

Water security and interstate conflict and cooperation*

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Abstract

Tensions and conflicts over water use are increasingly common, as a result of both high water scarcity and high water demand. The use of water resources generates political disputes between countries sharing waters within their borders. This paper aims to discuss water security and the interstate conflict and cooperation that can result from it. It is based on an interdisciplinary literature review that aims to contribute to the development of studies on transboundary water policies, encompassing concepts such as water security, water justice and water governance. This article aims to grasp the problems involved in the conflicts and cooperation on shared use of transboundary water resources. It is divided in the following parts: water and international politics; international security, environmental security and water security; and interstate water conflicts and cooperation in the use of shared water resources. Cooperation in the use of transboundary waters might spare distributive conflicts on water use. In situations of scarcity, policies should prioritize human and animal watering, which might relieve water supply issues between riparian countries. On the other hand, water abundance may end up creating more tensions than water shortages, since disputes over its use might emerge instead of cooperation favoring interstate security.

Keywords: water; water security; interstate conflict; international cooperation; transboundary water.

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Resum. *Seguretat hídrica i conflicte i cooperació interestatals*

Les tensions i els conflictes entorn dels usos de l'aigua són cada vegada més comuns, tant com a resultat de la seva elevada escassetat com de la seva encara més elevada demanda. L'ús dels recursos hídrics genera confrontacions polítiques entre els països que comparteixen aigües transfrontereres. Aquest article té per objectiu debatre entorn de la seguretat hídrica i els conflictes i la cooperació interestatals que se'n poden derivar. Parteix d'una revisió de la literatura sobre aquest tema abordada des d'una perspectiva interdisciplinària, té per finalitat contribuir al desenvolupament d'estudis sobre polítiques d'aigües transfrontereres i desenvolupa conceptes com els de seguretat hídrica, justícia hídrica i governança hídrica. L'article ajuda a comprendre els problemes que es plantegen al voltant dels conflictes i la cooperació en l'ús compartit dels recursos hídrics transfronterers. S'estructura en les parts següents: aigua i política internacional; seguretat internacional; seguretat ambiental i seguretat hídrica, i conflictes hídrics interestatals i cooperació en l'ús dels recursos hídrics compartits. La cooperació en l'ús de les aigües transfrontereres podria minimitzar conflictes distributius en l'ús de l'aigua. En situacions d'escassetat hídrica, les polítiques han de prioritzar els usos humans i ramaders, la qual cosa podria alleujar els problemes en el subministrament d'aigua entre països riberencs. Tanmateix, l'abundància d'aigua pot acabar creant més tensions que no pas la falta d'aquest recurs, ja que les disputes sobre el seu ús poden imposar-se a la cooperació en favor de la seguretat interestatal.

Paraules clau: aigua; seguretat hídrica; conflicte interestatal; cooperació internacional; aigües transfrontereres.

Resumen. *Seguridad hídrica y conflicto y cooperación interestatales*

Las tensiones y los conflictos en torno a los usos del agua son cada vez más comunes, tanto como resultado de su elevada escasez como de su todavía más elevada demanda. Los usos de los recursos hídricos generan controversia política entre los países que comparten aguas transfronterizas. Este artículo tiene como objetivo debatir en torno a la seguridad hídrica y los conflictos y la cooperación interestatales que de ella pueden derivarse. Se basa en una revisión de la literatura sobre esta temática abordada desde una perspectiva interdisciplinaria, con la finalidad de contribuir al desarrollo de estudios sobre políticas de aguas transfronterizas, y desarrolla conceptos como los de seguridad hídrica, justicia hídrica y gobernanza hídrica. El artículo ayuda a entender los problemas que se plantean en torno a los conflictos y la cooperación en el uso compartido de los recursos hídricos transfronterizos. Se estructura en las siguientes partes: agua y política internacional; seguridad internacional, seguridad ambiental y seguridad hídrica; conflictos hídricos interestatales y cooperación en el uso de los recursos hídricos compartidos. La cooperación en el uso de las aguas transfronterizas podría ahorrar conflictos distributivos en el uso del agua. En situaciones de escasez hídrica, las políticas deben priorizar los usos humanos y ganaderos, lo que contribuiría a aliviar los problemas en el suministro de agua entre países ribereños. Sin embargo, la propia abundancia de agua puede incluso crear más tensiones que la falta de la misma, ya que las disputas sobre su uso pueden imponerse frente a la cooperación a favor de la seguridad interestatal.

Palabras clave: agua; seguridad hídrica; conflicto interestatal; cooperación internacional; aguas transfronterizas.

Résumé. *Sécurité hydrique, conflits et coopération inter-états*

Les tensions et les conflits autour l'usage de l'eau sont de plus en plus communs, à la fois en raison de la pénurie d'eau et aussi à cause d'une plus forte demande. L'utilisation des

ressources hydriques génère des affrontements politiques entre les pays qui partagent des eaux transfrontalières. Cet article vise à discuter de la sécurité hydrique, des conflits et de la coopération inter-états pouvant en résulter. Il est fondé sur une révision de la littérature versant sur ce sujet à partir d'une perspective interdisciplinaire qui vise à contribuer à l'élaboration d'études sur les politiques des eaux transfrontalières et qui englobe des concepts tels que la sécurité hydrique, la justice hydrique et la gouvernance hydrique. L'article vise à comprendre les problèmes qui se posent autour des conflits et de la coopération sur l'utilisation partagée des ressources hydriques transfrontalières. Il est divisé en diverses parties : l'eau et la politique internationale; la sécurité internationale, la sécurité environnementale et la sécurité hydrique; conflits hydriques et coopération inter-états pour l'utilisation des ressources hydriques transfrontalières. La coopération pour l'utilisation des eaux transfrontalières pourrait épargner les conflits distributifs sur l'utilisation de l'eau. Dans les situations de pénurie d'eau, les politiques devraient accorder la priorité à l'alimentation en eau des hommes et des animaux, ce qui pourrait soulager les problèmes d'approvisionnement hydrique entre les pays riverains. D'autre part, l'abondance d'eau peut créer plus de tensions même que l'absence de celle-ci, parce que les conflits liés à son utilisation peuvent émerger à la place de la coopération pour la sécurité inter-états.

