WASH Cluster
State of Palestine

Gaza WASH sector damage assessment

1. Context – the WASH situation

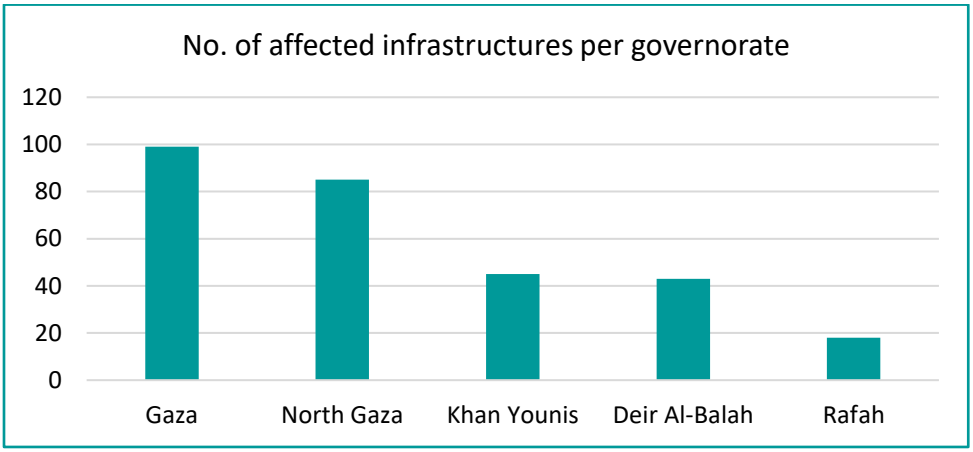
The longstanding closure of the Gaza Strip and extremely limited water resources have seriously impacted the water, sanitation and hygiene (WASH) sector. Years of restricted access to fuel and materials have eroded the ability of the 25 WASH service providers to provide adequate water and sanitation services to the population. These service providers operate more than 500 water and sanitation facilities, including water and sewer networks and pumping stations, and desalination and wastewater treatment plants. The coastal aquifer, Gaza's sole source of natural water, suffers from over-extraction, saltwater intrusion, and sewage infiltration, rendering it largely unfit for human consumption.

Even before the recent escalation of violence, more than 1.1 million Palestinians in Gaza were not receiving adequate water and sanitation services.[1] Daily water consumption per capita reached 82 litres against the WHO recommended minimum of 100 litres. According to Palestinian Water Authority (PWA), more than 96 per cent of the households received network water that didn't meet drinking water quality standards. Instead, people in Gaza mostly relied on purchased trucked and bottled water from private vendors. Inadequate wastewater treatment is another problem; more than 100,000 m^3 of untreated sewage was being discharged to the sea each day resulting in pollution along 75 per cent of the Gaza shoreline.

Throughout the escalation, the WASH Cluster, PWA, and the Coastal Municipalities Water Utility (CMWU) recorded more than 120 incidents affecting WASH infrastructure. Preliminary assessments determined that about 290 locations were partially damaged or completely destroyed. Immediate

[1] Humanitarian Needs Overview 2021, UNOCHA, Dec 2020

emergency repairs to the most critical water and wastewater facilities were undertaken to a limited extent. The Gaza WASH Cluster early warning indicators signaled that water supply per capita decreased by 30 per cent during the conflict due to direct impacts and loss of electricity, adversely affecting 800,000 people in Gaza.



2. Assessment methodology

With the cessation of hostilities, the WASH Cluster, in coordination with PWA and CMWU, spearheaded a systematic field assessment of damage to water supply, wastewater, and stormwater infrastructure. Technical staff were mobilized to document the severity of damage, previous and current operating capacities, needed repairs and equipment replacement, and the service area and population served.

This exercise contributed to the Rapid Damage and Needs Assessment (RDNA)[2]. Field work was followed by validation of the findings by partners, leading to agreement on the calculated damage, losses, and needs. A bill of quantities (BOQ) for each intervention combined with a local market survey yielded estimated reconstruction costs. The resulting database forms the common basis for this WASH Cluster report as well as sector reports produced by PWA[3], the World Bank, EU and UN[4].

