

# **UNITED NATIONS SEMINAR ON ASSISTANCE TO THE PALESTINIAN PEOPLE**

*Speeding up relief, recovery and reconstruction in post-war Gaza*

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**CHECK AGAINST DELIVERY**

## **PLENARY II**

**Looking ahead: prioritizing reconstruction tasks**

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## WATER CRISIS IN THE GAZA STRIP

Considered as one of the most populated area in the World, Gaza Strip with a population of around 2 Million habitants faces a severe, historic water crisis.

This historic crisis is resulted due to the ongoing occupation and Israel's control of resources.

The water crisis has been deepen due to Restriction on materials and imposed siege on Gaza, the shortage of water supply for domestic and agricultural uses, over exploitation and depletion of the Sub Aquifer underneath Gaza, sea water intrusion, contamination and pollution of resources by wastewaters, solid wastes and excessive use of fertilisers, Water Quality that does not corresponds to WHO standards, shortage of energy and power supply and its impact of water and sanitation facilities. The water dilemma of Gaza has reflected severely on the environmental, agricultural, health and socio economic situation of the strip.

Since 2008, Gaza has witnessed three wars with the recent one on 2014. Among the infrastructure affected was the water and sanitation.

The Palestinian Government has prepared the National Plan of Gaza Early Recovery and Reconstruction. The Plan tackled the recovery on the short, medium and long term with a total budget estimated at 4 Billion US Dollars, focusing on different sectors including the infrastructure one.

The Plan has been presented to the donor community at Cairo conference on October 2014 and the Palestinian Authority has received pledge of 5.4 Billion USD of which half of it is assigned for Gaza Reconstruction.

The rescue, early recovery and reconstruction of the water and sanitation infrastructure sector have been valued at 40, 80 and 116 Million Dollars respectively.

It should be noted that this figure does not correspond to the exact figure Gaza water sector needs to address it sever water and sanitation crisis.

The Palestinian Water Authority has prepared a detailed report that addresses the different components of interventions to address the water crisis. The total budget for such intervention on water sector is estimated at 720 Million USD.

It should be noted that a comprehensive studies have been performed on the situation and future development of the water sector in the Gaza Strip.

Two important studies tackled the water situation in Gaza. Both studies are considered the basis for any interventions to address the water crisis in the Strip:

- The Integrated Aquifer Management Plan (IAMP)<sup>1</sup> was developed with USAID funds and released in May 2000, before 15 years and was developed under the CAMP project (Coastal Aquifer Management Plan). Based on the Study's recommendations, the Gaza Seawater Desalination Plant Feasibility Study<sup>2</sup> was prepared with financing from USAID in 2003 and bidding documents drafted for a 55 Mcm/a SWRO plant. The project came to a halt due to political reasons.
- The second study is considered as the “Bible” for addressing the water dilemma in Gaza; the study entitled “The Comparative Study of Options for an Additional Supply of Water for the Gaza Strip (CSO-G)”<sup>3</sup> was published in July 2011 and financed by Norway. This study is the most recent document reviewing the water sector situation in Gaza and resulting in set of actions known as “**the Rolling Programme of Interventions**”.

### **The Rolling Programme of Interventions**

The action plan and time schedule proposed in the CSO-G report are as follows:

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<sup>1</sup> Integrated Aquifer Management Plan, Metcalf & Eddy Inc. - CDM International - Khatib & Alami - Palestine Hydrology Group; May 2000, for USAID.

<sup>2</sup> Gaza Seawater Desalination Plant Feasibility Study, Aqua Resources International, LLC; Abridged Final Report, February 2003.

<sup>3</sup> S Phillips Robinson & Associates, Updated Final Report, 31 July 2011. The Gaza Emergency Technical Assistance Programme (GETAP) on Water Supply to the Gaza Strip; Component 1 - The Comparative Study of Options for an Additional Supply of Water for the Gaza Strip (CSO-G).

