



## 7. WATER & ENVIRONMENT

(see also the Water Map in the map section of this diary)

### ■ Background

Since the 1967 occupation, Israel has, in violation of international law, almost completely controlled Palestinian water resources and deprived Palestinians of access to its rightful share of water for the benefit of its own population and illegal settlements. With Military Order (MO) 92 (15 Aug. 1967), Israel transferred the authority over WBGS **water resources** to the area military commander. MO 158 (19 Nov. 1967) forbade the unlicensed construction of new water infrastructures, and MO 291 (19 Dec. 1968) confiscated all water resources, declaring them state property. In 1982, the Israeli Water Authority Mekorot took control. Palestinian wells were destroyed and supplies dried up by widespread digging and pumping from deeper wells for Israeli use.

In the context of the **peace process**, water was considered an interim issue; the **Palestinian Water Authority (PWA)** assumed responsibility, but Israel maintained control of the flow and volume of water to be used by Palestinians. While Palestinians had asked for 450 million m<sup>3</sup> (mcm) water annually, **Oslo II** provided – as a temporary measure – only 28.6 mcm for domestic use; any additional increase was subject to usage of new water resources. The future needs of the Palestinians on the WB were estimated at 70-80 mcm/year (Oslo II, Art. 40) and a Joint Water Committee was established. However, Israel constantly vetoed Palestinian water projects, hindering any development. Among other things, from 1995 until today, Israel has not allowed the Palestinians to **dig** a single well to use the waters of the western aquifer but only the eastern aquifer (requiring up to 800-m-deep digging at high costs for low-quality water) and in rare cases the north-eastern aquifer. Instead of developing their water resources, this has forced Palestinians to purchase water from Israeli companies.

According to **international law**, which calls for “equitable and reasonable” allocation of water among the parties with a claim to shared watercourses, Palestinians should have full sovereignty over all the eastern aquifer resources that lie beneath the West Bank, and at least equitable water rights regarding the western and northeastern aquifers, as these are recharged almost entirely from the West Bank. The Palestinians accept international law and how it governs the allocation of freshwater resources shared by Israel and the OPT. Under the **law of international watercourses**, as reflected in the related 1997 UN Convention, the State of Palestine is entitled to an equitable and reasonable allocation of shared freshwater resources, including those in the four main aquifers and the Jordan River. Under international law, Israel must pay compensation for the past and ongoing illegal use of Palestinian water resources. (<http://www.nad-plo.org/howsummer.php>).

### Main Water Indicators, 2007:

	WB	GS	WBGS <sup>1</sup>
Annual Available Water Quantity (million m <sup>3</sup> /year)	158.3	177.1	335.4
Annual Pumped Quantity from Groundwater Wells (million m <sup>3</sup> /year)	68.7	172.5	241.2
Annual Discharge of Springs Water (million m <sup>3</sup> /year)	44.8	---	44.8
Annual Quantity of Water Purchased from Mekorot (million m <sup>3</sup> /year) <sup>1</sup>	44.8	4.6	49.4
Annual Quantity of Water Supply for Domestic Sector (million m <sup>3</sup> /year)	85.5	90.1	175.6
- of which → from wells:	35.3	85.5	120.8
→ from springs:	5.4	---	5.4
→ purchased <sup>2</sup> :	44.9	4.6	49.5
Daily per capita allocation (liter/person/day)	110.2	174.1	135.8

<sup>1</sup> excl. Israeli-annexed parts of Jerusalem; <sup>2</sup> incl. pumped water from wells located in the WBGS but controlled by Mekorot. Source: PCBS, *Water Statistics*, 2008 (figures from the Palestinian Water Authority).

### ■ Water Resources

- There are 8 **groundwater basins** in Palestine/Israel, four of which lie within Israel proper (Tiberias, Western Galilee, Carmel, Negev basins), while the other four are located partially or totally in the WBGS (North-Eastern, Eastern, Western, and Coastal Aquifers). The total available water of all eight basins is about 2,634 mcm/yr on average, of which 1,454 mcm/yr emerge from groundwater, 965 mcm/yr is Jordan River surface water and 215 mcm/yr is surface runoff (e.g. from rainwater).
- At present, the **overall available water resource** in Israel and the OPT combined is between 2,200 and 2,800 million m<sup>3</sup>/year (M.C.M./year) on a sustainable basis, and varies each year according to rainfall and other factors. (NAD, *Negotiations Primer*, Aug. 2008).
- **Israelis control** and utilize 89% of the available shared water resources. Of the groundwater resources (recharge), they control 86% and utilize 83% of them (average); of the surface water



resources, they control 90% and utilize all of the Jordan River waters after Syrian, Lebanese, and Jordanian use; and of the runoff waters, Israelis control 82% and utilize 90% on average.

