



Applied Research Institute – Jerusalem (ARIJ)  
P.O.Box 860, Caritas St.  
Bethlehem, Palestine  
Tel: +972-(02)-277-0535  
Tel: +972-(02)-274-1889

## ***The Wild West and Hydropolitics in the Middle East***

### **1. Introduction**

The Middle East region is recognized as the driest and most water scarce region in the world. While representing 5% of the total world population, the Middle East region contains less than 1% of the global renewable water resources. Most countries in the region are heading towards a severe water crisis. The actual natural scarcity, however, is not the only key issue. In such region already critically short of water, water resources have been exploited at a much higher rate than can be replenished naturally. Water depletion has been compounded by a variety of factors. The high growth of population and the expanding initiatives in agriculture and industry have increasingly affected water resources in the region. This has resulted in a rising imbalance between the limited supply and rising consumption. Another aspect is the pollution, which has contributed to a deterioration of the usable resources and a general decline in the quality of the available water.

Most of the water resources in the Middle East region are transboundary and stems from three major waterways: the Tigris-Euphrates, Nile and Jordan River systems. Therefore, competition over the utilization of these shared resources is pre-programmed and the mutual reliance on them has made water a catalyst for conflict.

While the water crisis itself in the region is a consequence of natural scarcity and growing demand, water disputes emerge from the lack of binding legal agreements regulating the use of the shared water bodies. The current allocations of the shared water resources among the riparians in the region are not the outcome of agreements, negotiations or equitable principles. Rather they reflect the asymmetries of power in existence and the abilities of the strong to impose their wills on the weak. Turkey and Israel, even though one is a downstream riparian and the other is an upstream one, have both managed to monopolize and utilize water shares far and beyond those that any rational allocation system consistent with basic international law governing transboundary resources would entitle them to.

Of all the Middle East river basins, the Jordan River Basin hosts the most fraught and inflammable dispute. Over the years, water issues pertaining to the basin have sparked military conflicts and exacerbated the existing political tensions. The current water



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allocations has not been negotiated but are loosely based on the Johnston plan of 1955. Palestinians who are full riparians in the Basin, have been denied access to its waters by the Israelis. Therefore, the environment of conflict in the Jordan River Basin will be analyzed focusing on the Israeli Palestinian water disputes because it is believed that the water crisis that faces the Palestinians results from the inequitable distribution of the shared resource among the various riparians. The available water resources in the Palestinian Territories is sufficient for the Palestinian consumption at all sectors but the Israeli occupation has imposed several constraints on the water resources that hamper Palestinians water rights and share. Background to the problem is that, since the occupation of 1967, Israel has monopolized the water resources in the West Bank and Gaza Strip to meet its interests first, ignoring the basic water needs of the Palestinians.

## 2. JORDAN RIVER BASIN

The Jordan River Basin is an international watercourse shared between Israel, Jordan, Lebanon, Palestine and Syria. The Jordan River originates from three main springs: the Hasbani in Lebanon, the Dan in Israel and the Baniyas in the Syrian Golan Heights, to form the Upper Jordan River Basin (**Figure 1**). The water of this basin flows southward through Lake Hula towards Lake Tiberias. The entire length of the Jordan River is 360 Km with a surface catchment area of about 18,300 Km<sup>2</sup>, of which 2,833 Km<sup>2</sup> lie upstream of the Lake Tiberias outlet. The Lower Jordan River Basin is downstream of Lake Tiberias and joins the Yarmouk and Zerka Rivers originating from Syria and Jordan in the east. The outlet of this basin is the Dead Sea in the south. It is worth mentioning that the West Bank, Jordan and Israel are considered the core part of the basin because around 80% of the drainage area of the Jordan River catchment system is located within their boundaries <sup>(1)</sup>. Moreover, the Jordan River represents the only permanent river that can be used as a source of surface water in such areas.



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## **2.1 Past Conflicting Water Plans in the Jordan River Basin**

The Jordan River Basin has emerged as a flashpoint for conflict over water. The 1948 war forced a great number of Palestinian refugees to flee and settle in the eastern part of the Jordan Valley. The Jordanian Government and UNRWA (The United Nations Relief and Works Agency) agreed to develop irrigation schemes in the area to assist Palestinian refugees to resettle and cultivate the land. For this purpose, the Jordanian Government commissioned a British consultant, Sir Murdoch MacDonald, to conduct a study on their behalf. The MacDonald Plan was finalized in 1951. The plan called for Jordan Basin water to be used exclusively for irrigation on both banks of the Jordan River by storing surplus water from the Yarmouk River in Lake Tiberias and constructing canals down both sides of the valley.

Arabs were uneasy about the suggestion of the storage of water in Lake Tiberias and favored the plan put forth by the American engineer M. E. Bungler, which suggested a suitable location for the construction of a water storage dam along the Yarmouk River in the Maqarin area, where three valleys join. The impounded water would be diverted to another dam at Addassiyah and into gravity flow canals along the East Ghor area in the Jordan Valley. The plan included two hydroelectric generating plants at the site of the two dams to supply water and electricity to both Jordan and Syria. The Bungler Plan addressed several of Jordan's and Syria's needs and was intended to resolve, to some extent, the Palestinian refugee problem by increasing the productivity of available agricultural lands in the East Jordan Valley and parts of Syria.