Rolling Programme	Status
Establishment of a Gaza Programme Coordination Unit (PCU),	It's now established and financed by Austria. It oversees all water & sanitation interventions
Water and Health Monitoring Project	Ongoing Programs
Domestic Water Distribution System Improvements	Ongoing programs
Imported Water from Israel;	A long awaited pipe line has been completed connecting Mekeorot network to "Nahel Oz" connection financed by ICRC. This pipe is supposed to deliver 10 Million Cubic meter on yearly basis once the negotiation on Prices is settled down. It should be noted also that this pipe supposed to deliver the water to Al Mintar reservoir (5000 Cubic meter), unfortunately, this reservoir is completely destroyed by the 20014 war
Short Term Low Volume (STLV) Desalination Plants; currently tow small desalination plants are under construction one financed by UNCIF and the second one is financed by the Islamic development Bank.	<p>Rehabilitation of the 600 m<sup>3</sup>/d desalination plant in Dayr al Balah (completed)</p> <p>The 0.22 Mcm SWRO plant was constructed with Austrian financing in 2003 with a beach well intake and equipped in 2011 with a pressure recovery system with Italian financing. The cost of the plant was approx. EUR 2.2 million in 2003 and of the recent improvements approx. EUR 0.2 million.</p> <p>Expansion of the Dar al Balah SWRO plant by 2000 m<sup>3</sup>/d (proposal stage)</p> <p>The World Bank together with the IDB are financing the construction of a SWRO plant of 0.73 Mcm capacity next to the existing plant. An agreement has been signed with the PWA and tendering is on-going. Project cost including other water and wastewater components is USD 11.1 million.</p> <p>6000 m<sup>3</sup>/d SWRO plant in Khan Yunis by EU/UNICEF (under design)</p> <p>A MoU has been signed between the PWA, CMWU, the EU and UNICEF for construction of a 2.19 Mcm SWRO plant at Khan Yunis. The project shall be implemented jointly by UNICEF and the EU and project financing of EUR 10 million is provided by the EU.</p> <p>The project includes further a EUR 5 million package also financed by the EU for the construction of reservoirs and pipelines, for distribution and blending of the produced water. The MoU was signed in 09/2011 and the plant must be commissioned latest by 09/2014 in order not to lose the EU funds.</p>

	<p>Tender for a 3.7 Mcm SWRO plant in Gaza City for the private sector (tendered)</p> <p>The PWA has issued a tender for the private sector for a 3.7 Mcm SWRO plant in form of a BOT or BOOR (build, operate, own and remove) model. The plant should be constructed at the western outskirts of Gaza city and be operated for a period of 5 to 10 years. Bids were received on 21.02.2012 and evaluation is on-going, but the PWA is not optimistic of receiving an acceptable offer.</p> <p>North Gaza City STLV, “French plant” (abandoned)</p> <p>AFD has financed the construction of a STLV plant to the north of Gaza city. The partly completed plant has been damaged during recent conflicts. Construction has been suspended for some time and recently the construction contract was terminated and the site abandoned.</p> <p><u>In summary, the currently planned STLV desalination capacity comprises only 6.84 Mcm/a; this is just half of the 13 Mcm/a proposed in the SCO-G report.</u></p>
Regional Desalination Plant;	<p>This is the major intervention as recommended by 2003 USAID CAMP study. It’s identified as the corner stone for resolving the water shortage. The objective of the project is to improve the water supply situation in the Gaza Strip, by construction of a seawater desalination plant. Socially affordable water complying with WHO/Palestinian standards shall be produced by blending the desalinated water with lower quality groundwater.</p> <p>This project with its components being the north south Carrier of 43 KM and the associated project of related networks to address the non-revenue water. This project is identified by the Palestinian project as the strategic project. It has presented for the Union for the Mediterranean and it was the first project of UfM that endorsed by the 43 countries of the UNION with a budget estimated at 450 Million dollars. The cost figures provided are very preliminary and need to be verified. The total investment cost identified are <b>USD 455 million</b>, comprising of USD 230 million for the desalination plant, USD 40 million for the gas power plant, USD 140 million for the main carrier, reservoirs and pumping stations (including a 10% reserve), USD 35 million for the NRW programme and USD 10 million for the Implementation Consultants. Operation and maintenance costs for the SWRO plant have also been drawn from experience of similar plants.</p>

