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Water in the Israeli-Palestinian Conflict

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July 2006

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Summary of Conclusions and Recommendations

Israel and the Palestinian territories are in a severe water crisis. The accumulated water deficit in the region has reached the level of annual consumption. Such a deficit jeopardizes the quality, and hence the availability, of freshwater in the aquifers. Evaluation of the economic value of the water in dispute between Israel and the Palestinian Authority (PA) reveals that it is of secondary importance relative to the dangers posed by water scarcity.

Recognizing that the Israeli-Palestinian dispute over water is politically charged, the paper recommends focusing on unilateral supply-enhancing measures, such as construction of desalination plants and recycling facilities. Such steps would reduce the importance of the water in question and therefore allow for an easier resolution of the dispute. The paper estimates that if these steps take place, then the value of the water in dispute would be \$30-\$70 million per year, which stands for merely 0.03-0.07% of Israel's GDP and 0.4-0.9% of the PAs' GDP.

Finally, the paper points out that in order to carry out these projects the PA will need financial aid from the international community.

1. Introduction

Water, borders, refugees, settlements, and Jerusalem have been identified as the core issues in the Israeli-Palestinian conflict. The water issue, however, should be differentiated. The origin of the Israeli-Palestinian dispute over water is its scarcity, while the other conflicts stem mainly from past wars. Furthermore, the situation of water in the region requires unilateral supply-enhancing measures regardless of the status of the peace process. Such steps would reduce the importance of the water in question and therefore allow for an easier resolution of the water dispute. In other words, the key for resolving the water conflict lies at it source—the water scarcity. Resolution of the other issues requires negotiation and active cooperation between the Israelis and the Palestinians, which are scarce attributes by their own right.

This paper starts by reviewing the overall situation of water in the region. Evaluation of demand and supply conditions reveals that the region as a whole is in a water crisis. Currently the accumulated water deficit is in the order of the region's annual consumption. We then turn to assess the magnitude of the water conflict. We conclude that in monetary terms the conflict is over $30-$70 million per year. This is surprisingly a small number; it is in the order of 0.03-0.07% of Israel's GDP and 0.4-0.9% of the Palestinians' GDP. The crisis in the region is a result of poor management and the consequence of living in a semi-arid area; it is not a result of the Israeli-Palestinian conflict. Therefore, settling the water dispute would not resolve the crisis; however, alleviating the crisis would make the dispute easier to resolve as the quantities of water at stake would loose much of their importance.

Finally, we point out measures the international community can take to be most effective in resolving the water crisis (and therefore also the dispute). These measures boil down to financing the construction of water infrastructure such as treatment facilities and desalination plants. These are far from cheap, and the Palestinians especially are likely to need financial help from the international community. Recognizing that transferring funds directly to the Palestinian Authority (PA) may be problematic, such project-specific donations may facilitate a diplomatic solution.

The advantage of focusing on the water crisis rather on its related dispute is that it does not require cooperation between the Israelis and the Palestinians. Furthermore, each side is likely to favor the development of water infrastructure of its neighbor, as it is likely to reduce demand pressures from the common natural resources that are in dispute.

2. The Water Problem: Supply, Demand, and the Water Balance

Why is water a source of dispute? The answer is simple: because water is scarce. Natural resources of freshwater in the Middle East are limited, while demand is ever-growing mainly due to population growth.

This section reviews the data on demand and supply conditions in the region, and concludes that the region as a whole is in a water crisis. It should be stressed that this observation is independent of any water dispute; that is, even if there were no conflicting interests between Israel and the Palestinians, the existing supply and current demand trend still imply a severe water shortage.

2.1. Supply

Supply is determined by the multi-year average of the renewable amount of water in the various sources. Persistent extraction rates beyond this level may lead to intrusion of saline water and pollutants to freshwater reservoirs.

The exact amount of naturally renewable freshwater in the region is a subject of debate. A 2002 report by an Israeli parliamentary investigation committee cites various estimates for water availability in Israel; these vary from 1500 to 2000 MCM/Year.[1] However, past demand figures combined with the deterioration in water quality of various sources suggest that the lower estimates are probably the more accurate ones. This assessment is consistent with the Israeli Water Commission estimate, which is 1,555 MCM/Year.

As mentioned, the figures above reflect resources under Israeli control. In addition, the Gaza Strip has a potential of additional 55-60 MCM/Year[2] while the West Bank can approximately contribute additional 120-200 MCM/Year.[3] We therefore conclude that the total available amount of natural freshwater in the region is in the order of 1750-1800 MCM/Year on average.

This quantity comes from three main resources of freshwater: the Sea of Galilee (500 MCM/Year), the mountain aquifer (610 MCM/Year), and the coastal aquifer (310 MCM/Year). The rest (around 330-380 MCM/Year) comes from regional sources.[4] Figure 1 presents a map with the location of the main sources, and Table 1 summarizes the long-run supply figures.

