

Original Paper

The Effectiveness of Governance Mechanisms in Scenarios of Water Scarcity: The Cases of the Hydropolitical Complexes of Southern Africa and Jordan River Basin

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Abstract

In many regions of the world, the multiple uses of transboundary fresh water have been a critically important component for regional stability. This situation explains why, in many cases, water management has commonly become linked to national security concerns. But, in what intensity? In search for answers, we analyze the cases of Southern Africa and the Jordan River Basin due to their prevailing condition of hydrological stress. To verify the role played by governance mechanisms in accommodating the interests of riparian states, the Hydropolitical Complexes model was applied in a comparative perspective. Our findings suggest a trend towards cooperation in Southern Africa due to the successful institutionalization of management mechanisms capable of minimizing potential conflicts. In the Jordan Basin, however, the struggle for control of water resources has been a paramount feature in the maintenance of a tense and resilient non-cooperative framework among riparian countries.

Keywords

Jordan River Basin, Southern Africa, hydrological interdependence, hydropolitical complexes, water governance

1. Introduction

The planet has approximately 1.4 billion cubic kilometers of water. However, about 97.5 percent of this amount is salty water. Of the 2.5 percent of the fresh water technically available, around a third of this total is unequally distributed through lakes, rivers, humid zones and aquifers that, in many cases, ignore national borders, condition that, by establishing an undeniable relation of interdependency, makes

water resources an important issue in the relations of those that share them (Clarke & King, 2005, p. 20; UNITAR, 2015, p. 5).

More specifically, data from the United Nations Educational, Scientific and Cultural Organization (UNESCO), the entity responsible for the World Water Assessment Program (WWAP), accounts for the existence of 263 transboundary water basins, of which, thirteen are shared by five or more countries. This noteworthy condition is also observed in relation to aquifers that for nearly a quarter of the world population represent the only source of drinking water (Clarke & King, 2005, p. 26; UNITAR, 2015) (Note 1).

Besides the complexity of such scenario, there are estimates that by 2050 almost half the planet's population will live in chronic water scarcity areas (less than 500 cubic meters per year per person) or in regions where the water system will be extremely imperiled by factors such as climate change and disorderly population growth (UNITAR, 2015, p. 5) (Note 2).

This prospective framework has implications in most of the fundamental issues in the contemporary international agenda such as natural resources sovereignty, regional security, water access and utilization, environmental protection and sustainable development. Chapter 18 of Agenda 21 ("Protection of the Quality and Supply of Freshwater Resources: Application of Integrated Approaches to the Development, Management and Use of Water Resources") warns humanity against a world of generalized scarcity where constant and gradual pollution of the world's water resources in most regions of the world is coupled with the progressive implementation of incompatible activities. Concomitantly, it calls for greater cooperation among states in what concerns transboundary water resources (Note 3).

In the same fashion, signatory states of the United Nations Millennium Declaration commit themselves in paragraph 23 "to stop the unsustainable exploitation of water resources by developing water management strategies at the regional, national and local levels, which promote both equitable access and adequate supplies" (Note 4).

A review of these preliminary issues surrounding the scenarios in the scope of the so-called *Hydropolitics*—term henceforth used to designate the multi-sector dynamics, cooperative and/or conflictive, originating from the relations of interdependence that are established among actors that, to a certain extent, impact and/or are impacted by the usage of international water resources (Queiroz, 2012, p. 39)—reveal important aspects that demand further considerations.

As water quality degrades or the quantity available has to meet rising demands over time, a fierce competition among water uses and users may exponentially intensify. This situation is worrisome, particularly in those regions that concentrate the most acute points of water stress (per capita availability of water between 1.000 and 1.600 cubic meters/year) or absolute water scarcity (less than 500 cubic meters/year), as are the cases of the Middle East, Sub-Saharan Africa and Southeast Asia. In this regard, there is a consensus among experts that international watercourse agreements need to be more incisive in setting out measures to incorporate effective conflict resolution mechanisms in case

disputes erupt (Note 5).

An analysis that takes into consideration the relation water/population shows that distributive inequalities are further accentuated, obviously, in densely populated regions. Such is the case of Asia in general, where 36 percent of the world's available water resources are to be found whereas it concentrates 60 percent of the planet's human population (UNESCO, 2003, p. 9).

This context of unequal sharing of water resources defined as water interdependence (Elhance, 1999, p. 13), gives rise to highly complex, potentially conflictive interstate relations. Complementarily, vulnerability is a central element in the relations of states commanding the use and management of shared water resources. Le Prestre (2000, p. 442), argues that fresh water has the potential to exacerbate tensions contingent on the following circumstances:

- 1) Degree of vulnerability and dependence of each country in relation to its water needs;
- 2) Number of actors that claim access to the shared water source;
- 3) Power resources available to riparian actors;
- 4) Existence of substitute products (in what concerns water, none is presently available); and even,
- 5) Political, cultural and identity symbolism socially attached to sovereign control of water resources.

Given these considerations, and per the holistic and multi-sectorial nature of Hydropolitics, in order to verify the effectiveness of water scarcity resources management instruments, this investigative proposal makes use of an ampler and more inclusive governance perspective (i.e., as a process of accommodation of consensus and, also, of conflicts and divergences) considering it, therefore, as being, "a multi-layered, multi-scale and multi-sector ensemble characterized by a combination of hierarchical structures, participatory dynamics, associative action and market mechanisms based on a culture of dialogue, negotiation, active citizenship, subsidiarity and institutional strengthening" (Castro, 2007, p. 3) (Note 6).

Thus, considering the undeniable importance of governance for managing a common and scarce resource—water—these are the issues that this article seeks to answer: to what extent the various uses of water resources interrelate with the multiple dynamics of those actors who share them? And, in favoring conflicting aspects and/or cooperative arrangements between riparian stakeholders, how do the ramifications resulting from these interactions affect the construction process of governance mechanisms?

2. Method

2.1 Levels of Analysis

Although levels of analysis, in their most general sense, serve more as ontological references for where events happen, rather than sources of explanation in themselves (Buzan et al., 1998, pp. 5-6), it is important to highlight their widely recognized epistemological relevance as they provide analytical consistency to the investigation, especially when the investigative method used is the comparative one. In this regard, to maximize the efficient operationalization of the method, and concomitantly, the

validation of the expected results, it is necessary to follow some implicit steps in this process of identifying the elements common to the different cases and/or those that are singular: 1) the selection of the phenomena to be observed, and 2) the definition of the elements to be compared.

We consider territorial contiguity as our control variable (Note 7), and the regional subsystem as our level of analysis. For that, the conceptual model of Hydropolitical Complexes is our reference unit as they are ontologically comparable, that is, geographically contiguous areas where hydrological interdependence among the actors taking part in them is a sufficiently strong factor to be considered. Thus, to maintain the same comparative coherence, some of the main watersheds within the selected Hydropolitical Complexes will be analyzed as subunits.

In turn, the necessary connection between the methodology and the theoretical framework strengthens the choice of the comparative method for this study, as comparisons allow us to discover regularities, displacements and transformations, similarities and differences in the search for generalizable explanations from the analysis of the cases previously selected, an effort in which we are going to focus on in the next pages.

To accomplish this task, we use a combination of comparative techniques labeled by Skocpol and Somers (1980) as investigative cycle, which basically consists of using multiple strategies of approach, in this case: 1) the systematic study of co-variations identified in the case studies; 2) the parallel demonstration in which the researcher applies a concept, set of concepts and/or a concrete model—in our case the descriptive model of Hydropolitical Complexes—in the universe of analysis, thus evidencing its explanatory validity; and last but not least, 3) the contrast of contexts through which we seek to highlight the existing reciprocal differences between the selected cases.