Mots-clé: eau; sécurité hydrique; conflits inter-états; coopération internationale; eaux transfrontalières.

Summary

Water and international politics	Cooperative and institutional arrangements for the regulation of shared water resources
International security, environmental security and water security	Final considerations
Interstate conflicts related to the use of water	Bibliographical references

This paper discusses water security and the interstate conflicts that can result from it. It is based on a literature review and seeks to contribute to the advancement of this topic.¹ It is divided into the following parts: water and international politics; international security, environmental security and water security; and interstate water conflicts and cooperation in the use of shared water resources. In the first part it presents a general overview of water management and its relationship to international politics. Afterwards, it explores the rise of the concept of water security on the international scene. Finally, it examines water conflicts among states and how international cooperation can be used to avoid aggravating the tensions between countries caused by distributive conflicts related to the use of water.

This paper aims to discuss water security and other issues involved in the conflict and cooperation between countries that share transboundary river

1. This topic area contains some literature reviews with different viewpoints, cf.: Dinar, S. and Dinar, A. 2003. The state of the natural resources literature. *Book Reviews. Natural Resources Journal*, v. 43: 1217-1287.

basins, and to do so, it will discuss the main concepts related to this theme, such as water politics, water security and governance. The political nature of water resources, which refers to their access and use, is what allows topics such as water politics to be discussed, which deals with the political relations established between human groups (namely States) which share water resources. Water politics is marked both by cooperation and by conflicts pertaining to water resources. In situations of scarcity, tensions might arise between riparian countries, which ought, in turn, to lead to a securitization of the topic, and that is what makes the concept of water security relevant to our analysis. In the specific case of cooperation between countries and the social groups within them concerning the sharing of water resources, the various initiatives that exist around the world, at different scales, not only at the international level, define water governance as a policymaking decision-making process which includes the participation of all the social agents involved with the goal of regulating access to and use of water resources. For this governance to be democratic and to seek water justice, it is necessary for it to involve the participation of all the parties concerned, such as social groups, the government, civil society at large, private initiative sectors and so forth. However, it is necessary to take into account the asymmetric relations between different social agents, mainly when it comes to power and information, since the mechanisms for social participation in water governance take this aspect into consideration, generating a lack of democratization in this political process.

This study aims to contribute to the study of transboundary water politics from a critical standpoint, taking into consideration the scales of analysis and the concepts used in the literature. In doing so, it approaches the critical political geography analyses and the new approach to security studies which point to their multidimensionality, as in the case of water security.

Water and international politics

It is already known that today there are 263 rivers basins and an as-yet uncalculated number of aquifers that cross the political boundaries of states and can be defined as transboundary water resources. These shared river basins account for 45.3% of the total area of the planet's surface, which 40% of the world's population inhabits; this corresponds to approximately 60% of the world's river flow, according to data presented by Delli Priscoli and Wolf (2009). In the opinion of these authors, water is a scarce resource with no substitute, but has a constant, immediate and growing demand in the world, which is why resource conflicts will become more frequent and intense, as the use of water in one country can no longer help but impact neighboring riparians, a situation which is aggravated by poorly developed international law (Delli Priscoli and Wolf, 2009).

Although all human communities are interested in water, the political nature of its access and use is not always explicit. It is worth noting that water is also seen as a resource; therefore, the use of the term water resources refers to the various properties and uses of water. According to Raffestin (1990),

water, just like other natural resources, has properties that can become utilities and therefore a resource. However, it may only be classified as such when it is the result of a production process. The relationship between matter and natural resources is political in the sense that a resource is a collective product and access to it is based on a political decision. Therefore, all human relations with matter are power relations which are played out in the political sphere through the means of production (Raffestin, 1990).

Therefore, water resources are the result of a historical relationship with human beings, who attach value to it according to its various possible uses (spiritual, leisure, agricultural, industrial, domestic, urban and hydropower, among many others). Water is not produced in the same sense as a new product is generated; however, human work is necessary for its capture, treatment and transportation. According to Ribeiro (2008), water is a substance that occurs in nature and it is not processed and synthesized in a laboratory. Nor is it altered in any expressway, although chemicals might be added to it that modify some of its traits (Ribeiro, 2008). As Raffestin (1990) points out, the usage of new techniques can lead to the manifestation of new properties of a resource which alters the relationship to the matter and the territory where it is inserted. Thus, technicity, in regard to matter, is the appendix of territoriality and can be symmetric or dissymmetric. A symmetric technicity is characterized by non-destructive relations to the matter and the environment, while a dissymmetric technicity is characterized by destructive relations to the matter and the environment (Raffestin, 1990).

Furthermore, technicity expresses power relationships not only with matter, but also with the people to whom this matter has a use. The production of resources, therefore, entail minimal dominion over the parts of the time-spatial frame in which and to which technicity interacts with territoriality. The whole problem of access is thus defined: access in space and/or access in duration (Raffestin, 1990).

The first political issue which arises with regard to water is access, and after that comes its natural distribution, which is unequal, and its use via several different techniques. As claimed by Warner and Wegerich (2010), there is not always a clear definition of what exactly “water politics”, also called “hydropolitics”, is in the vast literature about water resources. The earliest usage of this term first occurred in the work of Waterbury (1979), and to the extent that it relates to the relationships between states that share a transboundary river basin. According to Turton:

Hydropolitics as a relatively new discipline is and generally lacks conceptual rigor. It is also being developed by scholars from a variety of disciplines, each with their own set of core concepts and perceptions of reality, resulting in the fact that many hydropolitical concepts are used interchangeably with high degree of ambiguity (2003: 7).

Besides its usage regarding international relations as proposed by Delli Priscoli and Wolf (2009), who view it as related to political institutions' abi-

lity to manage shared water resources and avoid tensions between different political entities, other authors also refer to a broader concept of water politics. Mollinga (2008) points out that water politics should be approached as a broader concept within politics, one which encompasses not only the official actions of the state and the relations among states but also public policy on water resources and the notion of daily political uses of these resources.

