Water Crisis in The Gaza Strip

knowledge Sharing Conference
Jordan

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365 sq. Km
Egypt 11 Km, Israel 51 Km
Population: 2,000,000
Gaza Humanitarian Facts

- 10 years Blockade
- -50% GDP
- 43% unemployed, 60% in youth
- 80% aid dependants
- Dual use items & reconstruction
- 45% of 470 MW is met
- 12-18 blackout hours
- GPP operates with 50% capacity
- 70% can not pay pills

- +70% HHs receive water 6-8 hours once/ every/ 4 days
- 10% of has access to safe drinking water
- 96% of Gaza’s sole water source is unfit for human consumption
- 95% at risk of water-borne diseases
- 90 Million Litres sewage to Mediterranean /day
Challenges

1- the blockade

2- re-current conflict

3- the depletion of the coastal aquifer

4- people are left with no choice but to rely on contaminated water
**LET IT FLOW** HOW THE ISRAELI BLOCKADE HAS BROUGHT GAZA TO THE BRINK OF A WATER AND SANITATION DISASTER

**A CRIPPLING BLOCKADE**
As highlighted by multiple reports of the UN Secretary-General, the continued imposition of the blockade is unacceptable and punishes innocent civilians. According to the International Committee of the Red Cross, the blockade "constitutes a collective punishment imposed in clear violation of Israel's obligations under international humanitarian law".

**"DUAL USE" ITEMS**
Items which Israel believes could have a military purpose. The Israeli "dual use" list is excessively restrictive and inconsistent with international standards.

70% of materials needed for the water, sanitation, and hygiene (WASH) sector are affected by severe entry restrictions.

Up to 95 million liters of raw or partially-treated sewage discharged daily into the Mediterranean Sea (one Olympic swimming pool every 38 minutes!)

95% of the population relies on desalinated water which costs 5 times more than network water. 45% of the desalination plants in Gaza produce biologically contaminated water.

20% of Palestinians in Gaza cut off from the sewage network.

100,000 people still cut off from the water network.

40% of network water lost through leakage.

28% of Palestinians in Gaza cut off from the sewage network.

96% of the Coastal Aquifer water unfit for drinking.

**A HUMANITARIAN CRISIS IN NEED OF POLITICAL SOLUTIONS**
The water and sanitation situation in Gaza is already critical and, absent urgent intervention, will soon develop into a chronic water crisis. Members of the international community must comply with their third state responsibilities to ensure respect for international humanitarian law and exert political pressure on Israel to immediately lift the blockade.

Sources: UN, UNOCHA, Palestinian Water Authority, Coastal Municipalities Water Utility.

**CHEMICALS** for water purification
**PUMPS** for flood response and mitigation
**SERVICE VEHICLES** like vacuum trucks to empty cesspits

20 MORE ITEMS including concrete, steel cables, welding electrodes, etc.

46 WASH projects out of 53 are presently at risk due to lack of materials.

www.ewash.org
* The already dire WASH situation was further deteriorated by the recent war as Israeli airstrikes caused approximately 34 million USD, damage to WASH infrastructure
THE DEPLETION OF THE COASTAL AQUIFER

1- The Aquifer is being over-exploited by up to three times its sustainable yield.

2- Decades of over-pumping as well as the contamination resulting from the intrusion of wastewater, agrochemicals and saline water have put the aquifer in danger of irreparable damage.

3- 96% of the water extracted from the Costal Aquifer is already unfit for human consumption.

