

Issues of Water Distribution in the West Bank

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Water needs of both Israelis and of Palestinians in the Occupied Palestinian Territories (OPT) of the West Bank are rising, and current extraction levels are unsustainable. Access to clean and consistent sources of water is essential to meet the present needs and future demands of both parties. For the Palestinians especially, the Israeli policy of restricted water allocation has exacerbated health and nutrition problems. Further water scarcity for Palestinians has adversely affected agricultural output and domestic, commercial, and industrial development.

For these reasons, water is a point of constant and growing friction. Looking forward, because Israeli and Palestinian water needs are interdependent, joint water management and cooperation have the potential for serving as a stepping stone.

The present paper deals with the issues of water distribution in the West Bank. It is evident that water remains a scarce resource in Israel and the Palestinian Territories of the West Bank. Both people rely on common water sources. This underscores interdependence of both societies and the trans-boundary conflicts that arise over unequal control, extraction, and consumption are the affairs of everyday life.

Objectives of the Study

In West Bank both Ground water and Surface Water Resources (Wadi flow, Jordan River, and Rain water for harvesting) are available. But the

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emphasis of the present work is on the issues related to ground water resources. Short description about surface water resources is also given where it is required. The present study aims at investigating into the following issues of water supply and distribution in the West Bank

- To assess available water resources in the West Bank
- To highlight water supply situation in the West Bank
- To analysis local water resources (Palestinian Self-Controlled Water Resources)
- To identify well distribution in West Bank

1. Available Water Resources

1.1 Groundwater Resources:

The primary source of water in Palestine comes from groundwater aquifers. Geological formations below the ground that contain water which can be extracted from wells and springs are mountain aquifers. The Mountain Aquifer system, composed of 3 systems—the Western, Eastern and North-eastern, each named according to the direction of their water flow.(see Map1)

1.1.1. The Mountain Aquifers:

The Mountain Aquifer extends for over 130 km, from Mount Carmel in the north to the Negev in the south, and is 35 km wide, from the Jordan Valley in the east to the Mediterranean Sea in the west. It is typically divided into three sub-aquifers.

Yarkon-Tanninim Aquifer (Western Aquifer) The primary one- Western Aquifer is of high quality water. Most of its recharge area lies in the West Bank, while the entire storage area lies in Israel. 95% of its water is used by Israel. It supplies Israel with about 340 million cubic meters of water annually, which are used by the Jerusalem-Tel-Aviv area. Palestinians use about 20 million cubic meters a year.

Nablus-Gilboa Aquifer (Northern Aquifer) The second one, the Northern Aquifer, has both its recharge and storage areas essentially located within the West Bank. However, Israel extracts about 70% of the water. This supplies Israel with about 115 million cubic meters a year, largely for agricultural irrigation.

The Eastern Aquifer Finally, the Eastern Aquifer, which is entirely within the West Bank, more this 37% of its water consumed by Israel - mostly by settlers. This supplies about 40 million cubic meters annually to the Israeli settlements in the Jordan Valley, and about 60 million cubic meters to the Palestinians. (U.S. Geological Survey ,1998 and **MidEastWeb,2002**)

1.2. Surface Water Resources:

The main regional surface water system and the only permanent surface water source for Palestine is the **Jordan River (JR)** and its tributaries (see Map 3). Five riparian share the waters of the JR, Jordan, Israel, Syria, Lebanon and the West Bank (WB). To date, Israel diverts 75% of the river's water before it reaches the West Bank. The Jordan Basin stretches over 330 km from the Upper Galilee in the north to the Dead Sea in the south, with an average width of 30 m (passia.org)