2.1 Preliminary identification of damage to WASH infrastructure

PWA, CMWU, the WASH Cluster and local municipalities recorded all incidents against WASH infrastructure throughout the recent escalation, totalling more than 120 incidents. This preliminary list of sites and information on severity of damage was used for organizing a structured technical review of the situation.

2.2 Technical damage assessment of WASH infrastructure

The WASH Cluster, with support from UNICEF, developed a field assessment tool in the Open Data Kit (ODK) format to be used by all partners during the site visits. An orientation session was carried out for

[2] A collaboration of World Bank Group/EU/UN with Palestinian authorities and key stakeholders
[3] The Water Sector Damage Assessment Report, PWA, June 2021
[4] Gaza RDNA – Water and Sanitation Sector Report, World Bank Group/EU/UN, June 2021

all field surveyors. The WASH Cluster allocated 16 engineers from its partner organizations to do the field assessment, as shown below.

WASH Cluster organization	Governorate	# of field surveyors	# of assessed infrastructure
Islamic Relief	Rafah	1	18
Oxfam, ACTED, CESVI	Gaza	6	119
Action Against Hunger, Islamic Relief	Khan Younis	2	34
WW-GVC, CESVI	Deir Al-Balah	3	46
Save the Children International, ACTED	North Gaza	4	87
Total		**16**	**304**

Technical staff from PWA, CMWU, and local municipalities joined the field visits to provide updates about immediate actions taken and proposed technical solutions. Four engineers from UNOPS also provided technical advice for the most critical WASH facilities.

Technical assessment teams conducted field visits to all targeted infrastructures between 30 May–3 June, 2021, and collected the following data:

- Degree of damage to each infrastructure.
- Types and quantities of the damaged WASH items.
- Decrease in operations of affected WASH infrastructure.
- Population affected by the decrease in operational capacities.
- Proposed interventions incorporating 'building back better' (BBB) considerations.
- Types and quantities of required materials and tools for the proposed response.

The data were transmitted daily to the WASH Cluster Google server. Data were reviewed immediately by the WASH Cluster information officer to ensure data quality and provide immediate feedback for the field staff, ensuring maximum robustness and accuracy of the collected data.

The WASH Cluster participated in four technical sessions with key parties:

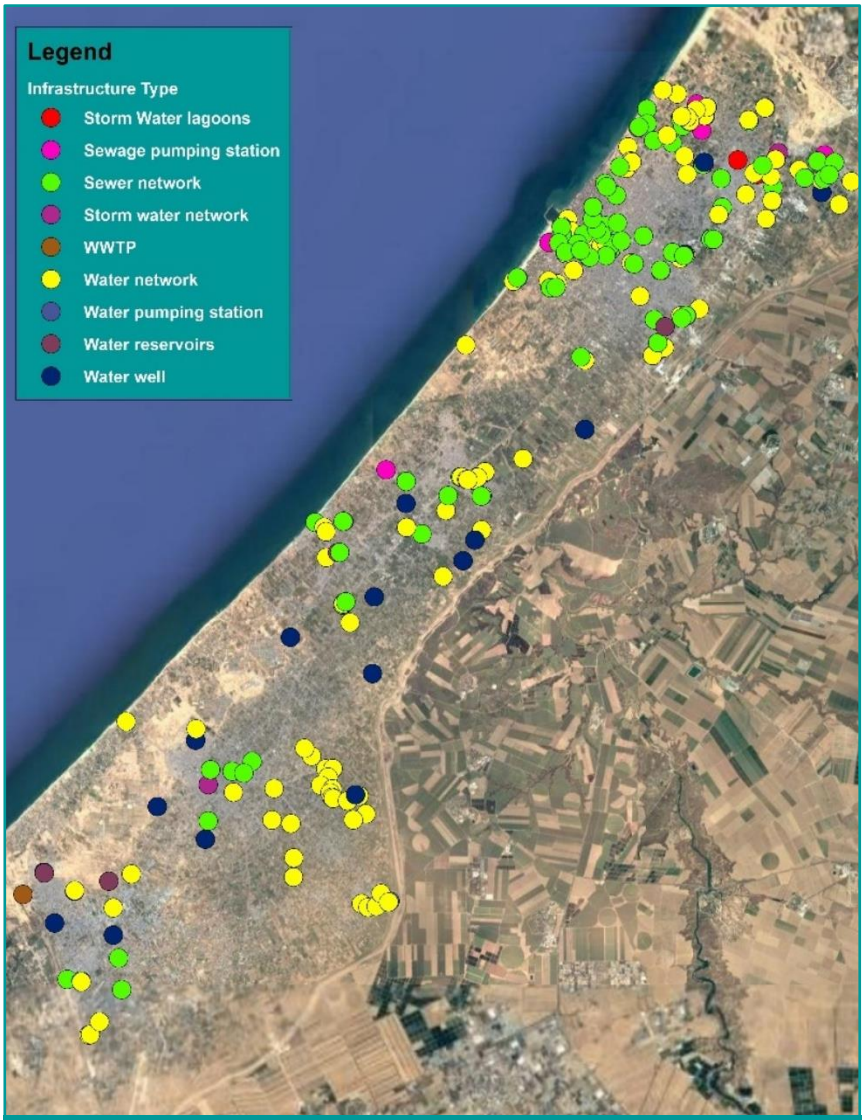
Session objective	Participants	Date
RDNA methodology and requirements	World Bank, EU, UNICEF	2 June, 9 June
Data verfication session	WASH Cluster area focal points, field surveyors	6 June
Verfication of proposed responses	PWA, CMWU	13 June
Final verfication of assessment and analysis results	World Bank, PWA, CMWU	17 June

