

Water crisis in Gaza Strip: Over 90% of water un-potable

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Boy fills water container at public multi-faucet sink of Khan Yunis Water Authority's wastewater treatment plant. Photo by Muhammad Sabah, B'Tselem, 4 February 2014

The coastal aquifer, Gaza's main water source, has been continuously over-pumped for decades, even prior to Israel's occupation in 1967. Some 180 million cubic meters (mcm) are annually pumped from the aquifer, although its rate of replenishment is only 50-60 mcm a year. Over the years, this has significantly lowered the groundwater level, leading to contamination of the aquifer's water by seawater seeping in and saline groundwater rising from deeper in the reservoir.

Another longstanding problem is the lack of wastewater treatment in the Gaza Strip. This problem has been aggravated in recent years by electricity shortages so plants could not be operated. Moreover, during Operation Cast Lead Israel damaged wastewater-treatment facilities, resulting in higher quantities of untreated sewage. Although some infrastructure has been rebuilt and new infrastructure laid in towns previously not connected to a sewage system, Gaza's wastewater-treatment facilities are far from able to meet the required amounts and standards.

As a result, the aquifer's water is high in nitrogen and chloride, making 90 to 95 percent of Gaza's main water supply unfit for drinking and problematic even in terms of agricultural use.

Water supply

The water currently pumped from the coastal aquifer is divided into 92.8 mcm for urban and domestic use and 86 mcm for agricultural use. In the Gaza Strip, average water consumption per person is 70 to 90 liters a day. Most residents buy their drinking water from door-to-door salespeople who sell water that has been treated in government or private wastewater facilities, or facilities run by charities throughout Gaza.

Topographic constraints mean that floodwaters that reach Gaza cannot be collected or used. Floodwater, therefore, is not included in calculations of water quantities in Gaza, unlike water calculations for Israel and the West Bank. The only other water provider in Gaza is Israeli water company Mekorot, which sells Gaza 4.2 mcm of water a year. Israel had also agreed to sell Gaza 5 mcm of desalinated water annually, but the infrastructure work for conveying

the water have yet to be completed.

Water infrastructure in Gaza is in poor shape. According to 2011 figures by the Palestinian Water Authority, depreciation in Gaza is currently approx. 44%. As a point of comparison, depreciation in the West Bank is approx. 34%. Depreciation in Mekorot's nation-wide network is approximately 3%, and 10-12% in Israeli cities. Since 2007, Israel has allowed almost no goods and construction materials into the Gaza Strip, making restoration of the water network difficult.

In 2009, as many as seven percent of Gazans did not have a running-water system at home. According to UN figures, at the end of 2013 this situation improved, with only three percent of Gazans not connected to the public water system. Nevertheless, being connected to the water system does not ensure a steady water supply. Households receive running water for only six to eight hours at a time: 25% of households on a daily basis, 40% every other day, 20% once every three days, and the remaining 15% (in Gaza City, Rafah and Jabaliya) only one day out of four.

The supply and treatment of water rely on electricity, which is supplied sporadically. Even at full capacity – with electricity both supplied at maximum level from the power station and purchased from Israel and Egypt – the electricity supply in the Gaza Strip meets only 70 percent of demand, and residents routinely suffer deliberate power blackouts. When there are fuel shortages, blackouts can last up to 18 hours at a time.



35,000 cubic meter of raw sewage flood a-Zaytun neighborhood, Gaza City, following power shortage and generator malfunction at sewage pumping station. Photo by Muhammad Sabah, B'Tselem, 13 November 2013

Sewage and wastewater

Sewage and wastewater treatment systems in Gaza are also deficient. Many residents are not even connected to the sewage system, and domestic waste flows into cesspits. The waste then seeps into groundwater, contaminating it. Every day, only some 25% of Gaza's wastewater – about 30,000 cubic meters per day – is treated and recycled for agricultural use. Some 90,000 cubic meters of untreated or partially treated wastewater flow daily into the Mediterranean, resulting in contamination, health hazards and damage to the fishing industry.

A full wastewater treatment cycle lasts 14 days and requires a steady, uninterrupted supply of electricity. The process in Gaza is hampered by frequent power outages, so water is not fully treated. Proper treatment of Gaza's wastewater could make treated water available for agriculture, thereby reducing the need for pumping groundwater.