2. Current Water Supply Situation in the West Bank:

2.1 Water Resources and Supply Level:

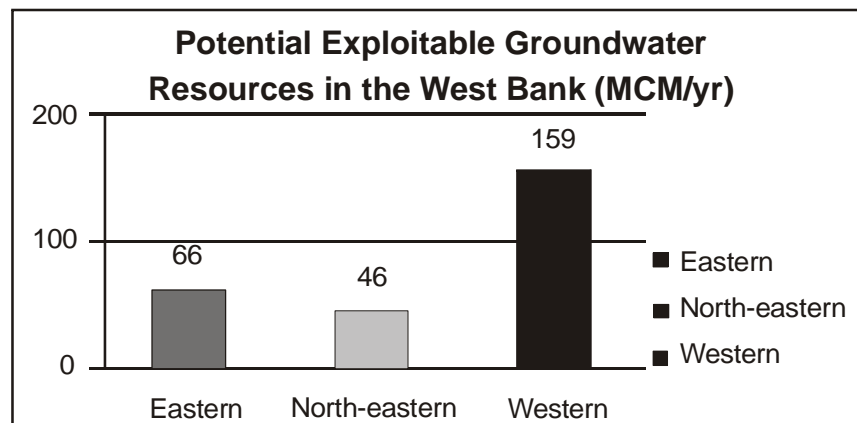
The description of current water resources in the West Bank in this study is based on review of data and baseline studies produced by the Water Resources and Strategic Planning Directorate (WR&SPD) of the Palestinian Water Authority (PWA)and specific water resources studies developed by United States Agency for International Development (USAID)under the Water Resources Program (West Bank, from 1996 to 2004) and the Coastal Aquifer Management Project (CAMP Gaza, 1996-2001). The Water Resources Program (WRP) and Coastal Aquifer Management Project (CAMP) identified the maximum potential resources, regardless of technical, political, or socio-economic constraints. It is important to emphasize that these resources are classified only as potentially exploitable. (ARIJ-October 2009)

2.1.1.Potentially Exploitable Groundwater Resources in the West Bank

Three groundwater basins underline the West Bank are the Eastern Basin, the Western Basin, and the Northern Basin. Groundwater resources in each basin are presently shared by Palestinians and Israelis. Analysis of all currently available data on the groundwater in the basins (including spring

flow) summarizes the potentially exploitable groundwater resources for Palestinian use as follows in fig.1(ARIJ, 2009).

Fig 1

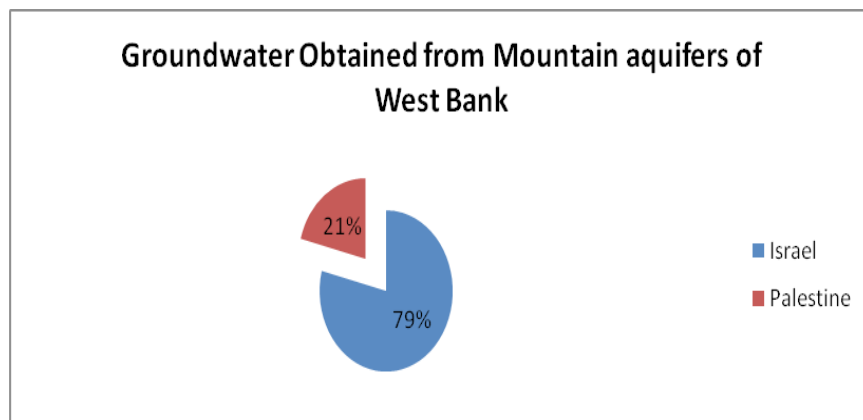


Sources: *Interim Agreement, 1995, Annex 3, article 40*

Of these aquifer systems, the Western Aquifer is the most fruitful, flowing towards the Mediterranean with a replenishment capacity of approximately 362 MCM per year, followed by the Eastern Aquifer, with a capacity of 170 MCM per year (though nearly 50% of this is brackish) and finally, the North-eastern Aquifer at 145 MCM per year. Nearly 100% of the Eastern Basin is located within the territory of the West Bank; Still Palestinians are allowed to extract just 54 MCM/year and Israelis extract approximately 40 MCM/year from this source. The groundwater analysis indicates that the Eastern and North-eastern Basins are currently developed to their approximate sustainable yield, while the Western Basin is being exploited beyond its sustainable yield. The identified potentially exploitable groundwater resources for Palestinian use (approximately 273 MCM/year) consist exclusively of groundwater that is currently being utilized by the Israelis. In other words, further Palestinian development of groundwater resources must be balanced by decline in Israeli use. In terms of

groundwater obtained, Israel “receives 79% of the Mountain Aquifer and the Palestinians 21%” (Fig. 2).

Fig 2



Sources: Water Sector Review – Situational Analysis Report , Volume II,ARIJ, October 2009

Israeli control over pumping and distribution of the two main groundwater aquifers has severely restricted Palestinian water use. This remains the main source of tension regarding water between Israel and Palestinians in the territories. Much of the West Bank sits atop the Mountain Aquifer, composed of the Western, Eastern, and North-Eastern basins.