The fact that water is viewed as a political matter demonstrates that there are several different interests which produce discourses in accordance with political strategies. Such discourses might contain an emancipatory strategy that seeks to break away from the “status quo”, and in the same vein, there is a discourse that water is not a political problem, which might serve as strategy to conceal the problems and conflicts of interests regarding water usage (Warner & Wegerich, 2010).

Beyond this, Ribeiro (2008) points out the existence of a political geography marked by the unequal distribution of water resources which is evident when its distribution across countries is analyzed. He also points out that the absence of regulation of its use on the international scale allows it to be commercialized on a wide scale,² which triggers tensions and conflicts between States in the dispute for access and use, which can entail a threat to international, environmental and water security.

International security, environmental security and water security

Analyses of international conflicts for natural resources are mostly centered around the idea that the international system comprises sovereign states that lack a higher authority above them which can regulate their actions (international anarchy³). Therefore, when some resources become scarce or when a state is denied access to certain resources, this leads to the possibility of international conflict (Le Prestre, 2000). This is the case of water that is plentiful in certain countries but scarce in others. Beyond all that, the sharing of river basins by two or more countries may also bring forth conflict if the use of water in one country has negative impacts in the other.

In the absence of an international regime of transboundary water resources, tensions proliferate around the use of shared water resources, which jeopardizes the water security of a significant portion of the world population. In this scenario wherein sovereignty, development and national security issues are often an impediment to international cooperation, non-state domestic agents have stood out as they play important roles in water management and governance. Changing water needs, values and governance structure in riparian states have

2. Water can be commercialized *in natura* but also through the sale of products that apply it in their production, as happens to be the case of agriculture, for example. This leads to the concept of virtual water (Ribeiro, 2008; Allan, 2011).
3. According to Bull (1997), international society is anarchic since it is made up of sovereign states that are not subjected to a common government.

contributed to the emergence of unresolved political tensions over transboundary water resources. These tensions and conflicts jeopardize the water security of more than half of the world's population. The critical causes of these tensions are identified as states' national sovereignty and security considerations. However, non-state domestic actors have played a prominent role in the context of the process of post-Cold War democratization and globalization. They have participated in national decision-making on traditional foreign policy debates, and combined with evolved definitions of the concepts of sovereignty and security there have been changes that pose new opportunities for ensuring international water security (Jansky, Nakayama & Pachova, 2008).

According to Ribeiro (2012) concepts such as territory and sovereignty have come to represent the interests of social groups in a certain areas throughout history. There is no natural fact in the territorial representation of countries, even though it can be used to delineate borders, such as river courses and mountain peaks. Instead, the individual or group that defines where the representation of territorial limits will run, thus establishing the boundaries of the exercise of sovereignty, are the social agents engaged in political struggles and agreements throughout the years.

Issues which involve water security must be politically regulated to ensure a democratic process. Concerns regarding interstate conflicts for natural resources and the expansion of the concept of security in the post-Cold War landscape led to a reformulation of the concepts of environmental security. The concept of security was mostly developed by the Copenhagen School,⁴ mainly by the studies of Buzan (1991), Buzan et al. (1998) and Buzan and Waever (2003), who incorporated new themes and actors to security studies. The authors define securitization as a process of extreme politicization of an issue that comes to be seen as a threatening situation, which therefore requires the use of any means necessary to contain it, including those above the usual rules of the political game (Buzan et al., 1998).

The concept of environmental security came to the fore in the international and academic agenda at the beginning of the 1980's, and also after the publication of the "Our Common Future" report (1988), also known as the Brundtland Report, written by the United Nations' World Commission on Environment and Development (WCED). This report points out the effects of unsustainable development, which could deepen international conflicts.

The great challenge of environmental security for traditional interstate relations is the fact that the environment and many environmental issues do not recognize political boundaries among states. Therefore, the same approach to traditional military security issues does not apply in the case of environmental

4. The Copenhagen School is affiliated with the Copenhagen Peace Research Institute (COPRI), created by the Danish Parliament in 1985 as a research institute established. In 1996, it became a research institute of the Danish government and in 2003 it was merged with the Danish Institute for International Studies (DIIS). Available at: <<http://www.diiis.dk/sw152.asp>>.

security (Dyer, 1996). According to Dyer (1996), it is important to understand the changes in the concept of security after the end of the Cold War and what this mean for environmental security proposals, as well as the changes in the global environment.

There is a series of definitions of the concept of environmental security, some of which are contradictory and ambiguous. For example, the Brundtland Report points out that there are no military solutions for environmental security, despite the fact that some authors refer to environmental security within the dispute between states for natural resources. According to the report, environmental security goes far beyond the traditional concept of security. Environmental security is concerned with threats to the environment, which cause its degradation, and the effects it has on human beings, but not necessarily with threats to states or interstate relations (Dyer, 1996; Grasa, 1994). Other authors pinpoint the fact that there might be global environmental changes which would affect the relations between states (Le Prestre, 2000; Ribeiro, 2002).

There are two main approaches to environmental security. The first is characterized by the securitization of environmental issues, in which environmental crises are seen as a threat to national and international security; that is, environmental issues are viewed within the traditional perspective of security issues. The second approach refers to environmental protection, to securing it "by which the integrity of the environment is both a security referent and a security goal, and in which environmental degradation is to be taken at least as seriously as traditional military threats" (Elliott, 2004: 201-202). According to this second approach, the traditional interpretation of environmental security is as a problem, as it narrows the political options by focusing on the symptoms instead of on the causes of insecurity, which can only lead to inadequate responses to the challenges of environmental degradation. It also reinforces a set of ideas that are directly or indirectly the cause of many environmental issues, such as military conflicts which lead to widespread environmental degradation at the site where they take place.

This perspective is much closer to the concept of human security, as environmental problems are seen as a threat to the security of human beings (Sánchez, 1998), not to the state in itself. According to Buzan (1991:19-20):

The security of human collectives is affected by factors in five major sectors: military, political, economic, societal and environmental. [...] Environmental security concerns the maintenance of the local and planetary biosphere as the essential support system on which all other human enterprises depend. These five sectors do not operate in isolation from each other. Each defines a focal point within the security problem and a way of setting priorities, but all are woven together in a strong web of linkages.