As soon as work began in July 1953, Israel vocalized its concern about increasing Arab control over the area's water resources. Israel objected on the grounds that the original Rutenberg Concession gave it exclusive rights to the Yarmouk River. As a result, pressure was exerted on the United States Government and UNRWA to cease support for the project. To the surprise of the Jordanian Government, work halted soon thereafter and the project was terminated.

After the War of 1948, the new government of Israel began to prepare practical plans for the utilization and control of the area's water resources. The first Israeli national water plan (the Seven-Year Plan) was approved publicly in 1953. The main component of the plan was to divert the Jordan River waters south toward the Negev desert and establishing a unified and comprehensive water network that would cover all parts of Israel.



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In September 1953, the construction of the *National Water Carrier* began and thus plans to divert the Jordan River water south to the Negev were activated. Diversion originated at the Banat Yacoub Bridge in the demilitarized zone between Israel and Syria. After Syrian objection to the excavation process, and United States' economic sanctions against Israel, a temporary freeze on the work at the Banat Yacoub Bridge was announced in October 1953.

In October 1953, the United States prepared the Johnston Plan as yet another attempt to solve the area's water crisis. The rising tension caused by the Israeli initiation of the National Water Carrier project encouraged the United States to mediate between the two parties. The plan sought to satisfy the minimum requirements of riparian Arab states, as well as Israel. Eric Johnston implemented a water plan prepared by Charles Main, under the supervision of the Tennessee Valley Authority. Essentially, the Johnston Plan was a combination of the Lowdermilk-Hays and the MacDonald-Bunger Plans. The new plan included water distribution quotas for the Jordan Valley Basin, estimated at 1,213 MCM annually, among the riparian states <sup>(2)</sup>. The plan was not well received by either Israel or the Arab States. Consequently, Arabs and Israelis submitted counter proposals for dividing water shares - the Arab Technical Committee and the Cotton Plan respectively.

The period between October 1953 and July 1955 was a stage of negotiating and bargaining over the Jordan River System. By the end of 1955, the Johnston Plan had become more favorable to Israel, whose share rose to 450 MCM, while Jordan's share dropped to 720 MCM <sup>(3)</sup> (see **Table 1**). The final form of the plan, even though it was rejected by the Arab States, was used by the United States as a basis for its future plans in the region. The failure to reach bilateral agreement reinforced each country's inclination to proceed independently.

**Table 1**

**Water Allocation According to Johnston's Plan of 1955  
(MCM/year)**

	<b>First Johnston Plan</b>	<b>Revised Johnston</b>	<b>Present use</b>
Syria	50	132	153
Lebanon	-	35	5-10



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Jordan	829	720	255-290
<b>Total Arab States</b>	<b>879</b>	<b>887</b>	<b>413-453</b>
Israel	426	375-475	675-700

\* Source: (4)

In 1958, Israel reinitiated the National Water Carrier project, albeit with some technical changes; also, the Seven-Year Plan was replaced by a Ten-Year Plan. The new plan shifted the diversion point to Eshed Kinort, at the northwest corner of Lake Tiberias. The new diversion project was carefully designed in accordance with Israel's water allocation in the revised Johnston Plan. It also refrained from invalidating its general principles.

Arab reaction to Israel's National Water Carrier was to build dams on tributaries of the Jordan and Yarmouk Rivers, thus reducing the water flow to Israel. In 1965, Syria began building dams to divert water from the Banias and Dan Rivers in the Golan Heights. These headwater diversions threatened to deprive Israel of 35% of its water potential from the Upper Jordan. Israel, as a riparian state of the Jordan Basin, considered this an aggressive action in regard to its water resources and sent fighter planes to destroy working sites. No water plans were devised after the Johnston Plan of 1954. However, many events have taken place since which have altered water distribution quotas.

Since the 1967 occupation of the West Bank, Gaza Strip and Syrian Golan Heights, Israel has vastly expanded its control over water resources in the area, to include Mount Hermon, West Bank aquifers and the entire length of the Jordan River. As an outcome of the 1982 Israeli invasion of South Lebanon, Israel extended its command even further, to include part of the Litani River. Israel's strategy is to control and derive maximum benefit from all water resources in the Arab occupied territories.

## 2.2 Present Conflicting Water Plans in the Jordan River Basin

The current allocations of the Jordan River waters among the riparians are not the outcome of agreements, negotiations or equitable principles. While the Jordan River System satisfies about 50% of Israel's and Jordan's respective water demands; Lebanon and Syria are minor users, meeting 5% of their combined demands from the Jordan River. Palestinian water use from the Jordan River is presently non-existent due to water quality degradation and the military closure of the areas where the Palestinians can have their access to the Jordan River.



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### 2.2.1 Proposed Plans to Raise the Dead Sea Level

The Jordan drainage system supplies two-thirds of the Dead Sea's total inflow, while the rest being accounted for by saline springs, smaller rivers and the seasonal wadis draining directly into the lake. During the past years, a stable water level of the Dead Sea was maintained through the equilibrium between the inflow and the high evaporation rate since the Dead Sea is a terminal basin without any outlet to the oceans.