Increased Reuse of Treated Wastewater	<p>Currently no wastewater treatment plant (WWTP) exists in the Gaza Strip, which is capable of producing effluents suitable for reuse. Construction of three large WWTPs is foreseen in the water master plan (see next chapter) to serve all Gaza Strip.</p> <p>A major investment is taken place in Gaza on construction of wastewater treatment plants. The major one is the “NGEST” Beitlehia waste water treatment plant which planned to serve the northern part of Gaza (around 400 000 Habitants) (World Bank, AFD, EU, SIDA, Belgium), its completed and lack of energy and power (3 Mega Watt) prevent its operation, The North Gaza Wastewater Treatment Plant with a capacity of 36,000 m<sup>3</sup>/d i.e. 13.1 Mm/a is the most advanced one and its effluent will be used for groundwater recharge. The effluent recovery and reuse scheme of 40,000 m<sup>3</sup>/d (including an additional 10% abstraction from the groundwater aquifer), is scheduled for commissioning in 2014.</p> <p>The Central Gaza Sheikh Ejlin Wastewater treatment plant and the recent agreement with IDB and Japan to build a 57 Million dollars Wastewater treatment plant in Khan Younis. Many programs for reuse are under construction.</p>
Other Interventions in the Agricultural Sector	

### **The Key issue of water crisis solution: Large Scale Seawater Desalination**

Recent United Nation report published on 2011, entitled “Gaza 2020, a liveable place?” Warned of irreversible damage of the Gaza Aquifer by 2020 if no action is taken.

It also states that by 2016 Gaza will be running out of water that could be suitable for human use.

Currently, in the Gaza Strip, more than 95% of all consumption is based on groundwater resources, the remainder being imports from Israel (around 5 MCM).

The aquifer has been exploited three times over its natural recharge capacity for several years, leading to sea water intrusion.

95% of the water produced in Gaza does not comply with WHO/EU drinking water standards due to high nitrate or chloride concentrations. The 2 million people living in the Gaza Strip are therefore exposed to an unacceptable high health risk.

Population is expected to continue growing at a high 3.5% per year and the domestic water demand is projected to grow from 91 million cubic meters per year (Mcm) to 199 Mcm till 2035. The situation has been extensively studied and a good-quality master plan been prepared.

The strategy developed is to (a) recycle treated wastewater by injecting it to the aquifer to cover the irrigation demand, (b) to increase imports from Israel to 5 times the current amount and (c) to fill the remaining gap by seawater desalination. The necessary desalination capacity was determined to be 11 Mcm in 2012, increasing to 55 Mcm in 2017 and to 130 Mcm till 2035.

### ***The Gaza desalination project***

With no alternative existing source of fresh water, a large-scale desalination plant is an absolute requirement to address the water deficit in the Gaza Strip.

The urgency for the Desalination Facility for the Gaza Strip has increased with the rising level of humanitarian crisis in Gaza related to inadequate water resources with related impacts on human health.

Further, the desalination of water from the Mediterranean would substantially alleviate the over pumping of groundwater from the Coastal Aquifer which underlies the Gaza Strip as a clear environmental benefit.

Lastly, the construction of the desalination facility and conveyance system in Gaza offers a substantial opportunity for job creation in their construction and subsequent operation as it will represent the largest single project built to date in the Gaza Strip.

The construction of a seawater reverse osmosis (SWRO) treatment plant of 55 Mcm capacity in the initial phase. The power supply for the plant is initially expected to be based on a new overhead line for power import from Egypt or Israel. The plant design shall provide for (i) the possible doubling of the capacity in a latter phase and (ii) for one of the related projects which is the possible construction of a dedicated gas-fired power plant next to the SWRO plant. The PWA has been allocated a plot of land for the SWRO plant near the beach, south of Dayr Al Balah by the Local Government Authority.

***Three related projects*** have been identified. These related projects are necessary to complement the desalination project in order to make it feasible.