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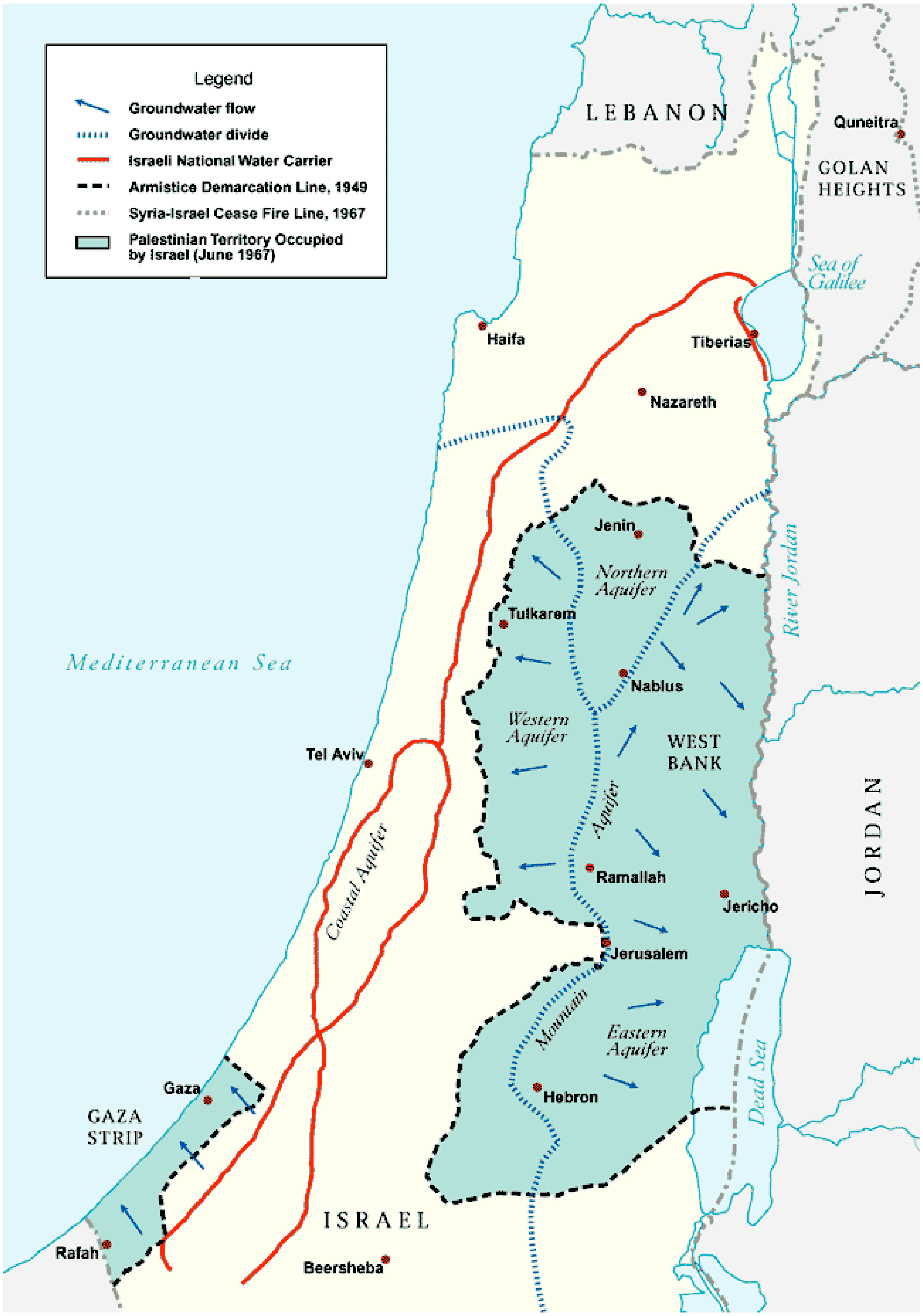
[1] CM = Cubic Meter, MCM = Million Cubic Meters. One CM = 264 American gallons.

[2] Atwan et al (1999) and Fisher et al (2005) estimate is 60 MCM/Year, Barghothi (2004) estimate is 55 MCM/Year.

[3] Based on figures from Oslo II agreement.

[4] The Sea of Galilee figure is from Mekorot (the major water company in Israel) website: http://www.mekorot.co.il/Mekorot/Mekorotmaim/natural. Coastal aquifer figure is from Mekorot after adjusting for

Figure 1: Map of Water Sources in the Region



Adapted from "Water and War in the Middle East," Info Paper No. 5, July 1996, Centre for Policy Analysis on Palestine/The Jerusalem Fund, Washington, D.C.

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the Gaza Strip. The mountain aquifer figure is from Oslo II. The residual quantity is roughly consistent with the Israeli foreign ministry estimate of 410 MCM/Year.

