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Gaza on the Edge: The Water & Energy Crisis in Gaza

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The Gaza Strip is facing a dire humanitarian crisis with potentially devastating implications. Lack of clean water for domestic use and unsafe sanitary conditions pose a serious public health threat to the two million Palestinians living in the Gaza Strip, and the neighboring communities in Egypt and Israel.

A UN report deemed the issues of water and sanitation in Gaza as problems of primary concern, and concluded that by 2020 the Gaza Strip will be uninhabitable.[1] This has alarming implications not only for the Palestinian population of Gaza but also for the whole region, as recognized even by Israeli PM Benjamin Netanyahu in a June 2016 press statement: "When there is not enough water in Gaza, and Gaza is in the process of gradually drying up, the aquifers become polluted and when the aquifers become polluted, this is not limited to the Gaza side of the aquifer. Therefore, it is in Israel's clear interest to deal with the water problem in the Gaza Strip. When there is not enough electricity, various problems arise, including those having to do with sanitation, and when there are outbreaks (of pandemic disease), the outbreaks do not stop at the fences. This is both a humanitarian interest and an outstanding Israeli interest."[2]

The current humanitarian crisis in Gaza is a product of a number of interconnected factors, including failed governance of the Hamas leadership and its unresolved reconciliation with the Palestinian Authority (PA), the severe restrictions imposed by the Israeli siege, and Gaza's over-dependence on the donor community. Even in the midst of the most recent

[1] United Nations Country Team in the occupied Palestinian territory, *Gaza in 2020* (August 2012).

[2] Israel Ministry of Foreign Affairs, *PM Netanyahu's statement at his press conference in Rome* (June 2016).

round of protests and violence associated with the so called 'March of Return', media attention has continued to focus on the underlying humanitarian issues. While all sides issue alarming reports, warning of the necessity to take immediate actions, a sense of urgency is missing and the required actions are hindered by the current political circumstances, cross border and internal Palestinian. If the situation is not urgently addressed, it could have devastating consequences on regional stability, including the outbreak of pandemic disease and new rounds of hostilities.

The depletion of Gaza's water resources

The coastal aquifer, which is located under the coastal plain of Israel and the Gaza Strip, is the only source of natural water in Gaza. Due to rapid population growth, which in the last decade increased from nearly 1.5 million in 2007 to more than 2 million today, the demand for water in the Gaza Strip has surged.

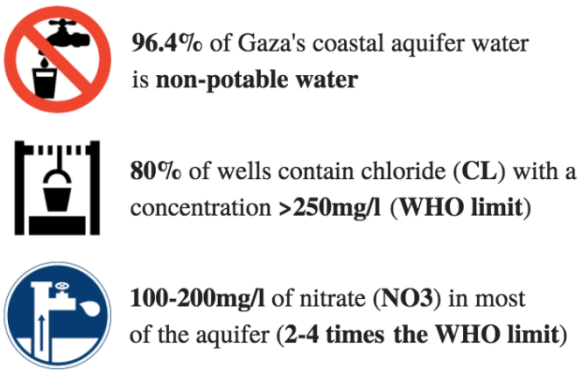
The increased water needs alongside the scarcity of alternative sources of water have led to the extreme over use of the aquifer. While the renewable extraction rate for Gaza's underground aquifer is about 60 million cubic meters of rain water annually, Palestinians in Gaza have been drawing an estimated 200 million cubic meters a year for over a decade, leading to the infiltration of sea-water into the aquifer, and therefore raising the levels of salinity far beyond WHO health regulations.[3] In a 2016 report by the Palestinian Water Authority (PWA) water extracted from more than 80% of the existing wells, namely 201 out of 249, contains concentrations of Chloride, Cl (indicator of salinity) higher than the WHO limit of 250 mg/L. Recent reports suggest that today 90 % of the wells in Gaza fail to meet salinity standards.[4] High levels of salinity in the groundwater may decrease crop production and may also have a direct impact on human health, including increased blood pressure and frequent diarrhea. Research indicates that the cholera pathogen shows higher

[3] Friedman, T. "Hamas, Netanyahu and Mother Nature." *The New York Times*. 22 May, 2018.

[4] Rinat, Zafrir. "Ninety-seven Percent of Gaza Drinking Water Contaminated by Sewage, Salt, Expert Warns." *Haaretz*. 21 January, 2018.

resistance in saline water, thereby increasing the risk of cholera infections and possible epidemics.[5]

Gaza's groundwater has also been extensively contaminated by sewage. The discharge of untreated sewage generated by the two million inhabitants into shallow ponds – which eventually percolates into the aquifer – has caused alarming levels of Nitrate (NO3). The PWA report reveals that large parts of the coastal aquifer exhibit Nitrate levels ranging from 100-200 mg/l, up to four times higher than the 50 mg/l limit set by the WHO. The presence of nitrates can trigger water borne diseases such as methemoglobinemia, a severe blood disease, as well as a related disease also known as the blue baby syndrome, which has already occurred amongst the Gaza's population.



