KONRAD ADENAUER STIFTUNG
PALESTINIAN TERRITORIES

# REPORT ON THE STATUS OF WATER SUPPLY AND WASTEWATER SERVICES IN THE PALESTINIAN WEST BANK:

## CONDITIONS BEFORE AND AFTER OCTOBER 7, 2023

PREPARED BY:

ENVISION

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KONRAD ADENAUER STIFTUNG
PALESTINIAN TERRITORIES

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## ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| CAPEX | Capital Expenditures |
| EQA | Environment Quality Authority |
| IWA | Israeli Water Authority |
| KAS | Konrad-Adenauer-Stiftung |
| $Km^2$ | Square Kilometers |
| L/C/D | Liters Per Capita Per Day |
| MCM | Million Cubic Meters |
| $M^3$ | Cubic Meters |
| MoH | Ministry of Health |
| NIS | New Israeli Shekel |
| NRW | Non-Revenue Water |
| OCHA | United Nations Office for the Coordination of Humanitarian Affairs |
| O&M | Operation and Maintenance |
| OPEX | Operational Expenditures |
| PA | Palestinian Authority |
| PCBS | Palestinian Central Bureau of Statistics |
| PWA | Palestinian Water Authority |
| SP | Service Provider |
| US$ | United States Dollar |
| WB | West Bank |
| WBWD | The West Bank Water Department |
| WHO | World Health Organization |
| WSRC | Water Sector Regulatory Council |

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## EXECUTIVE SUMMARY

This report examines the state of water supply and wastewater treatment services in the Palestinian West Bank (WB), highlighting the impact of population growth, resource depletion, and conditions before and after the attacks of October 7, 2023 and the subsequent war in the Gaza Strip.

Water resources in the WB are scarce and unevenly distributed, with over-reliance on groundwater, springs, and imported water from the Israeli water provider Mekorot. Domestic water consumption averages 88 liters per capita per day (L/C/D), below the WHO-recommended 100 L/C/D. A significant reduction in water supply from Mekorot has exacerbated shortages, particularly in the Middle and Southern WB[1].

Wastewater management remains critically underdeveloped, with only 29% of generated wastewater treated. Over 60% of the population lacks access to sewerage networks, leading to direct discharge of untreated wastewater into cesspits, nearby Wadis, and at a lesser scale into septic tanks, increasing risks to public health and the environment. Challenges such as infrastructure damage, water contamination, and limited access to sanitation facilities underscore the need for urgent intervention. Recent political and security developments have further strained water supply and wastewater services.

As the population continues to grow, water demand is increasing dramatically, while the total amount of available water remains insufficient. The WB's population grew from 2.73 million in 2014 to 3.4 million in 2024 (PCBS, 2024), an increase of 24%, while the total amount of available water grew from 163.8 million m3 to 221 million m3 over the same period (PWA, 2024), an increase of 35%. However, per capita water availability improved only marginally, increasing from 79 litres per capita per day (L/C/D) in 2014 to 88 L/C/D in 2024, remaining below the WHO recommended minimum of 100 L/C/D for household and personal use.. Palestine depends heavily on Israel for its water supply, buying water from Israeli-controlled resources, and that supply has declined. Additionally, locally produced water, which accounts for up 31% of total supply, remains insufficient to fill the gap. Israel directly or indirectly controls over 80% of the WB's water resources, complicating Palestinian access and development.

The connection rate of the population of the WB to the water supply system has reached 98%, but sanitation lags at only 35%, leaving a large portion of the population without access to adequate wastewater services. High levels of unaccounted for water, (i.e., Non-Revenue Water)[2] amounting to 35% or about 50 million cubic meters per year, represent significant physical and economic losses. In addition, revenue collection efficiency has dropped to 73%[3], reflecting the financial hardship and

[1] Hebron Municipality (June 2024) Public Appeal on Water Shortages, Published by WAFA – Palestine News and Info Agency, June 2024. WAFA (July 5th 2024) Article by the PWA on water shortages Link: https://www.wafa.ps/pages/details/98851

[2] Non-Revenue Water (NRW) refers to water that has been produced, pumped and either lost or not billed to customers. including, physical losses such as leakage in transmission pipes, storage facilities, distribution systems and service connections, or commercial losses such as metering inaccuracies and thefts.