4- 95% of Gaza’s population depends on desalinated water purchased from private vendors for drinking: 68% of this water contains bio-contaminants, yet its price so prohibitive that the most vulnerable households in Gaza end up spending up to a third of their income on water.
Geological Cross Section

Schematic - Not to Scale

Mediterranean Sea

A Subaquifer
B1 Subaquifer
B2 Subaquifer
C Subaquifer

Quaternary+Neogene

Kurkar Group (Coastal Aquifer)

Eocene Chalks and Limestones

Saqlye Group (Aquifer)

Senonian Chalks

Cretaceous Carbonates (Limestone, Dolomite, Marl)

Shale, Clay, Marl

Water Table

Clay

Source: Dan, Greitzer, 1967
PEOPLE ARE LEFT WITH NO CHOICE BUT TO RELY ON: CONTAMINATED WATER

1- 9 Out of 10 people in the Gaza Strip drink desalinated water. This water is produced by those desalination plants. Concerns about its quality have been raised in the past, and a recent study by the PWA confirmed those claims.
PEOPLE ARE LEFT WITH NO CHOICE BUT TO RELY ON CONTAMINATED WATER

2- Out of the existing 154 public and private desalination plants, only 48 of them are licensed by the designated authorities, posing issues to their monitoring.
PEOPLE ARE LEFT WITH NO CHOICE BUT TO RELY ON CONTAMINATED WATER

- Incidence of Total coleform (TC) is as high as 68% at the household/supermarket storage level. In other words, **68% of the desalinated water currently being consumed in the Gaza Strip is susceptible to biological contamination** due to the combined effects of inadequate disinfection at the desalination plants, the improper handling during distribution, and poor user storage habits.
Gaza Water Facts

- 98% of Gaza water supply comes from groundwater, which faces high levels of abstraction (200 MCM/y); four times higher than the annual recharge average (55-60 MCM/y).
- 96% of Gaza’s water supply is contaminated with unacceptable high levels of nitrate (NO3) and chloride (Cl), posing significant health risks to Gaza’s 2.0 million residents.
- Due to current high abstraction levels, coastal aquifer will be unusable by 2016, and irreversibly damaged in 2020 (UN report, 2012).
- Accordingly, most of Gaza population resort to uncontrolled desalinated water from private vendors/households’ to secure drinking water.
Gaza Water Facts

- Despite that Gaza’s water supply is estimated at 90 liters per capita per day (l/c/d), however this falls below the acceptable water quality and quantity standards recommended by WHO.
- Absence of adequate wastewater treatment facilities, approximately 35 MCM/year of untreated/partially treated sewage is dumped into the sea along Gaza’s coast. Additionally, 12 MCM/year of untreated/partially treated sewage infiltrates to the coastal aquifer.
- Water consumption for agricultural purposes exceeds 48% of available groundwater (more than 95 MCM/y).
Gaza Water Facts

- Gaza’s water and sanitation crisis will worsen, while population is expected to reach 2.1 million in 2020, in conjunction with projected water demand to grow to 260 MCM/y in 2020 for different uses.

- Current installed power supply to operate water and wastewater facilities is estimated by 29 MW, meanwhile, projected power supply demand for water and wastewater facilities is estimated by 81.5 MW in 2020. Blackouts of 12-16 hours/day are restricting the provision of basic services.
Water quantity

- Rain: 312 ml/ yr (450 North & 200 South), (110-120 MCM/yr)
- Domestic consumption: 70-90 L/C/D
- Water exploitation: is about 200 mcm/yr is not balanced by natural or anthropogenic replenishments.
- The natural replenishments of the aquifer: 35-45 mcm/yr,
- The anthropogenic replenishment (agricultural return flow and wastewater): 25-35 mcm/yr,
- The lateral inflow from the eastern part of the aquifer is about 10-20 mcm/yr.
- Overall, the Gaza Strip is facing an annual deficit of about -100 mcm/yr.
- Water wells: 12500 (2500 registered and 10000 illegal)
* Two cone of depressions had occurred in northern and southern parts of Gaza Strip with water level depths of -5 m and -19 m below sea level respectively.
Water quality

- Saline water is rapidly replacing fresh water in many parts of the Gaza Strips aquifer

- 96% of The Gaza Strip water is biologically and/or chemically contaminated and does not match international quality standards for drinking water.
Water quality

Nitrate:
50 mg/l - > 300 mg/l

Chloride:
250 mg/l -> 5000 mg/l
Water quality

- 80.20% of samples have CL < 250 mg/l and CL > 250 mg/l.
- 19.80% of samples have CL < 250 mg/l.
- 14.10% of samples have No3 < 50 mg/l.
- 85.90% of samples have No3 < 50 mg/l.
- 96.0% of samples have CL and No3 < WHO limit.
- 4.0% of samples have CL and No3 > WHO limit.
Water Demand

- Average water network efficiency of about 58.2%

- Unaccounted For Water (UFW) of about 41.8%
Electricity demand has reached 470 MW and the shortage reached 55%.

