# Water Scarcity and Regional Fragmentation in the Middle East: A Quantitative Assessment

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## Abstract

The turmoil in the Middle East takes its roots in the sharp incongruence between collective identities and territorial boundaries, but the severe and growing water scarcity significantly affects both the interstate relations and the socio-economic stability of the domestic regimes. Consequently, the access, supply, management and control of water flows are a long-standing source of contention and regional polarization. Nevertheless, the sharing of water resources commands the signing of mutual agreements to determine the parties' grade of exploitation, thus gradually opening to the institutionalization of a cooperative regime or patterns of joint governance. This article aims to provide a quantitative evaluation of the strategic water-related interactions at the interstate level across the Levant. The assessment provides an overview of the regional transboundary water relations with the purpose of determining whether the Middle East is currently moving toward an increased regionalization or exacerbating the existing rivalries.

## Key Words:

Conflict; Cooperation; Hydropolitics; Integration; Middle East; Regional; Resources; Scarcity; Transboundary River Basin; Water.

## Introduction

Hydropolitics lies at the heart of the Middle Eastern strategic environment. Specifically, two main factors contribute to determine the crucial value of water in the security relations of the area.

Firstly, the Middle East is the most water-stressed region in the world, registering the lowest internal water resources per capita rates, since the region accounts for only 1.1% of the global renewable water resources (FAO, 2008: 31). Water is a renewable but limited resource, with no substitute. While the arid or semi-arid climatic conditions shrink the available quantities of renewable surface water (physical scarcity), the unsustainable use (e.g. over-abstraction, pollution) of non-renewable underground reservoirs is depleting the fossil aquifers that the domestic demand relies on (socio-economic scarcity). Indeed, the UNDP estimates that most Arab countries "have already exhausted their water supply development potential", with no spare capacity left over (UNDP, 2008: 28). This gloomy picture is even worsened by the growing pressure produced by the combined effects of desertification, population growth, and urbanization. According to the World Bank projections, "per capita water availability will fall by half by 2050" across the MENA region (World Bank, 2007: xxi). Therefore, the growing imbalance between demand and supply is widely recognized as a cause of internal and external instability because of the dangerous consequences of water shortages and/or restrictions – such as tensions among users, disputes over allocations, inadequate sanitation and the rise of waterborne diseases[115].

Secondly, especially in the Near East sub-region, most of freshwater sources are parts of transboundary river basins. Hence, geopolitics and hydrogeology make water a shared and contested resource at the regional level: any unilateral action undertaken by a riparian state with the purpose to alter its grade of exploitation of the river system may exert negative externalities on its neighbours – as in the cases of the construction of a dam or the implementation of a massive irrigation project by an upstream state, which might result respectively in lower water quantity or deteriorated water quality for the downstream state. This situation of unavoidable interdependence is often depicted as a zero-sum game and is

[115] It should be noted that the recent socio-political unrest in many Arab countries (e.g. Libya, Egypt, Tunisia) was partly triggered by global food price crisis, which was in turn directly and indirectly determined by extreme and unpredictable climatic events in the crop-growing areas of the world.

generally associated with the emergence of – even militarized – conflicts. On the contrary, the needs of reducing insecurity and promoting an efficient management of international water bodies may also lead to cooperative behaviours (Wolf, 2007).

The literature on environmental conflict is rich of remarkable contributions in the field of water disputes. Following the post-'89 widening of security studies (Buzan et Hansen, 2006) and in line with the argument of water as a source of strategic rivalry (Homer-Dixon, 1991, 1994; Gleick, 1993; Butts, 1997), many scholars have further applied quantitative methods in search of causal relations between water scarcity and organized violence (Gleditsch et al., 2006; Hensel et al., 2006), as well as on the mitigating function carried out by negotiations and institutions (Conca et al., 2006; Brochmann et Hensel, 2011; Dinar et al., 2011).

This article aims to examine the nexus between water resources and conflicting-cooperative actions at the interstate level. Moreover, we propose a different reading, rethinking the controversial triad water-conflict-cooperation in terms of higher or lower regional integration in the transboundary river basins of the Levant[116], where hydropolitics is inserted in major protracted political conflicts and on-going high level of hostility among the riparian states. We argue that an explicative framework of water disputes may provide both a deeper understanding of the regional power struggle and a useful insight on the development of cooperative ties within the Middle East. In this perspective, we share the view that socioeconomic challenges and non-military threats will increasingly determine the patterns of regional security (Korany et. al., 1993).

At least two aspects support the methodological choice of a region-wide assessment. Primarily, Middle Eastern countries historically and culturally securitise water issues as a tool of national unity and external contention (Zeitoun, 2012). In other words, the "blue gold" shapes both cognitive perceptions and decision-making options of the political community. Therefore, water is to be considered as a policy driver of every actor belonging to the security structure of the Middle East. In addition, according to the physical and

[116] In this paper we consider the Levant as a sub-region composed by Turkey, Lebanon, Syria, Israel, Occupied Palestinian Territories, Jordan and Iraq. We excluded Egypt due to its belonging to the Nile River transboundary basin. According to geographical and climatic homogeneity, FAO grouped the same countries in the Near East sub-region. Thus, we use indifferently the notions of Levant and Near East.

economic unity of a river basin, which is irrespective of political boundaries or competing claims of sovereignty (Lowi, 1994), the internationally accepted Integrated Water Resources Management (IWRM) requires the implementation of coordination standards across vast geographic areas encompassing multiple political entities. Hence, a regionalised approach is *a fortiori* requested in the academic research in order to evaluate the consistency of water policies favoured by the international community with the competitive environment determined by intra-regional relations.

The article is organized as follows. The first paragraph introduces the main features of the hydropolitical setting of the Near East, comparing the regional actors on the basis of four indices of vulnerability. Then, the second paragraph outlines the theoretical assumptions and the methodology. Consistently, the analysis of quantitative data on water-related interstate interactions in the sub-region is presented in the third paragraph. Finally, the last section develops the discussion on water conflict and cooperation by proposing a set of hypotheses on the relationship between resource scarcity and regional integration, as well as examining some policy options that could be successfully implemented to address the fragmentation of water governance systems in the area.

## Hydrogeological and Geopolitical Scope

Middle Eastern countries' water supply mainly depends on shared international watercourses and aquifers. We chose to focus this analysis on three major river basins of the Levant sub-region: the Orontes (also known as Asi), the Jordan, and the Tigris-Euphrates. As illustrated in Table 1[117], riparian countries often belong to more than one of these different transboundary basins. Consequently, from a hydropolitical perspective, we unified them into a single strategic water system[118].

Before examining the strategic interaction among the riparian states, it is convenient to premise how water affects the national security agenda. To start with, economic growth and social welfare are strictly bound to water availability. While industrial development and

[117] Tables and figures are available at the end of the paper; see Annex I, *intra*, pp. 22-27.

