Concept note

'Day after' WASH infrastructure strategy for the Gaza Strip

Introduction

This concept note is a part of *"Advancing Climate Resilience: Area C Solar Power for Gaza and West Bank and Regional Water Security"* - a Joint project of the European **European Commission's Foreign Policy Instruments** and **EcoPeace Middle East.** EcoPeace Middle East is a unique organization that brings together Jordanian, Palestinian, and Israeli environmentalists aiming to advance both sustainable regional development and the creation of necessary conditions for lasting peace in our region. EcoPeace has offices in Amman, Ramallah, and Tel Aviv, and its 30 years of work in Environmental Peacebuilding has been rewarded with a Nobel Peace Prize nomination in 2024.

This project's objective is to achieve increased regional cooperation and agreement on joint action on climate, energy, and human security, through the creation of (1) increased awareness and political will of key national and international decision makers on water security as central to national and regional security; and (2) evidence base for implementation of rapid response measures to build climate resilience for Palestinians.

This concept note will focus on a strategy for the 'day after' governance and recovery of the WASH sector in the Gaza Strip, aiming to achieve fast-track reconstruction as much as this is necessary and to avoid external displacement.

'Day after' WASH infrastructure strategy for the Gaza Strip

Gaza's water, sanitation, and hygiene (WASH) infrastructure has been severely impacted by ongoing conflict and political instability. The region's limited resources, compounded by a fractured governance structure, have exacerbated the difficulties of maintaining essential services. The lack of political resolution, particularly the division between Hamas in Gaza and the Palestinian Authority, as well as the restrictions imposed by the Israeli occupation, poses significant challenges to effective recovery and long-term sustainability.

To address these challenges, the recovery strategy for Gaza's WASH sector must integrate both urgent humanitarian responses and long-term infrastructure development. Immediate interventions, such as the restoration of key energy and water systems, are critical for providing short-term relief. However, a sustainable recovery will require coordinated efforts across political, humanitarian,

environmental ,and technical sectors, fostering collaboration between local authorities, international organizations, and the private sector.

By aligning political frameworks with practical solutions, including green energy sustainability and infrastructure rehabilitation, the recovery strategy can help restore Gaza's WASH systems while setting the foundation for self-sufficiency and resilience against future crises.

The need for a political framework for the implementation of a WASH plan

The success of Gaza's WASH recovery efforts depends primarily on the political framework in place. Ongoing political instability and the blockade have exacerbated an already fragile water and sanitation infrastructure, making clean water access one of the most urgent humanitarian challenges.

Before October 2023, Gaza's water supply was already inadequate, relying on a polluted aquifer and limited infrastructure. Recent destruction has wiped out 89% of WASH assets, including water wells, reservoirs, desalination units, and sewage systems. The destruction of the Gaza Power Plant has further crippled water distribution, leaving nearly 40% of the population without sufficient water. This crisis has led to the resurgence of waterborne diseases like polio, unseen in Gaza for 25 years.

The economic impact of the crisis amounts according to the Interim Rapid Damage and Needs Assessment[1] (RDNA) for Gaza and the West Bank to $64 million, with 2,600 WASH sector jobs lost. Recovery needs total $2.7 billion, with $664 million required urgently to restore basic services and provide alternative water sources. Long-term recovery must focus on resilient water and sewage systems, expanding desalination, and restoring the coastal aquifer.

However, technical solutions depend on addressing political and governance challenges. Restrictions on materials and energy have hindered progress, and a political mechanism ensuring unrestricted access is essential for recovery. The governance structure in Gaza must also be stabilized for effective management and funding of water and sanitation services.

Ultimately, the WASH crisis is not just technical—it is deeply political. A sustainable and resilient water system in Gaza requires political resolution, unrestricted material

[1] https://thedocs.worldbank.org/en/doc/133c3304e29086819c1119fe8e85366b-0280012025/original/Gaza-RDNA-final-med.pdf

access, and support from international donors, the private sector, and regional actors. Without political stability and governance reforms, reconstruction efforts will fall short in providing lasting solutions for water security and public health.