As mentioned previously, several water diversion schemes from the Jordan-Yarmouk system were implemented (**Figure 2**). Redirecting the greatest part of the Yarmouk River to the East Ghore Canal and pumping the rest of it to the Sea of Galilee resulted in a major drop in the Jordan River water level. The diversion of additional water to the Negev via Israel's National Water Carrier dropped the water level even lower<sup>(5)</sup>. A direct consequence of such schemes is the lowering of the Dead Sea's water level. Currently, the Dead Sea is being lowered by about half a meter per year (except in particular wet periods). From 395 meters below sea level in the early 1960s the level of the Dead Sea fell down to -407 meters in 1987.

In view of the Dead Sea crisis, several massive projects have been proposed, such as the "Med-Dead" and "Red-Dead" canals, to bring water from the Mediterranean or the Red Seas to the Dead Sea. The canals would take advantage of the drop in elevation to the Dead Sea to desalinate water and/or produce energy. But no actions have been taken or proposed to alleviate the drop in the water level of the Jordan River, which, in 1953, had an average flow of 1250 MCM per year at the Allenby Bridge<sup>(6)</sup>, now records annual flows of just 152-203 MCM<sup>(4)</sup>.

#### *Israel's Proposed Mediterranean-Dead Sea Canal (Figure X)*

Two alternative routes for delivering water from the Mediterranean Sea to the Dead Sea were considered: the northern route from the northern part of the Mediterranean, Haifa to the Jordan valley and the central route from Gaza Strip, crossing Bi'r As Sabi' and ending at the Dead Sea. The idea of connecting the Dead Sea to the Mediterranean had originally been proposed by Israel in 1953 during the Johnston negotiations as one element of its Seven-Year Plan. The initial proposed plan focused on using the natural elevation difference between the two seas to generate hydroelectric energy rather than water generation.

In the 1980s, Israel did consider a project that would do both, energy and water generation. The generated electricity would be used to desalinate the Mediterranean Sea water, which could then be put to human or agricultural use. Water that was not processed would have been allowed to flow into the Dead Sea. But like many plans involving desalination, this one was ultimately shelved because it was deemed too expensive<sup>(7)</sup>.



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### *Jordan's Proposed Red-Dead Sea Canal (Figure X)*

The Jordanians proposed a similar canal, with the source of water originating from the Red Sea instead of the Mediterranean (the southern alternative). According to the plan, water would be pumped from the Red Sea's Gulf of Aqaba up the coastal ridge and then downhill through the Jordan Rift Valley to the Dead Sea. But this project could cost as much as 5 billion dollars. <sup>(7)</sup>

### *Which is better the Med-Dead Canal or the Red-Dead Canal?*

In general, the financial attractiveness of the "Med-Dead" and "Red-Dead" canals is limited, as they carry price tags in the billions of US\$. However, economics is not the only block to such mega-schemes as there has been no thorough environmental impact assessment yet. In this respect, Mr. Gidon Bromberg of Friends of the Earth Middle East said about the possibility of a Red-Med-Dead canal that "we would be very concerned because of the potentially negative environmental impacts" <sup>(7)</sup>. Furthermore, this kind of projects requires achieving a balance between the water inflows into the Dead Sea and the evaporation from its surface, which is very complex. Miscalculations might result in flooding a greater area than originally planned or require decreasing seawater input, inevitably jeopardizing the project's economical viability. Some Jordanian hydrologists expressed their worries about the potential increase of salinity in nearby fresh water aquifers, the submerge of several inhabited centers, roads as well as tourist establishments and the effects on the potash extraction works despite the fact that stabilization of the Dead Sea water table at the planned level of -390 m below sea level can be achieved. <sup>(1)</sup>

From a Palestinian perspective, the central alternative of a Med Dead Sea Canal is more favorable as it allows equal control and benefits to all parties compared to the other Dead Sea canal alternatives. A desalination plant accompanied with the aforementioned alternative can be proposed at Gaza by transferring electricity to Gaza from the generators at the Dead Sea. This is more promising than the one with the northern alternative of a Med Dead Sea Canal because of the critical need of water in Gaza Strip. Moreover, the central alternative provides much less potential environmental danger compared to the northern alternative that would entail potential pollution of the fresh groundwater aquifers along its route, as saline seawater will be transported over areas overlying such aquifers.

## **2.2.2 LEBANON'S PLANS TO DIVERT WATER FROM THE**



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## WAZZANI RIVER

The absence of clear agreements among the riparian countries has resulted in bad management of the Jordan River waters. The Article 7 of the ILC Convention on the Law of the Non-navigational Uses of International Watercourses, 1997 states “*watercourse states shall, in utilizing an international watercourse in their territories, take all appropriate measures to prevent the causing of significant harm to other watercourse states*”. During the past years, the Israelis did not consider this matter and went on with their projects to satisfy their water needs by constructing the National Water Carrier to divert the Jordan River water to the Negev.

