

GAZA WATER DESALINATION PLANTS

HEALTH AND ENVIRONMENTAL IMPACT

FACTSHEET
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مركز الميزان لحقوق الإنسان
AL MEZAN CENTER FOR HUMAN RIGHTS



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Factsheet

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Introduction

This factsheet discusses in detail the conditions of private water desalination plants in the Gaza Strip and their impact on human rights, including the rights to health, water and sanitation, and a healthy environment. Although the entire occupied Palestinian territory (OPT) faces a perennial water shortage issue due to over five decades of Israel's unlawful occupation, this factsheet focuses on the occupied Gaza Strip—where the realization of the right to water faces some uniquely serious challenges, with its more than two million residents lacking access to safe drinking water. Accordingly, the factsheet analyzes the conditions and impact of private water desalination plants within the broader context of the Gaza Strip's water and sanitation crisis, amid Israel's 15-year closure and blockade.

The Gaza Strip's water crisis: a general overview

The level and quality of groundwater in the Gaza Strip's Coastal Aquifer have deteriorated dramatically. According to the Palestinian Water Authority (PWA), about 96.2% of the water extracted from the aquifer is unfit for human consumption based on World Health Organization (WHO) standards. Facts on the ground indicate that Israel's practices, applied since its occupation of the Palestinian territory in 1967, are the main cause of the water crisis in the OPT, including the Gaza Strip.

Before implementing its unilateral "disengagement" from the Gaza Strip in 2005, Israel had built several water wells in its illegal settlements in the Strip, abstracting a significant amount of water from the aquifer. It also drilled several water wells along the separation fence east of the Gaza Strip, decreasing the amount of water naturally flowing into the aquifer, and built barriers to impede the flow of surface water through the valleys, particularly the Gaza Valley. Following its "disengagement", Israel also continued to systematically target water infrastructure during its successive military operations against the Gaza Strip, during which the Israeli military has repeatedly targeted civilian infrastructure such as water wells, reservoirs, ponds, water main feeder lines, and irrigation networks.¹

Israel's practices and policies left the population with no options but to over-abtract water from the coastal aquifer—the primary source of water in the Gaza Strip. Water is extracted for domestic and agricultural use through hundreds of water wells dug across the Gaza Strip. The PWA estimates the rate of groundwater abstraction in the Gaza Strip to be around 190 million cubic meters (MCM) per year,² and estimates the replenishment rate of the aquifer, mainly from rainfall, to be about 55 MCM per year.³ Such severe

¹ See, e.g., Al Mezan Center for Human Rights (Al Mezan), *Factsheet on the situation of desalination plants in the Gaza Strip*, May 2011, available at <https://www.mezan.org/post/12153> (Arabic only); Al Mezan, *In focus: the effects of Israel's military offensive on access to clean and safe drinking water in the Gaza Strip*, May 2021, available at: <https://mezan.org/en/post/24008>

² PCBS and PWA, Joint Press Release on the Occasion of World Water Day, 2022, available at: https://www.pcbs.gov.ps/portals/pcbs/PressRelease/Press_En_22-3-2022-Water-en.pdf

³ PWA, *Water Resources Status Summary Report /Gaza Strip*, published in 2015, available at: <http://www.pwa.ps/userfiles/file/%D8%AA%D9%82%D8%A7%D8%B1%D9%8A%D8%B1/Status%20WR%20Report%202014.pdf>



over-abstraction has led to seawater intrusion into the Coastal Aquifer, raising the level of salinity in the ground water and in turn raising the need for water desalination and purification prior to consumption.

Against this backdrop, Gaza residents began to look for solutions to improve the quality of drinking water supplied to households. One such solution was water desalination, which is the process of removing dissolved salt and impurities to make the water safer to drink. The Gaza Strip's private sector has invested in this technology and built several private water desalination plants (WDPs) that have been selling water to consumers since 2000.