Table 1: Long-Run Supply of Freshwater*

Resource	Replenishable Quantities (MCM/year)
The Coastal Aquifer	310
The Mountain Aquifer	610
Sea of Galilee	500
Additional Regional Resources	330-380
Total Average	1,750-1,800

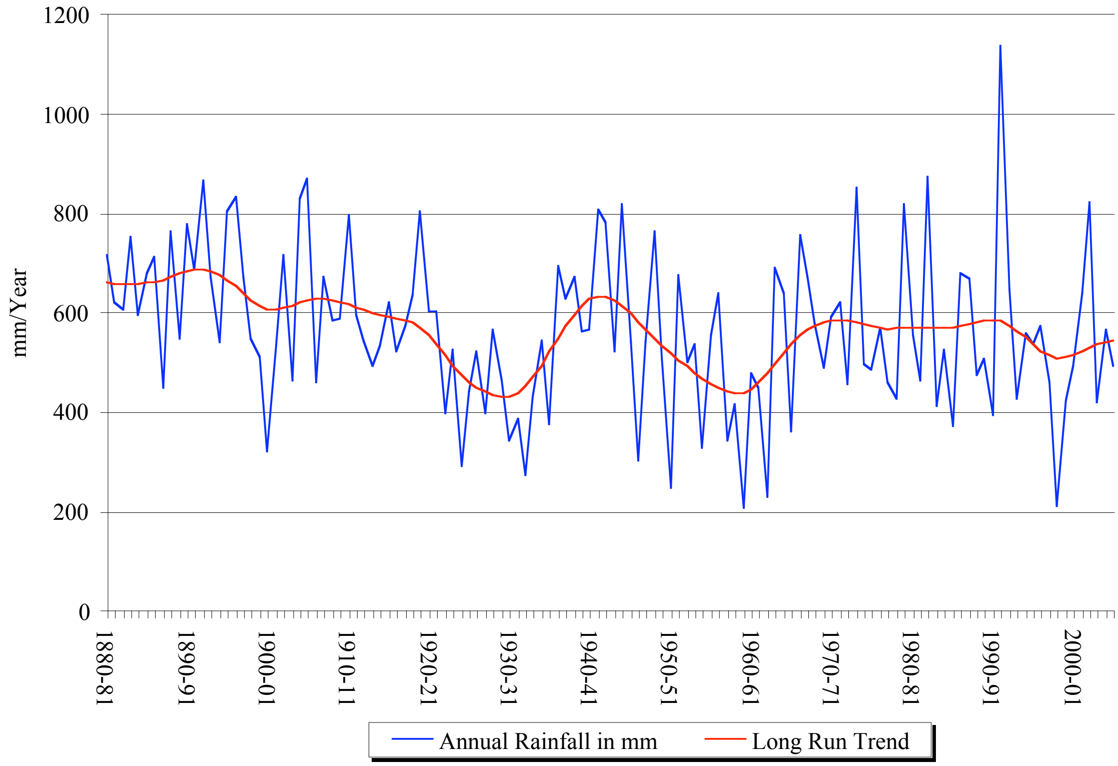
* The table was constructed by the intersection of various sources. See footnote 4 for details.

The figures above are annual averages. Generally speaking, utilization of the various resources at these rates does not jeopardize the quality of the water as long as some minimal safety levels of the reservoirs are kept. That is, in relatively dry years it is safe to extract more water than the renewable amount of that year, as long as this over-pumping is compensated by under-pumping in relatively wet years. This is true as long as the reservoirs levels are not too low. Once a threshold level is reached, it is no longer safe to utilize the resource since this may lead to a *permanent* deterioration in water quality. This may happen as a result of a sequence of drought years. Unfortunately, such a scenario is not a rare event in the region.

Figure 2 below displays historical data on rainfall in Jerusalem since 1880 and depicts its long-run trend.[5] The data display two interesting properties:[6] (a) The trend falls over time. The average rainfall in the first half of the sample is 592 mm/year, while in the second half it is 536 mm/year; a reduction of 10 percent. (b) The trend has cycles.

[5] The long run trend is measured using a Hodrick-Prescott filter with a smoothing parameter of 100.
[6] Kislev and Vaksin (2001) report the same properties.

Figure 2: Annual Rainfall in Jerusalem, 1880-2006 (mm/Year)



Source: Israel Meteorological Service.

Both properties should raise concerns. First, the downward slope implies that the estimates of the annual renewable amounts discussed above are probably biased upward. That is, the available quantities are actually smaller than reported in Table 1. Second, the cyclicality of the trend implies that drought (and wet) years tend to cluster together. This is bad because a sequence of drought years is not a rare event, and therefore utilization rates within the range of the long-run "safe yield" in the first drought year may lead to dangerously low levels of the reservoirs down the road. This is a real problem; in fact, Mekorot, the main Israeli water company, had shut down quite a few wells in recent years along the coastal aquifer under these exact circumstances.

2.2. Demand

This section reviews consumption figures and concludes that for at least the past decade, consumption has reached the upper limits of available water.