Elliott (2004) proposes the demilitarization of security and new ways of thinking about what must be secure. Environmental security must be based on approaches that do not identify "the enemy" and that do not identify security only as a matter of state conflicts, military interests and territorial security. The

focus has to be an integrated meaning of security, in which it is an indispensable component of human security.

In the discussion about the securitization of environmental issues, water is the one natural resource that brings out most of the conflicts in the near future (Gleick, 1993; Gleick, 1993a; Homer-Dixon, 1994; Gleiditsch et al., 2006; Yoffe et al., 2004). Water resources have gone through a process of securitization in several parts of the world, giving rise to the concept of water security, which has been used by a series of actors and in international documents. According to Pachova and Jansky (2008), water security involves a multiplicity of objectives, especially in regards to shared river basins, and multiple goals, such as ensuring peace, human security and environmental protection in the process of planning, using and managing water resources.

In accordance with Cook and Bakker (2012), the concept of water security has been subjected to a growing amount of attention in the last decade:

Multiple definitions of this concept exist, promoted by a range of international organizations – notably the Global Water Partnership and the World Economic Forum. Other groups identifying the importance of water security include UNESCO's Institute for Water Education, which has made water security one of its research themes (UNESCO-IHE, 2009), and the Asia-Pacific Water Forum, which in 2007 held its first summit entitled "Water Security: Leadership and Commitment" (Asia-Pacific Water Forum, 2007). Water security has also come to the fore in some domestic water management agendas in the past decade, particularly associated with (bio)-terrorism concerns, leading some to characterize it as "a key objective of a range of governmental and nongovernmental agencies across the spectrum of governance levels" (Jansky et al., 2008: 289). Moreover, [...] there has been a significant increase in the employment of "water security" within the academic community over the past decade (Cook e Bakker, 2012: 94).

In the opinion of Mirumachi (2008), water security has become as important to national political agendas as it is to the international political agenda. Several documents from international institutions attempt to define water security. According to the 2006 Human Development Report (UNEP, 2006), one objective of water security is to assure that any person has access to a sufficient quantity of water of good-quality at an affordable price so that it may contribute to a healthy, dignified and productive life, while also maintaining the quality of ecological systems for the continual supply of water to those that also depend on water for their survival (Mirumachi, 2008).

The term water security also recognizes that access to water might lead to conflict and competition; therefore, it is also associated with peace. This is especially true because water security is more complex in shared river basins, since the number of threats increases once conflicting interests in the interstate and domestic scale are involved. That is why Mirumachi (2008) upholds that the political stability of riparian states is important for cooperation, and therefore for international water security.

The idea of water security also prompts concerns on the part of certain authors who, like Davidsen (2010), notice how the discourses of water politics have increasingly made use of the language of security, as in the case of most literature about the management of transboundary water resources. This derives from the concept of security formulated by Weaver and Buzan (*apud* Davidsen, 2010), who define it as an act of discourse because, by using the word 'security', the agent inserts it in a specific subject, under a threatening situation, which demands a special right to use the means needed to fight such a threat. In that case, security becomes a matter of survival, because there is an existential threat to the state or to another designated referent. This special nature of the threat justifies the use of extraordinary measures to deal with it (Buzan et al. 1998). Therefore, a specific rhetorical structure including such issues as survival, priority of action and urgency is the specific feature of securitization. The problem must be dealt with immediately or it will be too late and there will be nobody left to remedy the failure (Davidsen, 2010).

The securitization of water triggers concerns since by defining threats, states can use any means necessary to fight these threats, which may sometimes mean the use of force. The limits on the actions taken by states can be questioned: up to which point can they employ the use of force to get water? To Ribeiro (2008), the limit to the use of force is preventing degradation of the resource they seek to obtain, because "one of the great difficulties in using force to have access to the water resources of another country is precisely the capacity to destroy the ecosystem that a war carries" (Ribeiro, 2008:129).

Interstate conflicts related to the use of water

Many authors dedicate themselves to researching conflicts involving the use of water between countries. Gleick (1993) demonstrates that there are several examples throughout history of disputes, competitions and conflicts for water. He posits that there are several reasons to believe that new conflicts will arise in the future, since many people will be competing for a limited and unreplaceable resource with an ever-growing demand moved by an increasingly consumerist lifestyle, not to mention the climate changes that might cause changes in the supply and quality of available water, still in a scenario of great uncertainty.

Gleick (1993) also points to the existence of inequalities between the rich and the poor when it comes to water access and how this can also be observed in the relations between states as a cause of disputes and conflicts. Another factor that might lead to conflict is the construction of the infrastructure to capture and use water resources such as irrigation canals, electric powerhouses, reservoirs to control floods and many others. Such constructions have major domestic impacts as they displace large local populations, change control over local resources, as well as international impacts as they affect downstream water users and cause economic dislocations. These impacts may also influence unresolved political tensions and exacerbate disputes among ethnic or economic groups, between urban and rural populations, and across borders.

Up to what point can “the destruction of the environment become an important source of conflicts that would, in turn, threaten the stability of states?” (Le Prestre, 2000: 427). Homer-Dixon (1994) created a conceptual model to frame the causal relation between environmental degradation and violent conflict. As a result, he pointed out that the major problem revolved around the “reduction of access to environmental resources necessary to satisfy the basic needs of the population, particularly those related to food resources”.

To Homer-Dixon (1994), the scarcity of resources is the result of three factors: environmental changes (caused by the degradation of the resource and the environment), population growth and the unequal distribution of resources. When a natural resource shows a decrease in its quality and amount due to changes in the environment, coupled with population growth, and the elites use it according to their interests, that leads to a unequal distribution of the resource, causing what Homer-Dixon (1994) called an interaction of “resource capture”. Population growth combined with unequal access to resources might lead to migrations to ecologically vulnerable areas. The lack of knowledge and capital to protect resources in these areas has caused severe environmental losses and chronic poverty. This process is known as “ecological marginalization”.

