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## **The Intensifying Water Crisis in Palestine**

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### **Abstract**

**Water lies at the heart of the Arab-Israeli dispute in general and the Israeli-Palestinian conflict in particular. Palestine, defined here as the West Bank including East Jerusalem and the Gaza Strip, occupies a unique status from a hydrological point of view, where the West Bank is located in the upstream portion of the Limestone Groundwater Aquifer System and in the downstream of the Jordan River Basin while Gaza Strip is located in the downstream portion of the Coastal Groundwater Aquifer System. Following the 1967 war, Israel imposed strict restrictions on well drilling and construction of water distribution networks which left 25 % of the Palestinians without piped water supply.**

**Israel is currently utilizing about 80 percent of the Palestinian groundwater resources and denying Palestinians their rightful utilization of the Jordan River. Palestinians are currently allocated 80 mcm per year for domestic use leaving the per capita consumption under suppressed demand at an average of 30 cm/year which is far below the required standards of water supply. For agriculture, Palestinians have access to 150 mcm per year which they are using to irrigate around 10% of their cultivated lands while Israel is enjoying abundant water to irrigate 50 % of its cultivated land. The situation is exacerbated by the colonization of the West Bank and Gaza by Jewish settlers who are consuming more than 90 mcm per year from Palestinian water resources.**

**According to Oslo II agreement, Israel recognized the Palestinian water rights, but these are to be negotiated in the permanent status negotiations. However, so far, no negotiations have taken place to enumerate the Palestinian water rights. The issue of Palestinian water rights will be one of the most difficult issues in the permanent status negotiations. Palestinian water rights include both the groundwater of the West Bank and Gaza Aquifer Systems and the surface water of the Jordan River Basin.**

**The Oslo II interim agreement has divided the West Bank into areas A, B and C where Israel retains control of security and power related to territory in area C. Area C which represents three quarters of the West Bank area includes the most sensitive water resources especially in the Jordan Valley and the Israeli settlements. Different maps representing the Israeli security and strategic zones in the West Bank are being suggested by Israeli leaders. Water security became one of the criteria that was used for determining the extent of further re-deployment of Israeli forces. According to this map, Israel will not re-deploy from Palestinian areas**



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overlying the Western Aquifer System in the West Bank. The Israeli Defense Forces came up with their own security map which calls for the retention of the Jordan valley by Israel. If these maps are superimposed, it becomes clear that Israel intends to retain its control of the majority of Palestinian water resources.

Unless the Palestinian water rights are addressed immediately and properly according to the international laws and principles that will translate their water rights to actual water in their pipes, Palestinians will remain the thirsty partner in the Middle East with a severe water crisis that will impact the sustainability of the peace process.

## **Outlines**

### **A. Hydrological Status in Palestine**

- *Groundwater & flow pattern (G. W. Basins)*
- *Surface water*
- *Sources of water*
- *Water Supply & Demand*

### **II. Restrictions on Palestinian Water Resources Management and Development**

### **III. Current Peace Agreements and the Future Water Conflict**

### **IV. Palestinian Water Rights**

#### **Hydropolitical Background**

Soon after the Israeli occupation of the West Bank and Gaza Strip in 1967, Israel seized absolute control over all the Palestinian land and natural resources. Since that time, Israel has either confiscated or declared as closed areas over 55% of the West Bank and 22% of the Gaza Strip, thereby placing it out of Palestinian reach. Less than 15% of the total West Bank water resources available to Palestinians are permitted for them to use. Israel has continued to expand its civilian colonies and their infrastructure on illegally confiscated Palestinian (mainly agricultural) land, further degrading the Palestinian environment.

To revert this unjust situation, the Palestinian people, by and large, accepted the discourse of peaceful negotiations based on the grounds outlined in the Madrid Conference of 1991.



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The guiding principles of these negotiations were ‘Land for Peace’ and the United Nations Resolutions No. 242 and 338.