Private water desalination plants in the Gaza Strip

Currently, there are 97 private WDPs in the Gaza Strip, each employing at least two workers for about 6 to 8 hours a day. Some WDPs operate 24 hours a day on a rotating system over three daily shifts. Some WDPs own special trucks for distribution. In other cases, self-employed drivers purchase water from plants based on water quality and price and distribute it individually. An estimated 320 workers work in the WDPs and distribution trucks across the Gaza Strip,⁴ sustaining around 1,470 family members.⁵ The desalinated water is sold to the consumer for around 25 ILS (\$7) per 1,000 Liters (1 cubic meter) of water. Plants charge 4-6 ILS (\$1.47-\$1.75) per cubic meter of desalinated water and the rest is for the distribution trucks.⁶

As part of Israel's closure policies, Israeli authorities routinely ban the entry of materials and equipment needed for WDPs' operation and maintenance, such as reverse osmosis pumps, which has been restricted since May 2021. In addition, since September 2021, 8-inch fiberglass vessels (which houses the filter membrane) have been banned from entering the Gaza Strip, while 4-inch fiberglass vessels, which were banned since the same date, were allowed to enter again in August 2022. This hinders the maintenance of WDP systems, thus compromising the quality of the water produced.⁷

Licensing and monitoring of PWDs in the Gaza Strip

Out of the 97 WDPs in the Gaza Strip, only 52 are licensed, while owners of 12 PWDs closed their facilities due to the fragile economic conditions. Relevant authorities have recorded professional irregularities in 13 facilities over the past two years.⁸

⁴ Interview: Abdelsalam Yassin, owner of Yassin Company for Water Desalination and Public Trade, interviewed by Hussein Hammad, Al Mezan's researcher, on 23 March 2022.

⁵ Average household size in the Gaza Strip is 5.6 persons. Source: The Palestinian Central Bureau of Statistics, On the Occasion of the International Population Day, July 2022, available at: <https://pcbs.gov.ps/post.aspx?lang=en&ItemID=4279>.

⁶ Interview: Mohamed Aladdin Ahmed, driver of a water distribution truck in the al-Weam DP, interviewed by Hussein Hammad, Al Mezan's researcher, on 24 March 2022.

⁷ Interview: Abdelsalam Yassin, owner of Yassin Company for Water Desalination and Public Trade interviewed by Hussein Hammad, Al Mezan's researcher, on 23 March 2022.

⁸ Interview: Monzer Salim, Director of the Resources Department in the Water and Environment Quality Authority, interviewed by Hussein Hammad, Al Mezan's researcher, 23 March 2022.

Private WDPs receive their working licenses from a specialized governmental committee comprised of the Palestinian Water Authority, the Environment Quality Authority, the Ministry of Health, the Ministry of National Economy, and the Ministry of Interior. The work of WDPs is monitored by the committee, which tests water quality and verifies that it meets the required specifications of zero microbiological pollutants, sterilization, chlorination, and pH level.⁹ If these conditions are violated, action is taken, and can go as far as the closure of the facility.¹⁰

The committee also requires specific criteria for licensing private WDPs and wells. Regarding premises, the committee requires specific criteria related to location, area, ventilation, electricity, sanitation, sewage discharge, safety equipment, and hygiene. Special conditions related to WDPs equipment mainly concern water tanks and water distribution trucks, while those concerning workers mainly address health certificates, vaccination, hygiene, work uniforms, and non-smoking.

The impact of WDPs on health

According to a chemical analysis conducted by the Ministry of Health in 2021 of 38 samples taken from WDPs and water distribution trucks, eight of the samples were found to be non-conforming to Palestinian standards.¹¹ Additionally, the microbiological tests conducted by the Ministry of Health in 2021 on 2,287 samples indicated that the water of some WDPs was contaminated with bacteria, including coliform bacteria and fecal coliform bacteria.¹²

In other words, desalinated water could be hazardous to human health, as the byproducts of the chemicals used endanger people's lives and, if acidic, affect the digestive system.¹³ In addition, desalinated water has a low concentration of beneficial minerals such as sodium, potassium, magnesium, calcium, and fluoride. Lack of these minerals in the blood can lead to diseases such as osteoporosis and tooth decay.¹⁴

The impact of WDPs on the environment

The efficiency of Gaza's WDPs is estimated at around 70%. In 2021, WDPs consumed 4.4 million cubic meters of groundwater and produced 3.05 million cubic meters of

⁹ Interview: Khalid al-Tebi, Director of the Environment Health Department at the Ministry of Health, interviewed by Hussein Hammad, Al Mezan's researcher, on 23 March 2022.

