencias Sociales**. Nueva serie de Geo Crítica. Cuadernos Críticos de Geografía Humana, v. XVI, n. 418 (28), 1 nov. 2012.

RIBEIRO, W. C.; SANTANNA, F. M. Water security and interstate conflict and cooperation – (Seguretat hídrica i conflicte i cooperació interestatals). **Documents d’Anàlisi Geogràfica**, p. 573–596, 2014. DOI: <https://doi.org/10.5565/rev/dag.150>

RIBEIRO, W. C.; SANTOS, C. L.; SILVA, L. P. Conflito pela água, entre a escassez e a abundância: marcos teóricos. **Ambientes: revista de Geografia e Ecologia Política**, v. 1, p. 11–37, 2019. DOI: <https://doi.org/10.48075/amb.v1i2.23619>

SANT’ANNA, F. M.; VILLAR, P. C. A governança de recursos hídricos nas áreas de fronteira: integração e ordenamento territorial. VI CONGRESSO IBEROAMERICANO DE ESTUDIOS TERRITORIALES Y AMBIENTALES. *In: Estudios Territoriales*. **Anais [...]**. São Paulo: Estudios Territoriales, 12 set. 2014.

SANT'ANNA, F. M.; VILLAR, P. C. Gobernanza de las aguas transfronterizas: fragilidades institucionales en América del Sur. **América Latina Hoy**, v. 69, p. 53–74, 2015. DOI: <https://doi.org/10.14201/alh2015695374>

SEMPER-PASCUAL, A. *et al.* Mapping extinction debt highlights conservation opportunities for birds and mammals in the South American Chaco. **Journal of Applied Ecology**, v. 55, n. 3, p. 1218–1229, maio 2018. DOI: <https://doi.org/10.1111/1365-2664.13074>

SILVEIRA, C. V. DA *et al.* Dinâmica regional da economia paraguaia: o caso da soja e carne. (ENANPUR, Ed.) *In*: XVIII ENANPUR. **Anais [...]**. Natal: ENANPUR, 31 maio 2019.

SOUZA, C. A. DE *et al.* Aporte de sedimentos dos afluentes da margem direita do Rio Paraguai, pantanal superior – Mato Grosso. **Ciência Geográfica**, Bauru XXI, v. XXI, n. 1, p. 18–31, jan. 2017.

VILLAR, P. C.; RIBEIRO, W. C. The Agreement on the Guarani Aquifer: a new paradigm for transboundary groundwater management? **Water International**, v. 36, p. 646–660, 2011. DOI: <https://doi.org/10.1080/02508060.2011.603671>

VILLAR, P. C.; RIBEIRO, W. C.; SANT'ANNA, F. M. Transboundary governance in the La Plata River basin: status and prospects. **Water International**, v. 43, n. 7, p. 978–995, 3 out. 2018. DOI: <https://doi.org/10.1080/02508060.2018.1490879>

WARNER, J. F.; WESTER, P.; HOOGESTEGER, J. Struggling with scales: revisiting the boundaries of river basin management. **Wiley Interdisciplinary Reviews: Water**, v. 1, n. 5, p. 469–481, set. 2014. DOI: <https://doi.org/10.1002/wat2.1035>

ZEITOUN, M. *et al.* Transboundary water justice: a combined reading of literature on critical transboundary water interaction and 'justice', for analysis and diplomacy. **Water Policy**, v. 16, n. S2, p. 174–193, 1 nov. 2014. DOI: <https://doi.org/10.2166/wp.2014.111>

ZEITOUN, M.; CARRASCO VINTIMILLA, A. I. Justicia del agua transfronteriza: una lectura combinada de la literatura crítica sobre la interacción del agua transfronteriza y la 'justicia', para el análisis y la diplomacia. **Relaciones Internacionales**, n.45, p.31–51, 31 out. 2020. DOI: <https://doi.org/10.15366/relacionesinternacionales2020.45.001>

ZEITOUN, M.; MIRUMACHI, N.; WARNER, J. Transboundary water interaction II: the influence of 'soft' power. **International Environmental Agreements: politics, law and economics**, v. 11, n. 2, p. 159–178, 8 maio 2011. DOI: <https://doi.org/10.1007/s10784-010-9134-6>

ZEITOUN, M.; WARNER, J. Hydro-hegemony – a framework for analysis of trans-boundary water conflicts. **Water Policy**, v. 8, n. 5, p. 435–460, 1 out. 2006. DOI: <https://doi.org/10.2166/wp.2006.054>