Likewise, the Oslo II Interim Agreement was accepted by the Palestinian Authority as an interim step towards the establishment of a Palestinian state. It is interim in nature and should therefore be applied as such by the concerned parties. That is, “neither side shall initiate or take any step that will change the status of the West Bank and the Gaza Strip pending the outcome of the permanent status negotiations.” Yet, in reality, Israel has and continues to violate and manipulate the Interim Agreement by creating *de facto* realities on the ground which have severely fragmented the West Bank and Gaza Strip. This will not only affect the outcome of the final status negotiations, but will render a future sustainable Palestinian entity unattainable and, more immediately, cause intolerable hardship and suffering.

Much has been written about water in the Middle East especially during the past few years. Most of the writings focused on hydropolitics and tended to create a hydrophobic environment towards the subject. Many speculate that the region's next war will be fought over water. Others focused their efforts to assert whether the water situation is acute, severe, chronic or catastrophic. Few went beyond that and offered a wide array of solutions to solve the water " crisis" ranging from peace canals or pipelines from Turkey, Yugoslavia, Lebanon, Egypt to medusa bags, icebergs, desalination etc. The regional parties met in both official and unofficial capacities to advocate the need for solving the water issue and included several aspects including joint management, data exchange, human resource development, enhancing water supplies, water conservation, equitable utilization, water banking, reallocation of water and prevention of environmental degradation.

After all these meetings and negotiations, the gap in the positions among regional parties is still as wide as ever. The region's hydrologists and politicians are still talking at different wavelengths. In the coming few pages, We shall muddle in the waters of the Middle East focusing on the Israeli Palestinian dimension in light of the recent political developments. We realize that water is a particularly critical, as well as emotional, point



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of dispute for both Israelis and Palestinians. We also strongly believe that finding a common understanding of water issues in the Middle East would go far to enhance the possibilities of achieving stability in the region. Conversely, failure to reach consensus will, most definitely, obstruct any efforts to attain this goal. We are confident that many will find this article provocative, but patronization and sweet talk will not solve the inequity in water distribution, allocation and usage among the regional parties which threatens the sustainability of the peace process. Neither will fantasies and hydrofictions. Regardless of the extents of the water situation in the Middle East, it is clear that the question of controlling the region's waters is basically related to various perspectives of different parties to their 'legitimate national rights'. As a matter of fact, all parties involved in the region's confrontation over water invoke a variety of legal principles to establish their claims: first-in-use first-in-right, customary or equitable utilization, absolute sovereignty, beneficial use, basic justice and fairness, good neighborliness, prior use, etc. In making their claims, these parties are merely selective, so that each riparian in the conflicted basin chooses the legal principles that buttress its claims. This raises questions about the explicitness/ambiguity of international law in respect to settling down disputes of this kind. Actually, there is at this time no regular system of a binding international law that can supply clear-cut principles for the situation of conflict between nations that share water resources. This is particularly true when the shared resources of water are subterranean.

Now with conflicting parties finally negotiating a lasting and sustainable political solution, the question of the egg and the chicken is being increasingly risen: which should come first, consensus over the use and control of the region's vital water resources or settling the area's political contention? Since the two issues are utterly inseparable, it is believed here that the two questions should be addressed simultaneously and in parallel tracks.

After all, a political settlement should involve the question of distributing the waters available to the region over its inhabitants, and an agreement on the use and distribution



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of the region's waters would, most certainly, enhance the chances for ending the region's political confrontation.

There is a growing fear among Palestinians that the Israeli government is not serious in its peace aspirations. Israel has not implemented its commitments stipulated in the interim agreements, while at the same time, it is continuing its unilateral steps of swallowing more Palestinian land for settlements and bypass roads. There is very little that the Palestinian layperson can point out to indicate visible fruits of the peace process. Over the past three years, the GNP per capita in Palestine declined by 30 % and unemployment rose to record levels of up to 40 %. Restrictions on movement and closures are becoming the norm rather than the exception. In the field of water, the peace process did not translate into continuous supply or additional waters in the taps. On the contrary, water shortages especially during the summer months are exacerbating. While the PWA is doing its utmost to rehabilitate the water infrastructure, its efforts are being impeded by Israel's practices. The Herodion, Ramallah and Jenin wells that have been agreed upon in OSLO II are still not operational. In fact, the site at Ramallah which was selected by Israel proved to be faulty.