The chronic shortage of water has led Gaza's residents to be increasingly dependent on small-scale desalination of brackish water, which is then sold by water suppliers that are under little supervision from health authorities and sell water at prices six times higher than regular water[6]. While these small desalination plants reduce salinity, they do not effectively remove the pollutants. According to agencies operating in the WASH sector, about 1.45

[5] Potsdam Institute for Climate Impact Research and Climate Analytics, *Turn Down the Heat: Climate Extremes, Regional Impacts, and the Case for Resilience* (Washington: The World Bank: June 2013)

[6] Rinat, Z. "Ninety-seven Percent of Gaza Drinking Water Contaminated by Sewage, Salt, Expert Warns." *Haaretz*. 21 January, 2018.

million people in Gaza faced a threat of contracting waterborne diseases in 2017[7].

Large amounts of raw sewage are also being released in the Mediterranean Sea. As of September 2017, 17 wastewater pipes send over 108,000 m3 of poorly or untreated sewage into the Mediterranean Sea every day.

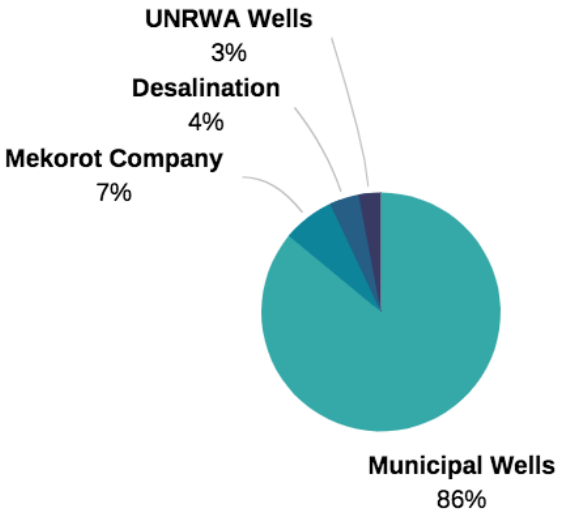
Water Policies

Up to 2005, the coastal aquifer alone supplied almost the totality of the water consumed in the Gaza Strip, water of high quality. A decade later the aquifer still contributes to roughly 90% of the total water supply for domestic use, but is 97% no longer potable. As of 2015 the total water supply for domestic use in the Gaza Strip amounted to 95 mcm/y, of which 86% comes from municipal groundwater wells; 3% from UNRWA wells; 4% from desalination; and 7% from Mekorot, the Israeli Water Company.

Mekorot started selling 5 mcm annually of water to Gaza in 1980. Under the Oslo Accords Israel committed to double the sale of water to Gaza from 5 to 10 mcm annually. But this agreement was not implemented at first because of the PA not desiring to pay for additional water and then with the rise of Hamas to power a refusal of Israel to supply. Only in March 2015 was there a reversal in Israeli government policies and the amount of water sold to Gaza was agreed to rise to 10 mcm per year. Due to lack of storage capacity, only 8 mcm were provided until early 2017, when the completion of some infrastructural work allowed the 10 mcm to flow into Gaza.

Following an EcoPeace briefing held in the U.S. Congress in March 2017, a second letter, a first one being sent to Israeli ministers in 2016, was signed by a bipartisan group of members of the U.S. Congress, urging President Trump and his administration to take the lead on finding solutions to the water and sanitation crisis in Gaza.

[7] Shawish, A., and Weibel C. "Gaza Children Face Acute Water and Sanitation Crisis." *UNICEF*, 1 Sept. 2017.



Sources of water supply in Gaza as of 2015.

On July 13th 2017, under the auspices of U.S. Middle East Envoy Jason Greenblatt, Israel and the PA agreed on the sale of 10 additional mcm of water to alleviate the situation, a deal that was struck as part of a revised version of the Red-Dead Canal project. Once the agreement comes fully into effect, Gaza will purchase a total amount of 20 mcm from Israel per year, which is said to double once it is blended with the water from the aquifer, ultimately providing the Strip with 40 mcm of potable water annually.