¹⁰ Interview: Monzer Salim, Director of the Resources Department in the Water and Environment Quality Authority, interviewed by Hussein Hammad, Al Mezan's researcher, 23 March 2022.

¹¹ Interview: Khalid al-Tebi, Director of the Environment Health Department at the Ministry of Health, interviewed by Hussein Hammad, Al Mezan's researcher, on 23 March 2022.

¹² Ibid.

¹³ See Webteb, *Water Disalination: the Needs and Risks*, 21 March 2019, available at <https://www.webteb.com/articles/المخاطر-الحاجة-بين-المياه-تحلية-20801> (Arabic only).

¹⁴ Interview: Khalid al-Tebi, Director of the Environment Health Department at the Ministry of Health, interviewed by Hussein Hammad, Al Mezan's researcher, on 23 March 2022.

desalinated water.¹⁵ Special wells are dug 20-50 meters deep at plant sites to extract water and store it in plastic tanks—and then pump it into desalination units. The level of water loss during this process is considerable.¹⁶ Available data confirm that pollution of desalinated water occurs slightly in WDPs, whereas it increases during the transfer of water from plants to distribution trucks and multiplies during the transfer of water from distribution trucks to domestic water storage tanks (rooftop tanks) due to contamination of tanks and transfer lines.¹⁷

Conclusions and recommendations

The work of the WDPs needs to be more organized and constantly monitored to ensure the supply of clean water to the Gaza Strip's 2.1 million inhabitants. Despite the standards set by the specialized governmental committee and the official follow-up on the WDPs, monitoring of the plants and distribution trucks has been insufficient. For instance, some plants were found to be operating without licenses, and analysis showed that some samples were polluted with chemicals and microbiological substances. It has been noted that pollution, which could be present in WDPs or occur during the transfer of water to consumers, results mainly from failure to follow proper instructions in the processes of production, storage, and distribution of desalinated water,¹⁸ thereby negatively affecting the right to health, water, clean environment, and other human rights of the Gaza Strip's population.

Accordingly, the factsheet presents the following set of recommendations and calls for action:

- i. The **international community** should uphold its moral and legal obligations vis-à-vis the Palestinian people and pressure Israel to protect and ensure the right of the Palestinian people to access their natural resources, especially water, and to provide the Gaza Strip's residents with clean and safe drinking water.
- ii. **Competent local authorities** involved in the water desalination sector, including the Palestinian Water Authority, the Environment Quality Authority, the Coastal Municipalities Water Utility, the Ministry of Health, the Ministry of National Economy, and the Ministry of Transport, should enhance their cooperation to ensure the safety of drinking water.

¹⁵ Interview: Monzer Salim, Director of the Resources Department in the Water and Environment Quality Authority, interviewed by Hussein Hammad, Al Mezan's researcher, 23 March 2022.

¹⁶ Interview: Mohammed Mesleh, Water and Environment Quality Authority, interviewed by Hussein Hammad, Al Mezan's researcher, on 20 March 2022.

¹⁷ Ibid 16.

¹⁸ Al Mezan, *Specialized Workshop on the Situation of the Private WDP in the Gaza Strip and its Impact on Human Rights*, 23 March 2022, available at <https://www.mezan.org/post/32938> (Arabic only).



- iii. **Competent local authorities** should monitor the work of WDPs and distribution trucks and conduct regular tests on desalinated water to ensure the delivery of safe and clean water to Palestinian households.
- iv. **Owners of private WDPs** should comply with the license conditions as well as with the health and preventive measures to produce clean, safe drinkable water.
- v. **Competent local authorities** should take into consideration the economic conditions of WDP owners and work on decreasing the fees of licenses and taxes.