Extent of contamination

Contamination of groundwater in the Gaza Strip is caused primarily by elevated levels of chloride (as a result of salination) and nitrogen (from contamination caused mostly by agricultural use of pesticides and seepage of sewage into the aquifer). A 2012 survey by the Palestinian Water Authority found a worrying rise in contamination levels in most of Gaza's 213 wells:

- 31 wells (some 15%) were contaminated by seepage. Most of these wells lie in western Gaza, by the coast, and in the Khan Yunis area, where saltwater seeped into wells far from the coastline due to the removal of dunes and drilling of agricultural wells.
- 64 wells (some 30%) showed initial signs of contamination due to saltwater seeping in from sediment or from deeper in the aquifer. The phenomenon is widespread mostly in the eastern and northeastern parts of Gaza. Another 40 wells (some 19%), located mostly in eastern and central Gaza, showed continued contamination due to seawater seepage, as identified in earlier surveys.
- Only a quarter of the wells contained fewer than 250 milligrams of chloride per liter, the standard level of salinity set by the World Health Organization (WHO). As for the remaining wells: one quarter of the wells contained 250 to 600 mg/liter; one quarter 600-1,000 mg/liter; and one quarter over 1,000 mg/liter.

Only 21.5% of the wells in the Gaza Strip met the WHO standard of fewer than 50 mg/ liter. These wells lie in areas of limited agricultural activity. Another 31.5% of wells contained 50-100 mg/liter; 38% contained 100-200 mg/liter; and the remaining 9% –located in Gaza's big cities – contain more than 200 mg/liter.

The combined data on chloride and nitrogen levels reveal that only 14 wells (some 6.5% of all wells in Gaza) provide water that meets World Health Organization standards.

Bringing equipment into Gaza to improve and restore infrastructure

In May 2010, Israel announced that it would ease restrictions on goods imported to Gaza, It would not limit the quantities of goods brought in other than those defined as "dual use", i.e. materials that Israel believes can also be used for military purposes. Such goods are only allowed in on a limited basis, for projects authorized by the Palestinian Authority and supervised by international organizations.

The equipment and materials needed to restore Gaza's water system and wastewater treatment facilities –including such items as water pumps, pipelines, electric generators, cement and chlorine – come under Israel's definition of "dual use". Progress on repairing damage caused in Operation Cast Lead and laying new infrastructure has been slow, because only limited amounts of the necessary goods could be brought into Gaza, and international organizations refrained from using goods smuggled in from Egypt (an issue no longer relevant at this time, as smuggling tunnels have been closed on Egyptian orders since June 2013).

International organizations including the World Bank, UNDP and USAID are sponsoring projects for new wastewater treatment facilities, improving and enhancing existing ones and creating infrastructure to connect residents to the main sewage system. However, these projects are costly and lengthy, requiring much funding and a great deal of time for approval within each organization, and also rely on Israeli permits to bring the necessary equipment into Gaza. Consequently, progress on the projects is too slow to meet the population's needs.

Recommendations by the United Nations Environment Programme (UNEP)

As far back as 2009, UNEP recommended that underground pumping from the coastal aquifer in the Gaza Strip cease, in order to prevent collapse of the Gaza water economy. Yet over-pumping continues, in part due to the lack of alternative water sources in Gaza. At present, no plan for a long-term solution to the Gaza water crisis is being implemented.



Raw sewage poured into Mediterranean, northern Gaza Strip. Photo by Muhammad Sabah, B'Tselem, 4 February 2014

The Palestinian Water Authority and UNEP have cautioned that the coastal aquifer has passed the point of no return in terms of rehabilitation options, so that as of 2016 it will no longer be possible to pump water from the aquifer.

To resolve the grave water crisis in the Gaza Strip, UNEP recommended that all parties to the coastal aquifer – Israel, the Palestinian Authority, the Hamas government and Egypt – act in conjunction to halt the swift rapid deterioration of the groundwater system that serves Gaza and also to work on finding other sources of potable drinking water for its residents. At the same time, and without delay, Israel must allow materials and equipment to be brought into Gaza for the purpose of restoring and developing Gaza's water and wastewater treatment systems.