

Explainer: Water Supply & Fuel Relationship in The Gaza Strip

State of Palestine WASH Cluster - 14 November 2023

Lack of fuel at crisis point: Water and sanitation services on verge of shut down

What are the implications for the humanitarian water and sanitation services if fuel is not allowed to enter Gaza? To answer this question, it is necessary to understand humanitarian water supply and survival needs of water, the specific context of the Gaza Strip water supply and the recent water and sanitation supply levels during the conflict. Since the start of the conflict water production and sewage management have been highly reliant on the stocks of fuel to continue operating. The WASH cluster in Palestine¹ has recorded significant fluctuations in the availability of water over the period of the conflict. The end of fuel supply in Gaza will mean that there is no capacity to treat saline water, no ability to distribute water, no ability to pump or treat wastewater. The conclusion is that with the correct political-will, the deteriorating humanitarian catastrophe can be averted.

Survival Water Needs

To serve the population of 2,226,544 Palestinians with a survival supply of water of suitable quality for drinking and cooking would require 13,359,264 liters per day. International humanitarian standards² require that the drinking water supply is of sufficient quantity, appropriate quality³ and is equally accessible to the population. All three factors need to be addressed to save lives and to prevent infectious water borne diseases. In addition to drinking water, the population requires water for personal and domestic hygiene, an additional 20,038,896 liters per day. The total water need is 33,398,160⁴ liters per day or 33,400 m³. This volume would provide each person with 15 liters per person, or a medium bucket size, to cover all their needs.

Until now, the population in Gaza has not had sufficient water to meet these survival needs. Due to the lack of safe drinking water, people have resorted to accessing water from unsafe sources that are brackish or saline water, water from agricultural wells and other potentially polluted waters. This is having a negative health impact, particularly for children, who are suffering from diarrhea and, dehydration. Families are reusing domestic water for multiple needs and reducing hygiene practices such as body washing and showers, to preserve the little amount of domestic water available. This is already resulting in negative health impact such as infectious and contagious skin diseases.

Water Quantity and Quality in Gaza

During the first 12 days of November, Gaza's water supply has continued from two sources of drinking water quality and one source of inferior quality. The drinking water is supplied from two of three Mekorot pipelines and two of three Short-Term Low Volume (STLV) sea water desalination plants (requiring fuel). The Al-Mentar Mekorot pipeline and North STLV have been non-operational since October 8 and the STLV is understood to have sustained damage due to the conflict and is inaccessible due to insecurity. Prior to

¹ The WASH Cluster in Palestine [website for further information](#)

² The SPHERE Handbook 2018

³ "Guidelines for drinking water quality"; World Health Organisation; 2022

⁴ 1000 liters of water is equal to one cubic meter (1 m³) of water

the conflict these drinking water sources provided approximately 20% of the drinking water supply in the Gaza Strip. In addition, humanitarian agencies have been able to import limited quantities of bottled water through the Rafah border crossing, 106 trucks carrying 3,525,984 liters of water⁵. The status of the drinking water supplies is shown in Table 1.

Source Name	Potential Drinkable Water Supply ⁶	Average Daily Supply November 2023	Requirements
	m ³ /day	m ³ /day	
Mekorot – Al Mentar	24,000	0	Political will
Mekorot - Bani Saeed	14,400	14,400	Political will
Mekorot - Bani Suhaila	15,000	10,400	Political will
Southern STLV	6,000	538	Fuel
Deir Al Balah STLV	2,000	375	Fuel
Gaza STLV	10,000	0	Fuel and safe access
Total	71,400	25,713	

Table 1: Potential and actual water of drinking and cooking quality arriving in Gaza in November 2023

The third source of water is from groundwater wells located in the Gaza Strip. The groundwater resources provide a bulk water supply (80% of the pre-conflict water supply). The groundwater well water is **not to drinking water standards** due to high salinity and nitrate levels that typically exceed WHO guidelines for safe water consumption. The groundwater is extracted from 282-307 water wells by three ‘agencies’, Municipal Water Service Providers, UNRWA and unregulated private sector suppliers.