2.2 Hydro Political Security Complex (HSC)

Still on the epistemological scope of our units of analysis, we resort to Schulz (1995) who formulated the concept of Hydropolitical Security Complex (HSC), an analytical tool that is used in this article in trying to assess possible answers to the questions previously posited. The concept was developed to help in the analysis of possible connections between Hydropolitics dynamics originating in the specific context of the Tigre and Euphrates rivers basin and the security agenda of Iraq, Turkey and Syria (Schulz, 1995).

The idea of a descriptive concept applicable to cases in which water-related issues are a relevant variable for the understanding of regional political dynamics was conceived from observations of externalities generated by the construction of dams, control of water flows and the generation of hydroelectric power. By doing so, Schulz (1995, p. 97) conceived the concept to describe regions where, “a set of states that are geographically part owners and technically users of shared rivers start to consider, consequently, this water body to be a major national security issue”.

Despite its importance, the Hydropolitical Security Complex analytical tool had relevant limitations, among them, mostly taking into consideration only conflict events. That restricted its explanatory capabilities when applied, for example, to contexts in which cooperative arrangements prevailed.

Moreover, the model was developed based on the sharing of superficial waters.

Taking into consideration these limitations, Allan (2001) and Turton (2003), developed Schulz's (1995) model further, incorporating other dimensions, to equip it with a higher explanatory capability. The authors introduced as independent variable the patterns of amity/enmity among riparian states. Also, they assigned more weight to the sharing of groundwater systems, thus achieving a more realistic model in regions such as Western Africa, Southern Africa and the Middle East.

Thus, the empirically based analysis of Allan (2001, 2002) and successively, Turton (2003, 2008), supported the existence of what they labeled Hydropolitical Complexes in regions that the dependence on shared surface and groundwater systems is strategically pivotal to the extent that it has a politically relevant role. In other words, it drives inter-state relations in an observable fashion towards potential cooperation (*amity*) or towards damaging competition (*enmity*) (Turton, 2008, p. 188).

Subsequently, Allan (2001) and Turton (2003) theorized that—as part of broader, more complex circumstantial and structural contexts—whenever the relational dynamics between riparian states (the most common, but not exclusive actor of hydropolitics) gravitates towards cooperation and stronger friendship ties, a stable Hydropolitical Complex (HC) is the most likely resulting outcome involving the concerned actors. On the other hand, whenever the opposite occurs, a Hydropolitical Security Complex (HSC) is formed. In this theoretical setting, an HSC is a tool that aids in mapping situations of heightened tension due to disputes relating to shared water resources.

Once defined the methodology and the level of analysis and determined the conceptual model of Hydropolitical Complexes as our theoretical framework, from its application we will search for evidence demonstrating the degree of vulnerability of those that share water resources in scenarios of high water-based dependence and, thereafter, the role played by these agents in a continuum of hydrological interdependence driven by cooperation and/or conflict. For such, we chose two sub regions markedly characterized by prevailing situation of water stress: the Hydropolitical Complexes of Southern Africa and Jordan River Basin.

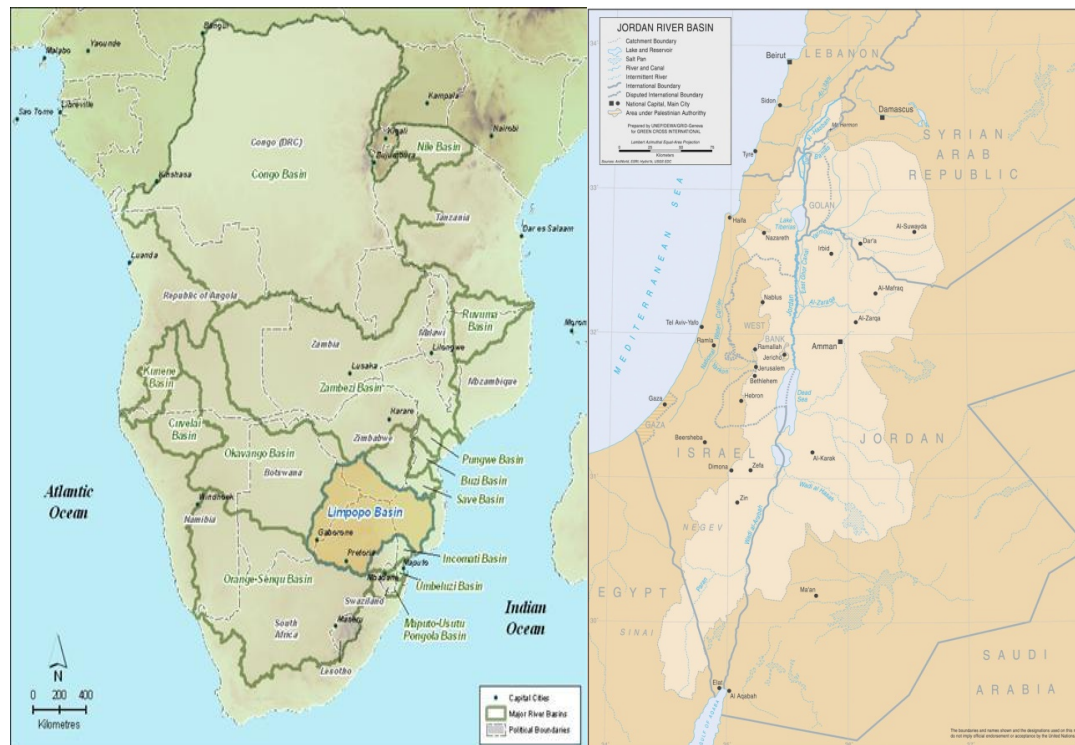


Figure 1. Universe of Analysis—Southern Africa (Left) and the Jordan River Basin (Right)

Hydro Political Complexes

Source: <http://www.orangesenqurak.com/river/Geography/Basins+of+Southern+Africa.aspx>

<http://www.internationalwaterlaw.org/blog/category/water-conflicts/>

To accomplish the proposed objectives, we present a sample of the main structural and conjunctural defining dynamics within such sub-systemic spaces to, then, analyze the effectiveness of governance mechanisms vis-à-vis the externalities stemming from the hydrological interdependence existing amongst some of the main actors of both Hydropolitical Complexes.

3. Result

3.1 Southern Africa

Southern Africa comprises Angola, Botswana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Zambia, and Zimbabwe. Particularly relevant to the subject matter is the influence played by colonialism, followed by the Cold War and the *Apartheid* regime which dominated in an overlapping fashion at least the last three centuries of the regions' shared history. In the beginning of the 21st century, some endemic political dynamics based on a common past took over the sub-regional security agenda, visibly gaining greater autonomy in relation to the global agenda (Turton, 2015).

Among the issues that have stood out since then is transboundary water sharing on which much of the social-political stability and economic development of the region hinges on (Kaniaru, 2010). Due in

part to its artificial and arbitrary borders and changing climatic regime, transboundary water management is one of the crucial pillars for sustainable economic development and political stability in Southern Africa. A remarkable feature of Southern Africa's hydropolitics over this period was the fact that of the seventeen most threatened watersheds in the world, six of them were to be found in this region's domains, namely, the Incomati, Kunene, Limpopo, Okavango, Orange and Zambezi river basins (Wolf et al., 2003, p. 29, p. 52), a situation that no longer persists as we shall see (Note 8).

Exclusive of the Mauritius and Madagascar, both island countries, all Southern Africa countries are part of the same set of interlinked Hydropolitical Complexes and are subject to differing degrees of water stress (Turton, 2002, 2003, 2005, 2006). Intrinsically coupled to that is the projection that Africa in general "is the only region in the world where the population is projected to keep increasing throughout the 21st century [...], and the current and growing 1.2 billion people, is "more than five times the population in 1950. By 2050, Africa's population will double, to 2.4 billion, eventually reaching 4.2 billion by the end of the century-just about the entire world population in 1977" (UNICEF, 2014: online).