Regarding the first hypothesis that there will be interstate conflicts over scarce resources, Homer-Dixon asserts the greater probability that these will be for non-renewable resources like oil and minerals, and that among the renewable resources only water might be a reason for interstate conflicts:

[...] the renewable resource most likely to stimulate interstate resource war is river water. Water is a critical resource for personal and national survival; furthermore, since river water flows from one area to another, one country's access can be affected by another's actions. Conflict is most probable when a downstream riparian is highly dependent on river water and is strong in comparison to upstream riparians. Downstream riparians often fear that their upstream neighbors will use water as a means of coercion. This situation is particularly dangerous if the downstream country also believes it has the military power to rectify the situation (Homer-Dixon, 1994: 19).

However, access to the natural resource is not the major cause of conflict; rather, it is presented as an aggravating factor that can kindle the conflict between states. Furthermore, water seems more prone to sparking far more internal than international conflicts (Homer-Dixon, 1994). According to Le Prestre (2000), Homer-Dixon's studies show how important social-political variables are to understanding conflicts which are “apparently” for resources. This demonstrates that the scarcity of a resource such as water will not lead directly to conflict, as it also depends on social-political variables.

Conflict can be defined as a social situation in which at least two actors dispute an accessible group of scarce resources (Delli Priscoli and Wolf, 2009) at the same time. In the literature about conflicts over water, the authors in general relate the possibility of conflict with the situation of scarcity.

According to Martinez-Alier (2007), distributive ecological conflicts, which are conflicts for natural resources or environmental services, commercialized or not, are studied by political ecology, a new field born from local case studies in geography and rural anthropology and now extended to the national and international levels.

In this way, political ecology started to question the modernity and functioning of industrial societies and even interrogated the nature/society opposition (Lipietz, 2003). These questions and analyses about distributive ecological conflicts have contributed to our understanding of the political relationship between water resources and society.

Analyses of environmental and water justice and studies about collective rights and water politics in the Andean regions can be found in Boelens (2010), Boelens and Urteaga (2006) and Boelens and Hoogendam (2007), which have shown how Andean communities are deprived of their rights to water access by their countries' new water policies. According to Geary (2012) the conflicts between Argentina and Uruguay regarding the installation of paper manufacturing facilities along the Uruguay River can be characterized as a distributive ecological conflict. In discussing the case of the Guarani aquifer, Villar (2012) argued that international organizations have created fragile and illegitimate management institutions. In analyzing the Amazon River basin, Sant'Anna (2012) stresses that in the Brazil-Peru-Bolivia border region (Acre River) and in the border region between Ecuador and Peru (Napo River), civil society has created governance initiatives to manage transboundary river basins. On the other hand, Ribeiro, Villar and Sant'Anna (2013), discuss the challenges of international cooperation in South America in the cases of the Amazon River basin and the Guarani aquifer. Giuppon (2013) examines the judicialization of water conflicts in Latin America, while Garcia (2013) studies conflicts over hydropower plant projects.

According to Mirumachi and Allan (2010), in situations where water is not perceived as a scarce resource, the interactions between riparian countries are not conflictive. When the scarcity of shared water becomes an issue on states' the political agendas, it means that the international relations regarding shared water resources have become politicized. And if this water scarcity is perceived as an existential threat, the securitization of this target reveals that it is part of the national security, and therefore measures beyond the conventional ones can be taken to guarantee access to the necessary water. Beside securitization, the stronger or more hegemonic riparian state might use violence to ensure access to this resource. From the moment transboundary water resources become politicized, their negotiation is led by the Ministry of Foreign Relations, and international water relations are no longer the responsibility of technical state departments such as the water, agriculture, planning and finance ministries. As a consequence, the issues and priorities on the agenda become related to sovereignty. If this occurs in the absence of an international water treaty, upstream states usually insist on principles of ownership of – that is, sovereignty over – the water resource in its territory

and over the water that flows out of it. On the other hand, downstream states will insist on continuing access to the water resources on which they are economically dependent, arguing the principle of prior use. These approaches have proved through history to lead to deadlock negotiations and the tendency of the hegemony to accumulate water based on a very poor understanding of both the hydrology and the economics involved in the matter (Mirumachi & Allan, 2010).

Gleick (2013) presents a timeline of water resource conflicts in the world that begins with events spanning from 3000 BC until the year AD 2012. Conflicts are classified by region, period and type, and they can result from religious accounts, disputes over infrastructure development projects, military targets, military tools, military weapons, political tools and terrorism. Furthermore, water resources can be related to conflicts in various ways, from conflicts over access to adequate water supplies to international attacks on water systems during wars, and as the roots and instruments of war when access to shared water supplies is cut off for political and military reasons. Another source of regional and international frictions and tensions is inequities in the access and use of water. A growing demand for water needed for agricultural, industrial and economic development will cause or intensify conflicts around the world. This scenario could change if various existing regional and international legal mechanisms meant to reduce water related tensions received the international support or attention needed to resolve many water conflicts (Gleick, 1993).

Gleditsch and Brochmann (2012) pointed out that riparian states' relations in transboundary river basins are always asymmetric due to the upstream/downstream situation. Upstream riparians will always have access to their water, while any action taken by them will impact downstream states. This means that a negative impact on downstream states will have no cost for upstream riparian states. However, asymmetries related to transboundary water resources will not always benefit upstream riparians, as in the case of navigation in international rivers, because downstream states can control exits and entries in the estuary, which can compromise international trade for upstream states.

Besides conflicts analysis, security studies applied to transboundary water resources created the concept of hydropolitical security complex (HSC) as applied by Schulz (1995), Turton (2003) and Allan (2001). Schulz affirms that a hydropolitical security complex emerges when "a set of states that are geographically part-owners and technically users of shared rivers start to consider this water body to be a major security issue as a consequence" (1995: 97). Therefore, the existence of an HSC implies a situation of interdependence between riparian states and that these states perceive shared water resources as a security matter. This concept was derived from the regional security complex formulated by Buzan and Waever (2003). In this case, the HSC is always part of a broader structure, namely the regional security complex.