[118] Considering the Levant as a closed water system is a simplification from both a hydrogeological and a hydropolitical viewpoint. The contentious exploitation of the non-renewable Disi aquifer extending across the Saudi-Jordanian boundary is an example of how complex is the picture of water relations in the Middle East. However, the choice of a subset of riparian countries is validated by the strategic coherence of the selected international basins.

urbanization cause the domestic demand to rise, on average Near East countries devote about 84% of the exploitable water to irrigation usage, leaving the rest to industrial and municipal uses; as a comparison, the global agriculture withdrawal rate stands at 70% (FAO, 2008). Even so, many dry countries in the area depend on food imports. In addition, water allocations are an often-used bargaining tool to maintain social order and political stability: paternalist subsidies and weak rules are common features in the region (Greenwood, 2014; Devarajan, 2014), producing the mismanagement of water resources. Thus, access and control of water flows are perceived as an essential pillar of state's sovereignty and legitimacy – as demonstrated by the Israeli enduring opposition to Palestinian "water rights" – or cleverly capitalized on a broader chessboard – such as the Syrian support to the Kurdistan Workers Party (PKK) militants (interrupted with the signing of the Adana Agreement in October 1998) against the Turkish envisioned diversion of Euphrates. Without being the leading cause of conflict, a historical overview of the Middle Eastern relations shows that water issues have been frequently used at a tactical level in order to consolidate (or challenge) both national authority and regional leverage, acting as a medium of exchange, a collective symbol, and even a target of warfare. Therefore, it is not surprising that in the aftermath of the successful onslaught of the self-proclaimed Islamic State, the jihadist insurgent group that has brutally conquered territory across Iraq and Syria since December 2013, heavy clashes regularly explode around the Iraqi strategic dams of Mosul, Haditha, and Sudur, while jihadists rule local tribes by commanding water delivery.

To operationalize the importance of resource scarcity in the Near East strategic scenario, Table 2 displays some interesting figures of the water system. It is necessary to consider that reported data are annual averages: each basin records extreme variations both in precipitation and river discharge during the year. In addition, irrigation requirements typically coincide with the drier summer months. Therefore, the degree of water scarcity varies seasonally, due to the hydrological cycle, and even annually, because of occasional droughts. As a result, the inconstant distribution of the available water increases the information asymmetry among neighbours. This condition of uncertainty negatively impacts on the signing of binding agreements about the allocation of variable flows.

Table 2 provides basic information about available water resources by riparian country. According to FAO's criteria for data collection, *natural* total renewable water resources (TRWR) "are the total amount of a country's water resources (internal and external resources), both surface water and groundwater, which is generated through the hydrological cycle" (FAO, 2003). Differently, *actual* TRWR estimates the country's water resources given the existing geopolitical constraints, "taking into account the quantity of flow reserved to upstream and downstream countries through formal or informal agreements or treaties and possible reduction of external flow due to upstream water abstraction". In brief, while the natural value is only potential by definition, the actual one is a more accurate indicator of the relative capacity of each actor in a transboundary river basin. However, *exploitable* water resources are less than the actual TRWR due to a plurality of socio-economic and environmental factors, such as the fragmentation of the hydrogeological system, the economic and environmental feasibility of extracting or storing freshwater, poor water quality, minimum flow requirements for navigational use and aquatic life. For instance, despite high rainfalls, Lebanon's manageable resources are almost half the actual value (2.08 km3/yr against 4.53 km3/yr), mainly because of the very low storage capacity determined by a harsh morphology that prevents the construction of dams. The infrastructural divide between urban and rural areas, the contamination of groundwater reserves, the heavy evaporation rates, the abundant water losses, and the outpacing of old transmission networks are additional factors shrinking the nominal availability and contributing to serious crises of governance (Michel et al., 2012).

Finally, total freshwater withdrawal (TFW) refers to the water extracted by its source for a specific use, without counting non-conventional sources (such as agricultural drainage water, treated wastewater, desalinated seawater). Given that not all uses are consumptive, usage is not equivalent to consumption. In other words, withdrawal does not imply a reduction in water quantity or quality because a major portion of withdrawn water returns to the system after its use. Nonetheless, although Table 2 does not provide data about consumption rates, the above-average withdrawal by agricultural use reveals that water consumption is far more intense in the Near East than in other regions. Indeed, agriculture accounts for 90% of total water consumption and irrigation systems lost on average 40% of withdrawn water. Moreover, MENA countries "tend not to charge agricultural and

urban users for water withdrawals at the full cost of provision, [pursuing] various policies that create perverse incentives for excessive groundwater overdrafts, such as subsidized credit for drilling wells, subsidized energy to fuel well pumps, and domestic price supports and external import barriers that favor agricultural products dependent on irrigation" (Michel et al., 2012: 29).

In order to interpret these figures in terms of reliability and availability of water resources, we put together four indices of vulnerability[119]. The ratio between TFW and TRWR, known as the Millennium Development Goal water indicator, is an indication of the human pressure on the renewable water sources. The demanding percentages of many riparian countries (notably Jordan, Syria, Israel, Iraq) show the overexploitation of water sources, particularly the underground aquifers that are naturally characterised by low recharge rates. To take just a few examples, it is estimated that the steady growth of Israeli over-pumping of groundwater from early 1970s to late 1990s led to a 2.000 million cubic meters deficit (Zeitoun, 2012), while the unchecked over-abstraction of Jordanian aquifers will shortly compel the Hashemite Kingdom to purchase water to meet the internal demand. The widespread and growing depletion of groundwater sources threatens both the regular supply (most Middle Eastern cities are experiencing water rationing) and the socio-economic development of these parched countries[120]. Introducing the demographic variable, the actual TRWR *per capita* expresses an essential measure of scarcity. Every riparian country in the Jordan River basin (Israel, Jordan, Occupied Palestinian Territory) falls short of the traditional threshold of 500 cubic meters/year per inhabitant, which defines the upper limit of a condition of absolute water scarcity (Falkenmark, 1989). If we compare the per capita availability on the basis of the internal resources, it is clearly visible that even Iraq and Syria suffer from a condition of severe undersupply. Focusing on riparian disputes in shared river systems, the fourth index of vulnerability is explicitly significant: the fraction of renewable water resources originating outside the country is a clear parameter of how a downstream state is dependent on an upstream state. Therefore, the higher the percentage of flows entering the country, the higher the grade of

[119] Gleick adds another index of vulnerability, the dependence on hydroelectricity as a fraction of total electrical supply (Gleick, 2013), which is particularly important in the Tigris-Euphrates basin due to the large number of hydropower dams and the correlated energy security strategies.

[120] The World Bank estimates that groundwater depletion equals to 2.1% of Jordanian gross domestic product (World Bank, 2007: 21).

dependency. While the previous indices denote the internally perceived water stress, this last parameter properly designates a benchmark of external vulnerability.

The riparian geographic position, the grade of scarcity, the relative military strength, the socio-economic resiliency, and the patterns of amity and enmity (Buzan, 1991) all determine the hydropolitical dynamics underlying the regional security structure. From this point of view, it is apparent that the water-rich Turkey benefits from a hegemonic stance in the water system. The minimal dependency ratio (1%) exhibits the abundance of internal water resources, while the control on the Tigris-Euphrates headwaters establishes a strategic advantage on the downstream Syria and Iraq. On the contrary, Damascus and Baghdad are heavily reliant upon the Euphrates (and Tigris in the Iraqi case) flows[121]. Moreover, in both countries endemic violence is further ruining water infrastructures and is spreading threatening spill over effects at the regional level, where the reception of refugees overburdens water services in Lebanon and Jordan (REACH, 2014).

As far as the Jordan River basin is concerned, growing demands match the unsustainable over-exploitation of groundwater sources. Despite of being the stronger riparian, Israel has experimented from its inception a condition of chronic water insecurity[122], which is nowadays partially softened by the intensive reliance on non-conventional sources, as well as by the extraction of groundwater from the Western Aquifer Basin in the occupied West Bank. Conversely, Palestinians are denied all access to the Jordan River and they are forced to a relation of absolute asymmetry both in the West Bank and in the Gaza Strip. Likewise, the Israeli first-class military and its economic power are overwhelming in regards of Jordan, which is by far the poorest Near Eastern country in terms of available water resources. In addition to an inadequate resource management, Jordan's supply is not only harmed by the Israeli hydropolitical influence in the Upper Jordan River, but it is also threatened by the Syrian upstream position in the Yarmouk River.

