

## **Past And Present Can Help Build Better Future For The States Sharing Water Resources (Israeli-Arab water conflict)**

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### **Abstract**

According to the latest United Nations reports, the biggest challenge facing the world wide at the present and in the next decades is water scarcity. This means water quantity and water portion is the key world.

Transboundary water resources from History to present could be one key for united cooperation or they key for confrontation and conflicts.

For the last sex decades, Arabs and Israelis conflict couldn't be solved, water issue has been raised to be one of the main key for any effort in solving or having a successful discussion. The whole area has been suffered and still suffering of the gabs and unsuccessful managing of the water resources. Palestinians Israeli Jordanians Syrians and Lebanese are sharing the major part of their water resources, Jordan river as well as the aquifer of the West Bank and Garza strip are the main supplier of water resources for Israelis and for the Palestinians. Dividing the land it will not get to any solution related to water gaps. In the other hand it will make the situation even worse.

Several agreement and discuss has been held between the riparian to achieve an effort for peace and co-operation, some of them are implemented and the reset are still remain due to the political changes in the area.

### **Background**

The history of the water conflict in the middle East began by the foundation of the Israeli state 1948. since that time Israelis tried to secure the state water quantity form different water resources in the area, the reason which caused a lot of conflicts with their neighbors.

Based on conflicts theory Regime and taking in consideration the history of conflict in the area, Regime theory and Helsinki Roles could be implemented to achieve the vision and strategy of the water gaps in the area.

Worldwide water resources are unevenly distributed and they are generally scarce in arid and semi-arid zones such as the Middle East. Lack of growth, distrust as a consequence of poor relations, use of force to solve conflicts and inefficiencies management and use of water resources are the problems besetting water resources.

Israeli-Arabic in general and Israeli- Palestinian areas in particular are currently suffering from water scarcity which will explode within twenty years. If nothing is done, this scarcity will increase with time due to rapid population growth, drought, as well as global climate changes. With the expected population growth the gap will be around 37 percent in the Palestinian and 53 percent in Israeli areas by 2020. There is an urgent need to maintain a balance in water use between different parties in the area, to reduce water scarcity, as well as to bridge water gaps.

Like in many other areas also in the area of water conflict resolutions history is repeating itself. There are numerous cases from past but also present, which can give a useful lesson in solving the complex relationship between riparian parties in Israeli-Palestinian water conflict. These cases point to the benefits of strong cooperation between riparian parties, rejecting sovereignty over water resources, integrated water resources management, building of institutions and development of human resources. Only when these are accounted for then also technical means for generating additional water resources can be successfully implemented. These practices must not only alleviate current problems but also pre-empt future water shortages.

Past has shown that the United Nations often has a power to catalyst this process by forming international joint commissions and calling for international mediators to help resolve such conflicts. Harmonization of national regulations facilitates joint management of shared water resources. Harmonized national regulations cannot, however, replace an international agreement in the management of a shared aquifer or other trans-boundary water resources.

Studying positive results and failures of the past and present attempts to resolve similar water conflicts, finding the effective practices for given cultural, social and political environment and will and commitment to implement these are a key elements of water conflict resolution.

## Conflict and conflict categories

Generally conflicts can be defined as disagreements on the course of action to be taken. To better understand such disagreements, we first have to look at the possible sources of a theoretical conflict. These can be grouped in three categories: factual disagreement, conflict of interest, and mutual trust (Dorcy & Reik 1987), as expressed in Figure 1. Anatomy of a conflict (Mostert E. 1998, modified by the author 2000). The Arab-Israeli water resources conflict has the lack of mutual trust as its source, the two major aspects being distrust and power struggles.

The distrust between the riparian countries in the Middle East concerning water resources management in general, and between Jordan and Israel and on the West Bank in particular, is often caused by problems in communication. That is, words and deeds that are not understood but are often interpreted as signs of bad intentions

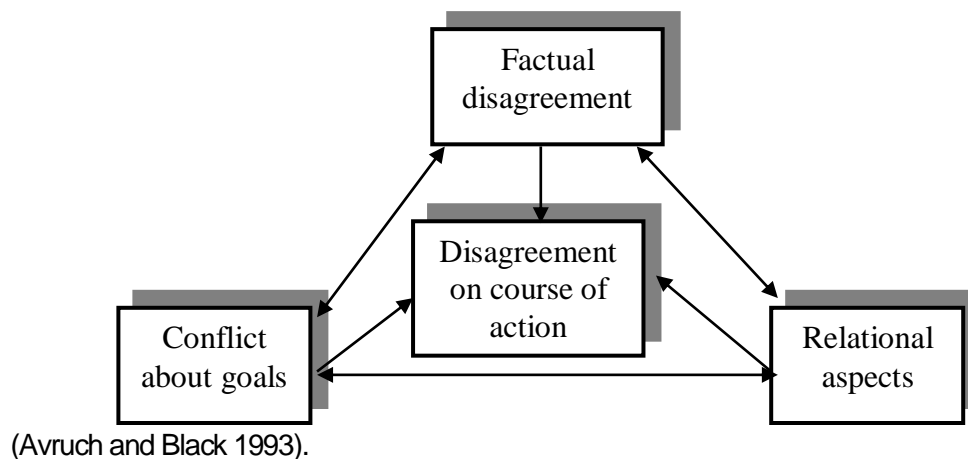


Figure 1. Anatomy of a conflict (Mostert E. 1998, modified by the author 2000)

This Anatomy can help the international mediators and experts to take the right approach in negotiations and discussions with the mentioned riparians. Getting the parties to sit down at the same table can be one step in solving the problems.

## Conflicting national and international interests

According to Just & Netanyahu (1998), national and international interests are the most important elements of conflicts and the toughest ones to solve during international

negotiations. In defining their interests in transboundary water resources, countries are affected by various water-related national priorities. Such national priorities are likely to be influenced by, for instance, administrative and water law procedures, alternative resources for their solution, stage of industrial development, and geographic location (upstream/downstream).