[3] The 73% includes both the efficiency of the revenue collection process and the inability of some people to pay due to economic hardship. However, it is important to note that the owed amounts to service providers extend well before October 7 events, with the events exacerbating the economic inability of people to pay.

impact of the war on service providers. Aging infrastructure, reduced investments, and intermittent supply force households to rely on pumps and storage tanks, exacerbating operational problems.

Without immediate mitigation measures, these issues threaten public health, environmental sustainability, and economic stability. Addressing these challenges requires improving infrastructure, promoting regional collaborative management, and ensuring equal access to water and sanitation for all.

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# 1. INTRODUCTION

Access to clean drinking water and effective wastewater disposal are essential for public health, environmental sustainability, and economic development. In the Palestinian territories, particularly in the West Bank (WB), these basic services face significant challenges, deeply rooted in political, economic, environmental, and infrastructural constraints.[4] These challenges affect the daily lives of over 3.2 million residents across an area of 5,860 km$^2$, posing broader risks to health, livelihoods, and regional stability.

On October 7, 2023, a large-scale attack took place by Hamas on southern Israel, leading to an unprecedented escalation in hostilities. In response, Israel launched a military campaign in Gaza, triggering a prolonged conflict with widespread humanitarian and economic consequences. The war's ripple effects were felt across the region, including in the WB, where heightened security measures, movement restrictions, and economic instability further strained essential services. The water and wastewater sectors, already burdened by limited resources and infrastructure challenges, faced additional disruptions.

The WB's governance and administrative divisions, established under the Oslo Accords, complicate the delivery of water and wastewater services. While the Palestinian Authority (PA) administers civil and security matters in Area A (18%), administers only civil matters in Area B (22%), much of the WB remains classified as Area C (60%) under Israeli security control.[5] Development in Area C requires approval from the Israeli Civil Administration, leading to delays and restrictions in essential infrastructure projects, including those for water and wastewater systems.

Economic fragility in the WB, worsened by reduced financial transfers and a declining business environment in 2024, further undermines the sustainability of public services. Many consumers face difficulties in paying for water supply services, challenging service providers' ability to maintain and expand essential infrastructure.[6] Moreover, increasing population growth at 2.4% requires constant infrastructure development that is not in place.[7]

Environmental factors compound these issues. The region is highly vulnerable to natural hazards, including drought and extreme heat, risks that are exacerbated by the effects of climate change.[8] Rising temperatures, less frequent rain at higher rain intensities that lead to reduced aquifer recharge, and increasing water shortages intensify pressure on already limited resources. The region's diverse topography and altitude variations further complicate the development of water distribution and wastewater disposal systems.

[4] United Nations – Common Country Analysis for the Occupied Palestinian Territory – November 2022: https://palestine.un.org/sites/default/files/2023-08/United%20Nations%20Common%20Country%20Analysis%20for%20the%20Occupied%20Palestinian%20Territory.pdf
[5] OCHA – Humanitarian Needs Overview Occupied Palestinian Territory – January 2023: https://www.ochaopt.org/sites/default/files/HNO_2023.pdf
[6] Author's compilation of information from stakeholder consultations with relevant authorities
[7] World Bank Development Indicators - 2023
[8] Climate Change Impacts on Palestinian Farming Communities – PAFU – 2023

Consequently, water supply is limited to the local communities in the WB with an average of 89 liters per capita/day.[9] Lower consumption is seen especially in peripheral villages in rural Southern Hebron, for example, where consumption is only 30 liters per capita/day.[10] In addition, water is supplied on an intermittent basis – and many locations water is supplied between twice a week (e.g., Nablus) and up to once a month (e.g., Yatta).