- As a **regional drought** enters its fifth year, Palestinians are suffering a serious **water shortage** exacerbating already existing supply problems. A 45% reduction in average annual rainfall has left some 200 communities (at least 220,000 people) which are not served by the water network, struggling to meet their basic water needs, and has led to frequent cut offs, including usually less affected urban centers, with some areas only receiving water once every fortnight. While Israel is also affected by the drought there have been no cases of community water supplies being cut off. (AFP, 27/07/2008).
- Israeli water experts have declared the current situation to be the most serious since the establishment of the state of Israel in 1948, with water levels in **Lake Tiberias** - one of only three major water sources - falling below the "red line," seriously decreasing its water quality, and nearing the "black line" beneath which it will no longer be possible to operate the lake's pumps. (Palestine News Network, 2 July 2008). The withdrawal of water from Lake Tiberias is also believed to be the main reason for the decrease in the size of the Dead Sea.
- The **Jordan River** is shared water shed by 5 riparians (Syria, Lebanon, Jordan, Israel and Palestine) though Israel controls and utilizes over 65% of its discharge, while Palestinians have no share at all since 1967 (Syria: 11%, Lebanon: 0.3%, Jordan: 23.4% (PWA, *Water Resources*, at <http://www.pwa-pna.org/status/res.php>).
- **Palestinian use of water** in the West Bank - most of which lies in Area C- is limited to 17% of total water in the aquifers. Israel uses the remaining 83% either through its settler population or pumping from the shared aquifers for consumption in Israel. This is despite the fact that 10%-14% of Palestinian GDP comes from agriculture, as opposed to 2-3% of Israel's GDP. Only 10% of Palestinian agriculture uses irrigation; the rest is rain-fed. Israel irrigates more than 50% of its land. (The World Bank. *Palestinian Economic Prospects: Aid, Access and Reform*. Sept. 2008).
- The **Gaza aquifer** - the only water source in Gaza - is already over-extracted (about 3 times the renewable resources); the UN estimates that Gaza will have **no drinking water** in the next 15 years. (The World Bank. *Palestinian Economic Prospects: Aid, Access and Reform*. Sept. 2008).
- Israel's separation barrier and settlements seize vital land and **water resources**, and effectively pre-empt a fair and equitable future allocation of the West Bank's water resources. Today, for instance, Area C - controlled by Israel - contains 280 of the West Bank's 597 wells, of which only 51 are owned by Mekorot. (ARIJ. *Israeli Policies in Area C: Silent Transfer of the Palestinian People*, 12 Oct. 2008).
- The **separation barrier and settlements divest Palestinians of their water rights**; this is especially apparent with regard to the Ariel and Kedumim "fingers" near Qalqilya, which stretch 22 km into the northern West Bank, covering only 2.2% of the occupied West Bank, but some of its most valuable water resources. (PLO - NAD. *Barrier to Peace: Assessment of Israel's Wall Route*, July 2008).
- The PA, along with Israel and Jordan, is an active participant in the ongoing **Red Sea-Dead Sea Water Conveyance Study Program**, begun in May 2008, which could bring up to 500 million m<sup>3</sup> annually of new potable water to the region. Decision on financing and construction are not expected before late 2010.