- The construction of a north-south water carrier including storage reservoirs for transport of the treated water to the consumers and for blending it with groundwater.
- A non-revenue water (NRW) reduction project, for reduction of the NRW to an acceptable level of 20% and equally important, to increase the currently poor revenue collection efficiency of 38% to 80%.

- The construction of a dedicated gas-fired power plant of 30 to 35 MW capacity. The supply from the overhead line would remain as a stand-by source. This project is still considered as optional at this stage.

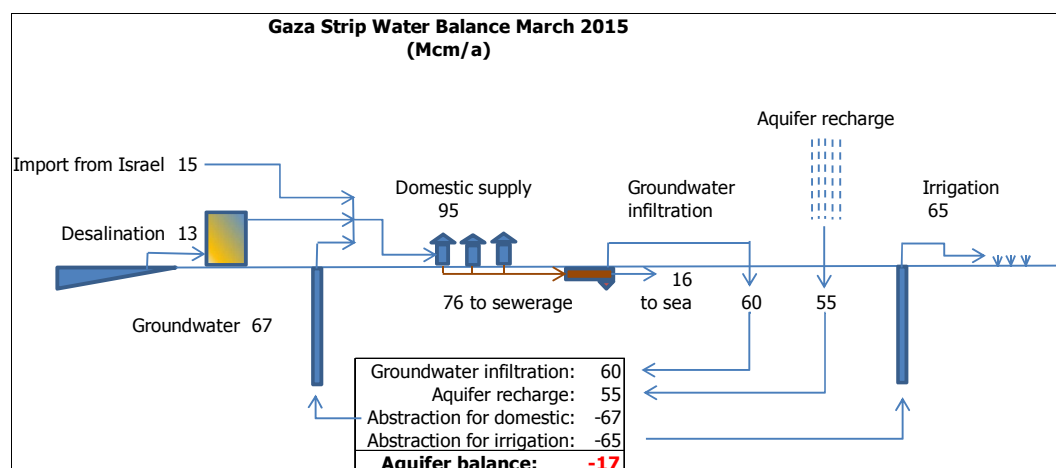
### First Project labelled by the Union of the Mediterranean

On 22 June 2011, the Union for the Mediterranean “labeled” the Desalination Project for Gaza Strip as its first project. This landmark operation consists of the construction of a 100 million cubic meters desalination facility and distribution system in the Gaza strip that would help to address the major water deficit for a population of 2 Million.

The “labeling” of this large-scale project, submitted by the Secretariat’s Environment & Water Division in collaboration with the Palestinian Water Authority, by the representatives the 43 UfM countries<sup>4</sup> was partly based on a unanimous recommendation from the UfM’s Water Expert Group, and is an acknowledgement that the project is capable of delivering concrete benefits for 2 million impoverished citizens living on the southern shores of the Mediterranean, not only from humanitarian and health perspectives, but also contributes to job creation and future economic and sustainable development in that highly populated region of the Mediterranean.

The Project will also contribute to the political stability of the region through the removal of the water scarcity issue from the web of the multiple and complex issues facing the Gaza Strip.

### The Rolling Programmes by figures



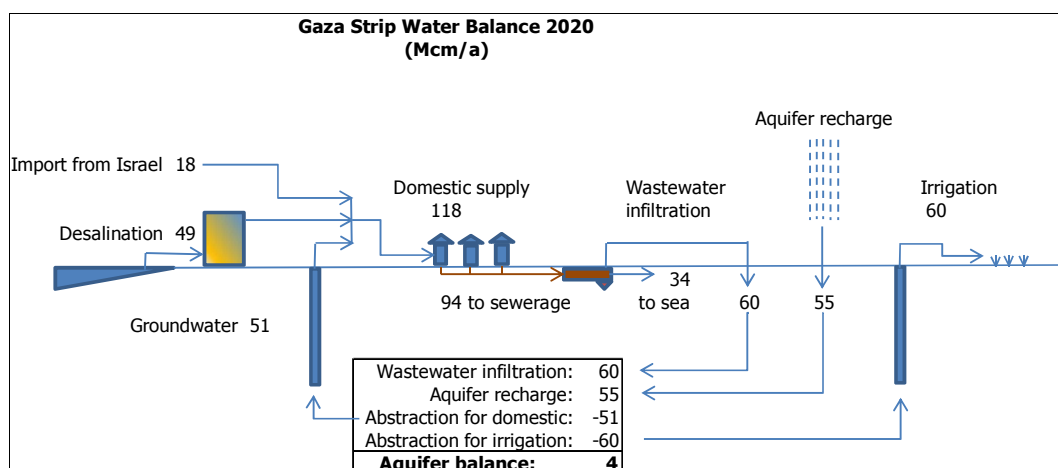
**Figure 1: Planned Gaza Strip Water Balance in 2015**