Most of the surface and groundwater resources in the Middle East (ME) region are drawn from shared rivers and aquifers without agreements between all the riparian countries regarding either water allocation and/or management of most water basins. Sound management of such resources requires extensive negotiations and the establishment of binding agreements between the riparian parties involved. Shared water resources present a major obstacle to sustainable water management since communication, and cooperation between the various nations is difficult to achieve, especially in light of the political instability in the ME.

While negotiating a basin-related treaty, a country faces competing domestic and neighbouring country pressures simultaneously. For example, giving up water quantities to another country may affect the country's various domestic economic sectors differently; the agricultural sector is likely to be affected the most. Accepting stringent pollution standards (i.e., giving up the "right" to pollute) as part of an international treaty may have a dramatic effect, for example, on specific domestic industries and/or agricultural practices. Domestic interest groups associated with these sectors are likely to oppose a "soft" international position, which complicates the work of policy makers and negotiators.

An example of an attempt to reduce the problem of misinterpretation is the decision based on the peace treaty signed by the Israelis and Jordanians in Oslo in 1994 (Jordan Inelegant Agency 1998), requiring Israel to divert part of the river Jordan to the north of Jordan for the agriculture in the area. The struggle over sharing the underground water resources between the West Bank and the Gaza Strip Palestinians and the Israelis is an example of a power struggle.

According to Watershed (1997), analysing the study carried out by David Brooks and Stephen Lonergan (1994), water issues have emerged as a potential source of conflict in many parts of the world, particularly in the Middle East. In the study, the value of water in dispute is only \$200-600 million. By international standards, this is not a huge amount –

the daily cost of warfare is estimated to be higher than the annual cost of the loss of water. Watershed (1997) divides water conflicts or crises into three categories:

- Water crises caused by economic constraints.
- Ecological crises that can be identified by poor or differing water quality available to the riparian parties; in this case the problem of quality is not important nor the allocation of the water resources.
- Geopolitical crises mainly related to the distribution of water resources.

In the Israeli-Palestinian conflict the data gaps affect allocation of available supplies. The relatively low value of water compared to the cost of conflict is almost certainly valid for most of the regions of the world. The round table discussion of the group dealing with water problems at the 7<sup>th</sup> International Water Conference in Jerusalem on June 13-18, 1999 agreed on the idea that the acute water scarcity problems could be solved through investments in water facilities, negotiations in good will and cooperation management. These options are more cost effective than any military ones. Moench (1997) similarly claims that most water management challenges have a solution that is economically and technically viable.

Experts on the subject from all around the world agree that in order to reduce the risk of water conflict in the area, various regional and international approaches for reducing water related tensions should be applied. Among those approaches are: following agreements and international conventions related to the topic, application of proper joint technology, joint institutions for dispute resolution, ensuring that proper and innovative water management meets the national and international standards on political, economic, social, technological, environmental and natural resources (PESTEN).

Table 1. International river basins in the Middle East (Gleick 1994, modified by the author)

<b>RIVER BASIN</b>	<b>TOTAL AREA OF BASIN (KM<sup>2</sup>)</b>	<b>COUNTRIES IN BASIN</b>	<b>AREA (KM<sup>2</sup>)</b>	<b>PERCENTAGE OF TOTAL AREA %</b>
<b>Tigris</b>	378,850	Iran	220,000	58
		Iraq	110,000	29
		Turkey	48,000	13
		Syria	850	<1
<b>Euphrates</b>	444,00	Iraq	177,000	40
		Turkey	125,000	28
		Syria	76,000	17
		Saudi Arabia	66,000	15
<b>Orontes</b>	13,300	Syria	9,700	73

<b>RIVER BASIN</b>	<b>TOTAL AREA OF BASIN (KM<sup>2</sup>)</b>	<b>COUNTRIES IN BASIN</b>	<b>AREA (KM<sup>2</sup>)</b>	<b>PERCENTAGE OF TOTAL AREA %</b>
		Turkey	2,000	15
		Lebanon	1,600	12
<b>Jordan</b>	19,850	Jordan	7,6500	39
		Syria	7,150	36
		Lebanon	950	5
		Israel	4,100	21
<b>Nile</b>	3,031,00	Sudan	1,900,000	63
		Ethiopia	368,000	12
		Egypt	300,000	10
		Uganda	233,000	8
		Tanzania	116,000	4
		Kenya	55,000	2
		Zaire	23,000	1
		Rwanda	21,500	1
		Burundi	14,500	<1

According to Gleick (1994), there is no single solution for the Middle East water-related conflicts and problems, and ultimately a combination of efforts and innovative ideas must be applied. Hope is increasingly put on the political agreements to be negotiated to apportion and manage the shared water resources in the region, particularly of the Jordan River, the West Bank territories aquifer, and the Euphrates River basins. The aquifer and river basins contain imported water for several countries in the region with a high rate of dependence on water. Table 1. lists the international river basins in the Middle East area and the riparians.

Similarity in terms of PESTEN attributes was sought between different cases of water-related conflicts and this study case (the Palestinian-Israeli water conflict), and those showing the closest correlation were selected for deeper analysis. Some of the riparians of the river basins displayed in **Error! Reference source not found.**, for instance Egypt and Jordan, could also have an impact on the Palestinian-Israeli water conflict by giving their view and assisting in negotiations.

### **Enforcement limitations**

Agreements are not likely to be effective if they cannot be enforced or are not adhered to. Enforcement often requires some degree of monitoring. Monitoring has three major limitations: (i) high cost, (ii) technical feasibility, and (iii) sovereignty. When monitoring is feasible and acceptable to all parties, it provides the parties with valuable information. The likelihood of non-compliance should, of course, be small for effective monitoring to

occur. However, as concerns international issues, monitoring by itself does not provide an enforcement tool.