Governance Scenarios and their Implications for WASH Sector Recovery

The success of Gaza's WASH sector recovery is heavily dependent on the governance model that emerges in the aftermath of the conflict. Given Gaza's political fragmentation and the uncertainty surrounding future governance, the WASH recovery must align with one of the potential governance scenarios. Each scenario presents distinct challenges and opportunities for rebuilding and maintaining water, sanitation, and energy infrastructure. Below are three primary governance scenarios and their potential implications for the WASH sector.

Scenario 1: Palestinian Authority (PA)-Led Governance

- In this scenario, the Palestinian Authority (PA) regains control over Gaza, either through a political agreement or following the end of hostilities. This would restore governance through the PA or a national committee of independent figures. A PA-led governance would likely strengthen coordination between Gaza and the West Bank, making it easier for international donors to channel funding through a unified Palestinian leadership. Re-establishing cooperation with Mekorot, Israel's water operator, could facilitate the resumption of shared water resources, improving Gaza's access to water and helping integrate WASH systems across Palestinian territories.

- With PA control, coordination of material imports could also become more streamlined. The easing or lifting of Israeli restrictions on "dual-use" materials, such as pipes and pumps, would be critical for rebuilding infrastructure. However, this scenario faces challenges due to the political legitimacy of the PA in Gaza. Hamas and other factions may question the authority of the PA, potentially slowing down reconstruction efforts. Security concerns, especially in areas controlled by Hamas, could also hinder the effective implementation of WASH programs. Moreover, Israeli security restrictions may continue to obstruct the smooth flow of materials, even with PA oversight.

- While a PA-led governance offers the greatest potential for coordination and financial support from the international community, it also faces significant political and security challenges that could delay or obstruct progress.

Scenario 2: Israeli Full Occupation

- In this scenario, Israel assumes full control over Gaza, taking legal responsibility for providing essential services, including WASH, as an occupying power. Under international law, Israel would be required to ensure access to clean water and sanitation, including repairing critical infrastructure and providing adequate humanitarian assistance to Gaza's population. International humanitarian organizations, such as UNICEF and WHO, would likely play a major role in overseeing WASH services in coordination with Israel.

- While Israel's control over imports could streamline the entry of materials for infrastructure rebuilding, its political reluctance to engage directly in WASH recovery could slow efforts. Israel might allow humanitarian actors to manage WASH services but may not invest directly in long-term infrastructure, leaving the reconstruction largely to international donors. Although Israel would be legally required to restore WASH services, its reluctance to take full responsibility for Gaza's recovery could leave much of the burden on humanitarian organizations and international donors. The effectiveness of this scenario would depend on Israel's willingness to meet its legal obligations and the extent of international pressure.

- Furthermore, Israel could integrate Gaza's WASH systems into its national network, such as through water supply from Mekorot, but this would likely increase its control over Palestinian water resources, potentially raising political tensions. The possibility of exporting water from Israel's desalination plants to Gaza could offer a short-term solution, but this would not provide a long-term strategy for self-sufficiency in Gaza.

Scenario 3: A Mixed Governance Model with International Oversight

- This scenario envisions a mixed governance model in which a national committee, including independent Palestinian figures, oversees Gaza's recovery under international oversight. In this model, key international actors such as the UN and NGOs would play a central role in facilitating the reconstruction process. International stakeholders would ensure that WASH recovery efforts align with international standards, offering substantial financial and technical support, particularly in coordinating the importation of materials and rebuilding infrastructure.

- Despite the benefits of international involvement, this model could face significant operational challenges. A mixed governance structure may struggle with internal political fragmentation, as competing factions, such as Hamas, the PA, and other local actors, could undermine cohesion and slow down decision-making processes. Coordination with Israel for the importation of construction materials may also be difficult, as Israeli approval would still be necessary for many key components.

- In the short term, the UN and NGOs could provide emergency water trucking, temporary sanitation services, and power generation. However, long-term solutions would require a clear and unified political and governance framework, which could be difficult to establish in a mixed governance context. This scenario may lead to a fragmented recovery, with some areas receiving better services than others depending on the governance structures in place.