Current water stress and population growth are a potentially volatile combination capable of elevating the management of water resources to a national security status, particularly in those situations in which riparian countries compete over access to water. This association is what Ohlsson (1995, p. 4) called the ultimate limit and an imminent threat to development. The availability and the access to water and potable water form the basis to sustainable economic development, being one of the primary components of the physical base of the state, "particularly under conditions of aridity" (Turton, 2003, p. 31).

Thus, Hydropolitics assumes distinct contours in this type of scenario in which water scarcity emerges as a limiting factor to economic growth and social development, mainly in the most advanced economies in the region. That ensures that water remains and increasingly becomes more prominent in the Southern Africa's political agenda. And, although the possibility of conflict over water resources is potentially growing, scarcity has also the potential of evoking and promoting cooperation opportunities and alternative means of settling disputes (Gleditsch et al., 2005; Bernauer & Boehmelt, 2013).

In Southern Africa's case, mainly over the post-decolonization period, interactions of riparian countries concerning water related issues have been fundamentally peaceful, leading to the institutionalization of the theme rather than to its *securitization* (Note 9). Cementing the normalcy of water relations in the region, regulatory norms and management procedures have been successfully incorporated to the political processes supporting this cooperative setting (Turton, 2003, p. 31; 2006, p. 8; 2009, p. 6; 2015).

3.1.1 Hydro Political Symbiosis

The 1986 South Africa-Lesotho treaty, "Lesotho Highlands Water Project" (LHWP), exemplifies the nature and achievements of water cooperation in Southern Africa. Essentially, the LHWP is a cooperative international water supply project with a hydropower component, that over a period of

more than thirty years has facilitated water supply to South Africa in exchange for electric power supply to Lesotho; the last construction projects are expected to be delivered by 2020. The final stage of the project will allow for up to seventy cubic meters of water per second ($70 \text{ m}^3/\text{s}$) to be transferred from the Senqu River in Lesotho to the Vaal River in South Africa. It has included the damming of sizable areas, a hydropower plant, transfer tunnels and canals and, considerable social and environmental impacts (Note 10).

South Africa is Lesotho's main partner in practically every area mostly since it is entirely landlocked by South Africa. Two thirds of Lesotho's workforce find employment in the neighboring country, especially in the mining sector and is responsible for at least a third of the country's gross national product. Apart from the supply of electricity, South Africa pays around US\$60 million in royalties for the use of Lesotho's water resources and transfers back electric power generated in the scheme (IIED, 2015, p. 2). There is, therefore, a working Hydropolitical Complex in this two-riparian-country basin.

This is a condition we typified as a case of "Hydropolitical symbiosis". Drawing openly and directly from the biological sciences, we define it as a mutually advantageous relationship between two or more states, which actively and voluntarily act in conjunction, for mutual gain (Queiroz, 2012, p. 140). In the example, the hydropolitically symbiotic relationship between these two riparian states has been satisfactorily fruitful to both to date (IIED, 2015) (Note 11).

This emblematic case is a demonstration that a situation of extreme power disparity is not an insurmountable impediment to viable agreements over shared water resources with mutually beneficial economic incentives (Wolf & Newton, 2008, p. 1). And, although the Southern African Development Community (SADC), comprising 15 countries, is also a case of extreme power disparity in a regional level, that does not constitute a hindrance to cooperation. South Africa has a country share in SADC regional GDP of 55.5%, while the second largest share, Angola, stands at 13.6%. Nonetheless, even considering that this is a localized case between only two countries in the region, it does indicate a progressive and consistent movement away from the potential conflict towards the potential of cooperation (Kaniaru, 2015).

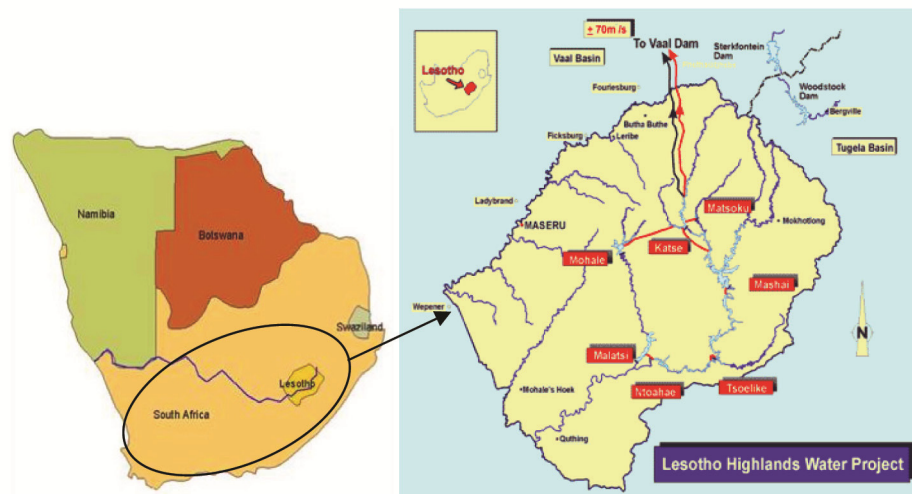


Figure 2. Lesotho and South Africa: A Case of Hydro Political Symbiosis

Source: <https://www.dwa.gov.za/orange/images/rm207t6.gif>

In second place, water tends to be of such importance to riparian states that rather than fight over it, it leads to long term agreements that withstand even antagonistic and belligerent actions in other areas (Turton, 2015). This trend, identified by Anthony Turton more than a decade ago, and currently consolidated by cooperative arrangements resulting from it, is because water resources were, and still are, perceived as, “[...] so important for each riparian state. Too important to fight over, to the extent that water agreements are significant enough to be considered as drivers of international relations in their own right, leading to the conclusion that a Hydropolitical Complex exists in Southern Africa” (Turton, 2005, p. 37).

So, in this specific case, the dominating behavior is clearly molded by cooperation. Conflicts, that eventually arise, are dealt with through peaceful means. Pursuant to this consolidated pattern of action, the recognition of such practices results in a plus-sum agenda based on communicative trust, in which the benefits of cooperation are evident, and, in their turn, influence directly the way riparian states perceive each other (Queiroz, 2012; Warner et al., 2013; Kaniaru, 2015).

In this aspect, it is worth highlighting that the first protocol signed by SADC signatories was the *Protocol on Shared Watercourses Systems* of August 1995. It testifies to the strategic importance of water resources to sub regional development and its priority status in commanding political will for the institutionalization of a cooperative regime—mostly as hydrographic basins commissions—as a feasible option in conflict management in the region.

Moreover, some provisions contained in the 1992 SADC Treaty and its Protocols require its parties to solve any disputes amicably, negotiations being the first resort. In case of failure, the issue may be brought before the SADC Tribunal, created to ensure “adherence to and the proper interpretation of the provisions of the treaty and the subsidiary instruments, and to adjudicate upon such disputes as may be

referred to it” (UNITAR, 2015, p. 42) (Note 12).

Aligned to these efforts, the *Okavango River Basin Commission* (OKACOM) was created in September 1994, bringing together Namibia, Angola and Botswana under the motto, “three countries, one river”. It was established to promote the coordinated and sustainable development of shared water resources and the surrounding environment, concomitantly fairly accommodating the legitimate demands of each riparian state.

Angola, an upstream riparian and in a privileged position in terms of the water resources of the Okavango, presented a long-term post-conflict reconstruction agenda for the south of the country. Namibia, on the other hand, upstream in relation to Botswana, downstream in relation to Angola, faces multiple limitations to develop the rural northeast, mostly due to a general scarcity of resources that plagues the region.