## Analytical Framework and Research Design

[121] In addition, Iran is another relevant actor given that it contributes 10% of the total volume of Tigris.
[122] It is emblematic that the PLO first attack ever was directed against the Israeli National Water Carrier on 1 January 1965.

In the previous paragraph water stress indicators were briefly exemplified. Moving from a country-based to a basin-based analysis, the Near East water system appears as extremely vulnerable because of the explosive contradiction between growing resource scarcity and cross-border rivers, which establishes the premises of a competitive environment. However, it is properly the low level of hydropolitical resilience – defined by the institutional capacity of a transboundary river basin (Wolf et al., 2009) – that releases these competitive pressures. From this point of view, an analysis of the regional water disputes cannot ignore that riparian countries in the area have not yet reached any formal multilateral agreements to manage the allocation of shared flows. Furthermore, to be effective and sustainable, the implementation of collective water governance mechanisms necessarily implies the engagement of all parties. Therefore, given its crosscutting importance, water issues might promote a cooperative agenda, "[catalysing] region-wide aspirations for overall governance reform" in a longer term (UNDP, 2008: 15).

The purpose of this paper is to verify which direction at this fundamental crossroads the Middle East is advancing to. We assume that water security relations can be measured on a continuum conflict-cooperation, where the negative end of the spectrum collects interstate tensions over international watercourses, while the positive end gathers cooperative behaviours. Besides, we suppose that a hostile praxis in the water security relations contributes to widen the broader polarization among regional actors through the fragmentation of the transboundary basins' systems of governance. On the contrary, water-sharing agreements are functionally associated to the development of regional integration.

This last point requires further explanation. The succession technical cooperation-regional integration is undeniably a functionalist thinking, but we apply this theoretical assumption without any determinism. From the fall of the Ottoman Empire, the Middle East has lacked in restoring strong intra-regional ties. Despite the powerful attraction of supra-state identities, the unstable consolidation of the existing state system over the arbitrary colonial boundaries precipitated in centrifugal forces that have been opposing a convergence of interests at a regional level. As cleverly pointed out by Fawcett, the regionalization of conflict has failed to produce unified response: "there is no Middle East region that corresponds to any existing institution, no successful free trade area, no security community; no longer perhaps a core community of shared ideals" (Fawcett, 2005: 190). So

far, resources and security interdependence has been leading to strife and clashes. Nevertheless, water cooperation is a necessary step in order to relieve a situation of physical and socio-economic scarcity that feeds a costly insecurity for every riparian country. In other words, the pressure on freshwater resources and the sub-optimal management of transboundary flows should appraise water as a public good from a regional perspective (Granit et Joyce, 2012). Joint institutions, in this respect, "can serve as an outlet for conflict management by providing an arena for riparians to resolve their differences, by providing neutral information, reducing uncertainty, and minimizing transaction costs" (Hensel et al., 2006: 389). Therefore, the application of a multilateral approach to water disputes, even though conceived as an instrument of internal governance, may open to increasing coordination and then to valuable improvements in the regional security relations – at least by reducing a cause of friction or easing a negotiating process. This point is in line with the nexus between institutions and hydropolitical vulnerability introduced by Wolf, who states, "the likelihood of conflict rises as the rate of change within the basin exceeds the institutional capacity to absorb that change" (Wolf, 2007: 12). Wolf identifies international agreements and joint institutions (especially river basin organizations), a history of collaborative projects, general positive political relations, and higher levels of economic development as features enhancing resilience in a basin. On the contrary, rapid environmental change, rapid population growth and economic asymmetries, major unilateral development projects, the absence of institutional capacity, and generally hostile relations swing toward an increasing vulnerability.

However, several *caveats* about water cooperation should be added prior to introduce the quantitative analysis. First, in a situation of asymmetry, the arrangements advocated by a stronger country may lend a guise of cooperation to a mere demonstration of power by other means. Second, cooperative measures in the water sector do not exclude the persistence of hostile actions in other sectors. Third, the resolution of a water dispute does not presuppose the resolution of a comprehensive political conflict, in which the former may exert a utilitarian function. As a result, the quantitative assessment will be necessarily weighted by some qualitative considerations.

After having discussed the theoretical foundations of this paper, we can proceed to illustrate the research methodology. In order to conceptualize the Middle East water security relations into an empirical framework, we used the Transboundary Freshwater Dispute Database (TFDD) developed by the Oregon State University. This relational database is a remarkable and unmatched research tool to study water relations, using a plurality of indicators and levels of analysis (spatial, temporal, country-dyads, etc.). It collects water events in 263 international river basins in the period 1948-2008. Water events are defined "as instances of conflict and cooperation that occur within an international river basin, involve the nations riparian to that basin, and concern freshwater as a scarce or consumable resource (e.g., water quality, water quantity) or as a quantity to be managed (e.g., flooding or flood control, managing water levels for navigational purposes)" (Yoffe et al, 2003a: 1110). In addition, water events are classified according to a conflict-cooperation intensity scale, which devises a categorization system that is consistent with both the theoretical premises and the research purposes of this paper.

The Basin at Risk (BAR) project, built upon the TFDD database, brought some interesting findings to light. Particularly, it showed that "international water relations over the past fifty years have been overwhelmingly cooperative, belying claims that water is mainly a source of international conflict" (Yoffe et al, 2003a; Yoffe et al, 2003b; Wolf et. al., 2003). However, the MENA region was associated to the lowest level of cooperation: indeed, BAR reveals that cooperative events were less than half of total events in the Jordan, Tigris-Euphrates, and Orontes basins; as a comparison, out of the 1800 events considered in the study on a global scale, 67% were cooperative. Furthermore, the Jordan and the Tigris-Euphrates were by far the basins with the highest number of reported events. These annotations are significant because they address the hydropolitical vulnerability of the water system and the strategic value of international rivers in the Middle East. Therefore, they encourage the attempt to deepen a regional understanding of the water-based strategic interactions.

## Data Analysis and Findings

The TFDD database codes 783 events and 1089 classified country-pair interactions in the three river basins. The statistical sample is larger than the original one examined in the BAR project, since the current database is updated until 2008, while the previous version

included events through 1999. Out of 1089 interactions measured by the intensity scale, 561 (51.5%) are cooperative, 433 (39.8%) conflicting, and 95 (8.7%) neutral[123]. Overall, cooperation and conflict on shared water resources were characterised by low levels of intensity, mostly spanning from strong/mild verbal expressions to diplomatic, economic, and technical actions. Indeed, the 87.5% of the riparian interactions falls between -3 and +3 values on the BAR intensity spectrum.

However, this preliminary observation does not report the actual magnitude of water tension in the Near East water system. The distribution across time of interactions with high levels of intensity – including military acts on one side and tactical-strategic agreements on the other side – is quite interesting. It shows opposite trends that are portrayed in Figure 2: while the most violent confrontations took place in the first two decades after the 2WW, the water security relations in the sub-region appears to have been increasingly denoted by cooperative events from the 90's. Nonetheless, the aggregated data is misleading. By analysing each basin separately, we found contrasting trajectories. Both in the Tigris-Euphrates and the Orontes basins the conflict curve exceeds the cooperation curve in the period 1994-2008, thus showing the unresolved composition of long-standing allocation disputes in the former and growing tensions in the latter. Conversely, the graphical representation of the water-related interactions timeline in the Jordan basin indicates a prevalence of cooperative events. This discrepancy deserves a careful explanation.