The Palestinian bureau of statistics have just completed the population census which revealed that the total Palestinian population in the West Bank and Gaza strip including Jerusalem is 2.8 million persons. This figure is far beyond the estimated figure which the Israeli authorities used to float. Based on the new figures, it becomes apparent that on average, a Palestinian is allocated less than 25 cm of water for domestic and industrial purposes annually. This means that Palestinians need immediately an additional 70 mcm of water per year in order to bring the domestic consumption per capita to 50 cm per year which is the minimum requirement for basic water needs. This shows that the 9.5 mcm of water which Israel agreed to provide the Palestinians according to Oslo II are simply too little.

The basic problem is that Israel so far has refused to approach the water conflicts with its Arab neighbors in an integrated manner. Israel's strategy is to strike a separate deal with each of its neighbors without any consideration to the geohydrological nature of surface



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and groundwater basins. Since Israel is holding all the water cards in its hands, it is using this tactic to ensure that it will have the overall control and responsibility for managing the water resources and providing its neighbors with certain quantities of water that are agreed upon. Certainly, such an approach is neither acceptable nor sustainable.

Israeli policy on final status issues has begun to be debated publicly during the past several months. This marks a change, as the delineation of Israel's territorial demands had not been openly before. Regrettably, the outcome points toward the peace process being transformed from negotiations between two parties to an internal Israeli debate with the goal of determining unilaterally the land areas they choose to retain and the areas they might return to the Palestinian people.

### **Hydrological Status in Palestine**

The hydrological status in Palestine is unique due to both political and natural conditions. The natural conditions include both rainfall scarcity and uneven distribution, and hydrogeological location of the West Bank in the upstream portion of the Shared Carbonate Aquifer System and the downstream of the Jordan River Basin, while Gaza is located in the downstream portion of both surface and groundwater systems. The political conditions is represented by the full control of Israelis over all the Palestinian water resources.

The water resources of Palestine include:-

#### **I.1 The Jordan River:**

The Jordan river is 360 kms long 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 eastern catchment area downstream of Tiberias is about 13027 km<sup>2</sup>, while the western catchment is about 2344 km<sup>2</sup>. The average annual flow of this river is about 1200 MCM (Abu Faris 1992). The Jordan river initiated from three main springs: the Hasbani in Lebanon, the Dan in occupied Palestine, and the Baniyas in the Syrian Golan Heights to form the Upper Jordan river basin. The water of this basin flows southward through Lake Hula towards the Lake Tiberias. In the absence of irrigation extraction, the Jordan River system would be capable of delivering an average annual flow of 1,850 MCM to the Dead Sea. The riparians of the Jordan River are Lebanon, Syria, Palestine and Jordan. Only three percent of the Jordan River's basin fall within Israel's pre-1967 boundaries.



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Average precipitation for Upper Jordan and Lake Tiberias averages 1,600 mm and 800 mm respectively. Lower basin, around the Dead Sea has a desert climate characterized by scarce rainfall. The Jordan River is progressively more saline and less usable towards the Dead Sea. The Jordan River system satisfies about 50% of Israel's and Jordan's water demand; Lebanon and Syria are minor users, meeting 5% of their combined demands via the Jordan.

Downstream of Tiberias is the Lower Jordan river basin which joins Yarmouk and Zerka rivers originating from Syria and Jordan in the east. The outlet of this basin is toward the Dead Sea in the South. As a result of water diversion from the upper Jordan by the Israelis which is approximated to be about 650 MCM/yr (Salameh, 1993), there is no fresh water to flow downstream of Tiberias. Different riparians took their needs from the Jordan River basin and the only small quantity that can reach the Palestinian riparian in the West Bank is of deteriorated quality. The deterioration of Jordan River water quality may be due to the upstream utilization by other riparians and Saline springs emerged at the bottom downstream of Tiberias as well as agricultural return flows and untreated wastewater practised by the Israeli settlements of Jordan Valley. Palestinian's share in the River's water cannot be used because they have no access to the Jordan River due to military closure by the Israelis since 1967.

