



# Sustainable Management of the West Bank and Gaza Aquifers

## Summary Report



Palestinian National Authority  
Palestinian Water Authority



السلطة الوطنية الفلسطينية  
سلطة المياه الفلسطينية



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Intelligent Solutions



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## Contributors and acknowledgements

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# 1 Introduction to the Palestinian Water Sector

Since the start of the Peace Process through an agreement called “The Declaration of Principles” (signed on 13 September 1993) it was evident that there is a major equity issue concerning the sharing of Israeli and Palestinian water resources. The parties agreed to prepare plans for water rights and equitable use of water resources. Article 40 of Annex III of the Oslo II agreement, signed on 18 September 1995, formed the basis for water sector planning and project implementation during the interim period (1995-2000) at the end of which a final agreement was supposed to be reached. In addition to the water rights problems, there was a need to protect and sustainably manage natural resources for economic and social development and to safeguard health. The historic balance between water demand and supply in Palestine has been artificially constrained by non-market forces. However, the development and sustainable management of water resources in Palestine is complex due to hydro-political, socio-economic and environmental constraints.

At present, water demand in Palestine exceeds the available water supply which has led to low consumption rates. On average, the per capita consumption in the West Bank is about 70 l/d and water losses from conveyance systems can reach 40% and thus the actual water consumption per capita amounts to 42 l/d which is about one third of what the per capita consumption needs are according to WHO standards. In the Gaza Strip, only a total of about 8.9 MCM/yr out of the water supplied by municipal wells may be considered acceptable (based on health considerations); this corresponds to approximately 18 percent of the total supply quantity, and translates to an unacceptable per capita supply rate for domestic use of only about 13 l/c/d.

The gap between supply and demand in 2005 for all uses was 336 MCM/yr. The main causes of increased water demand in Palestine are agriculture (accounting for 59% of total demand), demographic growth and urbanization. Urbanisation reduces aquifer replenishment and increases the risks of floods. Climate change is expected to lead to decreasing and more irregular rainfall, creating major constraints for agriculture and water supply for other purposes. Climate change could also lead to higher rates of evapo-transpiration, lower soil moisture content, growing desertification, falling water levels in aquifers and saline intrusion into coastal aquifers. Desertification has also taken place in Palestine as a result of losing 50% of the grazing area to Israeli settlements and military camps and “nature reserves”. This has an impact on climate patterns in the region.

Some of the Palestinian aquifers such as the Western Aquifer Basin are mismanaged, and, in some drought years, the aquifer was overexploited by Israelis (in 1999 the Israelis pumped from this Aquifer 572 MCM/yr while its replenishment according to Oslo II agreement is 362 MCM/yr) and other aquifers such as the Coastal Aquifer suffer from saline intrusion, also due to over-pumping.

The poor sanitation services, poor management of sewage and solid waste and over-application of fertilizers and pesticides in the agricultural sector can cause pollution to the Palestinian aquifers. In Gaza, aquifer quality is an important issue, with high nitrates and chlorides arising from over-extraction and reduction in storage volumes, leading to a continuous degradation of water quality. There are also some areas where seawater intrusion has been detected. Also, in areas of intensive pumping, saline water has been drawn upward from underlying waters or saline geological formations. Contamination of water will minimize the already limited quantities of water resources in Palestine, enlarging the gap between water supply and demand.

As a result of Israeli security measures, the Palestinian economy suffered over the last few years from a 38% decline in Gross National Income (GNI) and unemployment that reached 37% (and even higher). Real per capita income is 46% lower, poverty is affecting 60% of the population, imports and exports are down by one-third, and investments are down by 60%. In these circumstances, agriculture plays the most important role in providing subsistence livelihoods and essentials. However, agriculture is constrained by the overall limitations of land and water resources. At the social level, there is a need to emphasize the principles of access to essential water supply and sanitation services (40% of the Palestinian communities (population about 300,000) are not served in this respect), financial resources, information access, gender equality, approaches based on actor participation, consultation and partnerships. The participation by local people and other stakeholders in decision-making and management are major elements in this context. It is important to adjust unsustainable consumption of water and support the promotion of reforms and strengthen water institutions within integrated approaches and improved governance. The Palestinian citizen pays about \$1.25 per 1 m<sup>3</sup> of water. This is a high cost compared to the average income of the Palestinian citizen. The high cost is due to high cost of electricity, fuel, spare parts and maintenance of water supply wells and systems that normally are imposed by Israeli companies.

With regard to Palestinian water rights, an analysis of the percentage shares of aquifer utilization for 1998/99 reveals an 86%/14% split in favour of Israel; when the other sources (Jordan River and wadi-runoff) are taken into account, the overall split is 89%/11%. When viewed in terms of per capita consumption, the ratio of Israeli to Palestinian consumption is roughly 4:1, and average Palestinian per capita consumption, at 83l/c/d, is below the recommended WHO limit of 100 l/c/d.

In the light of the above, there was a great need to undertake a project that deals with the above challenges and provide an integrated approach that starts from assessment of sustainable yield of aquifers to provide an assessment of different sustainable water resources management options. This was the mission of the SUSMAQ (Sustainable Management of the West Bank and Gaza Aquifers) Project as summarised in this report.



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