Water sources for the entire region[11] are very limited. The main water sources are local mountain aquifers and from Israel's water company – Mekorot[12] (which supplied 86 mcm of water in 2023 compared to an average of 72 mcm during the past 10 years).[13] Non-Revenue Water (NRW) is estimated to be 36%.[14] Increasing the available water for the population can be through proactive measures in reducing NRW, coupled with diversification of water sources and increasing water independence. Effluent reuse is a sustainable irrigation source which in turn reduces the amount of potable water used in agriculture.

Understanding the challenges, the Palestinian Water Authority (PWA) has focused on continuous work on upgrading the water networks together with the donor communities. Previous discussions with the Israeli Water Authority (IWA) have resulted in various agreements for additional water supply, although the time needed for implementation has lengthened by bureaucratic hurdles, technical limitations, and political issues (including the recent events following October 7th 2023), leading to delays in delivering additional water to Palestinian communities.

On the other hand, currently 33% of wastewater is collected and treated. There are several small projects for effluent reuse, yet these have yet to materialize on a large-scale effective level. Untreated or poorly treated transboundary wastewater between the WB and Israel creates a situation where Israel deducts the cost of wastewater treatment from the tax revenues collected on behalf of the Palestinians – approximately 128 million NIS per year.[15]

Future goals that should be targeted include collecting wastewater from the communities, treating the wastewater to a degree of unrestricted reuse for agricultural purposes. This goal not only alleviates severe environmental and public health issues but provides the agricultural sector with water, jobs, and food security.

This report provides analysis of the state of drinking water supply and wastewater disposal in the WB. It examines the availability of resources, the condition of existing infrastructure, and the challenges faced by Palestinian communities, highlighting challenges and variations before and after October 7th 2023.

[9] PCBS and PWA - joint Press Release on the World Water Day; on March 22nd, 2023: https://www.pcbs.gov.ps/post.aspx?ItemID=4468&lang=en
[10] Abu Dayyeh et. Al - Introduction to water poverty and social crisis in Hebron district Palestine – IRD Editions – October 2013: https://books.openedition.org/irdeditions/4801
[11] Region in this document refers to both the WB and Gaza Strip.
[12] Mekorot is the national water company of Israel and its top agency for water management. Founded in 1937, it supplies Israel with approx. 80% of its drinking water and operates a cross-country water supply network known as the National Water Carrier. Mekorot and its subsidiaries have projects in different areas including desalination and water management.
[13] Author's compilation of information from stakeholder consultations with relevant authorities (PWA and PCBS)
[14] Author's compilation of information from stakeholder consultations with relevant authorities (WSRC).
[15] Author's compilation of information from stakeholder consultations with relevant authorities (PWA and PCBS)

## 2. SCOPE AND METHODOLOGY

This report focuses on the state of water and wastewater services in the Palestinian WB, highlighting the current challenges and risks to water security, public health, and the environment, with implications that were exacerbated following October 7th 2023. The geographical scope of the report covers Areas A, B, and C of the WB.

Due to the fact that the Palestinian water sector is fragmented with 284 service providers[16], coupled with the geopolitical and socio-economic situation in 2024, access to information from water facilities and timely data collection was challenging. Therefore, data collection was at best partial. This limited access to data related to certain geographic areas and service records. However, efforts were made to triangulate data from multiple sources to ensure the accuracy and reliability of the findings.

Data was primarily collected through desk research, utilizing secondary sources such as government publications, reports, records, maps, and surveys. In addition, fieldwork was conducted using a participatory approach, which included key informant interviews, structured quantitative surveys, and consultations with service providers. These consultations provided direct insights from stakeholders in the water and wastewater sectors. Stakeholders engaged with included: (i) PWA, (ii) Palestinian Central Bureau of Statistics (PCBS), (iii) Major water service providers, and (iv) IWA. All of whom provided information on water statistics, including available water quantities from different sources (ground, surface, and imported), quantities supplied for domestic use, service delivery, consumption rates, financial and operational challenges. These consultations helped to generate the findings and the figures.