Last year, it was reported in the press that Lebanon intends to construct a pumping station for drawing water from the Wazzani River – a tributary of the Hasbani River to the Wazzani village in southern Lebanon to supply the needs of a few local villagers. The Israeli government considered this action as a violation of a long-standing principle - that the status quo on water should not be changed without agreement <sup>(8)</sup>. They considered this as a violation of the international conventions. Israel forgets that it converted the Jordan River water without any agreement with the other riparian countries. Israel believes that what is right for her is not right for any body. It is worth mentioning, that Lebanon was entitled to about 35 MCM of water yearly from the Hasbani River according to the revised Johnston plan. But its current use does not exceed 10 MCM/year, which makes its plan to pump water from that river to meet the needs of local population legitimate.

This issue has been currently raised by the Israelis who warned Lebanon not to divert water from the Hasbani River and considered such attempt as “a pretext for war”. However, Lebanese officials declared that their plans would continue despite the Israeli threats as they have been deprived of profiting from its share of the Wazzani spring for many years because of the Israeli occupation. <sup>(9)</sup>

### 3. ISRAELI-PALESTINIAN WATER CONFLICT

Historical Palestine covers an area of about 27,700 Km<sup>2</sup> of which the Palestinian Territories covers only an area of 6,210 km<sup>2</sup> and the rest is occupied by the state of Israel (**Figure X**). The newly defined Palestine consists of two physically separated landmasses, the West Bank (including Jerusalem) covering 5,844.5 km<sup>2</sup>, is surrounded by Israel from the west, north and south and the Jordan River from the east, and the Gaza Strip, covering 365 km<sup>2</sup>, is surrounded by Israel to the east and north, Egypt to the south and the Mediterranean to the west.



The political situation prevailing in Palestine dominates all aspects pertaining to both the availability and accessibility to water resources. Thus it is the Israeli occupation and Israel’s discriminatory policies that constitute the main constraint against both Palestinian right and share of their water resources.

### 3.1 Available Water Resources

Historical Palestine includes three major sources of water namely: the Jordan River, Mountain Aquifer and the Coastal Aquifer. These sources provide the area with an annual amount of about 2,000 MCM. Palestinian entitlements for water include the underground water of the West Bank and Gaza aquifers, in addition to their rightful share in the water of the Jordan River as riparians.

#### 3.1.1 Mountain Aquifer

The Mountain Aquifer System in the West Bank is mostly recharged from rainfall on the West Bank mountains (**Figure 4**). It has three major drainage basins: the Western, the Northeastern and the Eastern Aquifer basins. The annual renewable freshwater of this aquifer is estimated at 679 MCM according to Article 40 of Oslo B Agreement (**Table 2**).

**Table 2**  
**Palestinian and Israeli annual consumption of the three basins in the West Bank according to article 40 of Oslo B Agreement in MCM**

<b>BASIN</b>	<b>Israeli consumption</b>	<b>Palestinian consumption</b>	<b>Quantities available for development</b>	<b>Total estimated yield of the basin</b>
Western	340	22	--	362
Northeastern	103	42	--	145
Eastern	40	54	78	172
<b>Total</b>	<b>483</b>	<b>118</b>	<b>78</b>	<b>679</b>

Source: 10

**The Western Basin**, which is the largest, has a safe yield of 360 MCM per year (of which 40 MCM brackish). Eighty percent of the recharge area of this basin is located within the West Bank boundaries, whereas 80% of the storage area is located within Israeli borders. Groundwater flow is towards the coastal plain in the west, making this a shared basin between Israelis and Palestinians. The groundwater being mainly of good quality, this source is largely used for municipal supply. Israelis exploit the aquifers of this basin through 300 deep groundwater wells to the west of the Green Line, as well as through Mekorot (the Israeli water company) deep wells within the West Bank boundary. Palestinians, on the other hand, consume only about 7.5% of its safe yield. They extract



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their water from 138 groundwater wells tapping the Western Aquifer System (120 for irrigation and 18 for domestic use) in Qalqilya, Tulkarm, and West Nablus. There are 35 springs with an average flow discharge exceeding 0.1 L/s located in this aquifer system.

*The Northeastern Basin* has an annual safe yield of 140 MCM (of which 70 MCM brackish). Palestinians consume only about 18% of the safe yield of their aquifers in the Jenin district and East Nablus (Wadi Al Far'a, Wadi El Bathan, as well as Aqrabaniya and Nassariya) for both irrigation and domestic purposes. There are 86 Palestinian wells in this aquifer system (78 irrigation wells and 8 domestic wells). The general groundwater flow is towards the Bisan natural springs in the north and northeast.

*The Eastern Basin* has a safe yield of 172 MCM per year (of which 70 MCM brackish). It lies entirely within the West Bank territory and its Palestine's only exclusive water resource and was used exclusively by Palestinian villagers and farmers until 1967. After 1967, Israel expanded its control over this aquifer and began to tap it, mainly to supply Israeli colonies implanted in the area. The most important springs in the West Bank are in this basin. Seventy-nine springs with an average discharge greater than 0.1 L/s provide 90% of the total annual spring discharge in the West Bank. There are 122 Palestinian groundwater wells in this aquifer system (109 for irrigation and 13 for domestic use).