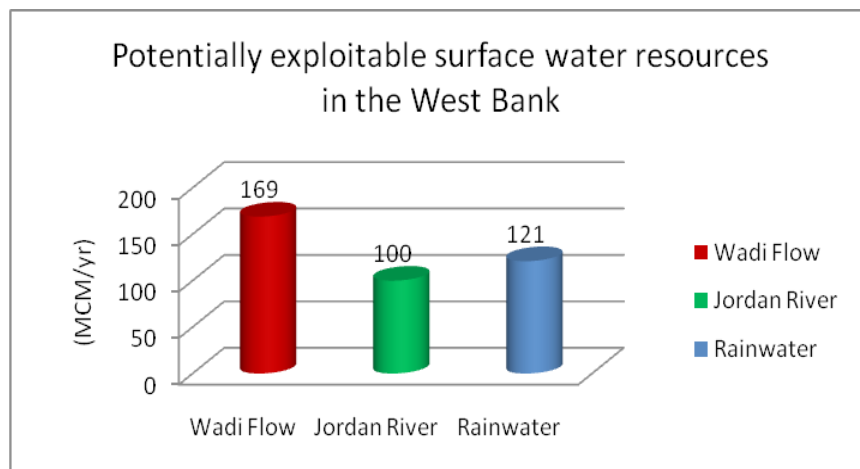
According to recommended standards of the World Health Organization (WHO) and the U.S Agency for International Development (USAID), a minimum of 100 liters a day per capita are needed for balanced and healthy domestic consumption in rural households. In contrast, B’Tselem, the Israeli human rights organization, documents that Israeli per capita consumption of water already reaches 350 l/day, about five-times of Palestinian consumption. Per capita consumption of water in Israeli settlements, most of which are strategically located directly above main water extraction sources, can reach even higher levels, estimated at “seven-fold” the Palestinian consumption rate. In contrast, Palestinian consumption

rates per capita vary between 35-80 litre/day, well below WHO and USAID recommendations.

2.1.2. Potentially Exploitable Surface Water Resources in the West Bank:

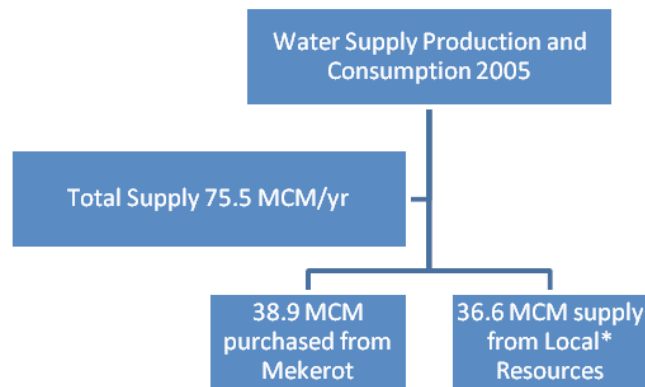
Surface water resources considered by the Water Resource & Strategic Planning Directorate (WR&SPD) includes wadi flow, the Jordan River, and rainwater for harvesting. The potentially exploitable surface water resources are summarized as follows. (Fig.3)

Fig.3



Sources: Interim Agreement, 1995, Annex 3, article 40

2.2. Water Supply from Ground Water

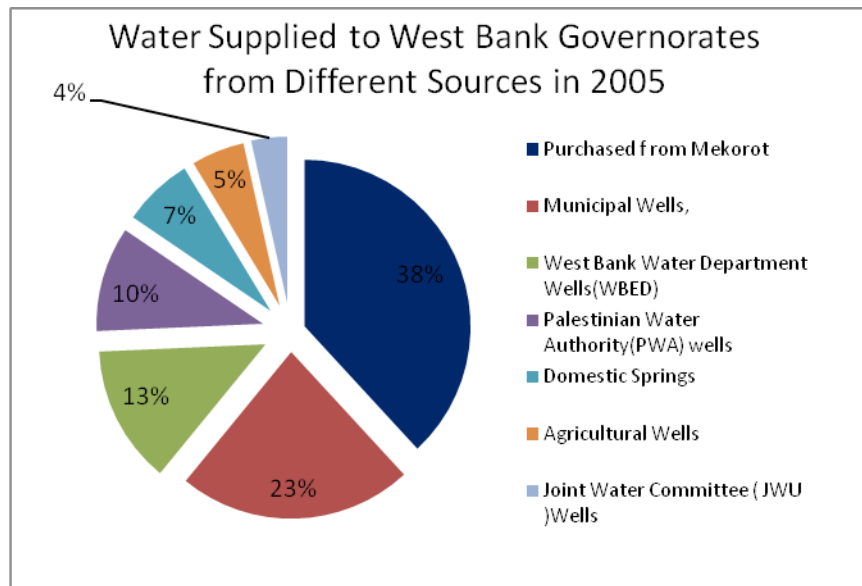


*Local Resources(Palestinian Controlled sources)

Source: Based on the report of Palestinian Water Authority (PWA),2005

As it is clearly indicated in above flow chart that total water supply in the West Bank is 75.5 MCM/yr in which 38.9 (51%) is Purchased from Mekerot company and 36.6 MCM /yr (49%) is supplies from local water resources. The breakup of water supplied to the West Bank from Different sources is following (Fig. 4).