U.N (1992) reported that an estimated 180-200 MCM/yr may be provided by surface runoff and from Jordan River for Palestinians in the occupied territories.

## **I.2 West Bank Aquifer System**

The Mountain Aquifer which was called so by Blake and Goldschmidt (1947) includes the area which was controlled by the Jordanian Administration before 1967 and since then became under Israeli Occupation. It is mainly composed of karstic limestone and dolomite formations of the Cenomanian and Turonian ages. It is mostly recharged from rainfall on the West Bank mountains of heights greater than 500 meters above mean Sea level. The annual renewable freshwater water of this aquifer ranges from 600 MCM to 650 MCM according to different Israeli and Palestinian sources. Figure (1) shows a schematic diagram of the Mountain Aquifer that illustrates the rain water's flow path to form different groundwater basins in the West Bank (Gvertzman, 1993). According to that schematic diagram (Fig.1), the Mountain Aquifer can be divided into three main groundwater basins, each of which can be subdivided into subbasins. Figure(2) shows the distribution of groundwater basins and aquifers in the West Bank. There are two general directions for the groundwater of the Mountain Aquifer, east and west. The groundwater basins were recharged directly from rainfall on the outcropping geologic formations in the West Bank mountains (forming the phreatic portion), while the greatest part of the storage areas was located in the confined portions (Fig 1).



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The phreatic portions constitute the subsurface area under the West Bank mountains where the Palestinians dug their groundwater wells to tap the shallow unconfined aquifers. The Israelis, however, dug their wells to tap the confined aquifers whose quality and quantity are better. These groundwater basins are:

### *1. The Western Groundwater Basin:*

Consisting of the western part of the Mountain Aquifer, it consists of two subbasins, Nahr el Auja A-Tamaseeh and Hebron- Beer Shava, that drain the Lower and Upper Cenomanian aquifers with a total pumpage and spring discharge ranging from 380-400 MCM/yr. The storage capacity of this basin is about 360 MCM/yr (Gvirtzman, 1993). 80% of the recharge area of this basin is located within the West Bank while 80% of the storage area is located within the Israeli borders.

The groundwater flow movement is towards the coastal plain in the west. Though, in theory, it is a shared basin between both Israelis and Palestinians, the Israelis have overexploited the basin using 333 MCM in 1992, while the Palestinians consumed in the same year about 27 MCM for all purposes. Palestinians pump their water from 138 wells for irrigation and domestic purposes in Qalqilya, Tulkarm, and west Nablus, while the Israelis overexploit this basin through their 300 deep groundwater wells to the west of the green line which are under artesian pressure (IPCRI, 1993). The total number of springs of this basin with an average discharge greater than 0.1 L/S in the West Bank is 35 with a total annual flow of about 7.7 MCM (Nuseiba, 1994).

### *2. Northeastern Groundwater Basins:*

Consisting of the Nablus-Jenin basin that drains the Eocene aquifer and the overlying Samarian basin that drains the Eocene and Neogene aquifers, the basin's storage capacity is approximately 140 MCM/yr (Gvirtzman, 1993). While again this is a shared groundwater basin, Israelis in 1992 consumed about 115 MCM and Palestinians consumed about 25 MCM for both irrigation and domestic purposes from their wells and springs in Jenin district and East Nablus ( Wadi El Far'ah - Wadi El Bathan ). In 1992 the total pumpage in these areas is about 12.3 MCM in addition to about 15 MCM from springs (Nuseiba, 1994). In total Palestinians have 86 wells tapping this basin. The general groundwater flow direction is towards the Bisan natural outlets (springs) in the north and northeast.

### *3. Eastern Groundwater Basin:*

Constituting the eastern flank of the Mountain Aquifer, the general groundwater flow direction in this basin is to the east (Jordan Valley). The available potential resources of



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this basin ranges from 100 MCM/Yr (Tahal, 1990) into 150 MCM/yr(IPCAI,1993). This basin drains the Neogene, Pleistocene, Lower Cenomanian, and Upper Cenomanian Aquifers and can be divided into six subbasins (Fig.2). It is an unshared groundwater basin as both recharge and storage areas are located within the boundaries of the West Bank. It is unexploited completely because of water quality problems in the upper shallow aquifers in which Palestinians dug their wells. It needs extensive hydrogeological study to identify its actual potential resources, safe yield, the hydrogeological properties, groundwater quality, and flow pattern of each aquifer.