Existing international legal rules offer guidelines for water allocation principles but cannot be effectively enforced. In addition, sovereignty principles give nations the option of either not exposing themselves to an international court or not accepting a third party ruling. The international community failed to enforce some of the parties involved in transboundary issues to execute the rules of the international agreements concerning upstream and downstream riparians, e.g. Turkey in damming the Euphrates and Israel in draining the Huleh Lake in 1951 (Wolf 1992).

## **The Israeli-Arab water conflicts**

### **Past, present, and potential freshwater conflicts**

Related to past and present conflicts over water in the area, Table 2. presents some consequences of the taken actions.

Water disputes in the Middle East are intimately linked to the overall political tensions. Water represents, as Wishart (1990, p. 536) explains, "one facet of the multidimensional dispute between the Arab states and Israel". It is also a source of conflict, although usually less acute, among Arab states. Arab-Israeli and Syrian-Jordanian enmities have so far prevented the development of integrated water projects, while the Jordan River Basin would be well suited for such large schemes. Fears and counter-fears are commonplace between the countries in the Middle East due to perceived fears based on history.

Table 2. The historical water conflict between the Israelis and Arabs (Gleick 2000, modified by the author)

<b>YEAR</b>	<b>COUNTRIES</b>	<b>ACTION</b>	<b>TYPES OF ACTIONS TAKEN</b>	<b>SOURCE</b>
1948	Arabs, Israelis	Military tool	Arab forces cut off West Jerusalem's water supply in first Arab-Israeli war.	Wolf 1995, 1997
1951	Israel, Jordan, Syria	Political tool, Military tool, Development disputes	Jordan makes public its plans to irrigate the Jordan Valley by tapping the Yarmouk River; Israel responds by commencing drainage of the Huleh swamps located in the demilitarised zone between Israel and Syria; border skirmishes ensue between Israel and Syria.	Wolf 1997, Samson & Charrier 1997
1953	Israel, Jordan, Syria	Development dispute, Military target, Political tool	Israel begins the construction of its National Water Carrier to transfer water from the north of the Sea of Galilee out of the Jordan basin to the Negev Desert for irrigation.  Syrian military actions along the border and international disapproval lead Israel to move its intake to the Sea of Galilee.	Samson & Charrier 1997

<b>YEAR</b>	<b>COUNTRIES</b>	<b>ACTION</b>	<b>TYPES OF ACTIONS TAKEN</b>	<b>SOURCE</b>
1965-1966	Israel, Syria	Military tool, Political tool, Control of water resources, Development dispute	Fire is exchanged over "all-Arab" plan to divert the Jordan River headwaters and presumably pre-empt Israeli National Water Carrier; Syria halts construction of its diversion in July 1966.	Wolf 1995, 1997
1967	Israel, Syria	Military target and tool	Israel destroys the Arab diversion works on the Jordan River headwaters. During Arab-Israeli War Israel occupies Golan Heights with Banias tributary to the Jordan; Israel occupies West Bank.	Gleick 1993, Wolf 1995, 1997, Wallenstein & Swain 1997
1982	Israel, Lebanon, Syria	Military tool	Israel cuts off the water supply of Beirut during siege	Wolf 1997
2002	Israel, West bank	Military tool	Israel cuts off the water supply of all the cities during siege.	Asheesh 2002
2002	Israel, Lebanon	Threat of using military tool	Israeli threat to use military action if Lebanon continues to convert part of the Jordan river water originating in their area	Asheesh 2002
2003	Israel, Gaza Strip	Threat of using military tool	Israeli threat to use military action to close the tunnels between the Gaza Strip and Egypt by flooding them by sea water	Asheesh 2003 discussion

The region is indeed particularly volatile politically, with five Arab-Israeli wars since 1948 and many tenacious issues yet unresolved. Scarce water resources are inextricably related to regional conflict, having led historically to intense, sometimes armed competition, but also to occasional instances of cooperation. The question of the links between freshwater conflicts and regional peace and security is discussed here, while the rest of this section focuses on specific water-related conflicts in the basin.

Freshwater conflicts, however, cannot be fully separated from other international problems, especially in the Middle East. The first thing is to know whether freshwater conflicts constitute an integral part, or even cause, of important international disputes. Some authors, such as Wolf & Ross (1992) and Gleick (1993a), argue that the political crisis among the riparians of the Jordan River Basin has been either precipitated or exacerbated by conflicts over access to freshwater resources. According to Elmusa (1995a), the conflict between the Palestinians and the Israelis is almost as much over water as over land. It thus seems that in the arid Middle East water does represent a fundamental dimension of transboundary problems.

The second question, linked to the first one, consists of knowing whether cooperation efforts in the field of water could facilitate, and perhaps help, the resolution of larger issues or whether technical cooperation is impossible as long as major political tensions exist. The resolution of freshwater conflicts in the region might be possible prior to a full political settlement (Wolf & Ross 1992). But such efforts might have to be included within



a larger political plan for cooperation, so that the parties agree to start negotiations (Drezon-Tepler 1994). It is a difficult situation when parties almost at war are forced into cooperation to solve some of their contentions, with a constant high risk of failure.

### **Past, present, and potential efforts for freshwater conflicts resolution or prevention**

The most important cooperation efforts on freshwater issues have been led or encouraged by the government of the United States. In the 1950s the so-called Johnston negotiations ended unsuccessfully but did allow for some technical cooperation on water issues between Jordan and Israel. The agreements of the 1990s between Israel and the Palestinians as well as between Israel and Jordan might attenuate freshwater tensions in the future.