2.3 Local market survey of required WASH materials and works

The WASH Cluster conducted a rapid market survey to obtain the cost and availability of the required WASH materials on the local market. The survey identified the unit price of materials and cost estimates for installation and technical supervision of each proposed intervention.

3. Assessment findings

WASH systems were affected during the recent escalation in about 290 WASH locations. Most of these WASH locations are still operating but at reduced capacity. The WASH Cluster technical assessment findings, estimated costs and priority interventions are presented in Annex A.



Location map of affected WASH infrastructures

3.1 Water infrastructure

Almost 170 water infrastructure sites were affected, including water wells, water pumping stations, water reservoirs, water transmission pipelines and distribution networks. Impacted water production and supply services adversely affected more than 800,000 persons in the Gaza Strip; water supply per capita decreased by more than 30 per cent.

Water infrastructure	North Gaza	Gaza	Middle area	Khan Younis	Rafah	Total
Water wells	4	11	5	6	4	30
# of people affected	30,000	18,000	35,920	28,000	118,000	229,920
Water reservoirs		1			2	3
# of people affected		4,000			21,000	25,000
Water pumping stations				1		1
# of people affected				5,000		5,000
Water pipelines	35	45	18	30	7	135
# of people affected	145,510	342,000	43,570	102,975	233,000	867,055

3.2 Wastewater infrastructure

Almost 110 wastewater infrastructure sites were affected, including wastewater pumping stations, wastewater treatment plants (WWTPs), sewer transmission pipelines and collection networks. Wastewater system damage disrupted the transmission of sewage to WWTPs, the treatment processes, and the amount discharged to the sea. Large quantities of raw sewage spilled into neighbourhoods and low-lying areas. WASH Cluster monitoring confirmed that the quantity of treated wastewater outflow to the sea dropped significantly, and that its quality also dropped as effluent biological oxygen demand (BOD) readings surged.

Wastewater infrastructure	North Gaza	Gaza	Middle area	Khan Younis	Rafah	Total
WWTP			1		1	2
# of people affected			46,814		200,000	246,814
Sewage pumping station	4	1	1			6
# of people affected	24,000	120,000	20,000			164,000
Sewer pipelines	34	41	16	6	4	101
# of people affected	180,550	285,444	39,230	400,000	11,200	916,424

3.3 Stormwater infrastructure

At least 10 stormwater infrastructure sites were affected, including stormwater pumping stations, stormwater lagoons, and stormwater networks.