Lastly, Botswana, of the three countries, is the one that presents the best socio-economic indicators. Nonetheless, the country is the most vulnerable to changes in the Okavango water regime. Its downstream location and low availability of natural resources in general, compound the situation.

Each country appoints two commissioners to be representatives at the Permanent Okavango River Basin Water Commission (OKACOM), headquartered in Maun, the fifth largest town in Botswana, its tourism capital, at the Okavango delta. The Okavango Basin Steering Committee (OBSC), with three to five permanent and non-permanent members from each of the three countries supports the OKACOM as a specialized discussion forum, directed to technical issues in the general agenda and is instrumental in the implementation of the OKACOM decisions domestically. The Committee works through three technical task forces: The Institutional Task Force, the Biodiversity Task Force and the Hydrology Task Force (OKACOM, 2015).

Among their challenges, the LHWP and the OKACOM have the mission of implementing large regional water transfer schemes in contexts of severe economic limitations, worsened by endemic water scarcity. For that, they depend largely on effective cooperation, particularly in the top tiers of government, among decision-makers, to keep the agreements relevant and to make expensive and large infrastructural projects such as the inversion of the normal seasonal flow pattern leave drawers and become reality.

Large projects, such as a proposed abstraction of water from the Zambezi River to the Okavango and Cunene rivers, a canal linking the Limpopo and Zambezi basins, or a deviation of 1% of the Okavango flow to the Namibian capital city, Windhoek, have been considered. Nonetheless, potential negative environmental impacts associated with such projects have allowed for their postponement.

Southern Africa’s hydropolitical complex developed around some of the most dynamic economies in the region: South Africa, Botswana, Namibia and Zimbabwe. Concomitantly, these are also the countries that face the biggest water stress challenges in the region as they are all close to reaching the limit of exploration of available resources in their territories, water being therefore a limiting factor for social and economic development (Speed et al., 2013).

These four countries fall into the category of “pivotal states”: riparian states with a high level of economic development that also have a high degree of reliance on shared river basins for strategic sources of water supply, with the real prospect of water scarcity posing limitations to future economic growth and development.

The southern Africa’s pivotal states-Botswana, Namibia, South Africa and Zimbabwe—are, by and large, interlinked by two of the main water basins of the region, the so-called pivotal basis: water systems that are strategically important to any one (or all) of the Pivotal States by virtue of the range and magnitude of economic activity that they support. In Southern Africa, two basins fall into this category: Orange and Limpopo (Turton, 2005, p. 16). Besides the Orange and Limpopo, they also share seven other smaller water systems-Pungué, Buzi, Save, Incomati, Umbeluzi, Maputo and Thukela—with the other co-riparian states, forming a multifaceted, complex network of water interdependence, known as the Southern African Hydropolitical Complex (SAHC) as illustrated below.

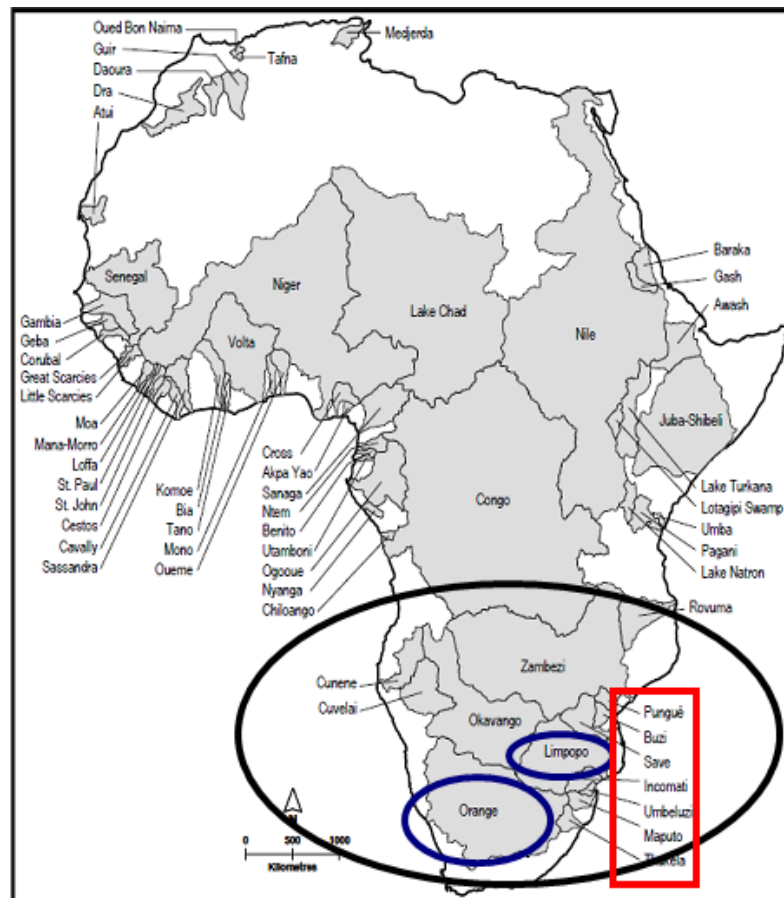


Figure 3. Southern African Hydropolitical Complex (SAHC)

Source: Adapted from Turton (2005, p. 4).

Table 1. Major River Basins in SAHC

River	Basin Area (km²)	Riparian States	Existing River Basin Organizations
Buzi	31 000	Zimbabwe, Mozambique	_____
Congo	3 730 470	Angola, Burundi, Rwanda, Central African Republic, Tanzania, Cameroon, DR Congo, Zambia	Commission Internationale du Bassin Congo-Oubangui-Sangha (CICOS)
Cuvelai	100 000	Angola, Namibia	_____
Incomati	49 965	South Africa, Swaziland, Mozambique	_____
Kunene	106 500	Angola, Namibia	Permanent Joint Technical Committee (PJTC)
Limpopo	408 000	Botswana, South Africa, Zimbabwe, Mozambique	Limpopo Watercourse Commission (LIMCOM)
Maputo-Usutu-Pongola	32 000	South Africa, Swaziland, Mozambique	_____
Okavango	530 000	Angola, Namibia, Zimbabwe, Botswana	Permanent Okavango River Basin Water Commission (OKACOM)
Orange-Senqu	721 000	Lesotho, South Africa, Botswana, Namibia	The Orange-Senqu River Commission (ORASECOM)
Pungwe	32 500	Zimbabwe, Mozambique	_____
Ruvuma	155 500	Tanzania, Malawi, Mozambique	_____
Save/Sabi	106 420	Zimbabwe, Mozambique	_____
Umbeluzi	5 500	Swaziland, Mozambique	_____
Zambezi	1 390 000	Angola, Namibia, Botswana, Zimbabwe, Zambia, Malawi, Tanzania, Mozambique	The Zambezi Watercourse Commission (ZAMCOM)

Source: SADC (2010) & <http://www.sadc.int/themes/natural-resources/water/>. Access in 06/01/2017.

In sum, as can be seen from the map and table above, the twelve SADC mainland Member States share several river basins, a condition of deep interdependence that ratify how cooperation and joint coordination efforts may act as a vital instrument for promoting stability in the Southern African through the harmonization of policies and strategies to cope with the challenges of water resources management, particularly those of a transboundary nature.

3.2 Jordan Basin Hydropolitical Security Complex (JHSC)

The Middle East North Africa region (MENA) is dominated by a hydropolitical structure that encapsulates the magnitude that disputes involving transboundary water basins can assume in a scenario of scarcity and profound water resources interdependence. The Jordan Basin Hydropolitical Security Complex (JHSC), which is the main water supplier for Israel, Jordan and the Palestinian territories is source and setting of some of the most enduring conflicts in contemporary times. As shown above, to a lesser extent Syria and Lebanon are also part of the same system, even though the Euphrates, the Orontes and Tiger rivers supply practically all their water needs (Le Prestre, 2000, p. 446).