The study concludes with a set of recommendations aimed at addressing key issues related to water security, public health, and the sustainable delivery of water and wastewater services in the WB given the arising challenges, particularly in the geopolitical sphere, aiming to mitigate their impact on critical water and wastewater services.

## 3. OVERVIEW OF WATER RESOURCES IN THE WEST BANK

The WB relies on a combination of groundwater, springs, imported water, and limited surface water resources to meet its domestic, agricultural, and industrial water needs. This section provides an overview of the water services, highlighting key data and challenges prior and following October 7, 2023.

### 3.1. WATER RESOURCES AND SUPPLY

The total annual available water quantity in the WB in 2023 is estimated at approximately 224 million cubic meters (MCM).[17] The primary sources of water include:

[16] WSRC – Performance Monitoring Report 2022 – August 2023: https://www.wsrc.ps/public/uploads/Publication/1703588627781695.pdf
[17] PCBS – Annual Available Water Quantity in Palestine by Region and Source, 2021: https://www.pcbs.gov.ps/Portals/_Rainbow/Documents/water-E4-2021.html

- **Groundwater (Aquifers):** Groundwater is the main source, supplying over 46% of the total water consumed, amounting to approximately 105.3 MCM annually.
- **Springs:** These provide an additional 37 MCM annually, about 16.5% of the total water consumed.
- **Imported Water:** The Israeli water provider, Mekorot, supplies approximately 81.7 MCM annually to meet domestic and agricultural demand, about 36.5% of the total water consumed.

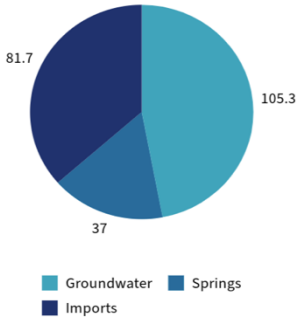


**Figure 1: West Bank Available Water Sources and Quantities**

Out of this total, 150.4 MCM is allocated for domestic use, however, according to survey and interview data, only 95.5 MCM is actually consumed. The actual amount results in an average daily per capita consumption rate of 88 liters per person per day (L/C/D). This figure falls below the World Health Organization (WHO) recommended 100 L/C/D,[18] – under normal circumstances. As a result, the current status of water supply is intermittent. This mode of supply is further exacerbated by increased water losses and NRW.

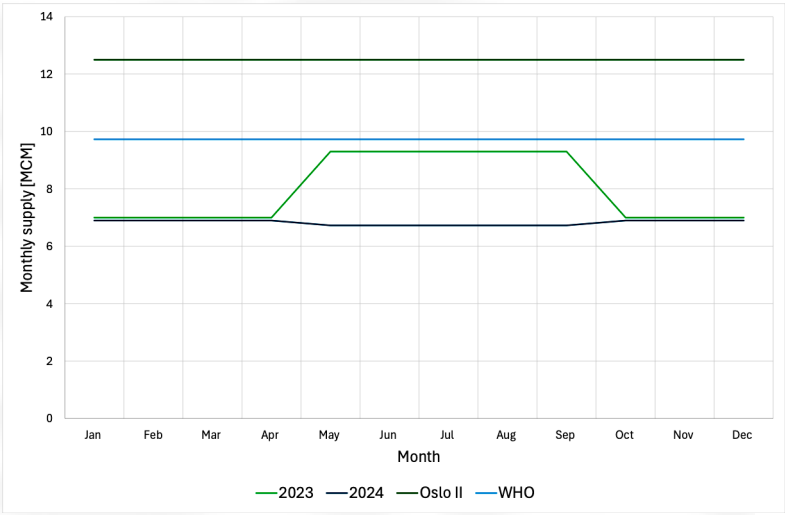


**Figure 2: Water supply to the West Bank for 2023 and 2024 compared to the Oslo Accords and WHO guidelines.**

A notable reduction of water supply was seen from October 2023 to date due to a substantial cut in water supply from Mekorot – from 85.9 MCM to 55 MCM.[19] The water supply reduction was seen mainly in the Middle and Southern areas of the WB. Figure 2 shows how the water supply was reduced during the summer months.