During the Cold War, the competition over the Tigris and Euphrates rivers reached peaks of violence in the 1975 – with the deployment of troops on the Syrian-Iraqi border following the filling of the Syrian Keban and Taqba dams which would have dragged the two neighbours into warfare without the mediation of Saudi Arabia – and during the Iraq-Iran decennial conflict. Then, the water security relations in the area have been characterised by the formation of an opposition front on the axis Damascus-Baghdad against the Turkish ambitions. Coordination between Syria and Iraq was formalized by ratifying a memorandum of understanding about the provisional division of Euphrates

[123] Events and interactions involved the riparian countries, as well as regional actors (Egypt, Saudi Arabia), extra-regional actors (Soviet Union, United States, France) and intergovernmental organizations (United Nations, Arab League, European Union).

flows in 1990[124], but the bilateral convergence did not succeed in resolving the disagreement with the Turkish position, despite many trilateral talks have been held to settle water disputes. On its side, Turkey firmly rejected the interference of the Arab League, threatened a military intervention against the Syrian backing of Kurdish separatism, and forced the downstream counterparts to separate agreements. Specifically, these agreements were a protocol establishing a joint technical committee signed with Iraq in 1980 and a treaty signed in 2001 recognizing the Syrian compliance to the Southeast Anatolia Development Project (known with the Turkish acronym of GAP) – a huge energy and agricultural development plan concerning the construction of 21 dams, 19 hydroelectric plants, and extensive irrigation systems on the Tigris and the Euphrates rivers that is expected to severely reduce downstream flows after its completion.

Even though in a reverse order, a similar situation originates from the control of the Orontes, which rises in Lebanon and runs for most of its length in Syrian territory before entering in Turkey where it flows into the Mediterranean Sea. Here, Turkey has the disadvantage of a downstream geographic position, while Syria acts as a typical upstream state. As a result, if Lebanon and Syria managed to reach an allocation agreement in 1994, Damascus has occasionally used rights over the Orontes waters to reinforce its claim on the disputed Hatay province. As the border affair fed the water controversy, Turkey (explicitly but uselessly) tied the negotiation on the Euphrates River to the inclusion of the Orontes issues in a comprehensive framework. The Friendship Dam almost resolved the disagreement, but the Syrian civil war halted the realization of the infrastructure (began in 2011) and deteriorated the bilateral relations.

Taking into consideration the Jordan River basin, the *status quo* is preserved by the Israel-Jordan Peace Treaty (1994) and the Israel-Palestine Interim Agreement (1995). In other words, the operating security structure is shaped on Israeli strategic preferences rather than expressing a multilateral consensus among the riparians. Hence, the cooperative trend should not be overestimated because of the hidden low-intensity tensions covered by the Israeli hegemonic stance in the transboundary basin. Indeed, the minor contention on the

[124] Syria and Iraq feared that the sudden interruption of Euphrates flows caused by the two-months filling of the Atatürk Dam would had been the prelude of restricted water supply due to the implementation of the GAP project. Consequently, the allocation protocols previously signed with Turkey were perceived as substantially undermined.

Wazzani springs remains an open affair after the Israeli military withdrawal from Lebanon, as well as the Kingdom of Jordan critically suffers from the unsustainable overexploitation of the Yarmouk River (the largest tributary of the Jordan River) by Israel and Syria, in the absence of an effective allocation formula. Furthermore, despite the significant recognition of mutual water needs, the cooperative aim of Israeli water policies toward Palestinians should be lowered since the Israeli over-pumping of groundwater in the West Bank fails to comply with the terms negotiated under the Interim Agreement, the Separation Wall acts as a tool of water grabbing, and the Joint Water Commission's procedures are strictly bound to the Israel Defence Forces' authority (Zeitoun, 2012). Besides, water is deeply "related to other contentious issues of land, refugees, and political sovereignty" that fuel the Israeli-Palestinian conflict (Wolf et Newton, 2009). Therefore, the recurrence of cooperative interactions does not imply the gradual resolution of the water dispute.

Cooperation and conflict trends assert the balance of power in the water system. This point is supported by the distribution of interactions by country. Countries benefiting from temperate climate and a favourable geographic position have logically no interest in raising a dispute on the management of international watercourses. Consistently, Turkey and Lebanon register few water events (with low intensity level) in comparison to the other riparians in the Near East sub-region. On the contrary, almost one-third of the total country-pair interactions directly involve Israel, a downstreamer with scarce water resources. Nevertheless, the material capabilities allowed Israel to pursue a condition of predominance in the system, which was fully achieved after the Six-Day War in 1967. Thereafter, Israeli hard power has succeeded in dissuading its neighbours to restore hostile actions and in avoiding the adoption of an aggressive posture, as depicted in the Jordan River strategic interactions timeline.

The distribution of events by issue area plainly shows that water quantity constitutes the bone of contention: 75% of total events refer to the allocation of water flows, while the global average in the BAR project stands at 46%. Conflict also relates to infrastructure and border issues (4% against the global BAR rate of 1%). Besides, these typologies are often tied. For instance, extensive war acts (+6 intensity BAR value) concerned the Israeli attacks to the Jordanian Ghor Canal in 1969 and recurrent clashes in the Huleh Valley during the 50's caused by the Israeli drainage projects. Cooperation events likewise focus on the

negotiation of water quantities and infrastructural plans, but they also include some cases of technical collaboration and joint management (respectively, 23 and 13 instances out of 388 cooperative events). Nevertheless, it should be underlined that these last attempts of cooperative interaction were almost exclusively promoted by external actors and donors – such as the World Bank, the USAID agency, or the International Fund for Agricultural Development. Only the 18% of the total cooperative treaties (intensity BAR value ≥ +3) in the Jordan and Tigris-Euphrates basins involved at least three riparian countries. Thus, the occurrence of cooperation in technical and governance matters does not indicate the progressive reliance on a mutually accepted basin-wide joint administration. The lack of functional agreements in the field of economic development is a telling symptom of the failure of the regionalization political process.

This argument addresses the relation between conflict-cooperation in water stressed basin and polarization-integration of the corresponding security structure at the interstate level. Despite the prevalence of cooperative interactions evaluated in the TFDD relational database, the water system of the Levant registers a low grade of institutional capacity. The operating treaties that established river basin organizations are not inclusive. Consequently, the non-fulfilment of a multilateral agreement governing the equitable division and utilization of transnational flows downgrades the actual hydropolitical architecture, which dictates the leading role acquired by the regional powers (Turkey and Israel) without solving water disputes. This finding is coherent with a realist reading of the security dynamics in the area, but the inefficient apportionment of shared water resources affects the strategic interests of every riparian country, with no exception. In other words, the distributional issue threatened by the growing scarcity would operate as a conflict multiplier in the Middle East strategic core.

## Water Conflict and Cooperation

The analysis suggests that the cooperative result of the quantitative assessment is fragile and spurious. The hydropolitical security structure of the Near East water system is carved by the regional balance of power and, specifically, by the political agendas of the stronger riparian countries. Most of cooperative arrangements concerned neutral issues or implied low commitments, as demonstrated by the lack of multilateral agreements governing the management of shared water resources. In this respect, cooperation efforts often expressed

competitive and even coercive behaviours[125], reinforcing contradictory strategic interests rather than safeguarding mutual needs. Moreover, missed improvements in the joint governance of transboundary basins signal the absence of a coping mechanism to tackle the increasing water deficit.

Therefore, our thesis of a linear relationship between resource scarcity and regional integration is not supported by the empirical study of water interactions. In fact, the assessment verifies the opposite trend: the perception of acute scarcity encourages the polarization within an international river basin. In other words, if national security is threatened, each country will follow the imperative of take care of itself, even when the net benefits of cooperation could outweigh the absolute gains of a unilateral action (Waltz, 1979). According to neorealism, efficiency does not have a systemic value in the anarchic realm of international politics since no state would risk favouring a competitor (*ibidem*, 104-109). This is consistent with Dinar's hypothesis on a curvilinear relationship that associates the emergence of cooperation to medium scarcity, by virtue of limited transaction costs (Dinar, 2009; Dinar et. al., 2011). It can be added that "the red flag for water-related tension between countries is not water stress per se, as it is within countries, but rather the unilateral exercise of domination of an international river" (Wolf, 2009: 12).