### **3.1.2 Gaza Coastal Aquifer**

It is a continuation of the shallow sandy/sandstone coastal aquifer of Israel (shared aquifer). About 2200 wells tap this aquifer with depths mostly ranging between 25 and 30 meters. It supplies 98% of the current water supply in the Gaza Strip. Its annual safe yield is 60 MCM, but the aquifer had been over-pumped at the rate of 110 MCM resulting in a lowering of the groundwater table below sea level and saline water intrusion in many areas. Of the 44 MCM used for domestic purposes, only 9% is of good quality. The agricultural water, estimated at 83 MCM per year, is also of low quality.

### **3.1.3 The Jordan River System**

The only permanent river, which can be used as a source of surface water in Palestine, is the Jordan River. According to Johnston plan, which included water distribution quotas for the Jordan Valley Basin among the riparian states, a West Ghor canal was proposed to provide Palestinians with Jordan River water that translates into up to 250 MCM per year. This project was never implemented.

As appeared in **Table 1**, the First Johnston Plan and the Revised one have given the Israelis the right to use an amount of about 426 MCM per year. However, through the years of occupation, Israel exceeds its share in the Jordan River and utilizes around 675-



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700 MCM per year for Israeli consumers depriving the Palestinians in the West Bank from their share. Historically, the Palestinian use of the Jordan River before 1967 was through 140 pumping units<sup>(11)</sup>. Immediately after the occupation these pumping units were either destroyed or confiscated by Israeli authorities. In addition, large irrigated areas of the Jordan Valley used by Palestinians were closed as a military zone and later given to Jewish colonists<sup>(11)</sup>. Approximately, 50% of the land in the Jordan Valley is confiscated and restricted to Palestinian use. Israel has declared the area surrounding the Jordan River a closed military zone and as a result, Palestinians have been denied access to its water. Such practices have influenced the authentic development of the Jordan Valley, which is considered the food basket for Palestinians. The area in the Jordan Valley, which was cultivated before the occupation of the West Bank in 1967, was estimated at 84,700 dunums. Since the Israeli occupation in 1967, there has been a decline in the cultivated areas of the Ghor.

### 3.2 Water Consumption and the Inequitable Distribution of the Shared Resources

It is estimated that the sustainable water resources in historical Palestine equals to 2200 MCM/yr including the treated wastewater of which 990 MCM is the Palestinian water rights in the Mountain Aquifer, Coastal aquifer and the Jordan River. Israel consumes 1920 MCM/yr (350 CM/capita/yr) while the Palestinians annual consumption does not exceed the 279 MCM (135 CM/capita/year) divided between the West Bank (146 MCM) and Gaza Strip (133 MCM). The inequity between Israelis and Palestinians in the use of the available water resources is illustrated if compared on the per capita water consumption basis. Figures reveals that Israelis enjoy 3-4 times as much as per capita Palestinian enjoys. An average Israeli consumes about 280 liters per day with a continuous flow of water in his tap even during drought years<sup>(12)</sup>. In contrast, the per capita consumption for Palestinians is averaged between 57-76 liters per capita per day which is far below the WHO standards of 100-150 l/c/day.

In the West Bank, Israel is currently utilizing more than 80% of the 679 MCM Palestinian groundwater resources by piping this resource to the illegal colonies and into Israel proper and thus inducing water scarcity in the area (refer to **Table 2**). Israel also denies the Palestinian access to their water rights in the Jordan River, despite the fact that they are riparians to this international water resource. In Gaza, Palestinians are forced to over-pump the shallow coastal aquifer leading to sea water intrusion and consequently, deteriorating water quality. The restrictions have suppressed Palestinian water use at all sectors of life and hindered their economic development.

Moreover, the Israeli Authority, during the period of 1967-1995, did very little for the water infrastructure resulting in deprivation of several communities from running water and restricts the development of new water resources. The statistics of the Palestinian



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Water Authority (PWA) shows that 304 Palestinian communities do not have access to piped water. They have to rely on rooftop cisterns, water tanker trucks, which supply poor quality and unsupervised water. Even with those who are connected to water networks, they do not have water in their pipes for a long period during the year. When the low monthly quota levels for Palestinian municipalities and towns are approached, the remaining supply is constricted, and communities may be without water for extended periods of time. These practices negatively impacted the economic, environmental and social fabrics of the Palestinian society. As a result, present water supplies are neither adequate to provide acceptable standards of living nor sufficient to facilitate economic development.

Since 1995, the Palestinian Water Authority (PWA) in cooperation with international donors have started a comprehensive program to improve the water sector in terms of quality and quantity, yet the gap in consumption still exists due to Israeli restrictions and reluctance to apply what has been agreed upon in the interim agreements between the Israelis and Palestinians with regards to water.

Water supply to Palestinians has been widely affected by the emerging political situation. Israel, during the second uprising that started on the 28<sup>th</sup> of September 2000, is using water as a tool to enforce Palestinians to stop their struggle against occupation. They have imposed a comprehensive siege on the Palestinian cities and villages and adapted a collective punishment policy. As a result, 36 Palestinian communities who totally rely on water tankers trucks are suffering from water cut for a period between one week and two months. Also, they have to survive with 20 liters per day. Over 26 Palestinian communities are suffering from the cut off of their piped water by illegal Israeli colonists in the West Bank and Gaza Strip. In the Gaza Strip, an Israeli Helicopter bombed the well that serves 179,000 Palestinians leaving them without water for a long period of time.