Water is one of the most contentious issues in the MENA region, and consequently a fundamental component of the ideal and physical structure of that region's nation-states (Buzan, 1991, p. 65, p. 91; Messerschmid & Selby, 2015, p. 258). Following the Arab-Israeli War of 1948 (1948-1949), latent tensions were further accentuated when Israel initiated in 1952 a project to use the waters of the Jordan to irrigate the Negev Desert. Soon after, in 1953, the Israelis started the construction of an intake for a diversion for their National Water Carrier at the Daughters of Jacob Jordan Bridge, north of the Sea of Galilee, in the demilitarized zone bordering Syria (Priscoli & Wolf, 2010). The construction was soon threatened by a veto by Russia at the United Nations Security Council and *de facto* stopped when the United States threatened Israel with sanctions, though Israel eventually completed the National Water Carrier in 1964 (Zeitoun, 2008).

When Gamal Abdel Nasser first came to power in Egypt (1954-1956) with an ambitious nationalist project, backed by a discourse of linguistic and religious unity of the Arab world—Pan-Arabism—and in the context of the Cold War, under Moscow's military support, the regional Hydropolitics became further entangled in the general international relations of the Middle East. One of Nasser's most daring measures in this period was to block the Straits of Tiran, where the Red Sea and the Gulf of Aqaba meet, where the exit of the strategic Israeli harbor of Eilat is found.

The stalemate was one of the ingredients for the second Arab-Israeli war: the Suez War that broke out on October 29, 1956. From then onwards, the Middle East would attain the condition as one of the main theaters of the dispute for influence between the two Cold War superpowers, the United States and the Soviet Union. While the United States endorsed and supported Israel's political and military actions, the Soviet Union financed and gave military support to Egyptians and Syrians (Bickerton & Klausner, 2014; Kinsella, 1994). In that period, the riparian states of the Jordan basin could not reach any agreement that would make a feasible, effective and efficient project for shared management of

water resources. Dwight Eisenhower, the then president of the United States, with the United Nations' support, appointed Eric Johnston as a special representative of the president of the United States to negotiate the water conflict between Israel, Jordan, and Syria in 1953. Eisenhower was trying to resolve the regional water issues and tensions by incentivizing cooperation among foes (Shapland, 1997; Queiroz, 2012).

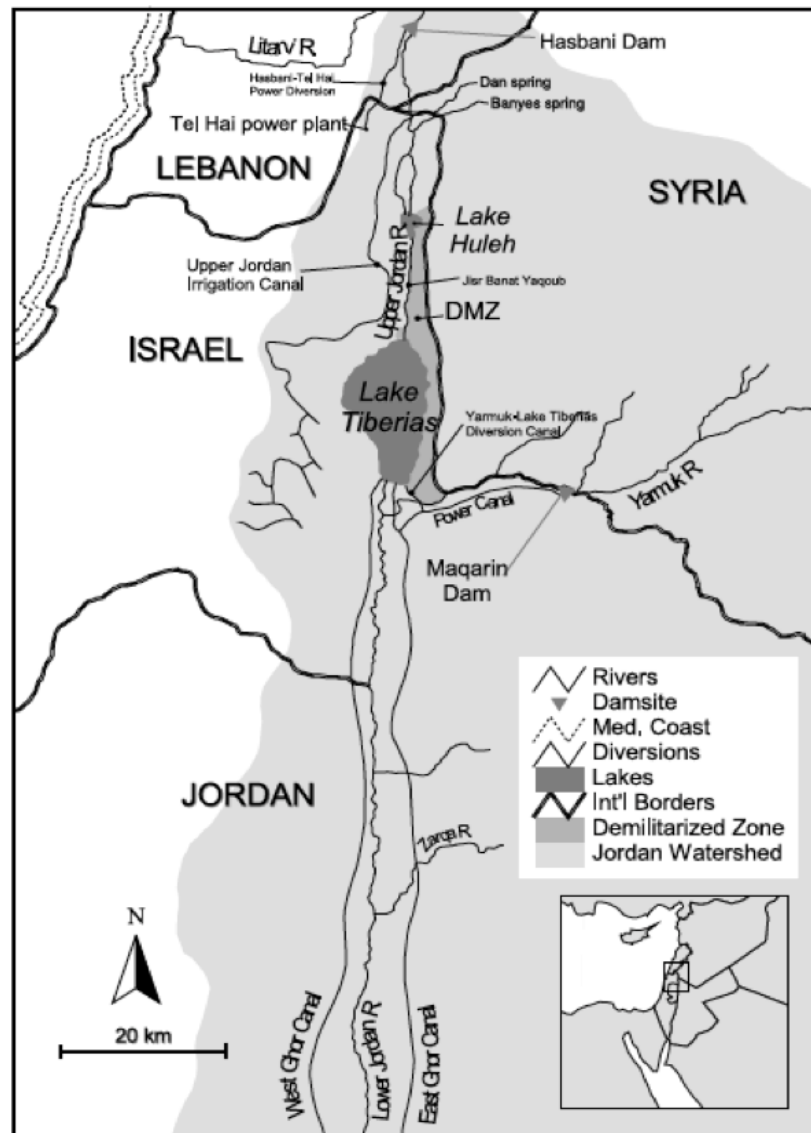


Figure 4. The Johnston Plan

Source: Elmusa (1998, p. 301).

3.2.1 Jordan Valley Unified Water Plan, a.k.a. Johnston Plan

The Jordan Valley Unified Water Plan, commonly known as the “Johnston Plan”, formulated in the two ensuing years, received formal approval from the technical committees of the Arab League and Israel but remained officially unratified (Priscoli & Wolf, 2009). The would be Arab signatories feared

that “their agreement would imply indirect recognition [...] of Israel” (Shuval, 2000, p. 44). And, in fact, it did mean that, as a proposal of cooperation of that magnitude would demand, consequently, the Arab League to recognize Israel as a legitimate state and, also as a user, *de facto* and *de jure* of scarce regional water resources. Such uncompromising stance further cornered Israel into an aggressive defensive position, heightening an insecurity perception that became incorporated in the political discourse and strategies of the Jewish state (Turton, 2003; Abukhater, 2013).

The years between 1964-1967 strengthened the hypothesis of the existence of a correlation between Arab-Israeli conflict and regional Hydropolitics. It was in that period that Israel’s neighbors decided to attempt to divert two of the three sources of the headwaters of the Jordan River—the Headwater Diversion Plan—to make National Water Carrier, initiated in 1955, unviable (Wolf, 1995).

The Israeli response came through the launching of an intensive airstrike in Syrian territory against the diversion works in April of 1967 which resulted in the immediate interruption of the Arab efforts but also in a series of reprisal military actions led by Egypt. The mounting tension around water related issues and resulting hostility, played a considerable role in politically justifying the June 1967 Six-Day War. The preemptive attacks by Israel that initiated the war were, in part, a response to the Jordanian and Syrian led attempt to divert the Jordan headwaters (Clarke & King, 2005). Lindholm (1995) argues that if water was not the main cause for the outbreak of the conflict, it certainly was one of its driving forces, contributing to exacerbating the escalation of aggression between Arabs and Israelis in the period 1965-1967.