Therefore, many scholars have argued that bargaining efforts on water issues will unlikely come to a cooperative and fair agreement in contexts of intense political tensions. Lowi clearly developed this argument: "when a dispute over water resources is embedded in a larger political conflict, the former can neither be conceived of as a discrete conflict over a resource, nor be resolved as such", since "antagonists in the high politics of war and diplomacy tend not to agree willingly to extensive collaboration in the sphere of low politics, centred around economic and welfare issues" (Lowi, 1993: 8-9). Consequently, functional arrangements need to be promoted and maintained by a central enforcer, but the dominant power in a basin would be interested in leading a cooperative regime only if it can pursue a greater exploitation of water bodies.

[125]According to Zeitoun and Mirumachi, the intertwining of cooperative and conflicting events asserts the unreliability of a one-dimensional continuum conflict-cooperation to study water interactions at the interstate level (Zeitoun et Mirumachi, 2008).

This general assumption indicates that an upstream state with sufficient capabilities will not engage a multilateral negotiation; whereas it will seek to maximise its control on the disputed resource. Turkey is a shining example of this strategic thinking. Benefiting from a superior riparian position and strong assets, Turkey has constantly adhered to a *divide et impera* regional policy in order to handle the intra-basin security dynamics. As a matter of principle, Turkish governments opposed the historical rights of utilization claimed by the Syrian and the Iraqi sides. Furthermore, Turkey voted against the 1997 UN Convention on the Law of Non-Navigational Uses of International Watercourses. As a result, the Tigris-Euphrates watershed is fractured by power asymmetries among the riparian countries. Then, the institutional weakness of Syrian and Iraqi orders is supposed to seriously jeopardize water supply across the region in the short term.

The other dominant power in the Near East scenario, Israel, did not succeed in forging cooperation on the model of the Nile Basin Initiative, where the powerful downstream hegemon (Egypt) advocated the establishment of a multilateral regime. Prior to the Six-Days War and the subsequent annexations, Israel opened to the U.S.-led negotiation that gave birth to the Jordan Valley Unified Water Plan (commonly referred to as the "Johnston Plan") in early 1950s. The agreement dictated national quotas, but despite the technical consensus it was not ratified due to the opposition of Syria, which fostered the Arab League's resolution on the diversion of the headwaters of the Jordan River. After the 1967 war, the hydropolitical setting shifted toward the Israeli preferences and a treaty binding the riparian countries was no longer in the list of priorities. Besides, the Arab non-recognition deprived Israel of the social capital required to pursue collective interests, acting as a regional water commissioner, given that a hegemonic regime depends on both a condition of primacy and "a general belief in its legitimacy" (Gilpin, 1987: 73; Clark, 2011).

To further interpret the chance of regional cooperation in the water sector, an additional consideration should be appraised. Contrary to Lowi's rationale on the rise of multilateral treaties in transboundary basins with the presence of a hegemonic actor, the analysis of strategic water interactions in the Near East proves that the stronger riparian is likely to work for bilateral negotiations (Zawahri et McLaughlin Mitchell, 2011). Indeed, in a bilateral agreement the hegemon is able to sanction defectors individually, avoiding the risk of free riding, meanwhile it can "prevent the formation of coalitions that could increase the

power of otherwise weaker riparians" (*ibidem*: 838). Hence, regional powers increase the potential of conflict along international water bodies.

However, a distinction between revisionist and *status quo* riparian countries fails to describe the undergoing water security challenges in the Middle East. With inadequate financing and indefinite coordination measures across the region, every riparian is vulnerable both to the looming climatic change and the rising water demand within the system. Moreover, demographic pressure and over-urbanization are currently unmet by equal improvements in water infrastructures. In this respect, the attempt to overcome the decline of already low water resources wades through the implementation of a participatory approach in the management of water flows. Nevertheless, internal over-centralization and external competition frustrate the adoption of IWRM policies.

How to induce distant and distrustful counterparts at the bargaining table? In the cases of the Johnston Plan and of the Maqarin Dam in 1970s, the involvement of a third party (namely, the United States) did not lead to the peaceful resolution of the distributional deadlock (Lowi, 1993: 194). Similarly, our assessment does not evaluate the hegemonic stance of both Turkey and Israel as a key enabler of cooperation. Despite that, Brochmann and Hensel properly argued that issue linkage and side payments might usefully modify the payoff structure of a basin-wide agreement (Brochmann et Hensel; 2011). The oil deal recently promoted by the Iraqi government – which allows Kurdish regional authorities to export crude oil to Turkey – is a good example of a bargaining chip that could be effectively managed in order to attain guarantees in other strategic sectors. In fact, integrating different interests in a broader negotiation on natural resources may transform the zero-sum situation of a typical distributive bargaining over transboundary waters into a positive-sum outcome. In other words, the presence of multiple relationships of economic dependency may offer the opportunity of connecting water and energy security. From this perspective, it should be primarily noted that in the Middle East oil "predominantly favored aggregation rather than disaggregation, (…) encouraging the definition of boundaries and accepting international arbitration in contested cases" (Fawcett, 2005: 87). Secondly, it has to be stressed the complex interplay between water and energy issues, given that "decisions made for water use and management and the production of energy can have significant, multifaceted and broad-reaching impacts on each other" (UN Water,

2014: pp. 13-14). Accordingly, important integrating water-energy projects are currently underway, such as the Red Sea-Dead Sea water conveyance study programme that will provide electricity and desalinated seawater to Israel, Jordan, and the Palestinian Authority (Granit & Lofgren, 2010).

Therefore, despite its competitive features, water resources are still essential in shaping cooperative opportunities. In addition, the private sector could offer a decisive contribution in terms of investments and managerial capabilities. Even though water services are usually structured as government monopolies, the "private operation of publicly owned assets" is becoming a common aspect in the domain of water supply (UN Water, 2014: pp. 18-19). In this terms, the involvement of private enterprises helps to decentralize water services, increase efficiency, and manage desalination and wastewater treatment plants. Moreover, private funds are expected to cover the financing of expensive and cross-border infrastructures, which are required to an increasing extent in order to foster the sustainable socio-economic development of most countries in the Middle East. In this regard, however, the integration of diverging hydropolicies into a regional framework would require not only the adoption of good practices and coordination measures, but also the parallel strengthening of chronically weak administrations.

## Conclusions

Around 40% of global population live along cross-border watercourses, but the Middle Eastern countries are the most affected by the geopolitical consequences of shared water resources. Several indices of vulnerability foresee that the Middle East faces a concrete risk of water undersupply. In this respect, fragmentation of water management and regional polarization are different sides of the same coin: the analysis of the strategic interactions within the transboundary river basins of the Near East appraises that the relative prevalence of cooperative events is far from shaping mechanisms of joint governance.

Notwithstanding this undesirable finding, we still argue that the nexus between water scarcity and regionalization process offers valuable horizons to both researchers and politicians. For instance, linkages between water and energy issues might contribute in depoliticizing water disputes, thus overcoming informational and power asymmetries among neighbours. Additionally, the involvement of stakeholders from the private sector

might encourage the adoption of constructive measures in a plurality of fields (e.g. infrastructural investments, information sharing, subsidies regulation). From this perspective, the international community has the diplomatic and economic means to induce an effective reform process, promoting water security as a main driver of both capacity building and regional integration.