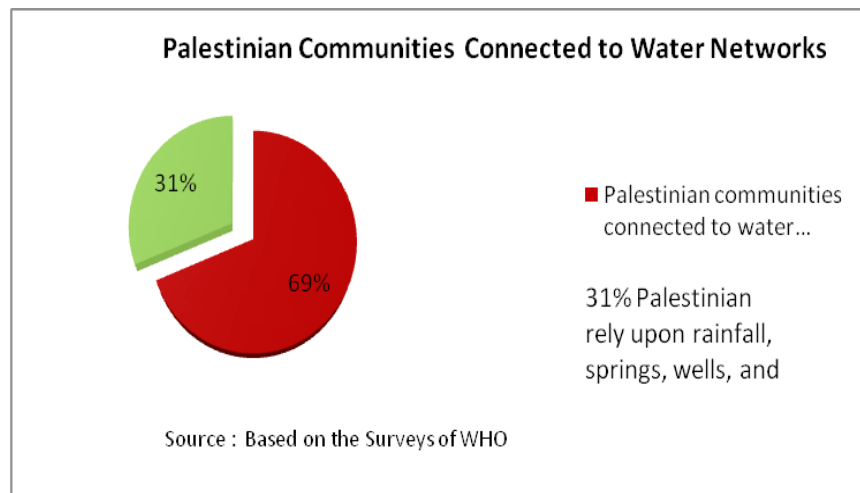
Fig. 4



Source: Based on the report of Article 40 of the Palestinian interim Agreement, September, 1995.

Different Surveys highlight that 69 percent of the Palestinian communities are connected to water networks. While the other communities are not reached by pipelines and must rely upon rainfall, springs, wells, and water purchased by private suppliers (Fig.5).

Fig.5



3. Analysis of Local Resources (Palestinian Self-Controlled Water Resources):

The drinking water resources in the West Bank are divided into two main resources, namely *self resources* from the groundwater wells and springs utilized by the municipal and villages and the *resources purchased* from the Israeli Water Company Mekerot and distributed through the West Bank Water Department (WBWD).

The self-resources are considered the main source of drinking water for most large cities, towns and surrounding refugee camps, which mainly depend on municipal wells and spring sources. Some of these municipalities purchases additional quantities of water from the Israeli Water Company.

Municipal Wells: The productivity of municipal wells reached **17.2** million cubic meters in 2005. These **29 wells** are utilized for drinking purposes,

and constitute **48%** of the total self resources, at an increase of 1.1 million cubic meters over the last year.

Palestinian Water Authority (PWA) Wells

The **11 new wells** drilled by PWA in the recent years in the southern area of the West Bank produced approximately **7.7** million cubic meters in 2005 for domestic water supply to Bethlehem and Hebron governorates. These wells, after years of low productivity, are now reaching nearly their full capacity, approximately **8-9.0** million cubic meters (increase in supply in 2005 was 1.3 million cubic meters compared to 2004). The PWA wells constitute approximately **22%** of the self resources.

Spring sources: Springs constitute only **13%** of the total self resources. Jericho Municipality as well as some villages in Nablus Governorate completely depends on springs. Springs constitute the second alternative resource of water for the Nablus city. It is worthy mentioned that the total inflow from the West Bank springs reached in the current year approximately 53 MCM.

Agricultural Wells

In recent years reliance on private agriculture wells for domestic water supply gradually increased, as the supply from those wells constitutes now about **11%** of the total self resources. This is mainly attributed to the increasing demand on water in parallel with the increase in the number of population, building expansion, insufficiency of water quantities abstracted from the municipal wells and lack of any other resources of water source.

Jerusalem Water Undertaking (JWU) Wells

The productivity of the 6 Ein Samya wells, owned by the Jerusalem Water Undertaking, reached approximately **2.6** million cubic meters in 2005. This quantity exceeds the quantity of the last year for approximately 0.35 million cubic meters, and constitutes only **7%** of the self-resources.

3.1. Confiscated Agricultural Wells As already mentioned above that the reliance on private agricultural wells for domestic water supply has gradually increased in the past. Dependency on agricultural wells for domestic use is likely to increase in the future as population and demand

will increase, especially if no alternative resources are developed. Agricultural wells represented about 3.9 MCM in 2005. Some of these resources (at least 50 agricultural well) have been confiscated in recent years by the construction of the Separation Wall. These resources have a productive capacity of at least 6.7 MCM/year principally used for agricultural production.

