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Water Scarcity:
Source of interstate conflict or opportunity for cooperation?

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Executive Summary

Discussions over transboundary freshwater resources management have raged over the years with advocates of interstate cooperation expressing moderate optimism against those who claim conflict to be on the loop in the years to come. Water scarcity has been identified by many as a crucial factor capable of triggering interstate conflicts. However, history has revealed that convincing evidence linking water scarcity to interstate conflicts is missing. Despite numerous tensions concerning the management of transboundary river basins, there are no examples of direct and extended conflict related to scarcity. Nevertheless, future projections seem to be quite alarming. This paper, based on a thorough literature review, aims to present the two sides of the discussion over water scarcity and transboundary freshwater management and the likelihood of cooperation versus conflict in the future.

Introduction

A voluminous bibliography on water management confirms the importance of water as a key environmental resource for social security, economic growth and prosperity. It is this reality that triggered a vibrant academic debate regarding the status over the management of transboundary freshwater resources, a concept that is admittedly difficult to pin down and render concrete.

This debate is all the more important due to the unequal distribution of water resources. Almost 40 percent of the world's population lives within the basins of international rivers, and, as Sadoff and Grey wrote, over 90% of the world's population lives within the countries that share these basins (Sadoff & Grey, 2005: 1). This fact shows the importance of the debate over the management of transboundary water resources and the dynamics that they produce regarding interstate relations. Indeed, academic and policy debates on transboundary freshwater resource management have raged over the years with advocates of interstate cooperation expressing optimism against those who claim conflict to be on the loop in the years to come.

At the spotlight of this debate is water scarcity, a condition that is highly impacted by the negative orbit of climate change. This paper will attempt to examine water scarcity as a potential cause of interstate conflicts when it comes to transboundary freshwater management by highlighting the principal argumentation of both sides.

Conflict versus cooperation

Before focusing on the scarcity factor, perhaps it would have been of some interest to provide some general points regarding the debate on conflict and cooperation in transboundary freshwater resource management. Water's importance far outstrips the importance of other global goods. It is not only a prerequisite for life. It is also attached to economic growth and production.

This has a twofold reading. On the one hand, it can be used as a strong argument for those suggesting that the management of freshwater resources, along with other vital resources can bring new antagonisms in the international arena replacing the old ideological conflicts (Klare, 2001: 49-61). Klare, for instance, claims that the increasing global population and the corresponding increase in demand for water which will produce 'intense competition for this essential substance in all but a few well-watered areas of the planet' (Klare, 2001: 57).

On the other hand, scholars like Nicol seem to disagree. Judging from the global history so far, Nicol argues that 'the history of conflicts or disputes over water is somewhat threadbare-instances of cooperation and agreement far outstrips those of dispute and conflict' (Nicol, 2003: 167-186). Wolf, in his ambitious effort to record water crises and treaties around the world seems also to agree. He argued that water has brought about much more interstate cooperation than conflict. He analyzed 412 crises among riparian states between 1918 and 1994 and identified only seven cases where water issues contributed to the dispute (Trottier, 2004: 133).

Of course cooperation can be accelerated by many different reasons. According to some scholars, cooperation that emerges between states is either the outcome of collaborative arrangements that favor each of them with balanced and equitable gains or is just a reflection of the distribution of power between the parties (Lowi, 1993: 47). Others claim that states perceive water as a tool for cooperation that can create shared regional identities and institutionalize cooperation on a broader range of issues. A characteristic example is the dynamic institutionalized environmental cooperation around the Baltic Sea during the Cold War (Helsinki Commission) and the cooperation in post-apartheid Southern Africa through the Southern African Development Community (SADC) (Conca & Dabelko, 2002). In the Mekong Basin, for example, the concerned parties—Thailand, Vietnam, Laos, and Cambodia—regarded water as an instrument of peace and development in the region; India and Pakistan were also able to set aside historical issues of religion and territory to reach an agreement dividing the waters of the Indus (Dinar, 2002: 237-238).