The concept of HSC was refined by Allan (2001) and Turton (2003, 2008) who distinguish between an HSC and a hydropolitical complex (HC). Thus:

A hydro-political complex (of which there are two distinct types) is defined as existing when a nation's dependence starts to drive interstate relations of potential cooperation (amity) or competition (enmity) in a discernible manner (Turton, 2003b, 2008b). If it is in the direction of amity, then a hydro-political complex emerges such as the one found in the SADC region (Turton, 2003b, 2008b). If it is in the direction of enmity, then a hydro-political security complex emerges such as the one found between Turkey, Syria and Iraq until at least a decade ago (Schulz, 1995) (Turton, 2008: 188).

Therefore, a hydropolitical complex exists when there is cooperation between riparian states coming from major interdependence in the use of shared water resources. When these relations become competitive and hostile, they lead to the securitization of the matter and a hydrological security complex emerges.

In the case of South America, as part of the South American regional security complex, Queiroz (2012) argues that in the La Plata River basin there existed a hydropolitical security complex; however, after the 1980's, it became a hydropolitical complex resulting from the de-securitization of the shared water resources issue, which became a matter of cooperation among the riparian states. The cooperative relations between Brazil and Argentina in the La Plata River basin were the consequence of a series of factors such as the re-democratization of their governments and the attempts to increase commercial relations, the latter resulting in the creation of Mercosul⁵. The proximity of and improvement in the cooperation between these two states contributed to the de-securitization of shared water resources in the basin. In the Amazon River basin, the scenario is different because there is no securitization of the matter and not even broad cooperation among the riparian states; thus, the author defines it as an Amazon hydropolitical proto-complex (Queiroz, 2012).

The debate over conflicts in transboundary river basins presents analyses about the existence of hydro-hegemony. Zeitoun and Warner (2006) argue that the control over transboundary water resources is not dependent on wars or armed conflicts but on power strategies, because in the majority of these river basins there is a situation of power asymmetry among riparian states. The authors uphold that there are three types of control over water resources: "shared (meaning some form of cooperation exists), consolidated in the stronger riparian's favor (where cooperation is minimal and the competition is shut down) or contested (when the competition is at its fiercest)" (Zeitoun and Warner, 2006: 443). In these relations, the most stable situation is likely to be

5. Mercosul (Mercado Comum do Sul or Southern Common Market, in English) is a regional integration organization for the commercial and economic integration of its member states (Argentina, Brazil, Paraguay, Uruguay and Venezuela), established in 1991 by the Asunción Treaty.

when the hegemon has negotiated a water-sharing agreement that is perceived positively by all riparians, considered to be the “positive/leadership” form of hydro-hegemony. The least stable situation is when the stronger competitor seeks to attain and consolidate maximum control over water resources through unilateral action, defined as a dominative form of hydro-hegemony. In these negative/dominative, exploitative configurations of hydro-hegemony, the weaker competitor will have less control over water resources, which is associated with induced relative scarcity for the weaker riparians. Another situation emerges when the riparians are roughly equal in power and one of them contests the established control over the resources, resulting in competition leading to either a reversal of the dominative form of hydro-hegemony or progression towards a leadership form (Zeitoun e Warner, 2006).

Power relations between riparians are the most important determinants of the degree of control over the resource that each state possesses and can be characterized by their nature: cooperation, conflict or a particular form of hydro-hegemony.

Cooperative and institutional arrangements for the regulation of shared water resources

Analyses that refute the idea of interstate water wars have dedicated their studies to cooperative arrangements and governance processes, as well as to the creation of institutions with the purpose of avoiding water conflicts. Conca (2006) asserts that there are global problems related to water that demand global regulation, besides the situation of shared rivers basins and aquifers among two or more countries. However, as pointed out by Ribeiro (2008), the absence of international regulations to water access, such as an international convention or political pact among countries, allows it to be commercialized on a global scale, and if necessary, it allows states to use force to guarantee their population's water supply.

International cooperation was and continues to be broadly studied as a relevant international relations phenomenon. In international environmental politics, the type of interactions among states will depend on the type of environmental issue at stake. To Elliott (2004:93), “environmental governance needs to be cooperative and collective because unilateral action by states is ultimately ineffective in the face of transboundary and global problems and inefficient in the face of shared or common problems”.

Le Prestre (2000) presents four types of attitudes that states may have towards multilateral international environmental negotiations. The first is called imperialist and occurs when a state realizes that its national interests depend on actions taken by others states in the international system and thus tries to impose its national values and models to be adopted by the international community. The second type is called defensive and refers to the behavior of states that perceive the imposition of economic and political values and objectives by other states as a limitation on their autonomy and thus

adopt a defensive position in an attempt to protect them. Generally, countries avoid the imposition of new commitments and obligations. A third type of behavior involves concessions in issue area to get gains in another one, that is, bargaining in one domain to guarantee results in another. This is a pragmatic attitude because the concern with the domain is vague, it is not the primary motivation. The last type is the internationalist position, in which states agree about defining and seeking a common goal since the problem and its solutions are transnational in nature.

The issue of water resources, despite its urgency and the fact that it involves social conflicts related to its use, have been broadly discussed in international forums but they have been incapable of putting an international regime into motion like the international climate change regime. Nevertheless, as pointed out by Conca (2006), this does not mean that transnational governance initiatives for shared water resources do not exist; however, they do not fit the traditional format of international regimes.

In the opinion of Conca (2006), international regime theory is predominant in the international relations literature about environmental issues. Nevertheless, this theory has revealed flaws in explaining several characteristics of transnational governance initiatives for water resource management that do not fit in an international regime model. Conca states that the international regimes have shown difficulties with compliance since they are rarely enforceable in a strictly legal sense. The institutionalization of the regime is the most important factor in establishing common understandings, shared expectations and cooperative norms that will shape the behavior of states. In an international system characterized by the absence of a centralized governmental authority, defined as anarchy, regimes are thus instruments of governance without a government as they promote rule-conforming behavior.