The most important springs in the West Bank belong to this basin. The total number of springs with average discharge greater than 0.1 L/S is 79 which participates in 90% of the total annual spring discharge in the West Bank (Jad Isaac, 1994). The total number of Palestinian groundwater wells in this basin is 122 used for irrigation and domestic purposes. The Israelis have 19 deep wells, located in Jewish settlements in the upstream of the Jordan Valley areas to extract water before it becomes saline. These Jewish settlement wells are located under artesian pressure and tap the lower Cenomanian aquifer with both good water quality and quantity.

### **I.3 Gaza Coastal Aquifer**

The main Gaza Aquifer is a continuation of the shallow sandy/sandstone coastal aquifer of Israel (shared aquifer) which is of the Pliocene-Pleistocene geological age. About 2200 wells tap this aquifer with depths mostly ranging between 25 and 30 meters. Its annual safe yield is 60-65 MCM (Tahal, 1990), but the aquifer had been overpumped since before 1967, resulting in a lowering of the groundwater table below sea level and saline water intrusion in many areas. The main sources of salinity are deep saline water intrusion from deeper saline strata, sea water intrusion, and return flows from very intensive irrigation activities. Since 1967, the aquifer has been overpumped by a rate of 90-100 MCM/Yr in order to meet both Israeli settlers and Palestinian water needs.

## **II. Palestinian Water Rights**

The Palestinian water rights issue is a very sensitive and crucial issue. Despite rights outlined by the Helsinki Rules and the International Law Commission, Palestinians have been denied their riparian rights to several surface water and seawater resources, in contravention of international water law. Israel is utilizing most of the resources of the West Bank aquifer, the recharge area of which is mainly in Palestinian land. At the same time, Israel is pumping water from the coastal aquifer, preventing the replenishment of the Gaza aquifer. The current water allocations have not been negotiated, but rather taken by force. Palestinian claims for reinstatement of riparian and groundwater rights include the following:

1. *Jordan River.* Although Palestinians are full riparians to the Jordan River, they have been denied rights to its water. Under the Johnston Plan, the proposed West Ghor



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Canal would have supplied 150 mcm from the River to the West Bank, but plans were never carried out. The Jordan's River waters have been diverted for transport via the Israeli National Water Carrier to irrigate areas in the Negev. Israel is also using the lower Jordan River as a dumping site for saline water from around Lake Tiberias, as well as for polluted and industrial wastewater. Treatment and use of the Jordan are important for household consumption, irrigation, transport, industry, and tourism.

2. *Yarmouk River Tributaries.* Palestinians have riparian rights to the Yarmouk River.
3. *Storage and Fishing Rights in Lake Tiberias.* Lake Tiberias is part of the Jordan River Basin. According to international law, Palestinians have storage and fishing rights because of their status as riparians to the Jordan River.
4. *Groundwater Aquifers.* Palestinians' claims for groundwater aquifers underlying the West Bank and Gaza must be under the sovereign control of the Palestinian Administration since the recharge areas are within Palestinian borders. Under Israeli control, inequitable groundwater allocations between Israelis and Palestinians are as follows: from the Northeastern Basin, the Israeli share is 115 MCM whereas the Palestinian share is 25 MCM; from the Western Basin, the shares are 325 MCM and 25 MCM; and from the Eastern Basin, the shares are 65 MCM and 60 MCM, respectively.
5. *Wells and Springs.* Control of well pumping and spring flow, drilling of new wells and proper maintenance, must be under a Palestinian water authority, though pumping levels for shared aquifers could be equitably negotiated.
6. *The Mediterranean and the Dead Sea.* Rights of access to the Mediterranean for fishing, port development, and shipping is essential for the development of the fishing industry and for international trade. The Dead Sea represents an important natural resource and area for tourism for Palestinians who are full riparians.