Relative to supply, consumption is easier to measure. Nevertheless, there are different estimates for consumption especially in the Palestinian territories. In addition, up-to-date figures are not readily available, and therefore we rely on Palestinian consumption figures from the late 1990s. From the various publications citing consumption figures, two seems to be in agreement. The Palestinian National Information Centre and Fisher et al (2005) both report total consumption of around 270 MCM/Year. Fisher's figures are for 1995, while The Palestinian National Information Centre's figures seem to relate to the late 1990s in general but do not refer to a specific year. Table 2 presents the breakdown by sector and area of total freshwater consumption in 1995.[7]

Table 2: Use of Freshwater in 1995

	Quantity (MCM)
Israel	
Urban	541
Industry	110
Agriculture	863
Palestinians: West Bank	
Urban + Industry	47
Agriculture	87
Palestinians: Gaza Strip	
Urban + Industry	46
Agriculture	89
Jordan:	
Water from the Sea of Galilee	50
Total	1833

Source: for Israel and the Palestinians figures are from Fisher el al (2005).

Table 2 also presents the Israeli consumption level of freshwater in 1995. The table clearly indicates that Israel is the main consumer of water in the region with freshwater consumption of

[7] Two other sources cite somewhat lower figures. Issac (1999) argues for Palestinian consumption of 246 MCM/Year, and Barghothi (2004) cites the figure 235 MCM for 1995. Also, it is conceivable that Fisher's figures are based on the Palestinian National Information Centre, which may explain their similarity.

over 1,500 MCM/Year.[8] The table also includes Jordanian consumption because under the 1994 peace agreement between Israel and Jordan, Israel is committed to supply Jordan with 50 MCM every year from the Sea of Galilee. The important lesson of the table, however, is that total freshwater consumption had already reached the supply's capacity limit a decade ago.

In order to get a more complete picture of demand conditions, it is useful to assess consumption over several years. Unfortunately, time series statistics of Palestinian consumption is not readily available; hence, our discussion relies entirely on Israeli data.

Figure 3 presents Israeli consumption of freshwater and other types of water in the years 1993-2004. The "others" category includes recycled water, saline water, and runoffs. The figure shows some fluctuations in freshwater consumption; these fluctuations are induced by supply conditions. Generally speaking, after wet years freshwater consumption increases, and after a relatively dry periods it falls. Recall that our discussion of supply suggests that this is not a good policy to follow since it seems that better preparation for future droughts can be achieved.[9]

The figure also shows that 1995 is not a unique year; once we add (at least) 250 MCM/Year of Palestinian consumption and 50 MCM/Year of transfers to Jordan, we realize that in every year during the last decade freshwater consumption has challenged supply.

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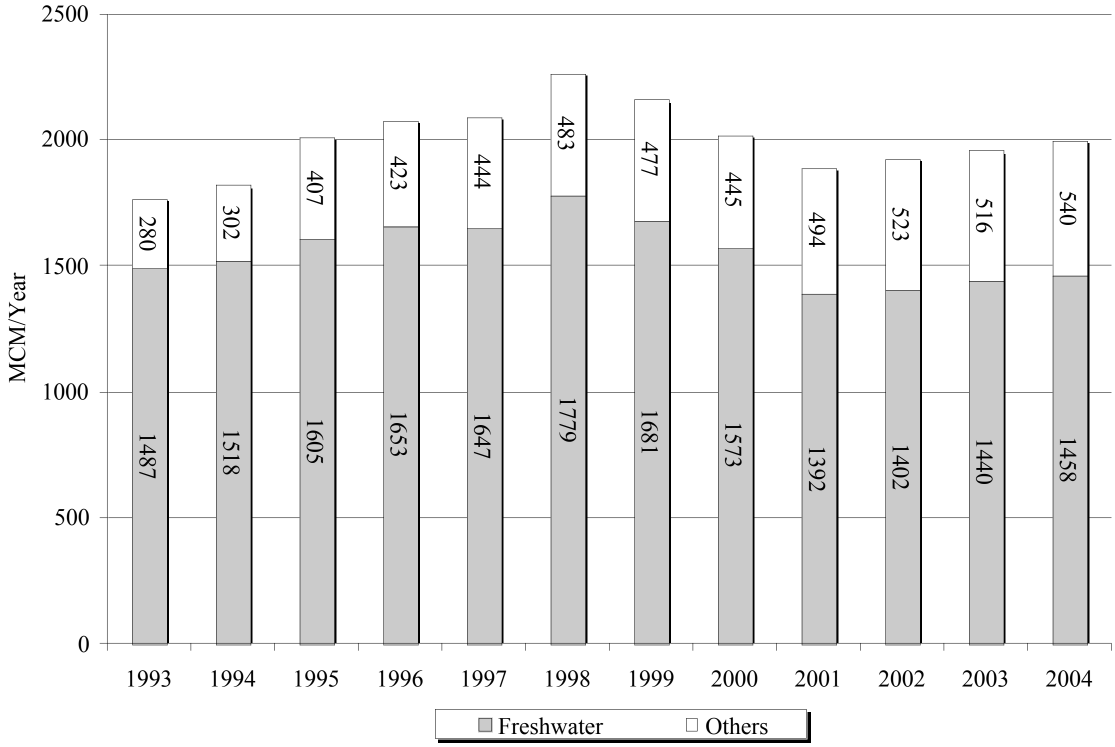
[8] The large difference in consumption between Israel and the Palestinians reflects differences in both population size and standard of living. Israeli population in 1995 was 5.6 million while Palestinian population was 2.5 million. Given these figures, Israeli urban consumption per capita was around 100 CM/Year, while the Palestinian per capita consumption was merely 35 CM/Year.