Evidently, while up so far there have been no particular cases where fresh water directly provoked inter-state conflict, at the same time, it is the most famous renewable resource cited as a possible source of acute conflict. More specifically, these potential conflicts can emerge in those particular cases where we have to deal with trans-boundary water management and international rivers.

The role of scarcity

Before examining scarcity as a (potential) factor of water conflicts *per se*, it is worth devoting few lines on how climate change impacts freshwater resources and why this might be a turning point in the future. The first way to understand the problem of water scarcity is by considering the distribution of water on the planet. Approximately 98% of the water is salty and only 2% is fresh. Of that 2%, almost 70% is snow and ice, 30% is groundwater, less than 0.5% is surface water (lakes, rivers, etc) and less than 0.05% is in the atmosphere (The Guardian, 2012). Climate change has several effects on these proportions on a global scale. Although, in global scale the number of rainfalls increases, there are specific regions that will be the exception and will suffer badly from reduced rainfalls and high levels of evaporation. According to the Intergovernmental Panel on Climate Change (IPCC) special report on climate change adaptation there are scientific estimations showing that almost a billion of people in the aforementioned regions will face increasing water scarcity (IPCC, 2001). However, it remains quite vague to identify up to what point can, as Le Prestre wonders '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 attempted to answer this question by creating a conceptual model to frame the connecting bond between environmental degradation and violent conflict. He concluded that the conflict becomes more likely as long as there is a 'reduction of access to environmental resources necessary to satisfy the basic needs of the population, particularly those related to food resources' (Homer-Dixon, 1994).

Scholars such as Vasquez and Huth have argued that most conflicts are over scarce resources of one kind or another, at least if territory is counted as a resource (Huth, 1996 & Vasquez, 1993). To this end, water scarcity was for many scholars a catalytic factor of an increase in international conflicts. In fact, scarcity compounded by the complex interdependence ascribed to river riparians places parties in a very uncertain and potentially unpredictable situation (Dinar, 2009: 114). Interdependence, accordingly, not only highlights the sensitivities between countries, but also their reciprocal vulnerabilities. This tends to make cooperation thorny and tensions more likely as states attempt to reduce their dependence on other countries (Waltz, 1979: 106 & 154-155). A well-known example, as Wolf and Hammer argued, was the 1975 crisis on the Euphrates River, which could have devolved into a military showdown between Iraq and Syria. It had been a particularly low flow year and Iraq had accused Syria of appropriating too much water upstream (Green Cross International, 2000: 57-58).

Mandel, in an article published in 1992, has created an intellectual theoretical model in order to deal with the sources of conflict. According to his study a three-stage explanatory process should be adopted involving a non-cooperative setting, environmental imbalance and power asymmetry (Mandel, 1992: 26). The second stage, environmental imbalance, dealt with scarcity issues, which are at the core of the problem, according to the author. Characteristically, Mandel wrote that 'on the supply side, the contamination of river water may be growing- and thus the amount of usable water contracting- due to exposure to increasing amounts of both human/animal (organic) waste and industrial (largely inorganic) waste; and decreasing ecological diversity in the water system as a consequence of the waste and over-exploitation. On the demand side, the use of river water may be growing due to increasing human population, generated internally or externally through migration; and increasing urbanization, industrialization (including the use of hydroelectric power), and agriculture. General studies of the link between resource scarcity and conflict emphasize that frustration may emerge as a result of such scarcity when expectations from the past exceed current achievements' (Ibid).

In 1994, Homer-Dixon attempted to identify the roots of scarcity. Apart from the ongoing environmental changes caused by the degradation of the resources and the environment, he also pinpointed population growth and the unequal distribution of resources as also important factors. The combination of these factors, leads, according to Homer-Dixon to what he called 'resource capture'. Yet, although Homer-Dixon sees interstate conflicts over scarce resources to be more likely regarding non-renewable resources like oil and minerals, he also includes water as a potential source for interstate conflicts as the only exception from the category of renewable resources.