Summary of Governance Implications for WASH Recovery

Each governance scenario presents its own set of challenges and opportunities for the recovery of Gaza's WASH sector. A PA-led governance model offers the most promise for coordination and international support but is hindered by political divisions and security concerns. In contrast, Israeli full occupation would legally obligate Israel to restore WASH services but could face delays due to political reluctance and the potential for increased control over Palestinian water resources. The mixed governance model offers the possibility of substantial international involvement but may struggle with fragmentation and coordination challenges. Ultimately, the most viable governance model will depend on political developments and the willingness of key actors to cooperate on long-term WASH recovery. Effective collaboration between Palestinian, international organizations, and Israel will be crucial to ensuring that Gaza's WASH infrastructure is rebuilt in a way that is both sustainable and resilient.

Regardless of whether Gaza's recovery unfolds under a PA-led framework, Israeli occupation, or a mixed governance model with international oversight, there is a need for a structured reference to guide WASH interventions. The Palestinian Authority's Emergency Response, Recovery, and Reconstruction Plan represents the most detailed roadmap available, outlining standards, phasing, and indicative costs. While it is not intended as a universal blueprint, the plan can be adapted to different governance arrangements, implemented directly by the PA, delivered through international actors, or scaled into modular solutions in restricted settings. It

therefore provides a technical baseline against which WASH recovery efforts can be measured and aligned.

The PA's WASH recovery plan - Emergency Response, Recovery, and Reconstruction Plan for Gaza

The Gaza Strip has suffered extensive destruction to its infrastructure, housing, and essential services. In response, the PA has developed a two-phase plan that prioritizes emergency relief, early recovery, and long-term reconstruction. This section outlines key interventions and required resources to address humanitarian needs and lay the foundation for sustainable recovery and development.

Phase 1: Emergency Response and Early Recovery

0-36 months: Starting with an initial emergency response program, covering the first six months post-ceasefire, focuses on lifesaving interventions, including the provision of food, medical supplies, water, shelter, and sanitation. Emergency response teams will be deployed, and temporary shelters will be established to support the displaced population. In some cases, pre-ceasefire interventions will be implemented where feasible, particularly in food and medical supply distribution.

6-18 months: The comprehensive response program will expand the provision of water, food, medicine, and psychological treatment services. It will include the restoration of critical infrastructure such as roads, temporary housing, and waste management. Transitional neighborhoods will be established to provide essential services, ensuring that the displaced population has access to basic needs.

18-36 months: The early recovery program will focus on repairing minor and medium-sized infrastructure damage. Short-term job opportunities will be created through cash-for-work programs, and compensation will be provided to affected businesses and workers. The program will also support the rehabilitation of roads, telecommunication systems, and essential utilities, including water, sanitation, and electricity.

Phase 2: Recovery and Reconstruction

6 months - 10+ years: This phase aims for comprehensive infrastructure and economic recovery, ensuring Gaza's integration into the State of Palestine. Investments will be made in sustainable housing, economic development, and social services. The government will work in collaboration with Palestinian civil society, the

private sector, and international partners to achieve a transformational reconstruction of Gaza, paving the way for long-term prosperity and stability.

The WASH sector has sustained physical damages and losses estimated at $1.53 billion. The damage includes 125 water wells, 120 km of sewage networks, 85 water facilities, and 18 sewage plants. Current water and sanitation systems provide less than 5% of the population's needs. Additionally, there are 270,000 tons of accumulated solid waste, increasing public health risks. Fuel shortages and targeted destruction of waste disposal infrastructure further complicate the situation.

To address these challenges, interventions will focus on supplying potable water, providing water transport trucks and tanks, and repairing damaged water networks, transmission lines, and wells. Water desalination plants will be renovated, and essential equipment such as generators, pumps, chlorine, oils, and fuel will be supplied to ensure the operation of water stations and wells. Spare parts for damaged wells and facilities will be provided. Solid waste collection and transportation will be prioritized, utilizing cash-for-work programs to create employment opportunities while addressing public health risks.