[9] Two comments are in order: First, the reservoirs have limited capacity and therefore in very wet years they may overflow. In these cases additional consumption does not come at the expense of preparation for drought years. Second, Mekorot does take these considerations into account. In wet years Mekorot divert water from the Sea of Galilee (which has relatively limited reservation capacity and is exposed to evaporation) to the coastal aquifer (which has greater capacity with no evaporation). However, given the consumption figures and the state of the coastal aquifer we believe that a better conservation policy could have been implemented.

Figure 3: Water Consumption in Israel by Type, 1993-2004[10]



Source: Mekorot.

Finally, we observe that the "others" category displays a distinct upward trend over time, from 280 MCM in 1993 to 540 MCM in 2004. This water is consumed mainly by agriculture. As we discuss below, further development of alternative water sources is key for resolving the water crisis.

We conclude our discussion on demand by reviewing consumption trends by sector. Figure 4 displays water consumption (of all types) by urban, industrial, and agricultural consumers in the years 1993-2005. Two features are of importance. First, urban consumption displays an upward

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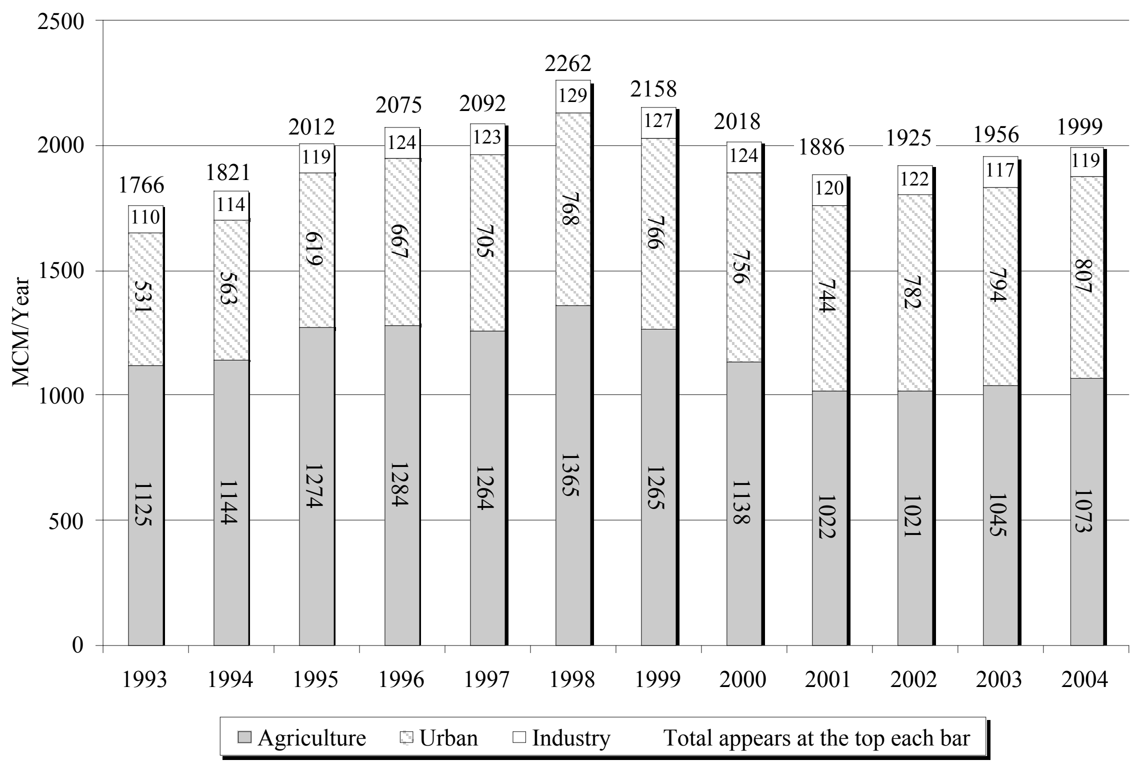
[10] The difference in 1995 consumption figure relative to those reported in Table 2 is due to the use of different data sources.