The outcome of the hostilities was a crushing Israeli victory and thus, a new political geography arrangement as the victors expanded their *de facto* borders, simultaneously taking control of close to fifty percent of the region’s water resources. Such view seemed to be supported by declarations such as of Ariel Sharon, then Head of the Northern Command Staff of the Israel Defense Force (IDF) by stating that:

We could have sat there much longer just watching the [Arab] canal make headway. Exactly when the government would have moved against the Syrians, or in what context they could have done so, I do not know. But with their assault in November, Syria started off a round of fighting that gave us the opportunity to put an end to their project. People generally regard 5 June 1967 as the day the Six-Day War began. This is the official date. But in reality, the Six-Day War started two and a half years earlier, on the day Israel decided to act against the diversion (initiated by upstream Arab stages) of the Jordan (Bullock & Darwish, 1993, p. 50).

In the following years, inspired by the words of David Ben-Gurion, one of Israel’s founding fathers and prime minister (1948-1953 and 1955-1963), who stated that “it’s necessary that the water sources, upon which the future of the Land depends, should not be outside the borders of the future Jewish homeland [...] the Land needs this water” (Lindholm, 1995, p. 61), Israel continued to place Hydropolitics close to the center of its geopolitical concerns, by persistently pursuing a policy of internalizing its sources of water, on which the development of the country depended on.

In this manner, the occupation of the Golan Heights plateau and, particularly, of the Cisjordan or West Bank, from where forty percent of the potable water consumed in Israel derives, guaranteed not only access to the spring heads of the Jordan River, but also control of twenty percent of the north banks of the Yarmouk River, its largest tributary (Awartani, 1981). Also, the water sources in the east bank of Lake Tiberias (Kinneret), Banias and the shared West Bank Aquifer (in the occupied territories) are in many ways fundamental to Israel's agriculture viability and even that of the State itself (Le Prestre, 2000; Queiroz, 2012).

On one side, water as a general security issue in Israeli-Syrian relations has been prominent since before the 1967 war when there were problems in Israel's point of view as Syria deviated the waters from the spring heads in Golan. Israel wanted to make sure that Syria would not be able to do that again (Chesnot, 1994, 1992). It is worth highlighting that the occupation of the Golan Heights allows Israel 770 million cubic meters of water a year, corresponding to a third of Israel's annual water consumption.

Therefore, any rearrangements in legal or illegal occupation would entail significant consequences in the geopolitics of Israel and its riparian neighbors. The regional war epicentered in Syria has profoundly disrupted the tenuous pre-war balance and Israel probably has never been further away from leaving its strategic water securing positions (Note 13). A remote possibility pre-Syria Regional War (March, 2011) was an Israeli withdrawal which would allow Syria to recover its privileged position as the riparian agent in control of the upper stream Jordan River. Such withdrawal would have resulted in profound rearrangements of Middle East geopolitics, especially in hydropolitical terms, changing the regional power positions.

On the other side, Palestinian access to water resources in the West Bank, a hydro-strategically relevant territory, is extremely unfavorable (Wolf, 1996; Hass, 2014; Zeitoun & Warner, 2006; United Nations, 2015; B'Tselem, 2016). Israel sells water at full price to the Palestinians and controls the amount of water to be sourced in the territory apart from maintenance of existing water infrastructure and development of new facilities. Concurrently, as the number of Israeli settlers grows in the occupied territories, the demand for water resources and the inequality in its distribution have grown at a higher ratio (Tignino, 2014; United Nations, 2015; B'Tselem, 2016).

The average daily Palestinian consumption in the West Bank is 71 liters per capita while the average Israeli consumption is 350 liters, much higher than the World Health Organization recommended daily quantity of 100 liters per capita (Carvalho, 2013). By 2012, the West Bank was already purchasing 60% of all municipal water supply, of which 34% was directly from the national water company of Israel, Mekorot (Palestinian Water Authority, 2013).

Water has become a major barrier to economic growth and further development in the West Bank, as since 1967, Israel has been limiting Palestinian usage and exploration, taking control of all water resources. Military orders established Israeli control of all West Bank aquifers, quotas on pumping, limitations on the depth of wells, limited maintenance and prohibition of new wells without

authorization of the Israeli military command (Le Prestre, 2000; Lindholm, 1995; Palestinian Water Authority, 2013; ESCWA, 2013; B'Tselem, 2016). And since October 2002, the Ministry of Infrastructure of Israel has banned Palestinians from drilling for water and frozen the issuance of future permits (Note 14).

The hydrogeological vulnerability of groundwater to pollution in the West Bank is high as Israel is already using almost 80 percent of the annual safe yield of the groundwater basins shared with the West Bank and the unmet demand encourages over-exploitation (Nazer, 2010; Mehyar et al., 2014). The severity of the situation has strengthened the prevalent view among Israeli authorities that a fully recognized and functional Palestinian state in the West Bank would seriously compromise the hydro security of the country. In the past, one of the arguments to justify such fears was that excessive usage was leading to irreversible salinization of the entire system, which would be “*casus belli* for Israel, because, in contrast to the situation elsewhere, no substitutes can be offered to Israel in this matter” (Shapira, 1978; cited in Ohlsson, 1995, p. 66).

Presently, the counterargument is that alternative solutions, such as desalinization plants of brackish water and treated wastewater re-use are becoming more and more feasible and offer potential long-term solutions (Palestinian Water Authority, 2013). Tignino (2014, p. 395) and Messerschmid and Selby (2015) argue that the Israeli stance seems to give robust evidence to the existence of a systematic policy of investment of one side and neglect on the other, being used as an efficient instrument towards guaranteeing political and economic hegemony of Israel in the West Bank, a dominative form of hydro hegemony that seems to be common to the region.

3.2.2 Turn for the Worse

The Middle-Eastern geopolitical scenario, including its hydropolitical dimension, has taken a turn for the worse after at least a positive perspective following the paradigmatic Oslo Agreements of 1993. Bill Clinton, Yitzhak Rabin (1922-1995), and Yasir Arafat (1929-2004) signed the agreement at the signing ceremony at the lawns of the White House in Washington, DC, on September 13, 1993. The Agreement established the autonomy of the Palestinian in Jericho, in the West Bank, in the Gaza Strip and in territories west of the Jordan River occupied during the Six Day War under the Palestinian Authority that was presided by Yasir Arafat.

The first Oslo Accords ratified the perception that a project that could bring substantial peace between Israelis and Palestinians would necessarily include that of water sharing (Wolf, 1995). In dealing with the issue, the subsequent agreements of 1995 provisioned for the creation of a water development program, formed by a regulatory agency overseeing the hydrographic basin and a joint committee for cooperation—the Joint Water Committee—which would both formulate proposals that would make possible equitable sharing and access to water resources (Rouyer, 1999).

Nonetheless, the lack of concrete commitments, the ambiguous nature of the existing legal mechanisms in relation to distribution and exploration of water resources and Israel’s limited political will in recognizing a plan for an equitable partition constituted unsurpassable impediments to reasonable

advances in the negotiations (Le Prestre, 2000; Handcock, 2004; Clarke & King, 2005; Carvalho, 2013; Tignino, 2014; Messerschmid & Selby, 2015).

The scenario described points to the hypothesis that in a context of water scarcity and interdependency, states that control water resources, regardless of the means used to obtain and guarantee such control, generally are not predisposed to negotiate. Also, they do not find obvious incentives to cooperate with those states that are incapable of negotiating in a condition of parity. Therefore, states in a hydropolitical complex are observably in a situation of vulnerability and dependency in relation to the decisions of the most dominant riparian and its political will to cooperate or not—both cases made exemplified in the cases of South Africa toward Lesotho and Israel toward Palestine, respectively.