Israeli restrictions on Palestinian water accessibility are not restricted to domestic water use but extended to economic activities such as agriculture, tourism and industry. Agriculture has traditionally been the major productive sector in the Palestinian economy, accounting for about 30% of GDP during 1968-1992 and about 13% during 1992-1998<sup>(13)</sup>. **Table 3** shows the difference in the percentage of irrigated land in the Palestinian areas compared to that in the region. It is evident that the percentage of irrigated agriculture in Israel is the highest in the region reaching almost 50% of its agricultural areas. Agriculture continues to be the largest consumer of water accounting for about 60% of total use. The amount of water currently used for irrigation is about 172 MCM to irrigate 194,000 dunums in the West Bank and Gaza Strip of which 89 MCM is used in the West Bank and 83 MCM in the Gaza Strip<sup>(13)</sup>. At the same time, the Israeli agriculture receives in excess of 70% (~ 1360 MCM/yr) of its annual water while providing less than 4% of its GDP and 3.5% of employment.



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It is worth mentioning that Israel has increased its arable land under irrigation by 340,000 dunums between 1970 and 1990. In contrast, the total area of land under irrigation in the West Bank declined from 100,000 dunums in 1966 to 95,000 dunums in 1990 <sup>(12)</sup>. Demand in agriculture is anticipated to grow exponentially, reaching 407 MCM by 2020 according to the Palestinian Water Strategic Planning Study that has been conducted by PEC DAR. Unless substantial additional supplies of fresh water are made available, Palestine will soon face a serious water crisis. It is estimated that there is a potential to irrigate more than 400 thousand dunums if restrictions on land and water use are lifted <sup>(14)</sup>.

**Table 3**

**Percentage of Irrigated Agriculture of Total Agricultural Land in the Region**

<b>Country</b>	<b>% of irrigated land of total agricultural areas</b>
Palestine	10
Jordan	19
Lebanon	38
Syria	21
Israel	46

Source: 15

**3.4 Water Pollution**

In the previous sections, the Palestinian water crisis has been mainly described as a problem of quantity accompanied by its equitable allocation among riparians. However, a potential quality problem exists, too. The Mountain Aquifer, which represents the most



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important source of fresh water to Palestinians and Israelis as well, has been subjected to severe deterioration. The wide spread use of chemicals coupled with the improper disposal of the generated wastewater and solid waste poses the potential for widely distributed groundwater contamination. Investigations showed that many springs in the West Bank are polluted and their water could not be used for domestic purposes. In a recent study conducted by the Applied Research Institute- Jerusalem (ARIJ) to assess the biological contamination level of three springs located in the Artas Village in the Bethlehem District, laboratory analyses were conducted. The analyses results were positive indicating the presence of fecal coliform bacteria in the analyzed water samples and consequently the presence of sewage contamination. Therefore, potential health risks exist for individuals exposed to the water of the three springs, as it is unsuitable for domestic purposes.

It is worth mentioning that the Israeli colonists living in the West Bank and East Jerusalem are adding more pressure on the environment and consequently contribute in the pollution of the water resources in the area. Furthermore, the practices of the Israeli occupation represented by the illegal movement of hazardous waste generated inside Israel into the West Bank and the relocation of Israeli hazardous industries into the West Bank have damaged the environment in the process.

For the Jordan River, its natural salinity has been exacerbated by the extensive exploitation of the high quality waters through the implemented water diversion schemes<sup>(16)</sup>. Moreover, in an attempt to stem the increasing salinity of the Sea of Galilee, Israel diverted the saltiest of its tributaries into a canal that skirts the lake and empties into the Jordan River. Since 1965 this has dumped an additional 60,000 tons of salts into the river each year. The high salinity of the river is seriously threatening the river's ecosystem and makes the river water scarcely suitable for irrigation.<sup>(5)</sup>

In addition, the saline springs that emerge downstream of Tiberias, as well as agricultural return flows and untreated wastewater from Israeli settlements in the Jordan Valley have deteriorated the quality of water. The salinity in the Lower Jordan is rather high and varies between 350 mg/l in winter and 2000 to 4000 mg/l in summer<sup>(16)</sup>.

### *3.4 The Middle East Peace Process and the Palestinian Water Rights*



Applied Research Institute – Jerusalem (ARIJ)  
P.O.Box 860, Caritas St.  
Bethlehem, Palestine  
Tel: +972-(02)-277-0535  
Tel: +972-(02)-274-1889

Upon Israel's insistence, the Middle East Peace Process was divided into two tracks namely the bilateral negotiations and the multilateral talks. The bilateral talks were intended to lead to peace treaties between Israel on one hand and each of the regional parties, namely Jordan, Lebanon, Palestine and Syria on the other. The multilateral track was intended to complement and support the bilateral track by promoting regional cooperation. A special working group was established for water resources in the multilateral negotiations. It failed to address the central issue of water allocation. Instead, the enhancement of the regional water supplies became a main agenda item. It is worth mentioning that this group lacks the regional component as Lebanon and Syria so far boycotted the multilateral talks.