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## Annex I – Tables and Figures

**Table 1 - Major transboundary river basins in the Near East sub-region**

| Basin | Area km2 | Area % of the region | Countries included | Area of country in basin (km2) | As % of total area of basin |
|---|---|---|---|---|---|
| Euphrates-Tigris | 879 790 | 13.4 | Iraq | 407 880 | 46.4 |
| | | | Turkey | 192 190 | 21.8 |
| | | | Iran (Islamic Republic of) | 166 240 | 18.9 |
| | | | Syrian Arab Republic | 96 420 | 11.0 |
| | | | Saudi Arabia | 16 840 | 1.9 |
| | | | Jordan | 220 | 0.03 |
| Asi-Orontes | 24 660 | 0.4 | Syrian Arab Republic | 16 910 | 68.6 |
| | | | Turkey | 5 710 | 23.1 |
| | | | Lebanon | 2 040 | 8.3 |
| Jordan | 18 500 | 0.3 | Jordan | 7 470 | 40.4 |
| | | | Israel | 6 830 | 36.9 |
| | | | Syrian Arab Republic | 1 910 | 10.3 |
| | | | Occupied Palestinian Territory | 1 620 | 8.8 |
| | | | Lebanon | 670 | 3.6 |

Source: FAO, ACQUASTAT, 2015

**Table 2 - Water resources by country in the Near East subregion**

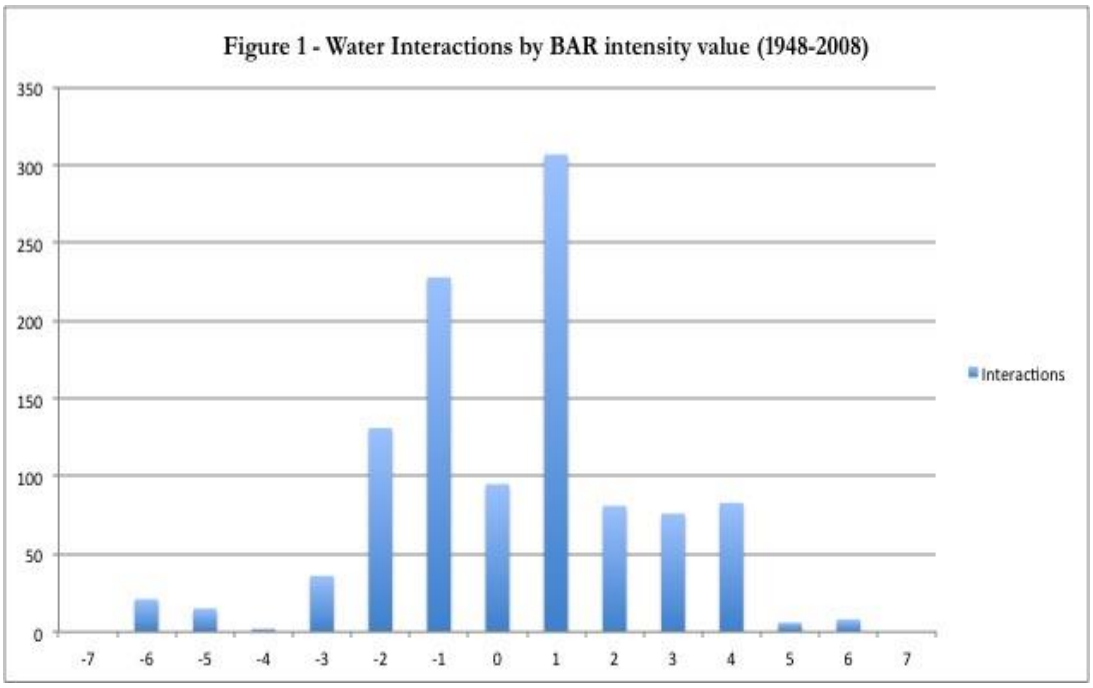
| | | | | | | Indices of vulnerability | | | |
|---|---|---|---|---|---|---|---|---|---|
| Country | average precipitation (mm/yr) | TRWR natural (km3/yr) | TRWR actual (km3/yr) | TIRWR actual (km3/yr) | TFW (km3/yr) | Freshwater withdrawal as % of TRWR actual | TRWR actual per capita (m3/inhab/yr) | TIRWR actual per capita (m3/inhab/yr) | Dependency ratio (%) |
| Iraq | 216 | 96.61 | 89.86 | 35.2 | 65.99 | 73.44 | 2661 | 1042 | 61 |
| Israel | 435 | 1.78 | 1.78 | 0.75 | 1.419 | 79.72 | 230.2 | 93.99 | 58 |
| Jordan | 111 | 1.662 | 0.937 | 0.682 | 0.8662 | 92.44 | 128.8 | 93.76 | 27 |
| Lebanon | 661 | 4.838 | 4.503 | 4.8 | 1.096 | 24.34 | 933.8 | 995.4 | 0.7 |
| Palestine | 402 | 0.837 | 0.837 | 0.812 | 0.408 | 48.75 | 193.5 | 187.7 | 3 |
| Syria | 252 | 55.78 | 16.8 | 7.132 | 14.14 | 84.17 | 767.2 | 325.7 | 72 |
| Turkey | 593 | 231.7 | 211.6 | 227 | 40.05 | 18.93 | 2824 | 3029 | 1 |

Source: FAO, ACQUASTAT, 2015

TRWR: total renewable water resources

TIRWR: total internal renewable water resources

TFW: total freshwater withdrawal




| BAR Scale | Events Description |
|---|---|
| -7 | Formal Declaration of War |
| -6 | Extensive War Acts causing deaths, dislocation or high strategic cost |
| -5 | Small scale military acts |
| -4 | Political-military hostile actions |
| -3 | Diplomatic-economic hostile actions: |
| -2 | Strong verbal expressions displaying hostility in interaction: |
| -1 | Mild verbal expressions displaying discord in interaction |
| 0 | Neutral or non-significant acts for the inter-nation situation |
| 1 | Minor official exchanges, talks or policy expressions--mild verbal support |
| 2 | Official verbal support of goals, values, or regime |
| 3 | Cultural or scientific agreement or support (non-strategic |
| 4 | Non-military economic, technological or industrial agreement |
| 5 | Military economic or strategic support |
| 6 | International Freshwater Treaty; Major strategic alliance (regional or international |
| 7 | Voluntary unification into one nation |

**Source: Transboundary Freshwater Dispute Database.**

Figure 2 - Timeline of high cooperative and high conflicting water interactions in the Near East sub-region