Neo-Malthusian writers have also foreseen an increase in competition around water resources due to growing and increasingly serious water scarcities in a number of countries. Characteristically, Gleick wrote that 'where water is scarce, competition for limited supplies can lead nations to see access to water as a matter of national security, and an increasingly salient element of interstate politics, including violent conflict (Gleick, 1993: 79). Moreover, Toset, Gleditsch & Hegre agreed that water scarcity is also associated with conflict, claiming that the upstream-downstream relationship appears to be the form of shared river most commonly associated with conflict (Toset et al, 2000: 971-996).

Neo-Malthusians also linked water scarcity with the issue of population growth. According to them population pressure plays a major role in increasing resource scarcity. In 1998, Tir and Diehl summarized the literature on this crucial issue focusing on population pressure and interstate conflict. They tested the relationship between conflict and population density and growth over the period 1930-89. They reached the conclusion that while population growth did appear to be moderately related to interstate conflict, population density did not have the same effect (Tir & Diehl, 1998: 319-340).

Moreover, as Frey and Naff argued the scarcity of water 'is always a zero-sum security issue and thus creates a constant potential for conflict' (Frey & Naff, 1985: 67). In the same tone, Quigg claimed that when opposition for limited water exists under scarcity, a harmful conflict-enhancing process

occurs as 'users outdo one another in consumption in order to sustain their claim into the future' (Quigg, 1977: 15).

In addition, Barnet has pointed out that 'the global maldistribution of water is even more pronounced than the maldistribution of energy or food and that the "enormous" escalation of water use in developed nation along with recurring drought conditions in the developing world increase the potential for tension and resentment' (Barnet, 1980: 193). LeMarquand also argues that 'the uneven distribution of positive and negative impacts from the use of resources and differing demands among the basin countries for the water obscure a basin-wide perspective and frustrate cooperative action to manage and develop the resource efficiently' (LeMarquand, 1977: 1).

In order to support this alarming potentiality of water conflict due to scarcity, proponents of this approach focus on the generality that many countries are highly dependent on water that originates outside their border. Gleick, for instance, uses the examples of Egypt, Hungary and Mauritania where over 90% of water comes from outside the borders (Gleick, 1993: 100-104). Falkenmark, among others, claims that there is a serious risk of international conflict, particularly in the Middle East and Africa, between upstream and downstream countries (Falkenmark, 1990: 179). Indeed, as Furlong and Gleditsch have shown with their research, 'everything else being equal, a river sharing dyad in which at least one member suffers from water scarcity has a 41% higher risk of experiencing an outbreak of a militarized dispute with at least one fatality' (Furlong & Gleditsch, 2003: 20). However, they have also pointed out that such disputes are low-probability events and cannot be taken as "water wars" (Ibid).

Many authors have pointed to the Middle East as a particularly likely location for a 'water war,' making this region the most well-known example. They claim that water played a significant role when Israel in March, May, and August 1965, as well as in July 1966, attacked the water diversion works of Syria, Jordan, and Lebanon with tanks and aircraft. This project, named the Headwater Diversion Plan, intended to channel two of the sources of the Jordan River, the Hasbani River in Lebanon and Banias River in Syria, around