3.2.3 Riparian States Options

Riparian states have three main options in such power imbalance scenarios: (1) sign cooperation agreements, which is difficult, nonetheless not impossible; (2) restructure their economies to leave them less dependent on shared water resources, a task that imposes many difficulties; and (3) militarize water disputes, an option for those that have resources and necessary incentives available. Faced with limited and costly options, water seems to be set to continually be an impediment in peace talk and subsequent negotiations regarding a Palestinian state, as narrated in the next section (Le Prestre, 2000).

Following Oslo I, an Interim Agreement on the West Bank and the Gaza Strip, also known as Oslo II or Taba Agreement, was signed in September 1995. Planned to remain in force for only five years, but still in effect today, Oslo II created Areas A, B, C in the West Bank. Area “A” encompasses eight Palestinian cities and their surrounding areas (Nablus, Jenin, Tulkarem, Qalqilya, Ramallah, Bethlehem, Jericho and 80 percent of Hebron) under full civil and security control of the Palestinian Authority, without any Israeli settlements and off-limits to Israeli citizens. It corresponds to 3 percent of the West Bank, apart from East Jerusalem (Note 15).

Area “B” that is composed of almost 440 Palestinian villages and surrounding land also has no Israeli settlements, but the Palestinian Authority has only civil control, while security is shared with the Israelis. Area “C”, where 60 percent of the Palestinian population live, occupying close to 70 percent of the West Bank, including the Jordan Valley (the *Emek HaYarden* Regional Council), is an area under complete Israeli civil and security control. Israeli control is obviously linked to security concerns over the water resources available in the area even though article 40, Appendix B of the Oslo II agreements expressly recognizes Palestinian rights over the same (Clarke & King, 2005; Magnoli, 1996; Caubet, 2006; United Nations, 2015) (Note 16). Because of this framework, United Nations pointed out in a recent report that:

Before the occupation, agriculture was the main source of labor and resources for Palestinians. Palestinian agriculture has, however, been adversely affected by measures taken by Israel as the occupying Power, in particular land seizures and restrictions on access to land and water resources (A/68/513, para. 40). From 1965 to 1994, cultivated areas shrank by 30 per cent from 1965 to 1994, and Palestinian agricultural production was reduced, from 50 percent in 1968 to 4.9 percent of GDP in

2013 (United Nations, 2015, p. 10).

Therefore, while Palestinians—based on humanitarian and sovereignty grounds—assert their right to a larger share of the water resources available in the West Bank, Israel opposes any principle of equitable utilization. In line with this stand point, the Israeli Information Center for Human Rights in the Occupied Territories (B'Tselem) highlighted the fact that, in 2016, Israel, through Mekorot, scaled down the amount of water it supplies to several Palestinian communities in the northern West Bank, predetermining water quotas regardless of the Palestinian demand (B'Tselem, 2016) (Note 17). On the other hand, Gvirtzman (2012) counters this stance, arguing that Palestinian complaints over water shortages in their towns and villages due to the Israeli occupation are baseless. By analyzing information on water supply systems provided by the Israeli Water Authority (for the first time after the signing of the Israeli-Palestinian Interim Agreement) the author asserts that, contrary to most Palestinian arguments, Israel has fulfilled all of its obligations according to the signed water agreements with the Palestinian Authority (PA).

So, by refusing the Palestinian claim to a rightful access to the most important waters systems such as the Gaza Strip Coastal Aquifer and the Jordan River, Israelis do not accept any further revisions of the present allocation status based on historical and acquired rights. This situation that has been reinforced and worsened by the political quagmire caused by events such as the successive wars in Gaza (2009, 2012, 2014) that resulted in significant damage to water and sanitation infrastructure, which in turn led to water contamination in both the distribution system as well as the Aquifer, now heavily polluted due to infiltration of wastewater and seawater. In this regard, we shall highlight that in 2015, only 4% of the Coastal Aquifer's waters were still suitable for drinking.

In addition, it should be noted that at least a half dozen major cease-fire violations, especially between 1951 and 1967, triggered by disputes over water resources, cemented the deadly political and territorial rivalries among Israelis, Jordanians, Syrians and Lebanese (Tignino, 2010, p. 669; United Nations, 2015), what points to a scenario in which the issue of sovereign rights over water resources in the region seems to remain a divisive and complex one until there is political will and popular support for a workable *hydropolitical symbiosis*.

4. Discussion

Water is often presented as the central theme in the most dramatic future scenarios due to its scarcity and indispensability for the maintenance of life and exercise of vital daily activities. It is frequently treated as a source of power and consequently, as a matter of national security.

However, although the admonitions presented in relation to the theme are pertinent, it is also equally pertinent to avoid extreme reductionism in water resource issues (Le Prestre, 2000). In situations in which the uses of water are object of dispute, it might always seem to be possible to construct a causation path, direct or indirect, proximal or remote, between the scenario of instability to be explained and understood and a hydropolitical variable and in so doing, foresee because of this

association, the harbinger of future instabilities.

What is suggested is caution when dealing with the binomial “water-security”. There is a need for analytical tools that would allow us to gauge the real dimension of water resources among a multiplicity of other variables that also present potential to aggravate a given situation of instability. In this way, it seems more useful and viable to study Hydropolitics as another element that generates supplementary tensions (Queiroz, 2012). After all, it is extremely difficult to sustain a hypothesis advocating water as a conflict-triggering variable as generally, once there are multiple causes motivating and originating a conflict, and in the present state of political and international studies, it is illusory to isolate a single factor as the main cause of a conflict situation.

Our research, guided by the comparative method and through the conceptual lenses of the Hydropolitical Complex Theory, allows us to infer that, in general, the propensity to cooperate prevails in situations in which the identities among actors are mostly perceived as positive, as it is in the Southern Africa case. On the other hand, a balance of power situation stands out, at times with the use of extraordinary means, such as aggressive use of force, in cases in which these identities are perceived as negative and/or existing mechanisms of governance are insufficient to lower prevalent perceptions occasioned by lack of trust and mutual fear of aggression, such observed in the Jordan basin context.

Regarding the two cases, the contrast of contexts technique has led us to hypothesize that in the Southern Africa Hydropolitical Complex, disputes over water resources have been mitigated through institutional arrangements strong enough to minimize potential conflict by directly providing the institutionalization of conflict management mechanisms of water resources through intergovernmental initiatives such as joint committees. Thus, even in a prevailing context of first order scarcity, conflicts arising from the sharing of water resources have been satisfactorily maintained at the level of the usual processes of bargaining and dispute of the political sphere, i.e., as a technical issue.

From this perspective, we have the synthesis of the rationale that defines the Southern Africa Hydrological Complex (SAHC). Supported by the symbiotic nexuses established between the elements that integrate the structure described, the outcome is a notable degree of hydrological interdependency that inevitably connects them in a highly politicized multi-sectorial scenario, that is in itself, the outcome of a context of prevalent cooperation in the region.

In its turn, through an overview of Hydropolitics at the Jordan River basin, inferences demonstrated that the intensification of tensions around water resources is not primarily caused by the region’s deficit between water demand and supply. As seen, it involves other historical, complex and multidimensional issues which have weightier impact in the general geopolitical context of the region. In that case, conflicts are fundamentally arising from physical and territorial integrity disputes, and from identity related underlying problems. They indicate that physical and conceptual state structures represent the main domains in which perceptions in terms of threat are formed and water is one more aggravating factor.

The hydropolitical situation in the Jordan basin, therefore, seems to be an additional risk and threat

element, supplementing and further complicating the regional security agenda and concurrently reinforcing the process of construction of antagonistic identitarian perceptions amongst regional actors. In this sense, we found that disputes over the control of water resources seem to have continually been one of the driving factors in the maintenance of a violence prone scenario, strong enough to trigger crises or for making it more difficult to reach a compromise on other disputed resources and issues in which enmity relations are emphasized in a noticeable context of second order scarcity (i.e., lack of willingness or capacity to deal with changes imposed by a scenario of water scarcity).