3.2. Average Per Capita Supply

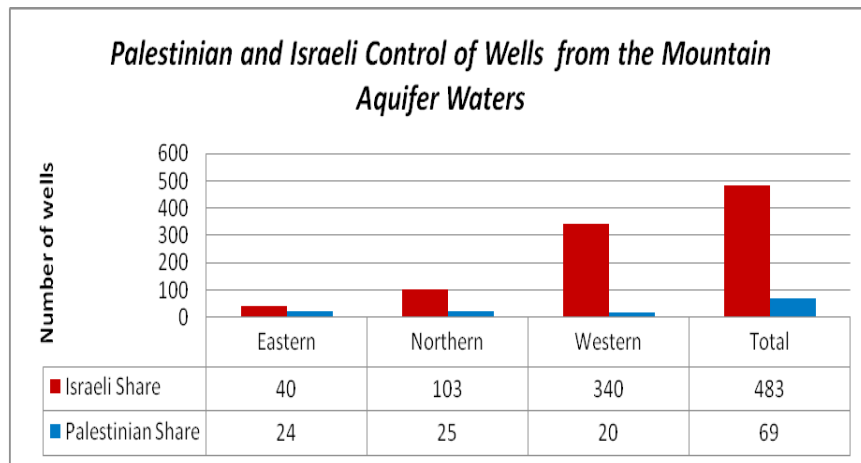
It is estimated that approximately 12 % of all water supplied to municipalities is used for public, industrial and commercial uses, based on data collected for the Water Sector Strategic Planning Study, 2000. The domestic water supply per person per day can be calculated to an average of **76.7** litre, which is well below the WHO recommendation of 150 L per person per day. This figure does not even take into account water losses through leaking pipes, a problem that is prevalent in the poorly designed and maintained internal water infrastructures of Palestinian municipalities. This problem is a legacy of minimal investment in these infrastructures throughout the period of Israeli occupation from 1967 to 1993 (World Bank, 1993).

Many Palestinians must buy water – either from Mekorot, or from private suppliers selling expensive and unregulated trucked water. Even within the oPt, Mekorot's prices are different for Palestinians and Israeli settlers (Jad Isaac, ARIJ, 2001).

4. Well Distribution in the West Bank

The major water resources in the West Bank consist of groundwater and springs, while additional sources include rainwater harvesting. There are 40 municipal wells in the West Bank that are used either wholly or partially by Palestinians. According to Environmental Quality Authority their annual yield is around 30 MCM (EQA, 2002a). This is insufficient to meet water demand and the deficit is supplied mainly through springs or through Mekorot (the Israeli Water Company). Some agricultural wells are also used for domestic purposes. Figure 6 shows respective shares of Palestinians and Israelis control of wells from the mountain aquifers.

Fig.6.



Source: Water Sector Review – Situational Analysis Report , Volume II, ARIJ, October 2009.

Conclusions:

The current political relationship between Palestine and Israel has no place for independent decision making on the part of the Palestinian people. All plans for developing new water resources in the West Bank must be approved by the Joint Water Committee (JWC), a mutual organization set-up under the Oslo Accords to guide the development of the Palestinian water sector during the intervening period prior to final status negotiation. This creates a difficult planning environment where implementation of projects is often based on opportunity as much as need or priority. For instance, the JWC has allowed for the development of water resources in the Eastern Basin which falls entirely within the West Bank political boundaries. However, approval of Palestinian groundwater development in the Western and North-eastern Basins, where resources are to be shared by Palestinians and Israelis, has been severely restricted by the JWC.

Autonomous management of independent water resources is essential to the sustainable development of the Palestinian water sector. This issue is being addressed through continued pursuit of Palestinian water rights; however, short-term water sector development can only focus on the opportunities provided by the JWC.

The West Bank has numerous localities which are not presently connected to a water source. It is estimated that inhabitants of Palestine deprived of water services may be benefitted in future from new wells and networks in order to improve the water services coverage and better health for the users.

Reallocation of water resources from the agricultural sector to the domestic sector is an important management issue to achieve sustainability in the long term. Currently about 11% (3.9 MCM/year) of the total Palestinian self-resources or is being used from private agricultural wells for domestic water supply. However, institutional actions should be taken to encourage the agricultural sector to switch from groundwater to alternate sources such as reclaimed wastewater (secondary quality resources that have a great potential in the West Bank) and harvested surface water.

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Mountain and Coastal Aquifers



Source: Arc World, UN Cartographic Section, DCW, Palestinian Environmental Quality Authority

MAP 2

Surface Water Surfaces



Source: Arc World, UN Cartographic Section, DCW, Palestinian environmental Quality Authority

MAP 2