***On the Israeli-Jordanian track***, the peace treaty has resolved the water dispute between the two states based on mutual recognition of the “rightful allocations” of both parties to the Jordan and Yarmouk Rivers as well as the Araba groundwater. The agreement allows for the use of Lake Tiberias for storing Jordanian surplus rain flows from the Yarmouk and to be redrawn during the summer. It also maintained the right of Israeli farmers to draw water from the Nubian sandstone aquifers from the Jordanian territory in the Araba. Israel and Jordan have agreed to the construction of a diversion dam at Adasiya. There is no doubt that this bilateral agreement will not be a substitute for an integrated and comprehensive one that should include all riparians to the Jordan River basin.

The peace treaty provides that Jordan and Israel will “cooperate in finding sources for the supply to Jordan of an additional 50 MCM/year of water of drinkable standard. This treaty came to test in the summer of 1998, when Israel provided Jordan with poor quality water in exchange for the good quality water that Jordan stored in Lake Tiberias. In the summer of 1999, Israel wanted to rescind from its obligations to provide Jordan with water during the summer. This event led to a political crisis that was finally resolved by the leaders of Israel and Jordan but not without scars.

The ***Syrian-Israeli Peace*** talks, which had been resumed in January 3, 2000, were stalled again due to difference in positions. The difference between these two positions is precisely over access to water resources. Israel is reluctant to withdraw from the Golan Heights and return back to the 1967 borders because it includes important tributaries of the Jordan River as well as the northeastern shore of the Lake of Tiberias, an area of 60 Km<sup>2</sup>.

On the ***Israeli-Palestinian track***, water was one of the major sticking points in the negotiations. Unfortunately, few water related issues between Palestinians and Israelis have been resolved in Oslo II negotiations while major issues and critical decisions in the water dispute were postponed to the final status talks.



Applied Research Institute – Jerusalem (ARIJ)  
P.O.Box 860, Caritas St.  
Bethlehem, Palestine  
Tel: +972-(02)-277-0535  
Tel: +972-(02)-274-1889

In Oslo II agreement, water is referred to under article 40 of Annex 3 “ Protocol Concerning Civil Affairs”. The main issues agreed upon can be summarized as follows:

- Israel recognizes the Palestinian water rights in the West Bank. These rights will be negotiated in the permanent status negotiations and settled in the Permanent Status Agreement relating to the various water resources.
- The Israelis shall transfer authority to the Palestinians to assume powers and responsibilities in the sphere of water and sewage in the West Bank related solely to Palestinians that are currently held by the military government and its Civil Administration, except for the issues that will be negotiated in the permanent status negotiations.
- The issue of ownership of water and sewage related infrastructure in the West Bank will be addressed in the permanent status negotiations.
- The future needs of the Palestinians in the West Bank are estimated to be between 70 - 80 MCM/Yr.
- The immediate needs of the Palestinians in fresh water for domestic use during the interim period is about 28.6 MCM/Yr. The remainder of the estimated quantity of the Palestinian future needs (41.4 - 51.4 MCM/Yr), shall be developed by the Palestinians from the Eastern Aquifer and other agreed sources in the West Bank. The Palestinians will have the right to utilize this amount for their domestic and agricultural purposes.

The agreement states that the future needs of the Palestinians in the West Bank are estimated to be between 70 - 80 MCM/year. This statement is ambiguous and may be interpreted differently by different people. In reality, this amount merely expresses the immediate needs of the Palestinians to satisfy domestic demand during the interim agreement period, without considering future development of other sectors such as agriculture, industry or tourism.

While the recognition of Israel to the Palestinian water rights in the Oslo II agreement is a very important step forward, the agreement attempts to undermine the significance of this issue by talking about maintaining existing utilization and recognizing the necessity to develop new resources, tacitly accepting that more water is needed to satisfy the needs of both populations. It ignores the issue of *equitable and reasonable* distribution of the available water resources.



Applied Research Institute – Jerusalem (ARIJ)  
P.O.Box 860, Caritas St.  
Bethlehem, Palestine  
Tel: +972-(02)-277-0535  
Tel: +972-(02)-274-1889

Palestinian Water specialists criticized that the agreement does not deal with the Palestinian water share in the Jordan River, and the shared Mountain Aquifer (Western and Northeastern) as well as a reduction in the Israeli water consumption from the Palestinian water resources or the quantities provided to the illegal Israeli colonists in the West Bank or Gaza Strip. The agreement indicates that the Palestinians can increase their water supply from the Eastern Aquifer of which an additional 78 MCM of water can be exploited. Most experts agree that the Eastern Aquifer could not yield this additional amount claimed by Israeli experts. However, for political reasons, their opinion was not seriously considered. The drop of the water level in the Palestinian wells in the Eastern Aquifer is raising alarm about the sustainable yield of this aquifer. Thus, it is believed that the maximum amount that could be extracted is 12 MCM. Despite the additional water allotments mandated by the Oslo agreements, the distribution of water resources remains the same and Israel does not fulfill what has been agreed upon in the signed agreement.