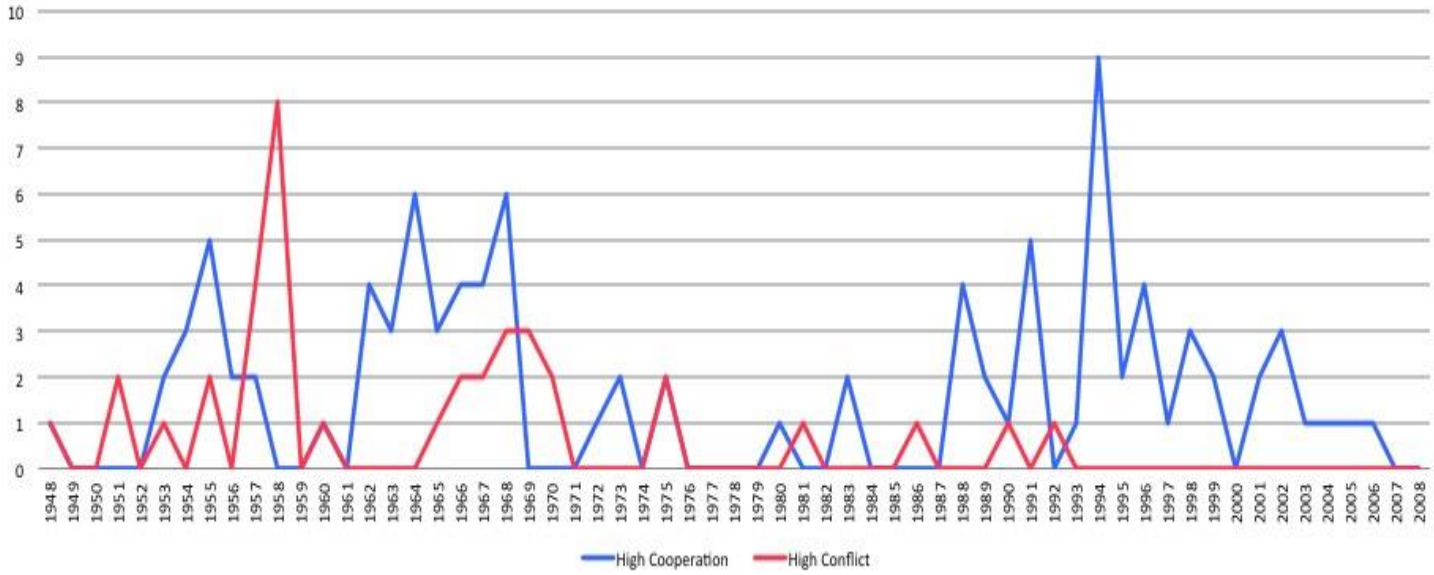



Figure 3 - Timeline of water interactions in the Jordan River basin

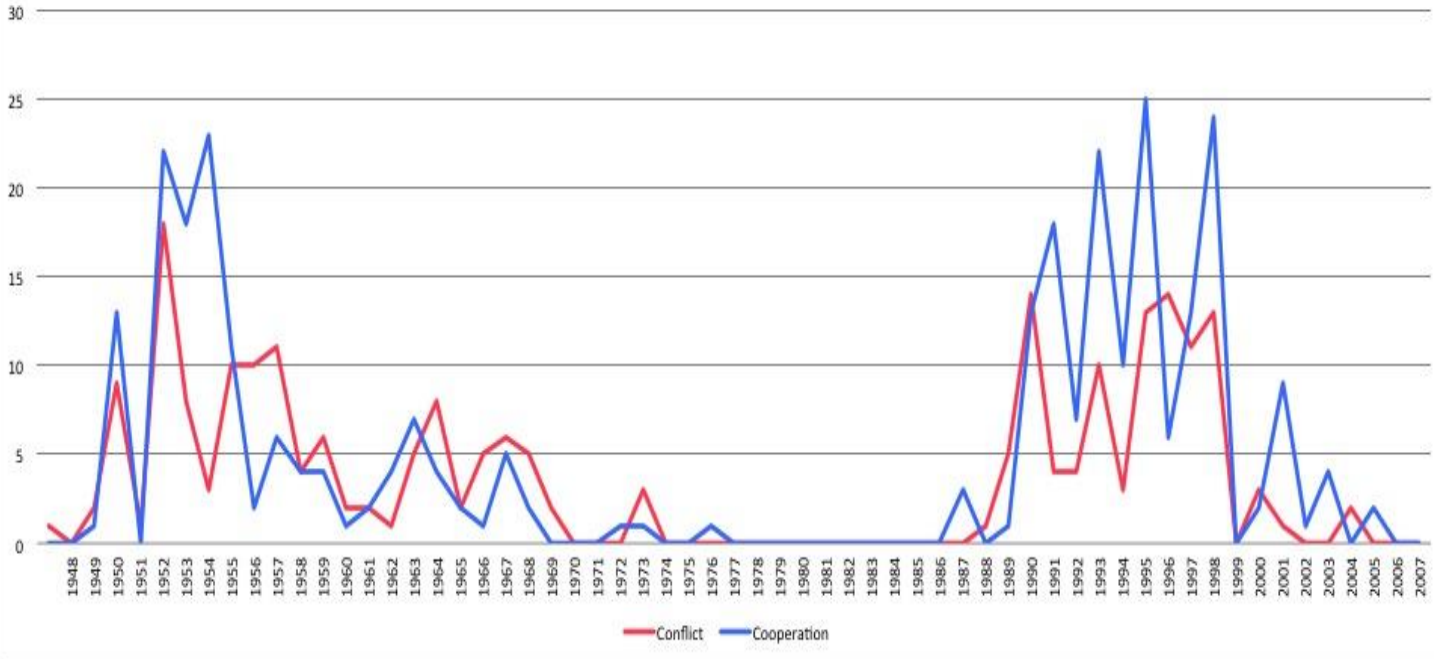


Figure 4 - Timeline of water interactions in the Tigris-Euphrates rivers basin

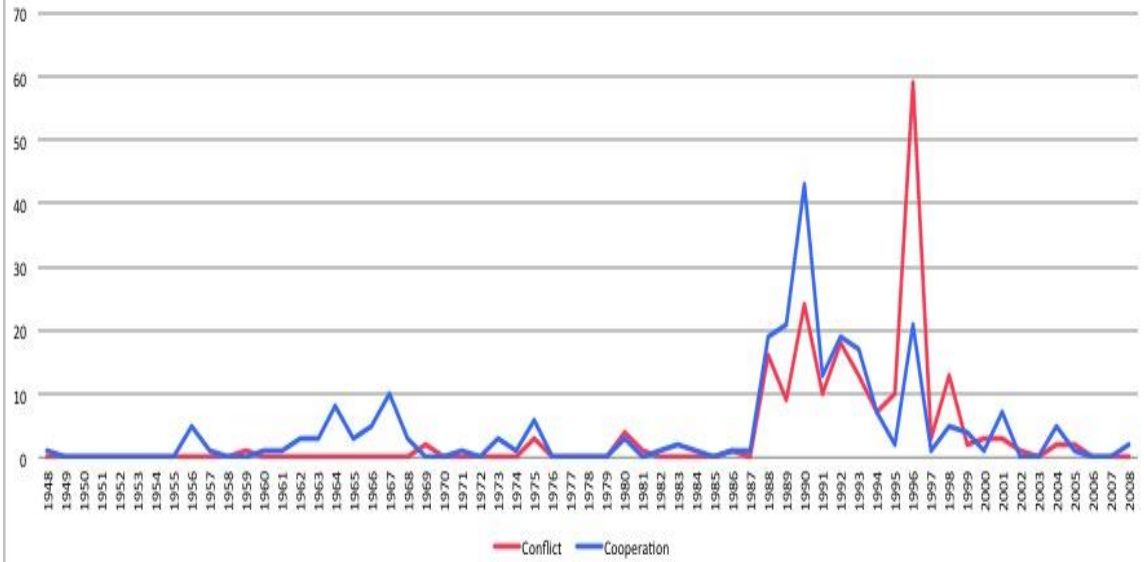
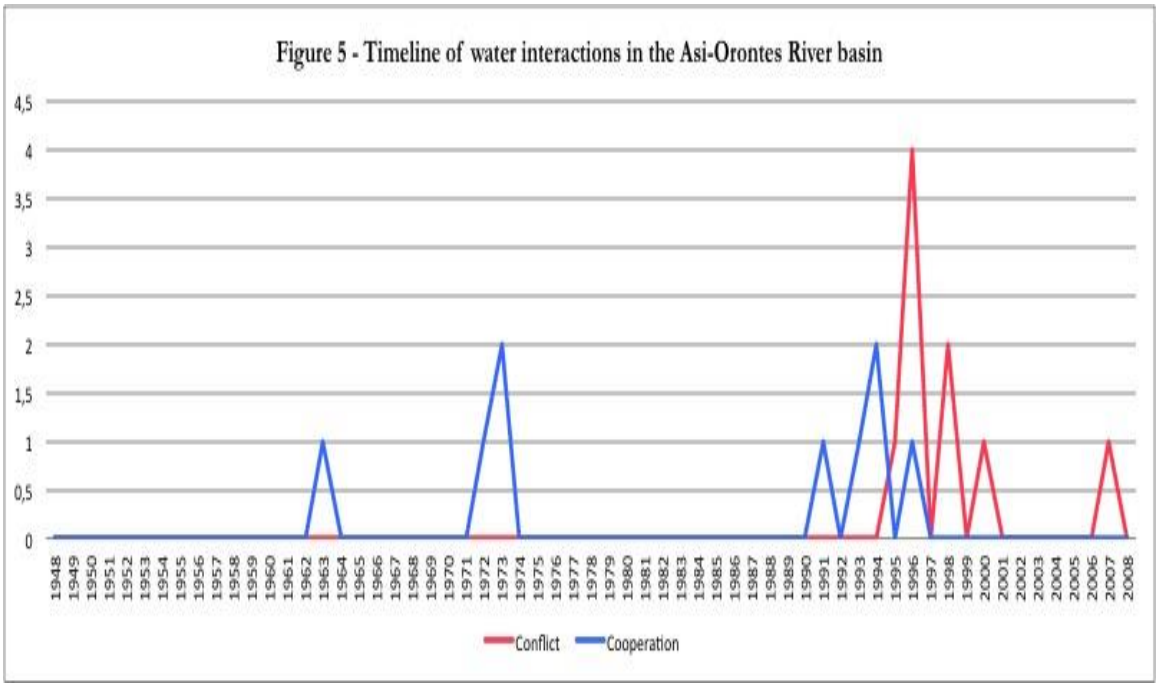