Life-saving urgent short term interventions for Gaza WASH Sector

In the short term, the priority is to recover and restore critical infrastructure in Gaza, particularly the water, sanitation, and energy sectors. WASH partners should focus first on repairing municipal water supply and sewage systems in highly impacted, larger communities where access to clean water is most crucial. Repairing these facilities is slowed by material shortages, such as pipes, pumps, and electrical components. To address this, a humanitarian pipeline will be established to allow the import of essential equipment, coordinated by the WASH sector with international partners, including UNOPS and UNICEF, to ensure timely delivery. Restoration of the energy grid, especially damaged electricity cables, is also critical, as water and sewage facilities require power to operate. In areas where the grid remains unreliable or unavailable, fuel supplied through the humanitarian pipeline will power private wells via small mobile generators, temporarily increasing water production until larger-scale infrastructure is restored.

These small-scale interventions such as fuel-supported private wells, mobile desalination units, water trucking, distribution of drinking water containers, deployment of mobile toilets, and hygiene and disinfection kits may serve as pilot projects that can be expanded into scalable models. For example, small local wells producing 70–120 m^3/day can evolve into a network of 200+ community wells integrated with municipal water grids, mobile desalination units of 50–120 m^3/day can expand into 100+ renewable-powered systems forming a decentralized backup water supply, and water trucking can become a permanent emergency fleet linked to logistics hubs and desalination plants. Similarly, distributed drinking water containers can form a nationwide household-level storage and refill network, mobile toilets can scale to 10,000 units across conflict zones, and hygiene kits can grow into an institutionalized supply system with pre-positioned stockpiles for over a million people in crises.

All water provided during this period will be free of charge to end users, formalized through MoUs with well owners and generator providers. By linking these emergency measures to scalable models, the approach ensures both immediate relief and a foundation for long-term resilience.

Early Recovery Action WASH Milestones

During the early recovery phase, planning and coordination are essential to restore water and sewage infrastructure. Private wells will be assessed for their physical condition, production capacity, and water quality, and selected wells can be equipped with mobile generators to increase output. Local communities, well owners, and implementing organizations will engage in regular assessments to determine how many people each well can serve and identify necessary infrastructure improvements, such as reservoirs or tapstands.

A critical element of early recovery planning is establishing MoUs with well owners, generator suppliers, and the benefiting communities to define roles, responsibilities, and expectations, including providing free water to residents and ensuring proper generator maintenance. In some cases, tripartite MoUs can be developed to include implementing partners, well owners, and local communities, fostering cooperation and accountability. To ensure the success of these interventions, a monitoring and reporting system will track daily fuel consumption, well and generator functionality, and water quality, while feedback mechanisms will allow community members to report issues or concerns.

Building on these early interventions, medium-term recovery will expand and scale successful pilot projects. Small water tanks in population centers will develop into district-wide storage hubs linked to municipal distribution networks, diesel generators at pumping stations will transition to renewable hybrid energy systems powering all water and wastewater infrastructure, and mobile sewage and stormwater pumps will grow into a full municipal pumping fleet capable of managing crises and seasonal flooding. These measures aim to strengthen resilience, improve sustainability, and ensure reliable access to water and sanitation services.

Long-Term Goal: Sustainable Water and Energy Systems

In the long term, the goal is to rebuild Gaza's water and energy infrastructure with a focus on sustainability and self-sufficiency. To achieve this, there is a need to plan for the rehabilitation and expansion of critical infrastructure, including water treatment plants, sewage treatment plants, and renewable energy facilities. A key component of long-term resilience planning involves small-scale interventions that can later be scaled into full programs. For example, rainwater collection areas have been piloted at 50 cleared and leveled sites for stormwater capture. The scalable model envisions an integrated rainwater harvesting program across Gaza and the West Bank, linking over 500 collection areas with treatment and reuse systems.