Conca (2006) believes that the international regime theory approach is profoundly based on international law, modern science and bureaucratic administration, which leads it to ignore conflicts that are centered on territory, authority and knowledge, like the majority of environmental conflicts. For example, in the case of water resources, territory refers to water access and authority to who has the legitimate power to make decisions related to water access, distribution and use.

In accordance with Conca (2006), there is a series of water-related practices, policies and rules that have been carried out by different political forces: the international law of shared waters (defined by responsibilities and rights of sovereign states); neoliberal structural adjustments (which includes privatization, mercantilization and commoditization); water resource expert networks (spreaders of integrated water resources management); and the transnational activism of local communities rights (which also struggle for human rights, participative democracy and the preservation of local ecosystems and culture). This variety of different contradictory forces which are part of water governance, as argued by Conca (2006), have several features in common since each has been thoroughly transnationalized and is sufficiently embedded in important spheres

of international life. These forces make up a set of proto-norms attempting to govern, shape, influence and “normalize” water practices around the world. Despite this, none has generated a dominant frame governing watershed practices. Therefore, water governance is a process taking place at the intersection of these forces and being normalized across national boundaries (Conca, 2006).

The study by the University of Oregon (United States of America) called “Basins at Risk” became notorious in this academic field dedicated to analyzing relations among countries that share rivers basins. This study analyzed interstate relations and classified them on a scale from conflict to cooperation, and it concluded that there are more cooperative events than conflictive ones in international relations involving shared water resources. The numbers demonstrated that are 507 conflict-related events versus 1,228 cooperative events, implying that water-related events among nations tilted towards cooperation. This might indicate that violence means over water are neither strategically effective nor economically viable. Another important conclusion of this study is that most actions over water among states are mild, because almost two-thirds of all events are only verbal and more than two-thirds are reported as having no official sanction whatsoever (Delli Priscoli and Wolf, 2009).

Giordano and Wolf (2003) indicate that the international community has recognized the benefits of cooperative management of water resources which had developed and refined its principles of joint management throughout the 20th century. Thus, they believe that it is necessary to assist states in shared river basins to create and develop cooperative management networks which have to consider aspects such as: flexible and adaptable management structures, flexible and clear criteria for water allocation and water quality management, equitable distribution of the benefits of the use of water resources, concrete mechanisms to obligate countries to fulfill their agreements and detailed conflict resolution mechanisms (Giordano and Wolf, 2003).

Duda and Uitto (2002), who worked for GEF and PNUMA’s projects in different international river basins, assert that strategic projects, such as those financed by GEF, are important to overcome the barriers and bring together countries that share water resources by creating a shared vision of the river basin and commitment among the countries. They also argue that to strengthen cooperation it is important to involve institutions at different scales related to water management in the shared basin and existing regional organizations and non-governmental organizations.

The negotiation process of agreements and conflict resolution are matters that have also been discussed in the literature on hydrogeopolitics. Jarvis and Wolf (2010) assert that water management is basically conflict management. They claim that:

There is room for optimism, notably in the global community’s record of resolving water-related disputes along international waterways and over trans-boundary aquifers. For example, the record of acute conflict over international water resources is overwhelmed by the record of cooperation. Despite the tensions inherent in the international setting, riparian countries have shown

tremendous creativity in approaching regional development, often through preventive diplomacy, and the creation of “baskets of benefits” which allow for positive-sum, integrative allocations of joint gains. Vehement enemies around the world have negotiated water-sharing agreements, and once cooperative water regimes are established through treaties, they turn out to be impressively resilient over time, even as conflict rages over other issues. Shared interests along a waterway seem to consistently outweigh the conflict-inducing characteristics of water (Jarvis & Wolf, 2010: 138).

Daoudy (2010) points out benefit-sharing as a way to avoid conflicts and create opportunities for cooperation in international river basins. He believes that pointing out the benefits resulting from the use of water resources in shared basins is crucial, and he defines benefit-sharing as an action designed to change cost and benefit allocations associated with cooperation. The benefits can be divided in four categories: to the river (quality, quantity, regulation, soil conservation, etc.); from the river (hydropower, agriculture, flood-drought management); because of the river (cooperation versus conflict, economic development, food security); and beyond the river (markets and trade, regional stability). The benefits can be monetary or non-monetary.

Generally speaking, authors who defend the benefit-sharing principle studied cases as the Lesotho Highlands Water Project between Lesotho and South Africa, and the agreement between Canada and United States over the Columbia River (Daoudy, 2010), as well as the case of the Senegal River basin (Alam, Dione and Jeffrey, 2009). Daoudy (2010) concluded that the cases examined demonstrated that this principle can be applied well, but its effectiveness depends on limited power asymmetries among riparian countries, or they need an active civil society. He states that benefit-sharing has a multidirectional nature and will only be possible if the upstream-downstream dynamic that dominates the majority of the relations in a shared river basin is surpassed by riparian countries in order to prevent conflicts, fight poverty and promote social and economic development.

One part of the literature about cooperation in shared basins is focused on the analysis of international law, such as the principles contained in the United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses (Machado, 2009), as well as regional agreements for specific transboundary river basins (Caubet, 2006), or groundwater (Villar and Ribeiro, 2011) and the human right to water (Ribeiro, 2008; Gupta, Ahlers and Ahmed, 2011; Villar and Ribeiro, 2012).

McIntery (2010) presents four categories within international law concerning riparian rights over the use of water resources in international watercourses: absolute territorial sovereignty, absolute territorial integrity, limited territorial sovereignty and common management. The theory of absolute territorial sovereignty asserts that states that share a river basin can freely use its water with no concern with the rights of the other riparian states. Absolute territorial integrity guarantees that a downstream riparian country can demand the upstream state the continuity of the water flow in its territory. It is based on

equity among countries and is compatible with the principle of sovereign equality of states, as contained in the second article of the United Nations Charter. The theory of limited territorial sovereignty is also known as the principle of equitable utilization, which determines that each riparian can use the water resources that flow through its territory in an equitable and rational manner. And in the perspective of common management:

The drainage basin is regarded as an economic unit, with the eaters either vested in the community or divided among co-basin states by agreement, accompanied by the establishment of international machinery to formulate and implement common policies for the management and development of the basin. The institutional structure and purposes of common management regimes vary from basin to basin, with most having a clear role in environmental management. Common management is an approach to managing water problems rather than a normative principle of international law, and as such it has been widely endorsed by the international community [...] and adopted by international codification bodies, including the Institute of International Law and the International Law Commission (McIntery, 2010: 67).