The Gaza Strip buys 120 MW from Israel and 28 MW from Egypt.

Blackout hours have reached 12-18 hrs per day.

70% of Gaza HHs are not able to pay their bills.

Due to fuel shortages:
- GPP works at 50% of its capacity (60/120 MW),
- Gaza HHs receive water for 6 hours every four days &
- 90 Million /L/day of untreated wastewater are dumped to the sea.
Water & Agriculture

1. Around 48 per cent of total water use in the Gaza Strip is for agriculture.

2. The Gaza Buffer Zone comprises around 30-40 per cent of Gaza's agricultural lands and numerous ground water wells.

3. The rapid deterioration of water quality in Gaza is having an impact on agricultural yields.

4. Repeated military incursions have caused extensive damage to water systems necessary for agriculture.

5. Israel has imposed restrictions on access to coastal waters with Gazan fishermen only able to access up to three nautical miles from the coast.
Challenges to water sector development

- Water shortages, growing needs and inadequate water and sanitation infrastructure threaten the health and welfare of Gaza’s 2.0 million residents.

- Scale and severity of the water crisis facing the Gaza Strip are enormous. Unless immediate action is taken, the damage to Gaza’s natural water resources will be irreversible and put the livelihood of Gaza population at serious threat.
The Comparative Study of Options for an Additional Supply of Water for the Gaza Strip (CSO-G)

- Water Demand Management
- Wastewater Reuse
- The Transfer of Water within Palestine
- Transfers of Water from Israel
- Transfers of Water from Turkey
- Transfers of Natural Waters from Elsewhere
- Desalination
Water Demand Management

- Domestic
- UfW
- Agriculture
- Rainwater
Desalination

• While the construction of a seawater desalination plant may be the most appropriate response to the urgent humanitarian needs of Gaza’s population, there are concerns regarding the implications of seawater desalination for Gaza
Desalination Challenges

- Increasing the vulnerability of the civilian population of Gaza
Desalination Challenges

- Desalination plant requires significant amounts of electricity which Gaza does not have
Desalination Challenges

- Seawater desalination plant is environmentally unsustainable, which will further deteriorate the already deplorable environmental situation in Gaza
Conclusion & Recommendations

- Desalination is a politically, economically and environmentally costly option and one that should only be pursued in the context of broad public input.

- In addition, large-scale desalination is not a sustainable solution without guaranteed, uninterrupted energy, lifting of the blockade, and protection guarantees.
The Palestinian National Authority, particularly the Palestinian Water Authority should take concrete steps to publically reaffirm Palestinian water rights as an essential and fundamental step to realizing the Palestinian right to self-determination and the Palestinian state.

The international donor community must exert political efforts to resolve the underlying water injustice in the occupied Palestinian territory based on the principle of territorial integrity rather than funding costly projects temporarily alleviating a humanitarian crisis.
THANK YOU
The Western Aquifer Basin (WAB)
Four main Treatment Plant
- North
- Gaza
- Khan Younis Temporary WWTP
- Rafah

Eight Points Disposal to Sea
- Three in Gaza
- End of Wadi Gaza down stream
- One in Khanyounis
- One in Deir El Balah
- One in Rafah

39 Sewage pumping stations distributed all over the Strip
- 16 in the North
- 8 in Gaza
- 7 in the Middle
- 3 in Khan Younis
- 5 in Rafah
THANK YOU