Lake Tiberias through Syria to the Yarmouk River where the water would have been regulated by a Jordanian dam at Mukheib (Naff & Matson, 1984: 43). It has also been argued that these trends towards competitive utilization of the water in the Jordan River system played a key role in the Six-Day War in 1967. This hypothesis was supported by a statement by the Prime Minister Levi Eshkol in 1967 and just before the Six-Day War between Israel and its Arab neighbours, saying that 'water is a question of survival for Israel,' and therefore 'Israel will use all means necessary to secure that the water continues to flow' (Biliouri, 1997: 5). According to an analysis based on Naff's and Matson's writings, in that war Israel destroyed a Jordanian dam on the Yarmouk, the most important tributary to the Jordan River. Regardless of the role of the water, Israel, by conquering the West Bank and the Golan Heights from Syria, improved its hydrostrategic position through control of the Upper Jordan River. The occupation of the Golan Heights had a great impact for the Arab states since it made it impossible for them to divert the Jordan headwaters. Indeed, as Naff and Matson argued, the 1969 ceasefire found Israel with control of half the length of the Yarmouk River, compared to 10 km before the war (Naff & Matson, 1984: 44). One of the most striking examples also is the problem of management of the Tigris and Euphrates rivers. Turkey's announcement concerning the implementation of the G.A.P (Güneydoğu Anadolu Projesi/Southeastern Anatolia project) made Iraq and Syria react and warn against undertaking military action against Turkey in order to destroy the dams to be built in the valleys of Taurus mountains. Finally, based on its military supremacy, Turkey managed to complete the net of the dams reaching an agreement with the other two countries providing them with a regular flow of water. However, a military escalation seemed possible. Iraq and Syria, which largely depend on the water of the Tigris and Euphrates, have expressed their strong opposition and their intention to protect their own national interests against a more powerful country such as Turkey (Lacoste, 2007: 88-92).

Yet, as Gleick has shown, water was used and manipulated as an instrument of war, but not essentially as the main cause for engaging in actual conflict for control of natural resources (Gleick, 1993: 79-112). According to

Toset et al., 'although such conflicts over shared water resources appear to be zero sum games, it seems far-fetched to argue that water is the main or even a very important general reason for war in the Middle East' (Toset et al, 2000). Issues such as nationalism and control of land territory seem to be more important factors in most of the disputes in the Middle East. Wolf says categorically that 'the only problem with these theories is a complete lack of evidence' and that 'water was neither a cause nor a goal of any Arab–Israeli warfare' (Wolf, 1999: 254).

Furthermore, there is a strong critique over this linkage between water scarcity and water conflict. For instance, while Homer-Dixon concludes that 'environmental scarcity has often spurred violence in the past' (Homer-Dixon, 1999: 177) and that 'in coming decades the world will probably see a steady increase in the incidence of violent conflict caused, at least in part, by environmental scarcity' (Ibid: 4), he at the same time made it clear that at this stage he cannot identify any clear "causal effect," and that his work is limited to establishing "causal mechanisms" (Schwarz et al, 2001: 273-294).

Additionally, even Gleick's examples, one of the greatest proponents of this belief, who wrote that 'history is replete with examples of competition and disputes over shared water resources', arguing that he will 'describe ways in which water resources have historically been the objective of interstate politics, including violent conflict (Gleick, 1993: 79), at the end he finally fails to present empirical evidences beyond reasonable doubts that conflicts over scarce water resources have resulted in the outbreak of the war. He rather presents only verbal conflicts between states, threats of violence, and water related violence in ongoing wars instead. In a more recent publication, Gleick identifies in detail 54 historical and ongoing disputes and conflicts over freshwater resources (Gleick, 1998: 25-31). In most of these disputes, water is an instrument of war or a strategic target, rather than a scarce resource at the root of the dispute.

The other side of the coin opposes the idea of scarcity as a source of interstate conflict. In fact, advocates of this side argue that water scarcity is more likely to act as an accelerating factor of cooperation. Beaumont, for

instance, argued that states facing water scarcity cooperate in order to solve their problems, simply because that is the most rational thing to do (Beaumont, 1994: 9-21).

Within the same framework, Dokken writes that for the same reasons that scarcity may initiate interstate conflict, it can likewise initiate cooperation (Dokken, 1997). Brock also underlines that environmental disparities change the meaning of ecological interdependence whereby states will struggle to seek alliances as they attempt to escape these imbalances (Brock: 99). Boserup, in her attempt to explain the history of societal development and ingenuity argued that scarcity can actually motivate innovation. She claimed that an environment of abundance does not work as a step for inspiration on issues of innovation and initiatives as well, since there is no pressing need to alleviate scarcity (Boserup: 383-407).