Source Name	Potential Drinkable Water Supply	Average Daily Supply November 2023	Requirements
	m ³ /day	m ³ /day	
CMWU groundwater	254,507	26,041	Fuel and safe access
UNRWA / private	18,147	6,500	Fuel and safe access
Total	272,654	32,541	

Table 2: Potential and actual bulk water in Gaza in November 2023

Municipal groundwater wells are then distributed from water reservoirs through the water networks. In 79% of households the water remains beyond WHO water quality standards⁷. The water from UNRWA wells is supplied directly to their agency facilities and schools as non-drinking water. The private sector vendors sell the water directly to consumers.

From the documented evidence the conflict and associated military actions, specifically the closure of the Gaza Strip power plant, the cutting of 10 cross-border power lines and embargo on fuel for generators has had a tremendous impact on water availability. Drinking water supply has reduced by an average of 64% or 45,687 m³/day and bulk water supply has reduced by an average 88% or 240,113 m³/day.

⁵ To truck bottled water to supply Gaza is not a sustainable option, to provide drinking and cooking needs would require 400 trucks per day

⁶ “Water Resources Summary Report 2021, Gaza Strip”; Water Resources Directorate, Palestinian Water Authority; April 2021

⁷ “Gaza Water Quality Analysis”; Coastal Municipal Water Utility, Palestinian Water Authority and State of Palestine WASH Cluster; 2022

Accessibility to Water in Gaza

It is not enough to say ‘Water is available’ if the water is not within the reach of the people. Accessibility of water is how easily available it is to consumers, or specifically the number and location of outlets/taps, the distance to the place of use and the length of time it takes to collect the water.

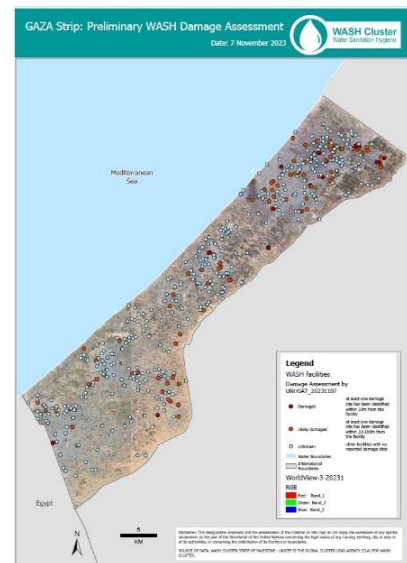
In the Gaza Strip prior to the conflict 97% of households⁸ were connected to the municipal water networks providing for all domestic and personal hygiene needs. Wealthier families purchased bottled water for drinking and cooking needs and the remainder made-do with the sub-standard network water⁹.

Households generally had water available in their kitchens and bathrooms through multiple outlets, aside from the issues of water quality, Palestinians were accessing an average per-capita consumption of 89 liters/day. It has been documented however that there were disparities in water available as the various distribution networks had a wide range of efficiencies, non-revenue water rates¹⁰ ranged from 20% to 68% depending on the age and state of repair of the pipelines.

Since the onset of the bombardment of Gaza there has been widespread damage or destruction to 45% of housing units, 285 education facilities, 135 health facilities, 11 bakeries¹¹ including unmeasured to roads, telecoms, and other support infrastructure. To date, of the 581 key water supply and sanitation facilities¹² 37 have sustained total damage and a further 226 (38%) have suspected damage due to proximity to the explosions (See insert).

This toll on water supply infrastructure does not include damages sustained by the complicated network of raw water supply lines, the treated water distribution network, the sewage pump stations and distribution networks for which damages north of the Wadi Gaza are expected to be 80% or more.

At the time of writing, access to water north of Wadi Gaza is impossible and south of Wadi Gaza the distribution of water is restricted to certain locations where the network is intact.



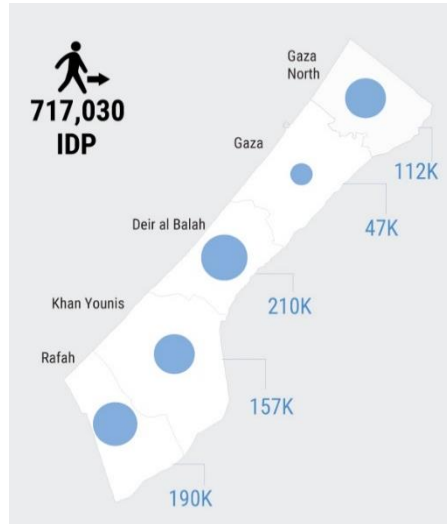
⁸ Multi-Sector Needs Assessment; UNICEF & WHO; 2022