#### Past efforts

##### *The Johnston negotiations (1953-1955)*

In 1953 the United States' President Dwight Eisenhower sent his special envoy Eric Johnston to try to mediate a comprehensive settlement concerning surface water rights in the Jordan River basin. Johnston's plans included the construction of several dams and canals, as well as precise water allocations to riparian countries. The negotiating representatives agreed on the October 1955 plan: Israel would be allowed to make out-of-basin transfers of its share of water, Arabs were assured supply of water before Israel, and the inclusion of the Litani in the scheme was abandoned (Drezon-Tepler 1994). Despite the holding of important international negotiations, Johnston' final plan was rejected by the Arab League Council in 1955 (Wolf & Ross 1992).

Failure was partly due to the fact that the Arab states (especially Jordan) did not need a comprehensive program of water development that directly involved Israel to achieve their immediate development goals (Wishart 1990). Also, Arabs and Jews follow different principles of water rights assignment. The Arab states follow the principle found in the Mejelle (Ottoman Civil Code, statutory law in the Jordan Valley prior to the British Mandate), which forbids out-of-basin transfers of water, whereas Israel and early Jewish settlers perform and have used such transfers without reserve (Wishart 1990). Moreover, Johnston entirely overlooked the problem of groundwater allocation, which has to be included in any basin-wide agreement (Wolf & Ross 1992).

After the failure of the Johnston negotiations independent programs for water development, partly incompatible, were embarked on in the late 1950s by Israel and

Jordan. But American efforts did permit some on-going technical cooperation between Israel and Jordan. Since that time to the present, officials of these countries regularly meet at so-called "Picnic Table Talks" to discuss the Yarmuk River's flow rates and allocations. This has helped reduce minor tensions over day-to-day hydrologic operations (Wolf & Ross 1992; Wolf 1993).

*Plan for the future Maqarin Dam (1978-1981)*

The United States government was ready to partially fund a proposed dam on the Yarmuk River at Maqarin. One condition of the plan was that Jordan had first to reach an agreement on water allocations with Israel and Syria. These attempts failed due to regional tensions (Lowi 1993a).

**Present efforts**

*Israeli-Palestinian Declaration of Principles (1993)*

After launching of the Oslo peace process in 1992, led mainly by the U. S. government, diplomatic efforts have focused on a comprehensive approach. Sessions over various aspects of the Arab-Israeli dispute were held during multilateral talks (Drezon-Tepler 1994). In Annex III of the Israeli-Palestinian Declaration of Principles on Interim Self-Government Arrangements of 1993 the parties agreed to establish a Continuing Committee, whose first task is to discuss the cooperation in the field of water (Benvenisti & Gvirtzman 1993). The legal principle of "equitable utilisation" has been recognized by the parties as the basis for discussion, although no detailed plan for water allocations has been agreed upon (Dellapenna 1996). The outcome of the multilateral working groups has so far included some progress concerning pollution prevention, but the enforcement of basinwide cooperation proved unfeasible (Libiszewski 1995a).

*Israeli-Jordanian Peace Treaty (1994)*

The Israeli-Jordanian Peace Treaty of 1994 provides for important cooperation in the field of freshwater. Joint management is planned for water development, pollution prevention, and assistance in the event of water scarcity. In addition, precise allocations are made concerning the waters of both the Jordan and the Yarmuk Rivers. Israel is to provide about 0.05 km<sup>3</sup>/y of additional water to Jordan (Art. 6 and Annex II). This will not, however, allow the Jordanians to cover their annual shortfall. In fact, Israel maintains more or less a favourable de facto situation, as Jordan is allowed to only slightly increase its withdrawals. These will remain much lower than was provided under the Johnston Plan's allocations (Gleick 2000; Libiszewski 1995b; Dellapenna 1996). The treaty does

not prevent political tensions over water allocations from occurring, as was the case in May 1997.

### **Water during the siege of 2002 in the West Bank**

In the West Bank and Gaza Strip during the siege of 2002 the Israeli army cut off the water supply of all the villages and towns in the West Bank (Newman 2002). There can be no doubt that a serious violation of basic human rights is going on, even a breach of international conventions and human rights (Newman 2002).

The scarcity of rain during the past few years, coupled with growing population and an increased demand for domestic water consumption, brings us closer and closer to crisis every year. It would not be an exaggeration to say that since the construction of the National Water Carrier in the early 1960s to bring water from Lake Kinneret to the centre of the country, the Israeli state has made no serious attempt to build water infrastructure. This Carrier has surely been one, if not the major, planning disaster for the Israelis and even for the Palestinians by any Israeli government during the past 30 years (Newman 2002).

The Israelis are suffering from a water shortage. The Palestinians and Jordanians are in just as bad a situation. It is only logical, therefore, that any political solution for the water conflict should apply to the entire region, it should be one that can be worked out to the benefit of all the parties. Geopolitical experts throughout the world have argued that the potential for future conflict in the Middle East during the next decade is as likely, if not more likely, to be the result of water disputes than anything else.

### **Cooperation options on transboundary water resources**

In 1969 the European Council adopted the charter of recognition and explanation of the need for international cooperation regarding water use. The charter, like many other international documents declares that water knows no frontiers, and as a common resource it demands international cooperation. (European Council 1969)

The multiple scope and scale of choices for defining international river basin management as well as the existence of competing doctrines and principles that offer guidelines for international water resource management are evidence of numerous conflicts over international water resources (Just & Netanyahu 1998). The lack of confinement of hydrological systems within the boundaries of respective political

systems, the absence of a common goal among riparian countries, and the increasing scarcity of water arising from multiple uses are the core of conflicts in international water basins (Knesset 1971). Even when conflicts are resolved and treaties are signed, agreements on transboundary water resource use can still be broken. In particular, cooperation and agreements are susceptible to change when new information becomes available. Such an example of information or transition cases is the case of Palestine and other colonised countries.

Cooperation can always be a victim of changes in understanding the principles of sovereignty or changes of strategies. Those problems, in turn, raise the possibility that agreements will need to be renegotiated following every major change in the information set. Such considerations underscore the importance of achieving broader understanding among riparian countries regarding the exploitation, administration, and protection of resources.