## 3.2. SURFACE WATER RESOURCES

The Jordan River is the primary surface water resource in the WB, but its contribution to water availability is minimal due to several challenges. Historically, the river's annual flow was estimated at 1,400 MCM, but this has declined dramatically over the last seven decades to approximately 30 MCM annually.[20]

[18] World Health Organization (WHO), Office of the High Commissioner for Human Rights (OHCHR), Centre on Housing Rights and Evictions (COHRE), Water Aid, Centre on Economic, Social and Cultural Rights. The Right to Water. 2003. http://www2.ohchr.org/english/issues/water/docs/Right_to_Water.pdf

[19] Author's compilation of information from stakeholder consultations with relevant authorities – PWA.

[20] Zeitoun et. Al - Hydro-Political Baseline of the Upper Jordan River – 2012: https://www.pseau.org/outils/ouvrages/iaf_hydro_political_baseline_of_the_upper_jordan_river_2012.pdf

Three main factors have contributed to this reduction:

- **Diversion Projects and Dams**: Extensive infrastructure projects in Israel, Jordan, and Syria have significantly altered the river's natural flow.
- **Water Pollution**: The quality of the river has deteriorated due to the bypass aqueducts that transfer brackish water springs surrounding the Tiberias Lake, untreated wastewater discharge, and contaminated irrigation drainage flows.
- **Climate Impact**: Natural factors, including evaporation and rising temperatures, have further reduced water availability in the river.

Wadis, which are valleys or streambeds where water flows temporarily and seasonally, are another source of water in the WB. These often experience flash floods after heavy rainstorms. The long-term average annual flow of floodwater through wadis in the WB is estimated at 168.75 MCM.[21] Based on flow direction, wadis are classified as either eastern wadis (toward the Jordan Valley and Dead Sea) or western wadis (toward the Mediterranean Sea). Currently, this resource is not extensively exploited; approximately 4 MCM per year are harvested in domestic cisterns, and only 2 MCM per year are harvested through agricultural ponds in the Jordan Valley.[22] Developing this resource further could enhance water availability for domestic and agricultural use.

# 4. OVERVIEW OF WATER AND WASTEWATER SERVICES IN THE WEST BANK

## 4.1. GENERAL

The WB's water and wastewater services face numerous challenges, yet they maintain a relatively high level of service coverage. Approximately 98% of the population has access to water services, supported by 284 service providers (SPs).[23] Of these, 42 SPs provide both water and wastewater services. However, disparities exist, with 50 SPs unable to supply more than 50 l/c/d, underscoring the uneven distribution of resources and capacity.

The infrastructure supporting these services includes 568,716 water supply network subscriptions connected by 16,581 km of pipelines, in addition there are 237,076 subscriptions to the sewage network, the total length of the sewage network is not documented, available data for specific cities, such as Nablus, indicate that the city sewage network length is 230 km, covering 93% of the city's area and serving 96% of its population. Alternatively, a rough estimate of the total length of the sewer network can be calculated by multiplying the number of people served by the network by an average of 3.2 linear meters per user resulting in a sewage network of 4100 km of pipelines (This method is used to estimate the total length of sewage infrastructure in the absence of precise figures).[24]

Despite this extensive network, the sector struggles with aging infrastructure, an ever-increasing population with increasing demand that strains the systems, limited coverage of sewerage networks, and inadequate wastewater treatment.