A key component of long-term planning will also be the construction of desalination plants and wastewater recycling systems. These plants will be integrated into the broader infrastructure network, including the expansion of sewage systems. In addition, it will be essential to ensure that energy systems are built with sustainability in mind. The incorporation of renewable energy sources, particularly solar energy, will help reduce Gaza's reliance on electricity supply from Israel.

Renewable energy plants, designed to power water and sewage treatment plants, will be central to ensuring the resilience of Gaza's water supply. These plants will reduce dependency on fossil fuels and offer long-term benefits by providing a sustainable energy solution. Hybrid systems, such as solar-battery-diesel setups, could be integrated not only into water production facilities but also into rainwater harvesting and other small-scale water interventions, ensuring continuous power while reducing environmental impact and supporting scalability from pilot projects to full programs.

The import of renewable energy from Egypt and Jordan need also to be considered. Drawing from our energy focused concept note, EcoPeace recommends importing

renewable energy from Jordan directly to the Gaza Strip. Building on the Prosperity Green initiative between Jordan and Israel, dedicated solar fields built in Jordan (where radiation and lands allow large scale renewables production) could be connected in a high voltage cable through Southern Israel to the Gaza Strip. This high voltage line would advance circular economy solutions by supplying the needed electricity for the large Gaza desalination plant, mentioned below, supplying Jordanian electricity to a desalination plant that would sell water also to Jordan. The same high voltage line could also sell Jordanian electricity to Europe via the proposed electricity cable proposed to connect Israel with Cyprus - the Great Sea Interconnector. The rationale behind these crossborder electricity connections is that they reduce dependence on Israeli sourced electricity and through the interdependencies created disincentivise unilateral actions of cutting off electricity to any one side. **A game-changing large desalination plant for Gaza**

A key element of Gaza's long-term water and energy strategy is the development of a 200 million cubic meter desalination plant for the long term planning and regional sustainability. This facility will provide a reliable and sustainable supply of freshwater, reducing Gaza's dependence on external sources and addressing the region's critical water scarcity. The plant will integrate renewable energy, primarily solar power, alongside hybrid systems combining batteries and backup generators, ensuring continuous operation despite Gaza's fragile electricity supply. This sustainable energy approach will reduce environmental impact while securing the water supply for households, agriculture, and industry.

Beyond meeting immediate water needs, the project will create local jobs, support economic stability, and strengthen social resilience. It also offers opportunities for regional cooperation, enabling water-sharing arrangements with the West Bank and neighboring countries, fostering stability and collaborative management of shared resources. Environmental sustainability is central to the project, with measures to safely manage desalination byproducts and integrate water recycling systems to maximize water efficiency. By combining renewable energy, water recycling, and regional collaboration, this desalination plant lays the foundation for a more resilient and self-sufficient Gaza, capable of withstanding future environmental, political, and social challenges. For broader information on this proposal for a large-scale desalination plant in Gaza please see EcoPeace Concept Note titles "*Region-Wide Water-Energy Nexus*".

Conclusion

The proposed interventions aim to address immediate humanitarian needs while establishing the groundwork for long-term resilience and sustainable WASH infrastructure in Gaza. Success will require strong coordination among government bodies, international organizations, and development partners, as well as immediate financial and technical support to protect the well-being of the population.

EcoPeace is prioritizing recovery milestones over the next 0–6 months and 6–12 months, with a particular focus on pilot projects that will serve as the building blocks for long-term recovery. These include a full repair, maintenance and activation of the three Mekorot pipelines, evaluation and rehabilitation of desalination plants and wastewater treatment plants (WWTPs), restoration of wells, and the reestablishment of critical water supply services. In parallel, small-scale, scalable interventions such as mobile desalination units, water trucking, flood mitigation measures, and temporary potable water distribution will provide urgent relief while testing models that can later expand into full-scale programs.

These pilot projects are explicitly designed to ensure a smooth transition between recovery phases, laying the foundation for self-sufficiency and larger-scale solutions, including the planning and future deployment of a major desalination facility. By linking immediate emergency measures to scalable pilots, the strategy not only saves lives in the short term but also strengthens Gaza's long-term resilience and water security.

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