<sup>4</sup> 27 EU Member States, nine Arab countries (Algeria, Egypt, , Jordan, Lebanon, Mauritania, Morocco, Palestine, Syria and Tunisia) and seven non-eu-non-Arab states (Albania, Bosnia and Herzegovina, Croatia, Israel, Monaco, Montenegro and Turkey).



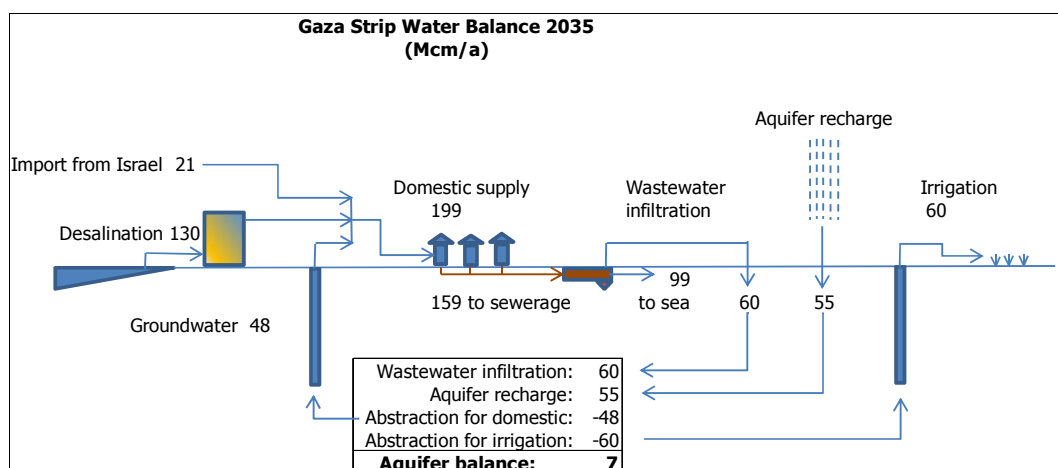
Figure 2 shows the planned water balance for the year 2020. Imports from Israel have increased to 18 Mcm, the desalination capacity has increased to 49 Mcm and 51 Mcm are still supplied from groundwater to produce in total 118 Mcm drinking water.

The produced wastewater is 94 Mcm (80%) of which 60 Mcm are recycled to cover fully the irrigation demand. In this case, the balance of the aquifer is just positive with 4 Mcm.



**Figure 2: Planned Gaza Strip Water Balance in 2020**

Figure 3 demonstrates the situation in 2035. Imports from Israel have increased to 21 Mcm, desalination capacity has increased to 130 Mcm and wells contribute 48 Mcm to the domestic water demand of 199 Mcm. The irrigation demand of 60 Mcm is fully covered by recycling of treated wastewater. This results in a just positive aquifer balance of 7 Mcm.



**Figure 3: Planned Gaza Strip Water Balance in 2035**

**Conclusion:**

The construction of the 55 Mcm desalination plant is a necessary investment and before the year 2035 the desalination capacity will have to be more than doubled. It is therefore recommended to construct now a 55 Mcm desalination plant and to include already now in the planning the necessary future doubling of the plant capacity.

This conclusion is based on the assumption that drinking water imports from Israel will increase from currently 4.7 Mcm to 21 Mcm and that all future irrigation demand will be covered from treated and recycled wastewater. If either of the two sources falls short of expectations, the desalination capacity will need to be developed proportionally higher.

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