[21] Fanack after ARIJ – West Bank Wadis: https://water.fanack.com/palestine/water-resources-in-palestine/
[22] Water and Environmental Studies Institute, Al Najah University
[23] WSRC – Performance Monitoring Report 2022 – August 2023: https://www.wsrc.ps/public/uploads/Publication/1703588627781695.pdf
[24] Author compilation of multiple resources from PWA, WSRC, and data obtained through surveys.

## 4.2. WATER USE BY SECTOR

Water usage in the WB is primarily divided between domestic and agricultural sectors:[25,26]

- **Domestic Use**: As noted, the total water supplied for municipal purposes is around 151 MCM annually.
- **Agriculture:** Approximately 80 MCM of water is used for irrigation annually, highlighting the sector's dependence on groundwater and springs.
- **Industrial use:** No statistics have been made available recently for this sector. Yet, food industries and stone cutting sectors are estimated to be the largest consumers.[27]

## 4.3. CHALLENGES IN WATER SERVICES

The WB faces significant challenges in maintaining water supply and quality, including:

- **Financial Resources and Revenues:** Water supply and wastewater collection and treatment require substantial Capital Expenditures (CAPEX) and Operational Expenditures (OPEX). Due to water scarcity and a hilly terrain (differential heights within village communities may exceed hundreds of meters) these costs are multiplied in comparison to many countries worldwide. During crises, revenues from the population decline significantly, if not ceased completely. During 2023, the amount of collected revenues is approximately 375 million NIS,[28] which amounts to approximately 2.5 NIS/m3. Actual costs for water supply in the region are considerably higher – for example, water and wastewater services in Israel are 11.5 NIS/$m^3$. Although manpower costs in the Palestinian Territories are far less than in Israel, electrical fees are twice as expensive, while equipment, pipes, chemicals, and fuel costs are similar. Furthermore, the hilly terrain demands higher energy requirements than the Israeli water sector. This significant discrepancy creates an unsustainable situation for the water sector.
- **Multiple Service Providers:** Current water supply is conducted by local independent service providers, leading to inefficiencies compared to a more consolidated framework, such as the lack of availability of dedicated technical professionals, varying service quality, inequitable access to water, and improper coordination between service providers. There are prospects for legislation that is trying to consolidate the sector, yet, as it has been seen in many countries worldwide, this is a difficult task to accomplish due to political, geographic, financial, and technical challenges.
- **Limited Access to Water Resources**: The classification of areas under the Oslo Accords (Areas A, B, and C) restricts Palestinian control over many water resources, particularly in Area C. The WB does not have access to the Mediterranean Sea, as such, it is dependent on Israel for importing desalinated water.

[25] Ministry of Agriculture and Palestinian Water Authority – Publication for World Water Day 2024 – shared with Author by PWA.
[26] UNESCWA, 2022 : https://www.unescwa.org/sites/default/files/event/materials/1.3%20Improved_Water_Allocation_Concept_Note_Palestine.pdf#:~:text=,56%20MCM%20for%20drinking%20and
[27] Author's compilation of information from stakeholder consultations and publications from relevant authorities – PWA & PCBS.
[28] Author's compilation of information from stakeholder consultations with relevant authorities – PWA.

- **Infrastructure Gaps:** Aging and inadequate infrastructure results in high water losses, further limiting the availability of potable water.
- **Water Quality Concerns**: the water sector faces several water quality issues, including:
    - Groundwater quality is increasingly under threat from over-extraction and pollution;
    - Intermittent water supply coupled with water losses and sewage network defects create ideal conditions for cross-contamination;
    - Lack of water treatment chemicals and reagents, difficulties in imports, and the logistical and storage difficulties in, for instance, emergency and crises (e.g., following October 7, 2023), especially for chlorine solution needed to treat drinking water.
    - Limited surface water resources, where the only main possible source is the Jordan River, which is heavily polluted and cannot be used for potable water applications.