[11] Two comments are in order: First, the reservoirs have limited capacity and therefore in very wet years they may overflow. In these cases additional consumption does not come at the expense of preparation for drought years. Second, Mekorot does take these considerations into account. In wet years Mekorot divert water from the Sea of Galilee (which has relatively limited reservation capacity and is exposed to evaporation) to the coastal aquifer (which has greater capacity with no evaporation). However, given the consumption figures and the state of the coastal aquifer we believe that a better conservation policy could have been implemented.

trend; it has increased from 531 MCM in 1993 to 807 MCM in 2004. This trend is driven by both population growth and an increase in the standard of living.

Figure 4: Water Consumption in Israel by Sector, 1993-2004[12]



Source: Mekorot.

Second, the agriculture sector serves as a "shock absorber". The decrease in total consumption between 1998 and 2004 is almost entirely due to reduction in agricultural consumption. Furthermore, recycled and saline water are consumed by agriculture. Therefore, the increase in the "others" category presented in Figure 3 reflects substitution from freshwater towards other types of water in the agriculture sector. This trend leaves more and more freshwater available for urban consumption.

[12] The difference in 1995 consumption figure relative to those reported in Table 2 is due to the use of different data sources.

2.3. The Water Balance

The figures above demonstrate that freshwater consumption has stretched its resources to the limit, at least for the last decade. In that period, freshwater consumption in Israel was slightly over 1,550 MCM/Year on average. Adding to that 270 MCM/Year of Palestinian consumption and 50 MCM/Year of transfers to Jordan, we get total consumption of 1,870 MCM/Year. Given the supply figures, this implies an average annual deficit of 70-120 MCM.

The discussion above was limited to the last decade due to limitation of data availability. Needless to say, water scarcity has always been recognized as a problem in the region and as a result water deficits have been common. Indeed, in 1990 the Israeli State Comptroller Report indicated an accumulated deficit of 1,600 MCM. Immediately after the report, the 1991/1992 season was extremely wet (see Figure 2) and resulted in a significant improvement in the water balance; however, by 2002 the accumulated water deficit reached 2,000 MCM.[13] This figure amounts to more than the annual consumption of freshwater in the region, and leads to a clear conclusion: the region is in a severe water crisis.

Despite the shortage in freshwater, consumption is expected to increase in coming years mainly due to population growth and increases in the standard of living. In Israel, average urban consumption per capita is around 100 CM/year, while in the Palestinian territories this figure is roughly 35 CM/year. Assuming similar per-capita consumption levels in the next decade, and population growth of 2% in Israel and 3% in the Palestinian territories, would imply an annual increase in demand of approximately 18-20 MCM every year.[14] Increased standards of living, especially within the Palestinian population, would further increase this estimate.

This rough estimate is consistent with projections from official sources. The 2002 Magen's parliamentary investigation committee reports projections of a 15 MCM/Year increase in Israeli urban consumption. Interestingly, this increase is not expected to be accompanied by a sizable fall in agriculture consumption; the latter is projected to fall by only 1-2 MCM of freshwater every year. On the Palestinian side, the Palestinian Information Centre forecasts urban

[13] Based on the 2002 report of Magen's parliamentary investigation committee.
[14] The calculation assumes current population of 7 million in Israel and 3.5 million in the Palestinian territories.

consumption to increase by around 5 MCM/Year with only a marginal drop of less than 1 MCM/Year in agriculture consumption. If these projections materialize, both parties will find themselves without water of adequate quality unless new resources are developed.

This section discussed the region as a whole; however, we direct special attention to the Gaza Strip due to its extremely severe situation. The main source of water in Gaza is the southern part of the coastal aquifer. As discussed earlier, the estimated replenishable amount of water in that part of the aquifer is 55-60 MCM/Year. However, total usage amounts to 140 MCM/Year, more than twice the safe yield.[15] It should be noted that the natural flow of the coastal aquifer is east to west; as a result the Palestinian utilization of the aquifer has little effect on water availability in Israel (and vice versa). Therefore, Gaza's water deficit is not "hidden" in the total deficit of the region, but directly affects water availability within the Gaza Strip. Such a high extraction rate rapidly deteriorates the quality of water as it reduces the groundwater level of the reservoir which allows the intrusion of saline water from the Mediterranean. In addition, wastewater also pollutes the aquifer. Atwan et al (1999) say that some experts estimate that it will take over 100 years of zero extraction to restore Gaza's pre-1948 aquifer conditions.

3. Water in Dispute

Unfortunately there are no official figures that indicate how much water is in dispute. The discussion in this section attempts to get a sense of the magnitude based on bits of information from various sources. We start by quantifying the amount of water in dispute, and then following Fisher et al (2005) we estimate its monetary value.

3.1. Quantities

Most of the water in dispute is in the mountain aquifer, under the West Bank area. In the Gaza Strip, although the water situation is severe, little amount is in dispute since, as discussed above, utilization of the coastal aquifer in its southern part has little effect on water availability in its

[15] Prior to the Israeli disengagement, Jewish settlements in the Gaza Strip used additional 10 MCM/Year. Israel also supplies Gaza with additional 5 MCM/Year from its own sources.

northern part (and vice versa). Another source of water under dispute is the Jordan River since Israel's utilization of the Sea of Galilee reduces the river's flow significantly.