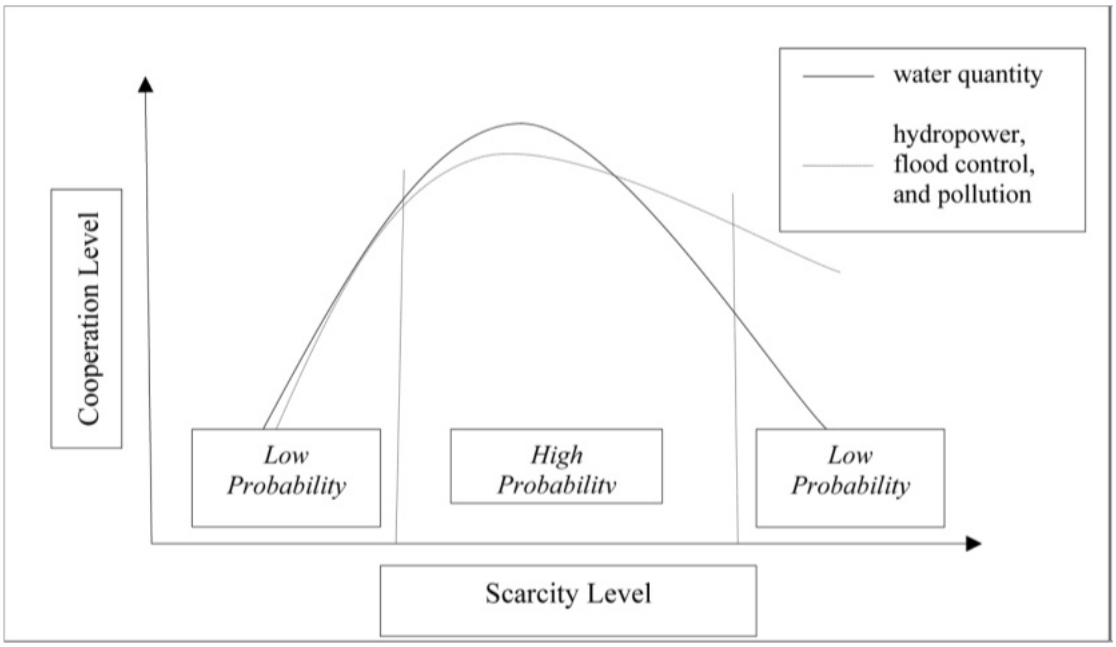
According to Deudney, resource scarcity based on environmental degradation tends to encourage joint efforts and exploitation to halt such degradation and contributes to a network of common interests (Deudney, 1991: 22-28). As Ostrom has added, 'Users who depend on a resource for a major portion of their livelihood . . . are more likely than others to perceive benefits from their own restrictions' (Ostrom: 281).

Dinar, in an article published in February 2009, concluded that 'at low levels of scarcity, cooperation, measured as an international water agreement, is less likely since the resource in question is available in relative abundance' (Dinar, 2009: 127-128). Consequently, any need for cooperation is limited. Dinar continued by arguing that in an opposite case where scarcity levels begin to rise the potential benefits from cooperation increase. Nevertheless, this is not a predefined outcome. On the contrary, Dinar found that 'as scarcity levels continue to rise, however, a turning point is reached at which the benefit from cooperation begins to decrease and the probability of an agreement between the parties approaches zero. The resource is so scarce that there is very little to benefit from and divide among the parties' (Ibid: 128).

In order to support his findings, Dinar introduced an inverted U-shaped curve, which in short portrays the increased probability of

cooperation, within the framework of international water agreements, when scarcity is moderate, rather than very low or very high (Ibid: 127).