Stormwater infrastructure	North Gaza	Gaza	Middle area	Khan Younis	Rafah	Total
Stormwater lagoons	2					2
# of people affected	90,000					90,000
Stormwater pipelines	4		2	2		8
# of people affected	190,000		81,697	70,000		341,697

3.4 WASH sector losses

Losses to the WASH sector due to the escalation go beyond the direct physical damage of infrastructure. The RDNA methodology was followed to quantify the loss of revenue over a six-month period as well as the increase in operational costs,[5] which PWA and CMWU identified as follows:

- Decrease of WASH services revenues by more than 30 per cent.
- Compensating for the power supply shortage by using electricity generators and extra fuel.
- Cleaning the affected infrastructure from debris (mainly water and sewer pipelines).
- An increase in chemicals and disinfectants for water treatment.
- Increased cost of the private vendors' services (water desalination and water trucking).
- Water wells out of order.

4. Required WASH response

Applying the market survey findings, the WASH Cluster calculated the cost of each proposed intervention which included:

- Supply of required materials.
- Civil works including BBB upgrades (see Section 5 below).
- Technical supervision.
- Administrative and logistics costs.

The total cost of the WASH reconstruction and recovery interventions was estimated to be US$13.34 million distributed as follows:

Type of infrastructure	Number infrastructures	Cost of response USD	Targeted population
Water infrastructures			
Water wells	30	1,576,328	229,920
Water reservoirs	3	105,889	25,000
Water pumping stations	1	16,933	5,000
Water pipelines	136	3,311,078	867,055
Total	**170**	**5,010,229**	**940,175**
Wastewater infrastructures			
WWTP	1	276,859	246,814
Sewage pumping station	8	1,010,136	164,000
Sewer pipelines	100	6,627,724	916,424
Total	**109**	**7,914,719**	**1,159,724**
Stormwater infrastructures			
Stormwater lagoons	2	206,300	90,000
Stormwater pipelines	8	206,914	341,697
Total	**10**	**413,214**	**341,697**
Overall	**290**	**13,338,162**	

[5] The World Bank calculated the total losses to be approximately $3-5 million.

In coordination with CMWU and PWA, the WASH Cluster developed prioritization criteria to target the most critical WASH infrastructure with emergency and immediate response interventions.

WASH Damage Response Prioritization Criteria										
Decrease in operation	Score	Affected population	Score	Cost per beneficiary	Score	Service provider response	Score	Geographical area	Score	**Total / 50**
More than 70%	10	More than 100000	10	Less than 5 USD$	10	None	10	Gaza	10	50
50% to 70%	8	50000 to 100000	8	6 USD$ to 10 USD$	8	Temporary	5	Northern Gaza	9	
30% to 50%	6	10000 to 50000	6	11 USD$ to 20 USD$	6	Permanent	0	Khan Younis	8	
10% to 30%	4	5000 to 10000	4	21 USD$ to 40 USD$	4			Deir Al-Balah	7	
less than 10%	2	less than 5000	2	More than 40 USD$	2			Rafah	6	

These criteria prioritized the infrastructure that suffered a significant decrease in the operational capacity, serve a large population, are relatively low-cost per beneficiary, and are not already targeted for repair or rehabilitation by WASH service providers. The results of the ranking yielded a mixture of high-impact repairs and large-scale investments. (The ranking is shown in Annex A.)

5. Building Back Better

In order to rebuild more resilient and upgraded WASH services, in line with the RDNA BBB approach, the WASH Cluster considered the following ways to achieve better results from the reconstruction or repairs of the affected WASH infrastructure:

- Increasing capacities to satisfy the increasing demands (e.g. greater productivity of solar systems, larger sizes for water and sewer pipes).
- Replacing damaged materials with more durable and more easily maintained materials available on the local market (e.g. replacing steel and concrete pipes with HDPE and UPVC pipes).
- Meeting national technical standards (e.g. on backfilling of pipelines, the minimum depth of pipes, the operational capacities of the materials).
- Re-designing the severely damaged infrastructure (e.g. changing the layout of water and sewer pipelines to ensure better services).
- Addressing power constraints through renewable energy solutions.

Taking BBB measures will require an average increase in overall repair and reconstruction costs of about 20 per cent, which was already incorporated into the Cluster technical assessment findings, reconstruction costs and priorities spreadsheet (Annex A).

6. Intercluster coordination

The WASH Cluster coordinated with the Education and Health Clusters to ensure that WASH in schools and health care facilities was included in their assessments and responses. For WASH in schools, the Education Cluster assessed WASH needs in each affected school and included WASH facilities rehabilitation in their Cluster response plan. For WASH in health care facilities, the Health Cluster and MOH conducted a preliminary assessment and confirmed that damage in WASH facilities is minimal and will be considered in the reconstruction response of the targeted health care units.