By and large the mountain aquifer lies under Palestinian territories; however, its western and northeastern parts are naturally flowing toward Israel. Israel has been utilizing 350-400 MCM/year (60-70% of the aquifer potential) prior to the 1967 occupation of the West Bank, and current utilization figures are within this range.[16] In fact, this water is most easily accessible from within Israel's borders. Extracting the water from Palestinian territories is at least twice as expensive.[17]

Shuval (2000), in describing Israel's concerns, suggests that Palestinian control over the mountain aquifer might force a reduction of some 300 MCM/year in the Israeli utilization of this source.

Fisher et al. (2005) suggests that the actual quantity in dispute is probably not more than 100 MCM/year. They say: "100 million cubic meters per year is a very large amount of water in the dispute, probably larger than the difference in the negotiating positions of the parties." (Fisher et al. (2005), p. xiv).

The figures in the Oslo II agreement seem to support Fisher's assessment. The agreement allocates 443 MCM/year of the western and northeastern aquifers' water to Israeli usage. This quantity is greater than the pre-1967 Israeli utilization by only 50-100 MCM/year.

Based on this discussion, we conclude that the quantity of water under dispute in the mountain aquifer is in the order of 100-300 MCM/year.

Without official data, it is hard to assess the quantity under dispute from the Jordan River. However, judging by the 1994 Israeli-Jordanian peace treaty, and assuming that the Palestinians

[16] Pre-1967 figures are based on Shuval (2000), current estimate is from the Israeli Foreign Ministry.
[17] Fisher et al (2005) estimate these costs by no more than 9 ¢/CM in Israel and over 20 ¢/CM from the Palestinian territories.

have similar rights over this water as do the people of Jordan, we conclude that the quantity under dispute is in the order of 50 MCM/Year.

To conclude, the water conflict boils down to an argument over 150-350 MCM/Year. Given the water shortage and comparisons to the consumption figures in Table 2, this is not a trivial amount.

3.2. Monetary Value

Fisher et al (2005) take a step further. They ask what the monetary value of the water in dispute is. A basic economic principle suggests that the value of any object is determined by its replacement cost. In our case, an upper bound of the replacement cost is given by the cost of desalination. Effectively, the Mediterranean provides an unlimited source of freshwater. Therefore the economic value of water in any location is bounded by the cost of desalination plus conveyance to that location.

Fisher's calculation is as follows. One CM of potable desalinated sea water costs around $0.6. The main users of this water will be the cities along the Mediterranean coast. Extracting water from the mountain aquifer and transferring it to these cities costs around $0.4 per CM. Therefore, *ownership* of this water cannot be worth more than $0.2 per CM ($0.6 minus $0.4), and ownership of the water in dispute (around 150-350 MCM/year) cannot be worth more than $30-$70 million per year.[18] To put that in perspective, given that Israel's gross domestic product (GDP) is more than $100 *billion* a year, a $30-$70 million annual dispute is a drop in the bucket (0.03-0.07% of GDP).

It should be noted that although this calculation is carried out from the Israeli point of view it is valid for the Palestinians as well. Assuming Israel owns this water, the Palestinians will be able to buy extraction rights for $0.2 per CM. Therefore, this figure provides the *ownership* value of the water.

[18] Cost figures are from Fisher et al (2005).

Nevertheless, the Palestinians have a much smaller economy. Palestinian GDP was around $8 billion in 2000.[19] The range of $30-$70 million out of $8 billion is merely 0.4%-0.9% of GDP – still a surprisingly small number.

Finally, one word of caution. The argument in this section and the calculation that followed depend, of course, on the *existence* of desalination plants. As of today, there is only one large-scale plant near the city of Ashkelon (a few miles north of the Gaza Strip) with a capacity of 100 MCM/Year. For the argument to hold, many more should be built.

4. What Can Be Done?

Our analysis suggests that the Israeli-Palestinian water dispute is, relatively, a minor issue compared to the stress stemming from the water crisis in the region as a whole. Therefore, a resolution of the dispute will not resolve the water crisis; however, a resolution of the crisis will significantly reduce the importance of the water in dispute and therefore help to resolve it.

The water crisis in the region requires three types of actions: (a) Demand management; that is, policies that promote conservation and proper pricing of water (i.e., pricing based on economic foundation). (b) Joint Israeli-Palestinian management of the water resources. The two peoples live in the same ecological system, and the actions of one party often affect the other. Joint management will therefore lead to better control of both sides over the water resources. Finally, and most importantly (c) Supply enhancing measures. These include the construction of desalination plants, recycling facilities, and conveyance system.