Kathryn Furlong (2006) published an important review and criticism of studies on transboundary water resources in the field of international relations. Her criticism is basically focused on four points: implicit theorization, “territorial trap”, hegemony and depoliticized ecological conditions. She points out that despite the new approaches in international relations, such as critical theory and constructivism, the majority of the literature on transboundary water resources is based on neorealism and/or neoliberalism, which come from the same rationalistic and positivist perspective. Nevertheless, the use of such theories is generally implicit in the analysis:

The reality, however, is that theory guides the analysis, how it is framed and the lines of inquiry pursued. As such, it also guides the data collected as well as their refinement, presentation and interpretation; other data may have been collected (guided by other theoretical constructs) that may have led to other conclusions. Secondly, explicit theorization might broaden the intellectual approach [...] by clarifying which theories are being used and which theories are not. The application of different theoretical approaches would lead to new – and potentially important – lines of inquiry as well as alternate data. Third, explicit theorization enables the contextualization of arguments and findings within debates in IR. This would equip one to more clearly evaluate the applicability of these theories to hydro-politics, assessing what modifications may be necessary. In this way, explicit theorization could contribute to a mutual advancement of hydro-political analyses as well as IR theory (Furlong, 2008: 812).

The author also asserts that the theoretical constructs which have been used the most widely are: normative theories to understand the agreements over shared river basins, realist theory of hegemonic stability to explain the establishment of these agreements, game theories to forecast the propensity for conflict

versus cooperation, and liberal theories of interdependence and reciprocity to elucidate the long-term function and stability of some international regimes of transboundary water resources. However, she argues that international relations theory is important for understanding the decision-making process in foreign policy (Furlong, 2006). According to Furlong, critical geopolitics, political ecology and nature production are perspectives that present important views that can complement the analyses. These perspectives can contribute to identifying the territorial trap and the different relevant scales and pave the way for a different approach to hegemony. They also examine the matter of distributive injustice related to water and social and ecological conditions.

Among the approaches to international cooperation in transboundary river basins, it is also relevant to point out studies on water governance. The concept of governance has been used in different scientific fields and by different national and international organizations with different meanings. In the field of international relations, it became popular due to the book by James Rosenau and Ernst-Otto Czempiel entitled *Governance without Government: Order and Transformation in World Politics* (2000). Rosenau (2000) presents governance as an effective ordering system that does not rely solely on formal mechanisms and institutions and also brings together non-governmental actors and mechanisms accepted by most actors, which forces them to have a given behavior.

Global environmental governance emerged from this concept as a sum of organizations, political instruments, financing mechanisms, rules, procedures and norms that regulate the process of global environmental protection (Najam, Papa and Taiyab, 2006). According to these authors, global environmental governance has diverged from its original design and purpose. It has high maintenance needs (costs), internal redundancy and intrinsic inefficiencies that have contributed to its divergence from its objective, which is to improve the planet's environmental conditions. Therefore, the authors propose a series of reforms in international environmental institutions to improve global environmental governance (Najam, Papa and Taiyab, 2006).

The concept of governance was adopted in the field of water resources and became water governance, even though its meaning was not yet clarified. As pointed out by Lautze et al.:

Water governance has emerged as perhaps the most important topic in the international water community in the 21st century [...] Although acknowledgement of and appreciation for the importance of water governance is widespread, definitions of the concept can be broad and fuzzy, and inconsistencies in usage and interpretation are common (Lautze et al., 2011, p. 1-2).

The proliferation of water governance rules, roles and practices has influenced water decisions and politics, in addition to countless social struggles all around the world. These initiatives emerge on different scales and involve a variety of actors. They are as much the outcome of local struggles among traditional communities as the result of organized civil society in municipalities and river basins, including transnational movements in transboundary river basins, and on the international scale of international water management institutions,

as in the case of the Danube, Reno and Mekong Rivers. According to Conca (2006), these diverse initiatives can shape a form of global water governance:

The net effect of this panoply of increasingly embedded roles and rules is not a neat, uncontested set of water norms of the sort proffered by the World Water Vision, but the result, nevertheless, is a form of global governance. Water-related struggles are being bounded, channeled, regularized, and normalized, with tangible consequences for the behavior of national governments and other actors. If global governance consists of governing acts that have a broadly international reach, and if those acts include such things as the framing of policy, the setting of standards, and the mobilization and allocation of resources, then water is indeed subject to governance that is increasingly, though certainly not exclusively, global" (Conca, 2006: 5).

Due to this plural characteristic of water governance initiatives, especially in shared basins, a multi-scale analysis is needed to comprehend how these water governance experiences occur at different scales and the linkages among them. Another justification for a multi-scale approach is to avoid generalizations and simplifications of the contexts where the conflicts occur, as well as cooperation initiatives over transboundary water resources.

Final considerations

This literature review reveals that there is no consensus among experts in international water politics regarding the predominance of conflict or cooperation among countries that share transboundary water resources. The fundamental feature of water is that it makes the reproduction of life in its various forms possible, and also the intensive increase of its use in production process in agriculture and industry or even to generate energy. This situation can spark the interactions between riparian countries. Water security, as discussed in this article, indicates that to achieve a scenario where water is secure, there has to be a discussion over what water use will be prioritized. In a scenario of water scarcity, drinking water for humans and animals and environmental services provided by water have to be prioritized, but this is not what occurs. Generally, distributive conflicts are caused by projects that aim to use water to produce goods or energy. This debate should only increase in the next years. There is still hope that cooperation will predominate over conflict, especially if it is created to provide water to people.

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