The WASH Cluster coordinated with the Food Security Cluster to avoid duplication of efforts with regard to agricultural water infrastructure such as irrigation wells and pipelines. The WASH Cluster will keep coordinating with other clusters to ensure that the WASH minimum standards and technical specifications are being applied to WASH components.

7. Immediate WASH Cluster response

In coordination with PWA and CMWU, the WASH Cluster developed an immediate response plan to restore and maintain the most urgent WASH services that required action from the WASH humanitarian actors.

More than 20 WASH Cluster partners contributed to the development of this immediate response plan and are currently implementing their WASH interventions according to pre-identified targeting criteria and technical standards. This immediate response plan represents a total budget of US$ 7.5 million, which has been fully secured by WASH cluster partners through the UN humanitarian appeal.

Objectives/activities	Targeted people	Requirements US$
Objective 1: Restore / maintain the operation of WASH infrastructures affected by the attacks		
Rapid repair and provision of maintenance and operational materials and tools for water and wastewater infrastructures	617,000	3,205,000
Objective 2: Support WASH service providers in restoring operation and productivity of WASH facilities and services		
Provision of chlorine and chemicals to ensure sufficient treatment of water and wastewater facilities	200,000	345,800
Provision of fuel for operation of critical WASH facilities due to power supply shortages	653,000	902,700
Objective 3: Improve access to basic water, sanitation and hygiene services for vulnerable households affected by the recent escalation		
Provision of trucked water for households suffering limited access to water (covering 30 L/C/D for one month)	83,950	1,087,000
Provision of household hygiene kits and vouchers (hygiene needs for 14 days, jerry cans or bottled water 3 L/C/D) for families suffering limited access to WASH services	162,078	1,475,460
Rehabilitation/provision of HH WASH facilities and items (sanitation fittings, PE tanks, handwashing stations, etc.)	18,708	1,335,100

Vacuuming and discharging wastewater for households and communities suffering wastewater accumulation due to sewer service interruption	9,200	63,000

8. Monitoring and follow-up

The WASH Cluster has an online 4Ws matrix (who does what, where, when) to track partners' WASH responses. WASH cluster partners provide regular updates about their response, the targeted WASH infrastructure, the status of the response (planned, ongoing, completed), the donor, and the allocated budget. The WASH Cluster ensures that all WASH Cluster partners, PWA, and CMWU have free access to this response tracking system to ensure maximum coordination between partners and local authorities and to avoid duplication of effort during the planning and implementation phases.

9. Challenges and constraints

WASH Cluster partners, CMWU, and PWA are still facing several challenges in restoring and maintaining WASH services after the recent escalation. These challenges include:

- **Restricted access to required construction and operational materials:** Due to Israeli restrictions on the entry of 'dual-use' materials into Gaza, certain types of key materials such as steel pipes, control valves, and fittings are highly controlled.
- **WASH services efficiency and unseen WASH damages:** PWA and CMWU are expecting to find unseen damage in the areas that were affected heavily during the escalation. This as yet unseen damage will affect sector efficiency, resulting in an increase in water losses and wastewater leakage. Therefore, a detailed efficiency analysis and technical tests are required for the affected WASH infrastructures to identtify currently unseen damages.
- **Shrinking service provider capacities:** To date, PWA, CMWU and WASH service providers implemented more than 200 repair and maintenance interventions for the most critical WASH infrastructure. Service providers relied on emergency materials stocks provided by UNICEF, ICRC, and other WASH partners as emergency preparedness measures. CMWU and service providers have reported that they are running out of most of the required maintenance items, restricting their ability to continue repairs and maintenance.
- **Continuing power supply shortages:** The Gaza Strip is still suffering a power supply shortage with a decrease of more than 30 per cent compared to the period prior to the recent escalation. Therefore many WASH facilities, including water desalination plants, water wells, wastewater treatment plants, water and sewer pumping stations, are still operating below their normal capacities.

(version 28 June 2021 - revised)

10. Annexes

Annex A: Technical assessment findings, reconstruction costs and priorities