Figure 1 Scarcity and Cooperation



Source: Dinar, 2009: 121

Rawls has conjectured that when natural and other resources are abundant, schemes of cooperation become superfluous. On the other hand, when conditions are particularly harsh, fruitful ventures break down. A condition of relative scarcity, therefore, can be perceived as a positive momentum for action between parties (Rawls, 1971: 127-128). Similarly, Ostrom has argued that for cooperation to occur, 'resource conditions must not have deteriorated to such an extent that the resource is useless, nor can the resource be so little used that few advantages result from organizing' (Ostrom et al: 281). In other words, if waters were abundant, a treaty dividing the waters may be pointless. On the contrary, cases of very high scarcity would also discourage collaboration. If water were extremely limited, the parties would have very little to divide amongst themselves, nor could they allocate any of the benefits that could be thereby derived (Dinar, 2009: 119).

Dinar also opposes to scholars that progress the role of third parties as a means of enhancing the relations of the riparian states. Indeed, institutionalists pay a lot of attention to the role of outside agents able to encourage cooperation especially in those cases where scarcity is very high. For instance, Fano mentions the role of third parties in the particular cases of developing countries and water scarcity (Fano, 1977: 219-230). In addition, two scholars who have engaged in projects in different international river basins, Duda and Uitto, support this thought by arguing that strategic important projects, financed by international institutions, play a catalytic role in bringing together riparian countries by creating a shared vision and endorsing commitment among them (Duda & Uitto, 2002: 365-378). Even in those cases, however, as Dinar argues, 'the likelihood of cooperation is expected to increase when both parties are experiencing moderate scarcity. It is in this context that voluntary cooperation, in the form of an international agreement, is most likely to arise in order to ameliorate the scarcity' (Ibid: 128).

Conclusions

Several studies tried to identify the linkage of interstate disputes and water scarcity. Neo-malthusians, for instance, linked water scarcity and population growth with an escalation of interstate water disputes. Scholars such as Gleick, LeMarquand, Homer-Dixon and Quigg paid much attention to scarcity issues as causes of conflict. Nevertheless, it seems that they have failed to spot actual examples of their beliefs. However, for some neo-malthusians, there is a tendency to shift the empirical evidence to the future. Gleick, for instance argues that in the future there will be an increase in water conflicts due to increasing water scarcity. Proponents of this belief argue that water scarcity is a spreading phenomenon that will be exacerbated by climate change, increasing population pressure and so on. In the same context, the Spanish hydrologist Llamas has argued that 'catastrophe is always in the future' (quoted by Marq de Villiers, 1999: 329).

The well-known study entitled “Basins at Risk” that was conducted by the University of Oregon provides a comprehensive analysis of interstate relations of countries that share river basins. The study has managed to classify these relations on a scale from conflict to cooperation. The conclusions came in support of those arguing that there is no evidence of interstate conflicts related to transboundary water management. In fact, the cooperative events are overwhelmingly more comparing to conflictive ones. The study counted 507 conflict-related events versus 1,228 cooperative events, implying, according to Ribeiro and Sant’Anna that ‘water-related events among nations tilted towards cooperation’ (Ribeiro & Sant’Anna, 2014: 589). This proves the assumption that countries have more to lose than to gain by engaging in violent conflicts in economic as well as other terms.

To conclude, transboundary water management is an unambiguously complicated matter. To a great extent it is affected by states’ relations and states’ comparative advantages in terms of power rather than other causes like scarcity. Water can be an important factor for creating tensions. Accelerating factors, such as multiple water uses, quantity as well as quantity issues, , can trigger a potential conflict. This likelihood can be even more significant, given the lack of an international institution that can impose integrated watershed management.

However, despite numerous tensions concerning the management of transboundary river basins, there are no examples of direct and extended conflict related to scarcity. This is due to the change of perceptions with which states approach negotiations. It is a common belief that states proceed to negotiations with the needs not only of themselves but also of their neighbors in mind. States take into consideration the actual needs of their neighbors and also consider how a nation “feels” about its water resources. This last parameter, known as “water ethos”, can help determine how much it “cares” about a water conflict (Beach et al, 2000: 43).

So, in most cases, riparian states proceed to multilateral negotiations, based on the general principles provided by international water law, in order to avoid a possible conflict. These negotiations find support via the

involvement of international institutions, such as the World Bank and the United Nations.

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