⁹ 2023 PCBS figures indicated 45% of the population of Gaza live below the poverty line prior to the conflict

¹⁰ Non-revenue water is water that is produced but lost in the system due to leakages or illegal connections

¹¹ Hostilities in Gaza Strip and Israel – reported impact | Day 38; OCHA; November 13, 2023

¹² The critical water supply infrastructure includes 3 STL, 3 Mekorot pipelines, 61 mixing reservoirs, 284 groundwater wells, 108 small scale desalination plants, 79 wastewater pumping stations, 6 Wastewater treatment plants, 8 stormwater pump stations, 29 stormwater basins and 3.2 km of water distribution network pipes and 2.25 km of sewer and storm water collection networks.



To compensate for the *frailties* of the municipal networks, WASH cluster partners are providing tanker water to populations isolated or unserved. The picture is further complicated by the massive displacement of the Palestinians, an estimated 1.4 million or 63% have been displaced from their homes to densely packed IDP shelters 150 people with access to one latrine and limited water supply, an IDP shelter of 2,000 people is hosting 20,000 people with up to 650 people to one latrine and limited water supply and countless others are living on the streets of Gaza. (Insert reflects registered IDPs only)

It is a challenge to calculate the water accessibility in terms of number of users to water points and flow rates, but the information is clear, the people of Gaza have no clear access to water supplies at the time of writing.

The impact of the lack of water means that people are struggling daily, are susceptible to waterborne and water-washed diseases and the weakest and most infirm are paying with their lives.

The Relationship of Fuel with Access to Water in Gaza

Prior to the conflict the water (and sanitation) services in Gaza were powered by electricity from the Gaza based power plant and additional electricity supplied from Israel. Some limited amount of photovoltaic solar panels had been available. Since the closure of those sources the municipalities and CMWU have relied on fuel and generators supplied from PENRA and UNRWA’s reserves. To economize on fuel, and due to security issues, the number of production wells has been reduced to between 60-120 wells to supply the network. By November the daily minimal requirement to operate was 25,000 liters per day for water supply, including the operation of water tankers to reach isolated populations, and limited emergency wastewater pumping¹³.

The announcement today, that UNRWA fuel reserves are finally depleted and that humanitarian services are going to stop, is a dire warning to political leaders around the world. The end of fuel supplies will mean that there will be no pumping of groundwater wells, no STLV water production, no distribution through the networks, no trucked water to isolated communities, no bottled water crossing the Rafah border, the water membranes of all desalination plants will wither and require replacement, no sewage pumping, no wastewater treatment. In a short time, the only water available for 2,226,544 Palestinians will be from the two Mekorot pipelines, 24,800 m³ in other words 42% of what they have today or 7% of the total water potential, assuming this supply remains operating. Furthermore, the water will only be available in the two immediate locations where the water arrives in Gaza leaving the vast majority of the population with no viable access at all.

In addition to Water, due to non-availability of fuel, Wastewater Treatment plants and overall pumping of sewerage is not possible, resulting in outflow of untreated Sewage water in the open. This is and will

¹³ The wastewater treatment and disposal system relies on fuel for operation. All six waste water plants are non-operational, the sewage networks are fractured, untreated sewage is collecting in communal areas, overflowing from the lagoons or contaminating the sea.

increase the vulnerability of the population not only to deterioration of health and hygiene but also to disease outbreaks

Conclusion and Requests

The end of fuel for the population of Gaza is a critical turning point in the health and wellbeing of the population, an already dire situation will get dramatically worse. The political road block to providing a viable humanitarian and life saving response will now come to a close. The WASH partners operating in the State of Palestine implore the international community and decision makers to:

- Immediately provide safe and unimpeded access for a daily supply of fuel for operation of critical water and sanitation facilities
- Immediately maximize water supply delivery from all three Mekorot pipelines from Israel
- Ensure safe access for repair and safeguarding of all 10 powerlines and recommence power supply from Israel
- Permit the supply of water and sanitation materials and equipment for the emergency repair and operation of critical water and sanitation services including production, treatment and distribution
- Permit the supply of mobile pumps and generators to manage the wastewater building up in neighborhoods
- Ensure the safety and access of municipal and agency staff operators for the repair of and operations of water and sanitation services.