## 4.4. WASTEWATER SERVICES

Wastewater management in the WB is significantly underdeveloped, posing critical risks to public health, groundwater quality, and the environment. Over 103 million cubic meters (MCM) of wastewater are generated annually, yet only about 29% (30 MCM per year) undergo treatment. Of this, 12 MCM is treated within the WB, while 18 MCM is treated in facilities across the border in Israel. The remaining 70% of wastewater is left untreated, being unsafely discharged into the environment.[29]

Furthermore, more than 60% of the population lacks access to sewerage networks, leaving the majority without sanitation services that meet WHO standards or the Sustainable Development Goals (SDGs). This inadequate wastewater infrastructure exacerbates water scarcity, as opportunities for wastewater reuse in agriculture remain largely untapped. Reuse of treated wastewater presents a promising alternative for providing additional water for irrigation. The availability of unrestricted, treated wastewater for reuse can help reduce the gap between water supply and demand, particularly for agricultural needs, thereby alleviating pressure on freshwater resources.

## 4.5. WATER QUALITY

The quality of water in the WB remains a critical challenge due to systemic, political, and resource-related constraints. Only 25% of service providers possess the equipment and tools needed to test the concentration of free residual chlorine in water. Consequently, 97% of service providers rely entirely on the Ministry of Health, whose role is primarily to monitor water quality standards, to perform these tests. Despite efforts, the chlorine test pass rate among service providers who conduct such testing has declined sharply from 92% in 2023 to 76% in 2024.[30] This decline reflects worsening conditions, including reduced chlorine availability due to financial constraints and decreased sample testing due to restricted access to water sources.

Testing for chlorine is predominantly conducted at water sources and along main distribution lines, with few tests reaching end customers. Additionally, the destruction of water infrastructure and restricted access during conflict exacerbates the risk of contamination, as repairs to damaged mains

[29] Author's compilation of information from stakeholder consultations with relevant authorities – PWA.
[30] Author's compilation of information from stakeholder consultations with relevant authorities – PWA.

are delayed. This situation has heightened the importance of testing for coliform bacteria to ensure water safety, even as the volume of tests for E. coli in 2024 has declined compared to 2023.

Israeli-imposed restrictions following the attacks on October 7th, 2023, and the war in the Gaza Strip significantly disrupted water quality monitoring. Movement restrictions and security concerns have severely limited the Ministry of Health's access to many areas. The number of drinking water samples collected dropped from 2,800 samples across 351 population settlements under normal conditions to just 1,100 samples in 225 villages in 2024. Despite these challenges, the Ministry continues to strive to cover as many areas as possible, working in cooperation with relevant authorities to address shortages of critical resources such as liquid chlorine (sodium hypochlorite) and maintain inspection cycles in each governorate.

# 5. GOVERNANCE AND FINANCIAL CHALLENGES

## 5.1. OVERVIEW

The governance structure for water and wastewater services involves several key entities with overlapping responsibilities:

- **The Palestinian Water Authority (PWA):** (i) Manages, develops, and protects water resources; (ii) Oversees strategy, priority setting, and planning, including infrastructure development; (iii) Plays a central role in policy-making for the water sector.

- **The WB Water Department (WBWD):** Operates under the PWA to provide bulk water supply to SPs.

- **Service Providers (SPs):** Function under local government units within specific geographic and administrative zones. And are responsible for providing quality water to residents, ensuring water supplies through infrastructure such as meters and pipes, and determining water prices and connection fees. Additionally, they are tasked with protecting local water sources, including springs and basins, as well as constructing, managing, and monitoring sewage facilities. However, their roles lack clarity regarding responsibilities for networks versus treatment.

- **The Water Sector Regulatory Council (WSRC):** (i) Ensures compliance with service delivery standards; and (ii) Contributes to policy-making by advising on regulations and performance improvements.

