Desalination: a fresh solution to Gaza's water crisis

Desperate water situation

The availability of fresh water in Palestine is amongst the lowest in the world[1]. With no streams or rivers, Gaza has historically relied on its coastal aquifer for its water supply. But as ground water is being drawn at a higher rate than natural replenishment, seawater from the Mediterranean has infiltrated the groundwater, increasing salinity to unsafe levels. Sewage and agricultural fertilizer infiltration have also contributed to contaminate the water, which is polluted with high levels of chloride and nitrates, in some areas as high as six times the World Health Organization (WHO) limit.

- **90% of water unsafe for drinking**
- **Aquifer may become unusable by 2016**

Today more than 90 per cent of the water extracted from the territory's sole aquifer has been found unsafe for human consumption. Over-abstraction of groundwater could render the aquifer unusable by 2016, according to one United Nations report. It indicates that the Palestinian Water Authority (PWA) expects demand for fresh water to grow to 260 million m^3 per year by 2020, a 60% increase of current levels of abstraction from the aquifer[2].

As the water that comes through the tap is often saline and undrinkable, more than four out of five Gazans buy their drinking water from unregulated, private vendors, a heavy burden on already impoverished families. Some families are paying as much as a third of their household income on water. An estimated four-fifths of the water sold by private vendors is contaminated.

Desalination allows the production of potable water from SEAWATER or BRACKISH GROUND WATER.

Brackish water is water that has more salinity than fresh water, but not as much as seawater.
It may result from mixing of seawater with fresh water.

A boy drinks water from a tap outside a desalination unit built by UNICEF in Rafah. UNICEF/El Baba

Desalination: a strategic option for Gaza

With no alternative sources of fresh water currently available in Gaza, desalination plants appear to be the most feasible solution to date, and an absolute requirement to address the water deficit. The urgency has increased with the rising level of humanitarian needs in Gaza related to inadequate water resources with related impacts on human health.

Seawater desalination is one of the **strategic options chosen by the Palestinian Water Authority** (PWA). A comparative study[3] conducted in 2011 concluded that desalination was an essential, pragmatic solution to provide a consistent supply of safe, drinking water to an expanding population in the coastal enclave, which has been under closure since 2007. This option was unanimously endorsed and backed by the 43-member countries of the Union for the Mediterranean, including Israel, in 2011. They called on donor countries to fund large-scale regional desalination for Gaza as a critical humanitarian need. All major parties now agree that it makes humanitarian and political sense to build desalination plants.

Environmental sustainability

There is a need to stop over-abstraction of groundwater and use sea-water as an alternate source of water for domestic and drinking purposes in Gaza. The desalination of seawater from the Mediterranean would substantially alleviate the over pumping of groundwater from the coastal aquifer which underlies Gaza, and prevent its total collapse. This outcome aligns with the strategic objectives of the Union for the Mediterranean in protecting coastal aquifers. It is accompanied by the development of new wastewater treatment plants in Gaza which shall actively prevent the further pollution of the Mediterranean as well as the coastal aquifer, under the guidance of PWA. The United Nations Environment Programme has endorsed the concept of a desalination facility for Gaza as the only and most feasible long-term alternative to supply Gaza with drinking water, and offered technical support[1].

UNICEF State of Palestine

UNICEF: humanitarian and development interventions

Gaza already hosts **19 small brackish groundwater desalination plants, 13 of them supplied by UNICEF,** and **a small seawater desalination plant**. The desalination units were installed where there is maximum water pollution. With funds from the EU, **UNICEF is implementing a large seawater desalination project**. CMWU is also planning to install a seawater desalination plant. Desalination is currently the only feasible long-term alternative with large impact that can supply Gazans with an adequate supply of drinking water, provided there is enough electricity and fuel available to power the plants.

- **Humanitarian response**: UNICEF installed 13 brackish groundwater desalination units
- **Development intervention**: a seawater desalination plant is being installed as a mid- to long-term solution

UNICEF	Brackish groundwater desalination units completed		Seawater desalination plant being installed
Desalination units	13 units		First stone laid on land adjacent to the sea in March 2014
Capacity	3 units treating 50 m^3 per hour	10 units treating 50 m^3 per day	6,000 m^3 per day
Number of beneficiaries	95,000 people altogether		75,000 people
Location & number of units	North	Jabalia: 1	One plant in Deir al-Balah, covering Rafah and Khan Yunis
	Middle area	Deir al-Balah: 2 Nuseirat: 1 Al Musader: 1 Al Meghazi: 1	
	South	Khan Yunis: 3 Rafah: 4	
Donor	Japan		European Union

Helping Palestinians gain equitable, sustainable access to water

Neighbourhood brackish groundwater desalination units and their free public taps provide clean water once per week to the poorest of Gaza's 1.7 million residents. This allows them to fill up their storage tanks at home with water that lasts until the next refill. For the first time in their life, they can drink water directly from their taps, or fill up bottles or jerry cans with water and carry them home.

The seawater desalination plant will provide a mid- to long-term, sustainable solution to help vulnerable families access adequate levels of safe, drinking water.

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29 year old Sabreen and her child now get safe drinking water at a desalination unit built by UNICEF with funds from Japan in Nuseirat Refugee Camp. UNICEF/El Baba

A father fills his bottles with water at the desalination plant built by UNICEF at the Nuseirat refugee camp. UNICEF/El Baba

UNICEF and water

In the State of Palestine, UNICEF works to ensure that households and schools located in the most vulnerable communities have increased access to safe water, sanitation and hygiene, and that emergency planning and response mechanisms are effective. UNICEF works with the Palestinian Water Authority (PWA), the Coastal Municipal Water Utilities (CMWU) and other partners to fight water scarcity and improve water networks in the West Bank and Gaza with support from Japan.

In **2014 in Gaza**, UNICEF will install a seawater desalination unit with EU funding; install solar distillation units on a pilot basis to produce safe drinking water in schools; work on grey water reuse in the Access Restricted Area; provide adequate water storage facilities to families; rehabilitate WASH facilities in schools with support from the Government of Australia.

[1] http://ufmsecretariat.org/wp-content/uploads/2011/07/Gaza-Desalination-Project-Fact-Sheet-14-May-2012.pdf
[2] www.unrwa.org/userfiles/file/publications/gaza/Gaza%20in%202020.pdf
[3] www.entwicklung.at/uploads/media/CSO_Water_Supply_Gaza_Strip.pdf