While the problems in transboundary cooperation can be grouped into two broad categories of asymmetry and sovereignty (Just & Netanyahu 1998), they can be usefully identified more explicitly according to the specific obstacles that hinder cooperation.

These obstacles originate from a) asymmetric information among riparian countries; b) existence of scientific gaps and technical uncertainties; c) lack of effective enforcement of mechanisms and institutions; d) natural claims for sovereignty; e) unavoidable conflicting national and international interests; f) obvious asymmetric country characteristics; and g) geographical upstream/downstream considerations. The existence of these elements and their consequences was forgotten, or in some cases not considered, during the design of international treaties and international conventions. Here follows an analysis of the elements:

#### *Asymmetric Information*

A fundamental barrier to negotiation arises from asymmetric information among players (Wilson 1995). Riparian countries generally have asymmetric access to data and information because of differing data accessibility and differing abilities to process data. Beyond the social value of data for planning purposes, data has a bargaining value for the country that owns it. Data can be used strategically in negotiations with other riparian countries. Having information that is unavailable to other riparian countries allows a country to better calculate its potential payoff from cooperation and to better assess risks. Even when information is available, sharing it openly may not be advantageous to

individual countries. A country may decide strategically to share the information fully, partially, or abusively (misleading other parties). This strategic possibility raises uncertainty about the reliability of shared data. Therefore, effective agreements need to be as robust as possible to prevent information asymmetries.

#### *Scientific Gaps and Technical Uncertainties*

While the relevance of asymmetric information is well understood in domestic water projects, the implications of asymmetric information intensify when water arrangements are expanded to the international arena. The source of missing information can be scientific and/or strategic. Scientific gaps often originate from inability to fully understand and measure physical processes or from nations' inability to agree on standards (Heal 1991). Scientific gaps create uncertainty with respect to the availability or quality of water. Examples of scientific gaps include, for example, the impact of acid rain on water quality in lakes, amount of water available in a particular aquifer, cyclical character of climatic changes, irreversibility of water pollution and overexploitation, etc. Quantifying water resources can be very difficult, especially in the case of an aquifer. Basin countries often dispute evaporation rates, flow rates (seasonal or annual), number of aquifers and the interactions among them, etc. This makes the estimation of water quantities very difficult. Reaching understanding over water quality is even harder because standards vary among countries. In addition, water quality is often determined in a pragmatic way depending on the purpose of the water use.

#### *Enforcement Limitations*

Agreements are not likely to be effective if they cannot be enforced. Enforcement often requires some degree of monitoring, which has three major limitations: (i) high cost, (ii) technical feasibility, and (iii) sovereignty. When monitoring is feasible and acceptable, it provides the parties with valuable information. The likelihood of non-compliance should, of course, be small for effective monitoring to occur. However, as concerns international issues, monitoring by itself does not provide an enforcement tool. Existing international legal rules offer guidelines for water allocation principles but cannot be effectively enforced. In addition, sovereignty principles give nations the option of either not exposing themselves to an international court or not accepting a third party ruling.

#### *Conflicting National and International Interests*

In defining their interests in transboundary water resources, countries are affected by various water-related national priorities (questionnaires sent to MIMI). Such national

priorities are likely to be influenced by for instance, administrative and water law procedures, alternative resources for their solution, stage of industrial development, and geographic location (upstream/downstream considerations). While negotiating a basin-related treaty, a country faces competing domestic and neighbouring country pressures simultaneously. For example, giving up water quantities to another country may affect a country's various domestic economic sectors differently; the agricultural sector is likely to be affected most. Accepting stringent pollution standards (i.e., giving up the "right" to pollute) as part of an international treaty may have a dramatic effect, for example, on specific domestic industries and/or agricultural practices. Domestic interest groups associated with these sectors are likely to oppose a "soft" international position, which complicates the work of policy makers and negotiators.

#### *Asymmetric Country Characteristics*

Various countries have different levels of population densities, national income per capita, military power. The seventeen riparian countries in the Danube Basin are a classical example of entities with conflicting interests and therefore different priorities. The upstream countries use water mainly for producing electricity, while the downstream countries use water for drinking, irrigation, fisheries, and tourism. While water quality is of interest to downstream countries, the upstream countries have no incentive to invest in pollution prevention or in maintaining or developing of natural resources, etc. (Linnerooth 1990). These differences affect each country's ability to bargain over its share in a basin and to issue effective threats to be carried out if either agreements or, alternatively, the status quo are broken. Part of the debate concentrates on the following questions: (i) Should rich countries that can offer side-payments (or other forms of compensation such as technical know-how) have greater rights over water than highly populated countries? (ii) Should income per capita or water availability per capita determine water allocation? (iii) Should rich polluting countries have a greater liability to clean up water than poor polluting countries?

#### *Upstream/Downstream Considerations*

Although the overall power of a country determines its impact on the size of the ruling coalition in a river basin, its geographical location may be an important factor as well. A country that controls a source of water can potentially hold a strong position in the negotiation process. For instance, Syria controls four major heads of the Yarmouk River and therefore has dominant power in its negotiations over water with Jordan. An

upstream country can divert water at its source or pollute water carelessly, decreasing both water quantity and quality available to downstream countries. Thus, in certain situations, an upstream country can be an essential player in basin-wide negotiations, without which no agreement can be reached, e.g. when upstream pollution or diversion is a major problem.

The Nile River, however, serves as a counter example. While Ethiopia contributes about 86 percent of the Nile water as an upstream country, Egypt contributes essentially no water and uses 66 percent of the annual 84 billion cubic meter flow as a downstream country (Alemu 1995). Although an upstream country can pose a credible threat with respect to polluting water, being an upstream country by itself does not give a country the ability to pose a credible threat with respect to water diversion. A credible threat must be backed up with, among other things, financial and technical abilities.