## ■ Water Supply & Demand

- According to the Palestinian Water Authority, 40-70 million m<sup>3</sup> of water are **lacking** to meet the needs of West Bank Palestinians. The PWA also notes that Palestinian access to water in the Mountain Aquifer has dropped from 118 mcm in 1995 to 106 mcm in 2007.
- The total **water quantity** Palestinians obtained in **2007** was 335.4 million m<sup>3</sup>, of which 241.2 million m<sup>3</sup> (71.9%) were pumped from water **wells**, 44.8 million m<sup>3</sup> (13.4%) were extracted from the 125 PA-controlled **springs**, and 49.4 million m<sup>3</sup> (14.7%) were purchased from **Mekorot** at a cost of NIS 129 million. (PCBS, *Water Statistics in the Palestinian Territory* 2007).
- **Access to water** is hindered by inadequate infrastructure and the inability of the PA to obtain Israeli permits for infrastructure development (the PWA reports over 140 projects for development of wells, springs, transmission lines, and wastewater treatment plants awaiting approval from the Israeli authorities.).
- In 2006, 88.6% of the WBGS households were **connected to public water networks** (84.1% in the WB, 97.3% in Gaza). Some 4.6% had water tanks as their main **mean of obtaining water**, 5.2% domestic wells, and 1.6% others means. (PCBS, *Water Statistics, 2007, Housing and Housing Conditions Statistics*, 2006).
- Of the 557 WBGS **localities**, 123 (22.9%) with 177,275 persons, have **no public water network**, all of them in the West Bank. In the West Bank, the main source for water of those connected was Mekorot (for 110 localities) and the West Bank Water Department (112), while in Gaza, 17 localities obtained water through wells, and 6 through Mekorot. (PCBS, *Local Community Survey*, 2008).
- The **price** of water purchased from **Mekorot** was as follows in 2007: 2.6 NIS/m<sup>3</sup> for domestic use (WB: NIS 2.4, J'lem: 3.9; GS: 2.1) and 0.4 NIS/m<sup>3</sup> for agricultural use (Tubas district only). Buying water from **tankers** cost three to six times more than water supplied through a water network.
- According to Dr. Ayman Ar-Rabi of the Palestinian Hydrology Group, Palestinians spend **30-40%** of their **monthly income** on water (as compared to the recognized world average of 5%) (Press conference, Ramallah, 24 March 2008).

## ■ Water Consumption

- **Per capita water consumption** for domestic use in communities connected to a central running-water network in the West Bank is only about 50 liters a day, taking into account system losses which are estimated at 40% of supply (e.g., leakage). In Gaza, daily per capita consumption is 78 l/c/d on average, whereby the water quality is poor and supply unreliable. (World Bank. *Palestinian Economic Prospects: Aid, Access and Reform*. Sept. 2008.) In Israel, per capita daily use is



280 liters, over 4.5 times greater. While the WHO recommends at least 100 l/person/day, some 10% of West Bank communities are surviving on less than 10 l/person/day.

- If water resources were divided into **equal per capita shares**, Palestinians would receive approx. 36% of the shared waters. (NAD, *Negotiations Primer*, Aug. 2008).
- In the WB, some 77.9% of the households evaluate their **water quality** as good (18.1% as fairly good and 4% as bad), whereas only 4.5% in Gaza do (39.9% as fairly good and 55.6% as bad). (PCBS, *Water Statistics, 2006*).
- **Agricultural consumption:** While agriculture makes up almost a third of Palestinian GDP, only 5% of Palestinian land is irrigated. On the other hand, 70% of Israeli and Jewish settlement land is watered, even if agriculture accounts for only 2% of Israeli GDP.