Hence, the satisfactory accommodation of seemingly competing interests of riparian states is one of the greatest challenges facing existing governance mechanisms. It gives evidence of the potential that hydrological interdependence among those actors sharing fresh water has to affect regional political stability, especially in scarcity-dominated water scenarios.

Therefore, these efforts in ordering demands and preferences that are seemingly incompatible requires greater effectiveness of the intended actions and also the coordinated adoption of polycentric and decentralized approaches (i.e., at various levels, with the active participation of local, national and regional actors), aimed at providing shared management tools with greater inclusiveness capacity, flexibility and adaptability to uncertainties and complexities, that quite often come up in such cases of water scarcity.

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Notes

Note 1. The Atlas of Transboundary Aquifers, an inventory published by UNESCO in 2008, points to the existence of 273 aquifers shared by at least two countries, 68 in the Americas, 38 in Africa, 65 in Eastern Europe, 90 in Western Europe and 12 in Asia (WHYMAP, 2015).

Note 2. A study published in March 2015 by UNESCO—(The UN World Water Development Report 2015, Water for a Sustainable World (WWDR, 2015)—warns that about 748 million people lack access to clean water sources and 20% of the world aquifers are already being excessively exploited, which can lead to serious consequences such as soil erosion and saltwater intrusion in these reservoirs. The report also predicts that world water reserves may shrink 40% by 2030 and that by 2050, agriculture and food industry will need to increase by 400% its demand for water. Adding to this pessimistic outlook, are estimates that with an average increase in global temperature of around 2 degrees Celsius

(this in a more optimistic scenario assessed by the UN Panel on Climate Change), water scarcity would certainly triple in highly vulnerable areas such as North Africa, Middle East and Central Asia. Densely populated regions in developed countries that presently are already living with chronic shortages, such as southeast Australia and the southwest of the United States, would also be severely impacted.

Note 3. United Nations. Agenda 21. Resolution adopted by the General Assembly [on the report of the second Committee (A/47/719). 22 December 1992.

Note 4. United Nations. Resolution adopted by the General Assembly [without reference to a Main Committee (A/55/L.2)] 55/2. United Nations Millennium Declaration. 8 September 2000.

Note 5. The history of water treaties dates as far back as 2500 BC, when the two Sumerian city-states of Lagash and Umma crafted an agreement ending a water dispute along the Tigris River. According to the Food and Agricultural Organization (FAO) more than 3,600 treaties related to water resources have been drawn up since 805 AD, mostly to deal with navigation and boundary demarcation. Nonetheless, the focus of negotiation and treaty-making in the last century has shifted away from the aforementioned issues towards the use, development, protection and conservation of water resources (Source: http://www.un.org/waterforlifedecade/transboundary_waters.shtml).

Note 6. Labeled by the literature on water governance as *collaborative* or *participatory water management* (Plummer et al., 2012; van Buuren, 2013), the polycentric nature of this approach based on more stakeholder participation, more collaboration, and more interaction encourages experimental efforts at various levels, which may lead to the development of methods for assessing in a more accurate way the costs and benefits of specific strategies adopted in certain situations, and thereafter the possibility of comparing them with results obtained in other cases.

Note 7. A variable that is held constant to assess or clarify the relationship between two other variables, in that case, effectiveness of governance mechanisms (dependent variable) and water scarcity (independent variable).

Note 8. Commonly cited in lists of the most endangered basins, Southern Africa's watersheds are no longer at risk and one of the reasons is precisely because institutions have been crafted to deal with water related issues over time and have been successful as a useful conflict mitigating factor. The SAHC is a very good example that in many situations, rather than causing open conflict, the need for water sharing can generate unexpected cooperation.

Note 9. *Securitization* may be understood as an extreme situation in which the securitizing actors (those in a position of power that have the authority to declare something as being threatened) facing a threatening situation tries to put the object to be protected (referent object) in a locus of decision immune to the ordinary rules of the political scenario. Thus, they may use the means they feel are necessary to solve the problem, including the force (Buzan et al., 1998, p. 23).

Note 10. Source: <http://www.lhda.org.ls/Phase1/>

Note 11. The hydropolitical symbiosis concept is not fully developed in this article and further considerations are needed to strengthen and improve it. An important reflection concerns the role of

power imbalances since hydropolitical symbioses are supposed to be based on consensual rather than imposed concessions. A good starting point for the discussion is the 2006 Mark Zeitoun and Jeroen Warner paper on “hydro-hegemony”.

Note 12. Art. 16 of the Declaration and Treaty of the SADC. And although the Court had been originally assigned to mediate disputes between “States and between natural or legal persons and States”, and between “States and the Community” (Article 17-18 of the Protocol on Court and Rules of Procedure), a resolution adopted during the SADC Summit, held in 2012, restricted its activities exclusively to interstate disputes.

Note 13. For additional information see: Lee Cahaner, Arnon Sofer and Yuval Kna'an, *Future of the Jordan Valley 0151—Keeping It under Israeli Sovereignty—Pro and Con* (Reuven Chaikin Chair in Geostrategy, University of Haifa, February 2006), 25-26 [Hebrew]; Anita Shapira, *Yigal Alon: Native Son* (Sifriyah Hadasha, Hakibbutz Hameuchad/Siman Kriya, 2004), 486, 488-491 [Hebrew]; Yerucham Cohen, *The Allon Plan* (Hakibbutz Hameuchad, 1972), 171-180 [Hebrew]; B'Tselem, *Land Grab: Israel's Settlement Policy in the West Bank* (May 2001), 12-13; Edith Zertal and Akiva Eldar, *Lords of the Land—The War for Israel's Settlements in the Occupied Territories, 1967-2007* (Nation Books, 2007), 279.

Note 14. It is worth mentioning that Israel has capped agricultural uses and well drilling in the West Bank for both Israelis and Palestinians. Nevertheless, there is a noticeable difference in the treatment given to both. Military Order n. 158, issued shortly after the Six-Day War, determined, among other provisions, that Palestinian wells could not exceed a depth of 140 meters, while Israelis were allowed to drill wells over 800 meters. LE PRESTRE (2000, p. 466) states that since 1967 no Palestinian has been authorized to drill a new well for agricultural purposes or to repair a well in the vicinity of an Israeli one.

Note 15. The Palestinian water allocation according to the Oslo Agreement of 1995 was 118 Million Cubic Meters (MCM). In 2016, the available water was 113 MCM compared to a demand of 148 MCM, indicating that the water demand far exceeds the available water supply for all uses, therefore Palestine purchases 70 MCM from the Israeli water company Mekorot and the estimate is that this figure will increase to 106 MCM by the year 2022. In sum, Palestinians extract less water nowadays than they did before Oslo, a trend that seems to be the Palestinian pattern of water access to the near future.

Note 16. Concerning the hydropolitical effect of such arrangement, it is worth mentioning, for instance, that the construction of much needed water distribution systems for Palestinians are not permitted in the Mountain Aquifer, one of the main groundwater reserves located at the West Bank, due to restrictions imposed in Area C by Israeli Authorities.

Note 17. Though the Palestinian population of the West Bank has nearly doubled since Oslo 2 was signed, Palestinians are only able to use 14% of the shared water resources due, in part, to an overestimation of the amount of water available in the areas designated for them, limited output from old drills and lack of investment. Israel, on the other hand, uses 86% of the water resources, 6% more

than what it was allocated in the agreements. Consequently, the Palestinian Authority is forced to purchase from Mekorot an amount two and half times greater than that set out in the cited accords (Source: http://www.btselem.org/water/201609_israel_cut_back_supply). Access on 06/4/2017.