Clearly, asymmetric abilities among riparian countries provide incentives to basin partners to join a grand coalition or block one, or even to keep the status quo under which countries act unilaterally. The major sources of asymmetry among countries that serve as obstacles to cooperation in transboundary water resources include, among other things, asymmetry in power (economic or military), asymmetry regarding information (lack of reliable data and inability to predict an opponent's moves), and asymmetry in location (upstream/downstream geographic location). From this perspective, (Lowi, 1993) suggests that agreements over cooperation can be achieved only if the dominant power in the basin accepts it. The formation of a coalition and its size are influenced by the various countries' abilities to provide incentives or disincentives to other riparian countries in bringing them closer to or further away from the negotiating table.

### **Framework for cooperation**

The study has provided important background information. It has been widely accepted that PESTEN and resource problems directly affect regional and international security. Although these PESTEN aspects have not been so far sufficiently incorporated into the approaches to reduce the risk of water conflict, a framework needs to be constructed that encourages scholars and policymakers to apply new tools, to set new priorities, to organize responses, to recognize water rights, share control and monitoring and portioning of water resources and to eliminate a range of environmental threats to peace and security (Asheesh 2001a).

The framework, particularly, will be developed in the area of water resources and will be based on the following aspects (Mostert 1998):

- Understanding the nature of the connections between water resources and conflict,
- Identifying policies and principles that reduce the risks of disputes over freshwater leading to conflict,
- Understanding the mechanisms for promoting cooperation over shared freshwater resources.

There have been few achievements on the political level concerning the subject that just understanding the necessity of cooperation is a way to resolve the water conflict in the Middle East area. In October 1994, a peace treaty between Israel and Jordan was signed which addresses water allocations, sharing of water information, and joint management policies for the Jordan River Basin. The Convention on the Non-Navigational Uses of International Watercourses based on article 6 of the treaty reads as follows:

The Parties agree to recognise the rightful allocations of both of them to the waters of the Jordan River and the Yarmouk River and Araba/Arava groundwater in accordance with principles set in Annex II of the Jordan Intelligence Agency agreement (JIA 1998).

- The Parties jointly undertake to ensure that the management and development of their water resources does not harm the water resources of the other party.
- The Parties recognise that more water, to meet their needs, should be supplied through various methods, including projects of regional and international cooperation.
- Parties agree to search for ways to alleviate water shortage and to co-operate in the following fields:
  - i) Development of existing and new water resources
  - ii) Prevention of contamination of water resources
  - iii) Mutual assistance in the alleviation of water shortages
  - iv) Transfer of information and joint research and development in water-related subjects.



Unless all the peoples who depend on the resources concerned are included in the agreements, conflicts will pertain. In particular, definitions of equitable utilisation of existing water resources must be negotiated and applied. These negotiations include discussing the priority of using the resources, like in the Israeli-Palestinian and California cases and in many other parts of the world, to resolve the wrestling between the demand for domestic and agricultural or urban and rural sector (Gleick 1996). The framework for cooperation will help in the formulation of criteria and prioritisation of the realisation of any of the proposed activities. As the water authority in the area is presently unorganised and the water itself is a quickly diminishing natural resource, direct involvement and efficient cooperative water administration is obviously essential and thus this factor cannot be handled separately from the technical issues.

There is a need for a secure scheme of better civil engineering services for as many households as possible. Israeli-Palestinian water service and water systems need novel solutions to curtail excessive water consumption in all the major areas: agriculture, industry, and households. Practicable and important solutions could be, for instance, methods for purification of wastewater and seawater as well as plans to improve the deteriorated networks. Expanding the water network and rehabilitating the old network are of primary concern, for most of the area still relies on water distribution trucks, use of which may be very uneconomical and wasteful. Moreover, the quality of water deteriorates, especially during the hot season. Rehabilitation of the existing networks should be scheduled to start as soon as possible and carried out using new technology. According to Al-Najah National University (Shahin 1995), the water loss in the system is more than 45 percent in Nablus City in the West Bank, and 31 percent, on average, in the whole West Bank and Gaza Strip (Mimi & Smith). Thus in order to save water and minimise water scarcity, the condition index for rehabilitation of networks (Asheesh 1998) could be utilised to plan and research the intended rehabilitation of water networks.

The framework for cooperation should include the management of wastewater, which also poses a risk to the environment, since the groundwater lies relatively close to the surface and is easily contaminated (Nashashibi 1995). There are only a few wastewater treatment plants in the area, and the wastewater network is not large enough. Consequently, proper planning and locating of treatment plants and expansion of the wastewater network make up an important part of this research. Water re-use, which represents a new possibility to increase water resources in the area, can eventually help

conserve significant amounts of fresh water, but much more research is needed to determine how water could be re-used in agriculture and industry.

According to (Kuttab & Jad 2000), three major issues concerning the Israeli-Palestinian conflict have to be analysed and ranked with regard to cooperation in water resources by the Palestinian West Bank and Gaza Strip Territories and the Israeli state.

The first issue relates to water resources that originate and are discharged completely in the Palestinian West Bank and Gaza Strip. The most obvious example of this sort is the Eastern aquifer resulting from rains within the catchment area east of the hydrological line that crosses the West Bank towards the Ghor Valley.

The Israeli West Bank Mountain Aquifers have three general basins. The west aquifer, providing more than a half of the total yield in Israel, is called the Taninim aquifer, the second aquifer is the northern aquifer and the third one is the eastern aquifer. The last one lies on, and enters the West Bank. The second and the third aquifers as well as the most important west aquifer, qualify as transboundary basins, and any water distribution solution should be based on principles of sharing the watercourses under international law.