## ■ ENVIRONMENT AND SANITATION

- In 2008, 12.3% of the Palestinian households did not have **solid waste collection** service. Local authorities collected solid waste for 61.6% of households, UNRWA for 10.6% (WB: 69.1%, GS: 47.2%). (PCBS, *Household Environmental Survey 2008*).
- The average household **daily production of household waste** was estimated to be 4.6 kg, and the average per capita daily at 0.7 kg. The total daily produced quantity of household waste is estimated to be 2,861.5 tons. (PCBS, *Household Environmental Survey 2008*).
- Some 88.2% of Palestinian households live in housing units connected to a **water network**, while 5.9% relied on **domestic wells**, and 3.1% on **water tanks**. (PCBS, *Household Environmental Survey 2008*).
- In 2008, the **wastewater disposal method** of 45.5% of WBGS households was the sewage network (WB: 30.2%, GS: 75.1%), while 53.7% used cesspits, and the remainder other methods (PCBS, *Household Environmental Survey 2008*).
- Some 85 (or 16%) of the WBGS **localities**, are connected to the public sewage system (WB: 64; GS: 21), while 511 localities use cesspits for wastewater disposal (WB: 478; GS: 33) (PCBS, *Local Community Survey, 2008*).
- In 2008, there were 122 **dumping sites** in the WBGS (WB: 119, GS: 3) (PCBS, *Local Community Survey, 2008*).
- In Gaza, a growing concern is **sea water pollution** from the effluence of untreated sewage as a result to shortages of fuel and electricity to avoid flooding of residential areas with sewage.
- 45.6% of the WBGS households consider the water quality as good (WB: 64.3%, GS: 13.8%). (PCBS, *Household Environmental Survey 2008*).
- A recent Palestinian-German study found excessive nitrate levels in the **drinking water of Gaza**. 90% of their water samples were found to contain nitrate concentrations that were between two and eight times higher than the limit recommended by the WHO. (Basem Shomar, Karsten Osenbrück, Alfred Yahya: "Elevated nitrate levels in the groundwater of the Gaza Strip: Distribution and sources," in *Science of the Total Environment* 398 (2008) 164-174.) In March 2008, the Exec. Dir. of the Palestinian Hydrology Group, Dr. Ayman Ar-Rabi, even warned of diseases like Cholera and Typhoid due to the water situation in Gaza where waste water was leaking and contaminating the aquifer. (Press conference, Ramallah, 24 March 2008).
- The West Bank has become a **dumping site for hazardous waste** as a cheap and easy alternative (i.e., to avoid the strict Israeli environmental laws governing the disposal of waste) at the expense of the health of Palestinians and the region's drinking water. A 2006 FoEME report, entitled "A Seeping Time Bomb, Pollution of the Mountain Aquifer by Solid Waste," found that the unsustainable disposal of solid waste has resulted in the percolation of toxic substances including chloride, arsenic and heavy metals such as cadmium, mercury and lead into the groundwater. Findings of PCBS and ARIJ, published in April 2008, showed that 73.4% of southern West Bank families live in areas **contaminated with waste water**.



### Recommended Research Sources:

- <http://www.phg.org> (Palestinian Hydrology Group)  
<http://www.arij.org>  
<http://www.idrc.ca/waterdemand/>  
<http://www.al-bab.com/arab/env/water.htm>  
<http://washmena.wordpress.com/>  
<http://www.unu.edu/unupress/unupbooks/80859e/80859E00.htm#Contents>  
<http://www.thelifesourceproject.org/index2.php?lang2=h>  
<http://www.lifesource.ps/?module=a14>
- <http://www.waternet.be/>  
<http://home.birzeit.edu/ceohs/>  
<http://www.hwe.org.ps/>  
<http://www.pcbs.gov.ps> (Water Statistics)  
<http://www.mena.gov.ps/default1.htm>  
<http://www.foeme.org/water.php>

- Allan, J.A., and C. Mallat.** *Water in the Middle East – Legal, Political and Commercial Implications*. London, 1995.  
**B'Tselem,** *Disputed Waters: Israel's Responsibility for the Water Shortage in the Occupied Territories* (September 1998).  
**B'Tselem,** *Thirsty for a Solution*, July 2000.  
**Feitelson, E. & M. Haddad.** *Joint Management of Shared Aquifers*. Jerusalem, 1995.  
*From Scarcity to Security: Averting a Water Crisis in the Middle East*. Washington, DC: World Bank, 1997.  
**JMCC,** *Water*. Jerusalem, 1994.  
**MOPIC,** *Regional Plan for the West Bank Governorates: Water and Waste Water – Existing Situation*. Dec. 1998.  
*Not Even a Drop – The Water Crisis in Palestinian Villages Without a Water Network*. B'Tselem, 2001.  
**PASSIA.** *Water - Special Bulletin*. Jerusalem, 2002. (available at [www.passia.org](http://www.passia.org)).  
**Trottier Julie.** *Hydropolitics in the West Bank and Gaza Strip*. Jerusalem: PASSIA, 1999.



*Water in Palestine – Problems, Politics, Prospects.* Edited by Fadia Daibes. Jerusalem: PASSIA, 2003.  
**UNEP.** *Desk Study on the Environment in the Occupied Palestinian Territories.* United Nations Environment Programme, 2003.