In the preparatory talks about the final status negotiations, Israel is refusing to discuss Palestinian water rights and is insisting on dealing with some additional water quantities that may be granted to Palestinians from other non-conventional sources such as desalination or imports from the region. The Israeli negotiators are adamant in rejecting Palestinian demands of their water rights in the Jordan River. They are proposing desalination to overcome Palestinian water shortages. The high cost of desalination per m<sup>3</sup> of water is not affordable by Palestinians, whose GNP per capita is US \$1,800<sup>(17)</sup> compared to Israelis who enjoy a GNP of US \$16,180 per capita<sup>(17)</sup>. Certainly, Israel can easily adopt desalination and grant Palestinians their water rights. Palestinians are completely convinced that any proposal regarding the issue of water shortage in the region will not be practical unless they get their water rights first which are summarized as follows:

- Absolute sovereignty over the Eastern Aquifer as this aquifer is entirely located beneath the West Bank and is not a shared water resource;
- Equitable water rights in the Western and Northeastern aquifers based on the Helsinki Rules, as these aquifers are recharged almost entirely from the West Bank;
- Equitable water rights in the Jordan River System: as a downstream riparian nation to the Jordan River System, Palestine is legally entitled an equitable share of the system's water resources.
- Water and fishing rights in the Lake Tiberias since this natural reservoir is an integral part of the Jordan River System, in which Palestine is a legally a riparian nation with the privilege to equitably utilize it.
- Full compensation for damages to Palestine's water resources and environment caused by Israel and reimbursement for water that has been utilized by Israel for years.



Applied Research Institute – Jerusalem (ARIJ)  
P.O.Box 860, Caritas St.  
Bethlehem, Palestine  
Tel: +972-(02)-277-0535  
Tel: +972-(02)-274-1889

#### 4. Conclusion “Looking Ahead”

IT CAN BE CONCLUDED THAT MOST COUNTRIES IN THE MIDDLE EAST ARE HEADING TOWARDS A SEVERE WATER CRISIS. ALMOST ALL THE RENEWABLE WATER RESOURCES IN THE REGION HAVE ALREADY BEING EXPLOITED AND IN RECENT YEARS, THE FOSSIL WATERS HAVE ALSO BEEN MINED. IT IS BELIEVED THAT THE WATER CRISIS IS NOT CHIEFLY ONE OF INSUFFICIENT SUPPLY, BUT OF UNEVEN AND INEQUITABLE DISTRIBUTION OF THIS SCARCE RESOURCE AMONG THE VARIOUS RIPARIANS.

In the context of the Middle East Peace Process, water represents a hot issue in the negotiations. However, the basic problem in this process is that Israel so far assigned itself as the water commissioner of the area and approached the water conflicts with the Arab neighbors separately and not in an integrated manner. Its strategy is to strike a separate deal with each of its neighbors without any consideration to the geohydrological nature of surface and groundwater basins. Certainly, such an approach is neither acceptable nor sustainable and violating the international laws. Furthermore, Israel despite its recognition of the Palestinian water rights in the Oslo II agreement, it ignores the *equitable and reasonable* distribution of the shared water resources. This ignorance prohibits achieving a comprehensive and sustainable peace in the area, as it should be based on justice and fairness. Therefore, it is required that both parties agree on the principle of “equitable utilization” of the shared resources where “equity” be used as a simple and straight forward interpretation and quantification for the term “equitable utilization”. In other words, the distribution of water in Israel and Palestine be shared equally between Palestinians and Israelis based on the population figures.

It is becoming evident that a holistic approach in addressing the water conflict is inevitable. Riparian countries should realize that it is imperative to collaborate in matters of mutual interests since an effective water resource management needs to transcend national boundaries. In a shared river basin, each riparian country is entitled, within its territory, to a reasonable and equitable share of the water and is obliged not to develop projects that would cause harm to other riparian country.



Applied Research Institute – Jerusalem (ARIJ)  
P.O.Box 860, Caritas St.  
Bethlehem, Palestine  
Tel: +972-(02)-277-0535  
Tel: +972-(02)-274-1889

Many countries in the world adopted the formation of a basin wide management to establish an integrated approach to land and water management in the catchment area of the entire basin. It is regrettable that so far, such an approach has not been implemented in the Middle East so far. Ultimately, this approach has to be adopted because it is the only rational way for solving conflicts and ensuring that all riparians not only utilize the waters but also protect their quality and guarantee sustainability.

The Jordan River Basin may be an ideal candidate for promoting a “basin wide regional institution” in which all riparian countries need to be involved. It is realized that this kind of management will be the ultimate goal for sustainable management of water resources. It is recommended that a committee that will steer the basin wide regional institution should be established by all the governments concerned in order to promote, coordinate, supervise and control the planning, investigation and implementation of water resources development in the basin. The main tasks of the committee should be:

- To cooperate in all fields of sustainable development, utilization, management and conservation of the water and related resources of the Jordan River Basin.
- To promote and cooperate in joint and/or basin-wide development projects and basin programs.
- To protect the environment and natural resources from pollution and other harmful effects resulting from any development plans and uses of water and related resources in the basin.



Applied Research Institute – Jerusalem (ARIJ)  
P.O.Box 860, Caritas St.  
Bethlehem, Palestine  
Tel: +972-(02)-277-0535  
Tel: +972-(02)-274-1889

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Applied Research Institute – Jerusalem (ARIJ)  
P.O.Box 860, Caritas St.  
Bethlehem, Palestine  
Tel: +972-(02)-277-0535  
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