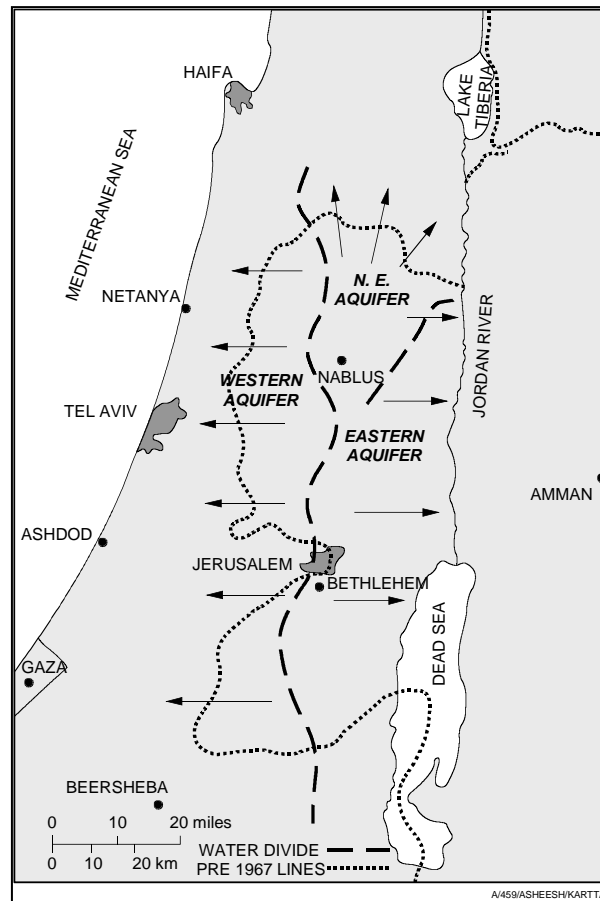
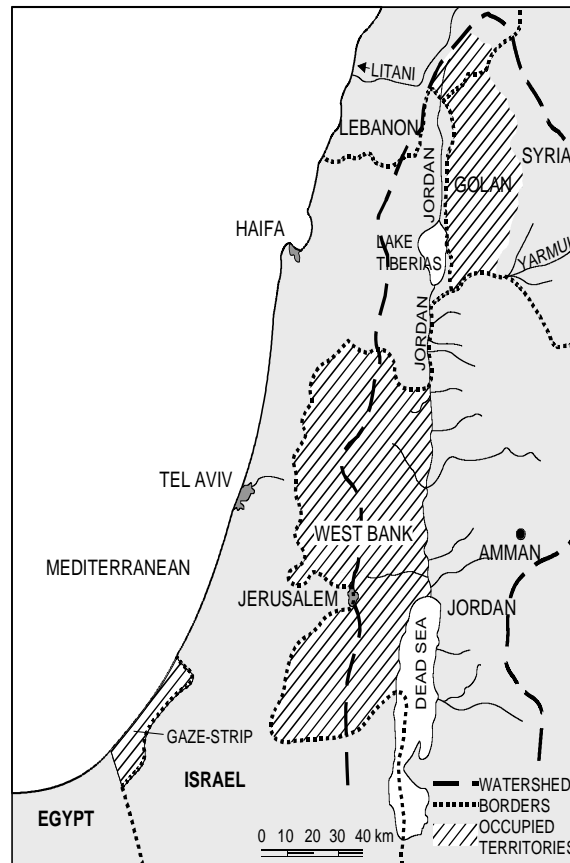


Figure 2. The hydraulic line locates the aquifer basin in the West Bank (Assaf *et al.* 1993; modified by Asheesh & katko 2002)

The second issue relates to the riparian waters, which flow into the Jordan River. The Palestinians in the West Bank together with Jordan, the State of Israel and Syria share these resources. Despite the absence of clear precision, there are sufficient guidelines in international law pertaining to surface riparian rights that can and should fully govern the allocation and distribution of the waters of the Jordan River among Israel, the Palestinians and other parties as shown in Figure 3. International Water Law and the Helsinki Rules can be applied.

The third issue pertains to water resources resulting from rainfall in areas west and northwest of the hydrological line and which feed two main aquifers that are shared with the State of Israel. The major portion, about 80 percent, (Asheesh 2000) of the waters in these aquifers originates from the West Bank catchment areas.



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Figure 3. The catchment area, source of the Jordan River basin (Libiszewski 1995a; modified by the author 2002b)

The aquifer itself flows and actually straddles the border between the two areas with the majority of it found in the West Bank Territories. The consumption of water based on withdrawal from those aquifers (the eastern and northern aquifer) is presented in Table 3. It shows that the main and the biggest share is consumed by the Israeli settlements in the West Bank area.

Table 3. The overall water use from the eastern and northern aquifers in Israel, the West Bank and Gaza (Jägerskog 2000; translated and modified by author 2000)

<b>AREA</b>	<b>WATER CONSUMPTION (M<sup>3</sup>/CAPITA/Y)</b>
Israeli close area	407
Palestinian close area West Bank	100
Jewish settlements inside the West Bank	650
Palestinians inside Israel	100
Jewish settlements inside Gaza Strip	1700*
Gaza Strip	100

- most of the consumed water was used in irrigation

## **Conclusions**

Freshwater conflicts are common in arid and semi-arid regions, and they tend to remain particularly acute when international relations are otherwise tense. These two elements co-exist in the case of the West Bank-Gaza Strip and the Jordan River Basin. Major tensions over freshwater resources indeed exist there: it is a perfect illustration of the role water can have in politics.

The transboundary water issue is a challenge for water professionals and decision makers worldwide. Rules have been declared by the international community to be followed to assist the riparians in solving conflicts and strengthening their cooperation. Among the riparian countries, the situation is particularly difficult bilaterally between Israel, Palestine, Jordan, and Syria. Israel and Jordan, both suffering from extreme water scarcity, have not so far fully agreed on the sharing of the waters of the Jordan and Yarmuk Rivers, although major efforts at cooperation have been made recently. Syria has a contentious dispute/agreement with Israel regarding the future national control of the Golan Heights area. The Palestinians are not powerful enough to participate in any discussions involving the important headwaters of the Jordan River. Syria and Jordan have had some disagreements over the project to build a dam on the Yarmuk River, which Israel opposes anyway. Finally, the Palestinian State question is also closely linked to water issues, since the West Bank area aquifers constitute a major source of water for Israel.