At the time of writing, the Israel Water Authority reports that by end of summer 2018 it will complete the building of a new water pipeline to the southern areas of Gaza and that it will be able to supply the full 20 mcm it committed to. Whether this quantity will actually be drawn however depends on various factors on the Palestinian side.

The collapse of the WASH[8] infrastructure

Following the damage inflicted by the 2008-09 conflict, the Gaza Coastal Municipal Water Utility (CMWU, 2009) warned about the risks of an impending water and sanitation crisis, including a growing danger of the spreading of infectious diseases among the population. Gaza's water infrastructure suffered additional damages during the 2012 conflict and again in 2014.

In the aftermath of the 2014 conflict, lice, scabies and diarrhea were reported to have spread in particular among children. The damage to the water and sanitation system was estimated at around $30 million, while the investment needed in large-scale water sector was estimated at over $900 million.[9] The donor community gathered at the "Conference on Palestine - Reconstructing Gaza" in Cairo, where it pledged aid to rebuild Gaza.

Massive investments were channeled in the reconstruction of the civilian infrastructure, through the establishment of the *Gaza Reconstruction Mechanism*. This mechanism has facilitated the entry of materials, which would not have been allowed otherwise, and now most of the rehabilitation of water and sanitation facilities damaged in the conflict has been completed. Additional investments in the WASH sector, however, are urgently needed, but are hindered by the severe constraints imposed by Israel, regarding the entry of dual use items, and the internal Palestinian divide between the authorities in the West Bank and the de facto authorities in the Gaza Strip.

When the construction of new facilities is possible, the main obstacle remains the lack of electricity to power such facilities. These include a desalination plant built with the support of the EU and UNICEF, which relies on generators working with imported fuel; and the Northern Gaza Emergency Sewage Treatment (NGEST) plant, a project led by the World Bank.

[8] Water, Sanitation and Hygiene
[9] Palestinian Water Authority, *Water Sector Damage Assessment Report* (August 2014).

The NGEST project was approved in 2004[10] and originally planned to begin operation within a few years. However, implementation of the project and construction of the facilities were delayed due to numerous challenges including restraints on the entry of critical materials and equipment, war and conflict, and contractual issues leading to suspension of works[11].

110,000 m3/d of poorly treated sewage discharged into the sea

Due to recent deterioration of the water and sanitation conditions and the pressure for finding a long-term, sustainable solution for Gaza's humanitarian crisis, the project finally moved to completion. The NGEST began operation on March 1, 2018 and is set to reach a full capacity of 36,000 m^3 water produced per day[11] and 13.3 Mm^3 water per year. In addition the treated wastewater will be reused for agricultural productivity. With the creation of an irrigation system downstream and the infiltration of the treated water into the aquifer, chances of massive contamination and waterborne diseases will decrease[12].

A Memorandum of Understanding was signed between the Gaza Electricity Distribution Company (GEDCO) and the PWA on January 25, 2018 stating that NGEST would receive a secure supply of energy. Despite this agreement, however, internal Palestinian issues between the PA and Hamas threaten NGEST's viability with only intermittent electricity supply from the network and the need for diesel generators [11].

Another important need in the WASH infrastructure will be construction of a large desalination facility. In March 2018, donors gathered in Brussels on occasion of the *Ad Hoc Liaison Committee* on Palestine, and pledged €456 million to fund the Gaza Central

[10] The World Bank."Northern Gaza Emergency Treatment (NGEST) Project."
[11] Office of the Quartet, *Report to the Ad Hoc Liaison Committee* (March 2018).

[12] Agence Française de Développement (AFD), *Water Banking and Adaptation of Agriculture to Climate Change in Northern Gaza* (November 2017).

Desalination Plant & Associated Works Project. The desalination plant once built will provide 55 mcm annually. Failure to resolve the electricity crisis for Gaza, as detailed below and the fact that the Gaza power station has been standing idle with no fuel for the past two months, are not encouraging signs as to the likelihood of the desalination plant in Gaza actually being built in the near future.

The energy crisis and its implications on sanitation and hygiene

Periodic interruptions of energy supply have had a direct impact on the delivery of water and sanitation services in Gaza. Already in 2006, the deficit of fuel supply affected the operations of water pumping stations and sewage treatment plants. With Hamas in power Israel's disengagement policies did not respond to Palestinian requests to purchase more electricity from Israel.

These policies were however reversed once the failure to treat sewage in Gaza publically became known as being responsible for threatening Israeli water security and public health concerns. In 2016, the Ashkelon Desalination Plant, which supplies 15% of Israel's domestic water, had been shut down twice due to sewage discharge into the Mediterranean Sea from Gaza. Moreover, in the same period, the raw sewage from Beit Lahiya, was carried along Nahal Hanun, under the Erez crossing and threatening ground water reservoirs of the Hof Ashkelon Regional Council.