Figure 5 - Timeline of water interactions in the Asi-Orontes River basin



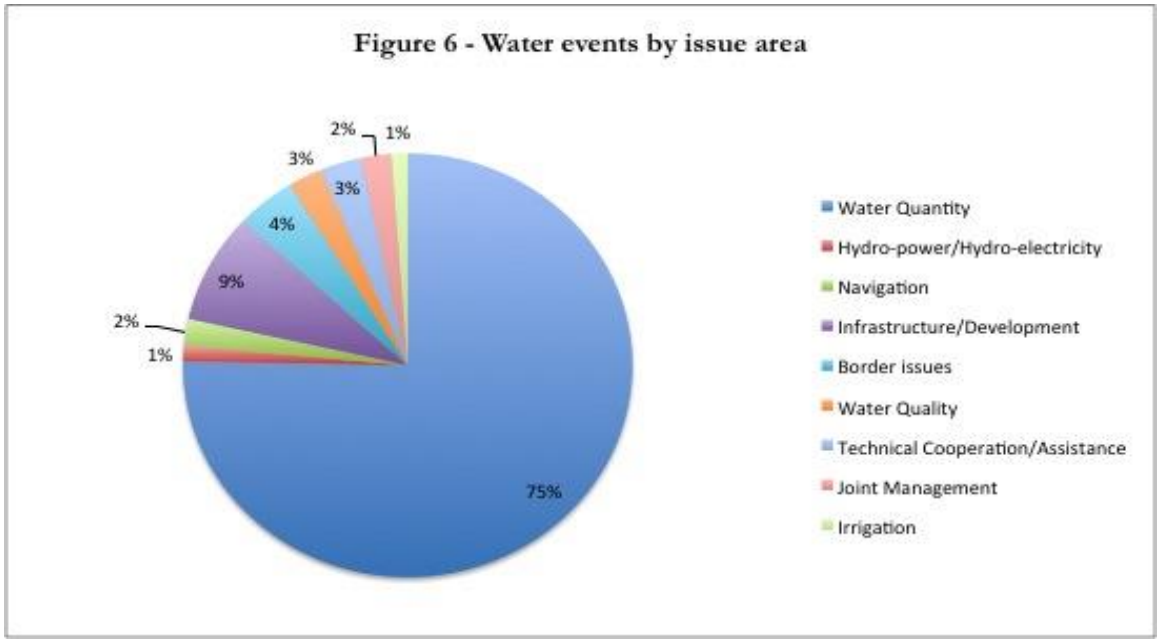


Figure 6 - Water events by issue area
2%
1%
3%
3%
4%
9%
2%
1%
75%
Water Quantity
Hydro-power/Hydro-electricity
Navigation
Infrastructure/Development
Border issues
Water Quality
Technical Cooperation/Assistance
Joint Management
Irrigation

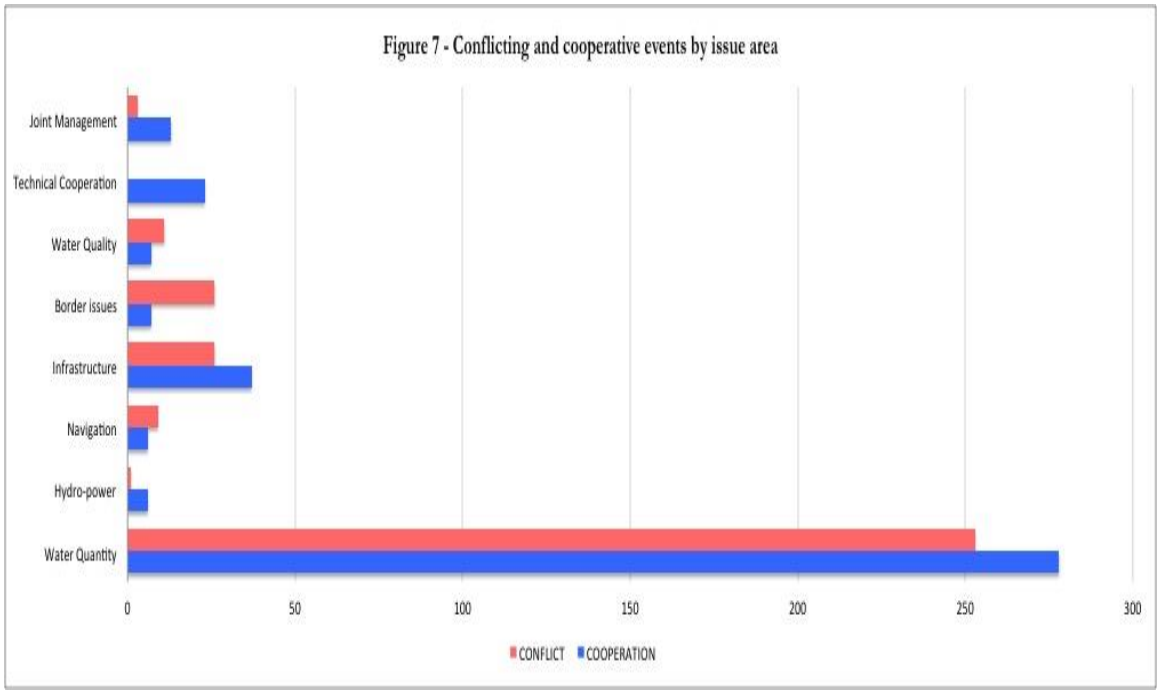


Figure 7 - Conflicting and cooperative events by issue area
Joint Management
Technical Cooperation
Water Quality
Border issues
Infrastructure
Navigation
Hydro-power
Water Quantity
0
50
100
150
200
250
300
CONFLICT
COOPERATION