Here we wish to focus on the third point – supply enhancing measures. The reason is that demand management and joint management are politically charged issues, where the politics take place either across sectors (demand management) or across nations (joint management). Although we recognize the importance of these steps, they are ineffective without full cooperation of all sides involved (sectors and nations). On the other hand, supply enhancement is purely a budgetary issue, and therefore this is where the international community can be most

[19] Latest estimate available from the Palestinian central bureau of statistics.

effective and most welcome. In addition, both sides are likely to support these steps regardless of the existence (or nonexistence) of an active dialogue between them. That is, the Palestinians should favor the construction of Israeli desalination plants because these will reduce the pressure of Israeli demand from the mountain aquifer. At the same time, Israel should welcome recycling facilities in the Palestinian territories since they will reduce the amount of wastewater intruding into the aquifers.

4.1. Desalination Plants

Using desalination plants to obtain freshwater is expensive relative to other sources of water. Based on recent experience, a facility with a capacity of 100 MCM/year requires investment of some $250 million and its operational cost is in the order of $0.527 per CM.[20] Based on a plant's life expectancy of 40 years and an annual interest rate of 4 percent, the investment cost is around $0.12 per CM. This brings the cost of desalination to around $0.65 per CM, which is roughly in line with Fisher's estimate of $0.6. Put differently, these figures suggest that the total cost of a 100 MCM/Year desalination plant working at full capacity is in the order of $65 million a year ($53 million operational cost and $12 million capital cost).

Israel has already begun the construction of a series of desalination plants along the coastline of the Mediterranean. The total capacity of the plants is expected to add the natural resources some 400 MCM/year of potable water. The first plant has only recently become operational (in August 2005) and has the capacity of 100 MCM/year. It is located near the city of Ashkelon, a few miles north of the Gaza Strip.

In Gaza, the Palestinian Water Authority has started the construction of a desalination plant with a capacity of 20 MCM/Year, and plans are to extend this capacity to 50 MCM/Year by 2020.[21] The project is financed by USAID. It should be stressed that given Gaza's water balance, desalination capacity of at least 80 MCM/Year is required.

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[20] Figures are from Water Technology. "Ashkelon Desalination Plant, Israel." Available at: http://www.water-technology.net/projects/israel/

[21] Nahed Ghbn, PWA Chairman Assistant, Feb. 2003. Newsletter, available at: http://www.ewatermark.org/watermark19/article2.html

4.2. Recycling Facilities

Around 70% of urban water consumption returns as sewage. After treatment, 80-85% of the sewage remains as effluent and can be used for irrigation. That is, 55-60% of urban consumption can be reused in agriculture.[22] The increasing trend of urban consumption (see Figure 4) suggests that more and more water becomes available for recycling. As the supply of treated water increases, effluents substitute for freshwater in agriculture; this, in turn, leaves more freshwater available for urban consumption.

Israel already has a decent water treatment system in place, and some of its facilities are considered to be of the most sophisticated in the world. However, due to lack of an available conveyance system, some of the effluents are damped to the Mediterranean.

In the West Bank there are no safe and complete wastewater reuse projects.[23] In the Gaza Strip there are two treatment plants located near Gaza City and Beit Lahia in the northern part of the strip; however, they are both outdated and overloaded. As a result, the treatment quality is poor. In Beit Lahia these conditions have created a lake made of poor-quality effluents, 1 km long and up to 9 m deep.[24] In the southern part of the Gaza Strip there is no water treatment facility, and all wastewater is discharged and left to infiltrate the aquifer.

The 2002 parliamentary investigation committee reports cost estimates of water treatment to be in the order of $0.2-$0.3 per CM. Such treatment is sufficient for making wastewater safe for agricultural use; however, some experts argue that further treatment is necessary in order to protect the aquifers' quality. The cost of such additional treatment is around $0.12 per CM.

Finally, the use of recycled water in agriculture can certainly increase freshwater availability for urban consumption. However, the development of recycling facilities must be accompanied by construction of a collection system from the urban consumers to the treatment plants and a distribution system from the plant to the agricultural consumers. In many cases all three components: collection, treatment, and distribution are missing in the Palestinian territories.

[22] Figures are from the 2002 report of Magen's parliamentary investigation committee.
[23] Barghothi (2004).
[24] Miller et al (2006).

5. Concluding Remarks

This paper has reviewed the situation of water in Israel and the Palestinian territories and assessed the magnitude of the water dispute between the two parties. Our main conclusion is that the region as a whole is in a severe water crisis; however, the value of the water in dispute is relatively small. Nevertheless, the scarcity of water in the region exacerbates the dispute. Therefore, a key to resolving the dispute is to deal directly with the water crisis. Among other necessary steps that include demand management and joint management, we have emphasized the construction of supply enhancing infrastructure. Given the demand and supply figures, these are necessary by their own right; however, we also believe that this approach is the most effective one since it lacks the political obstacles that might doom attempts to better manage the water sector.

The construction costs of building desalination plants and recycling facilities are far from cheap, and the Palestinians in particular are likely to need financial aid from the international community. Recognizing that transferring funds directly to the Palestinian Authority may be problematic, project-specific donations may facilitate a diplomatic solution to the financing question.

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