With this information made public by EcoPeace Middle East, the government of Israel, reversed prior disengagement policies and approved the construction of a new dedicated power line from Israel to NGEST specifically or, as an alternative, a larger 161K line to Gaza in order to guarantee additional supply of energy.

In April 2017, the Gaza Power Plant (GPP), which had been operating since 2002, shut down due to a lack of fuel, depriving Gaza's population of roughly 30% of the energy usually available. Prior to this cut, the available electricity in Gaza was already less than

half of the estimated requirement. Against an estimated demand of 350 to 450 MW/d, Gaza's electrical grid normally provided 208 MW/d, of which 120 MW/d were sold and supplied by Israel, 60 MW/d were produced by the GPP (with fuel imported through Israel), and 28 MW/d were sold by Egypt.[13]

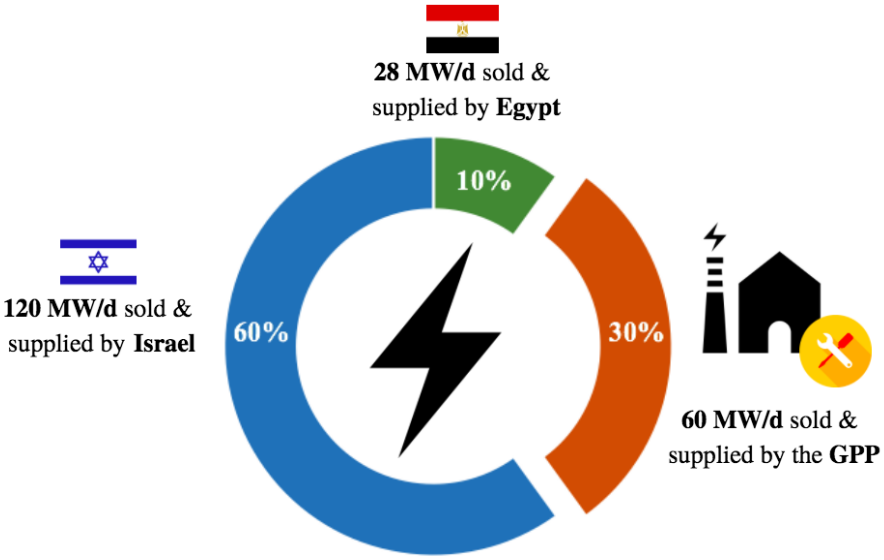
In response to a previous energy crisis in January 2017, which had caused a wave of social unrest against Hamas, Turkey and Qatar intervened to mitigate the crisis. Although Turkey and Qatar allocated funds to Gaza, within three months, they had already been depleted, entangling Gaza's humanitarian crisis with a political dispute between the PA and the de facto Hamas authorities over fuel taxation and electricity imports. To make matters worse, Egypt's infrastructural problems temporarily compromised its contribution of electricity at around 10% of Gaza's total supply. Even at full capacity, Israeli and Egyptian electricity supply together with Gaza's only power plant failed to cover the Strip's energy need.

On June 12, 2017, in an effort to place pressure on Hamas for internal political reasons, Palestinian President Mahmoud Abbas requested Israel to reduce the supply of power to Gaza by 60%. Israel agreed to side with the Palestinian Authority and to reduce the electricity supply to Gaza by some 42 MW/d.

Although the dispute regarding Gaza's electricity bill was perceived as an inner Palestinian issue, it had many implications as regards to Israel, as a delay in the operation of the NGEST directly contributed to higher levels of sewage flowing into the Mediterranean, nearby cross border streams and shared ground water. During the first week of July 2017, at the height of the bathing season, the Zikim beach in Ashkelon had to be closed to the

[13] United Nations, *Humanitarian Impact of the Gaza Electricity Crisis* (May 2017)

public due to high levels of contamination. Israeli officials have confirmed that the contamination was a result of untreated sewage from Gaza's wastewater treatment plants, which due to the electricity crisis were unable to operate. Beach closures due to contamination may continue during the 2018 summer season.



Sources of power supply in the Gaza Strip.

To maintain a minimum level of continuity of critical services, electricity providers relied heavily on backup generators. The main donors – UNRWA, OCHA, UNICEF, and WHO – coordinated the entry and distribution of emergency fuel operations to priority health, water and sanitation facilities to keep these back-up generators running.

On January 8, 2018, the decision to reduce the amount of electricity to Gaza was reversed and what was in any event insufficient supply was restored.

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