In Israel and Palestine, the conflict over shared water is the result of distrust, sovereignty, ownership of the water resources in theory, and use of force in reality. On the other hand, international water rights and water sharing principles are ignored. It is a fact that

the area will suffer from water shortages in the long term. Increasing the supply and decreasing the demands could be an alternative to covering the gaps. Water saving and water-use priorities could decrease the demands. This could be achieved by eliminating swimming pools in the settlement areas. Water demand for irrigation and other use also needs to be regulated and minimised. This can be achieved by growing the proper types of crops, or importing fruits and vegetables from neighbouring countries, if possible. On the other hand, the strategy of the Palestinian water plan should be implemented to control and monitor water portions, to fill in the gaps in the inland region of Palestine – 38 million m<sup>3</sup>/y – and 107 million m<sup>3</sup>/y in the coastal region by the year 2020.

Allocation of the water resources in the area is important for long-term planning and strategy building. Any allocation or any portions should be based on the principles of international law. Most of the key principles of transboundary water management are based on the so-called Helsinki Rules from 1966 although they are under review. Available tools and rules have to be applied to achieve the goal. The developed model is a tool applicable to allocation and evaluation of the water resources of the area. Yet, tools cannot be applied without faithful and real cooperation between the riparians. Exchange of information should be practiced to monitor the resources over the long term. Water authorities, consultancies, researchers and even decision makers can use this model.

Ironically, international cooperation is both necessary and difficult in the Jordan River Basin and the aquifer basin in the West Bank. The peace efforts of the 1990s could have eased the situation, but the only solution for the long run is to agree on basin-wide water allocations and management. It remains to be seen whether a general water agreement can be made before a lasting peace has been secured, or if these political questions must be resolved simultaneously.

## **Recommendations**

In river basin conflicts, possible and alternative solutions should be based on international legitimacy and principles of efficient and sustainable use of water resources. Two basic principles for a long-lasting solution should be applied. The first principle of solving any conflict is understanding that negotiations in good will are the way to solve a conflict. The second principle involves understanding that any solution should be comprehensive and integrated. The principles and rules that should be applied to solving

a conflict in a comprehensive and integrated manner include adoption of a water charter for a region, optimisation of water use in agriculture and industries, and water pricing policies.

As alternatives for covering the gaps of the current water deficit, there are two basic categories of solutions to water resource limits: increase supply and decrease demand. The most feasible alternatives are listed below:

#### *Increasing freshwater supply*

Importing water. In 1987 Turkey expressed the idea of leading some of its abundant waters to the region through a 'Peace Pipeline'. That project would be expensive. In addition, the Arab countries which it would benefit might be reluctant to give Turkey the power to control some of their water resources.

Wastewater reclamation. This option is highly feasible, as the example of Israel testifies.

Desalination of seawater. This is a very expensive alternative. It would concern mostly water from the Mediterranean Sea for Israel and from the Dead Sea for Jordan.

#### *Decreasing freshwater demand*

Using water-efficient techniques in agriculture. Israel uses drip irrigation on a large scale and other countries could do the same. The use of less water-intensive crops could also be a feasible option.

Increasing the price of water. This is an unlikely option, not only because it is difficult to implement, but also because it might be politically impossible to make the access to water more expensive for agriculturalists.

In the case of Israeli-Palestinian water demands, effective water supply can be increased by: i) Water desalination for the short and long run, ii) Water recycling for the short and long run, iii) Water conservation.

#### Suggestion for the whole area:

Establishment of Regional Technical Advisory Committees. These independent regional groups promote the application of integrated water resources management as a critical approach to managing the world's water resources. Support to the working plan was suggested by the GWP-Med Conference on Effective Water Governance, 19-20 March 2002, Athens, organised by GWP-Med Global Water Partnership for the Middle East.

The GWP-Med project supports the adoption and implementation of International Water Resources Management (IWRM) by all Mediterranean countries. As a means of providing this support, GWP-Med has developed a work plan, which could assist riparians such as the Palestinian and the Israelis to manage their shared water resources. The work plan focuses on the following areas: establishing partnerships, developing awareness and changing attitudes towards water management, supporting established alliances, forming alliances with key international and regional organisations, generating and disseminating knowledge about IWRM good practices, supporting dialogue on key IWRM issues, completing regional Frameworks for Action and prioritising actions, and identifying and supporting special studies

### **Lessons learnt**

Lessons that have been learnt during this study relate to two dimensions, the global and the regional dimensions. In general, despite the complexity of water disputes, history shows that they can be resolved, or at least a process of negotiations created (the Mekong, the Nile, the Rio Grande, etc.). On the other hand, such processes may often take a lot of time. The challenge for the international community is to get ahead of the "crisis curve", to help develop institutional capacity and a culture of cooperation in advance of costly, time-consuming crises that in turn threaten lives, regional stability, and ecosystem health.

From the global aspect, one productive approach to the development of transboundary waters has been to examine the benefits in a basin from a multi-resource perspective. This has required riparians to get past looking at water as a commodity to be divided and to develop instead an approach that equitably allocates not the water, but the benefits derived therefrom.

The most critical lessons learnt from the global experience related to international water resource issues are that:

Water crossing international boundaries can cause tensions between nations that share a basin. While the tension is not likely to lead to warfare, early coordination between riparian states can help ameliorate the issue.

Once international institutions are in place, they are tremendously resilient over time, even between otherwise hostile riparian nations, and even while conflict is waged over other issues.



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