- **Palestinian Ministry of Health (MoH):** (i) Monitors water quality standards; and (ii) Contributes to policymaking by prioritizing health-focused water strategies and infrastructure.

- **The Environment Quality Authority (EQA):** (i) Oversees, develops, and enforces environmental regulations which also relate to water quality standards; and (ii) Participates in policy-making for sustainable water and wastewater management.

The sector has been undergoing a reform process, guided by the 2014 water law, aimed at improving governance and financial sustainability. However, the reform's progress has been undermined by the security, economic, and political disturbances of 2023-24. These challenges have reversed some of the gains made between 2010 and 2022.

## 5.2. FINANCIAL PRESSURES[31]

The financial performance of service providers has deteriorated significantly, particularly following October 7, 2023, as the broader economic crisis has strained both households and local authorities. Consumers' willingness to pay for water and wastewater services has declined sharply, driven by factors such as the cessation of Palestinian labor in Israel and the inability of the Palestinian Authority to pay salaries to civil servants. In 2023, water and wastewater service providers collected 76% of service revenues, which dropped further to 72% in 2024 due to the worsening economic situation and the aftermath of the war. To offset declining revenues, some service providers began recovering debts from consumers who were able to pay. Additionally, around 32% of meters were replaced with prepaid systems by 2024, a measure aimed at improving collection efficiency.

In addition to these challenges, some municipalities are facing increased financial strain due to repeated acts of sabotage of water infrastructure by Israeli army. For example, in the cities of Tulkarem and Jenin, 21 km of water distribution networks and 8 km of wastewater networks were destroyed, alongside an agricultural water production well in the Jenin area.[32] These acts have created a significant financial burden for municipalities, requiring continuous repair efforts, heightened monitoring, and mitigation measures to ensure water safety and quality.

In response to these damages, Tulkarem municipality has implemented emergency measures, such as providing water tanks in affected camps in cooperation with local institutions. These interventions demand additional resources, including intensified monitoring to prevent the infiltration of wastewater into water supply lines and to ensure that the emergency water supply remains safe for consumption.

The compounded effects of financial instability, reduced consumer contributions, and infrastructure sabotage have significantly undermined the capacity of municipalities and service providers to maintain regular operations. The Palestinian population, growing at 2.4% annually, requires additional funding for new infrastructure, while aging infrastructure necessitates continuous maintenance and replacement. In 2023 and 2024, the total resources allocated for water and wastewater infrastructure in the WB were 44,898,067US$ and 11,561,14 US$, respectively. Addressing these challenges will require substantial external support and strategic planning to stabilize the sector and secure water and wastewater services for the affected population.

[31] Author's compilation of information from stakeholder consultations with relevant authorities – (PWA, Major SPs and Municipalities
[32] Israeli authorities justify these actions under various pretexts, including security concerns and claims of unauthorized construction. However, obtaining permits for water infrastructure in the West Bank is highly restricted for Palestinians. The destruction of wells, pipelines, and other water-related infrastructure is part of a broader pattern of limiting Palestinian access to water resources, exacerbating the water crisis and imposing additional financial burdens on municipalities and the Palestinian Authority

# 6. RECOMMENDATIONS

## 6.1. SECTOR SUSTAINABILITY

Access to water and sanitation is a universal human right and as such needs to be provided equally and at a uniform price for all citizens. This sometimes is taken by civil society as stating that water should be supplied at very low cost or for free. This may be possible in regions where clean healthy water is readily available adjacent to the consumers, in water scarce regions water becomes a very expensive commodity.

The WB is considered a water scarce region where current water sources are local wells, springs (with limited discharge), and imported water from Israel. Exploiting natural underground resources requires collecting water into a regional water network. Unfortunately, the local topography does not allow for easy and inexpensive implementation of a regional distribution network.

In addition, rainfall recharge of the aquifers is lacking due to climate change, urban area growth in the region and over pumping. Due to the ever-increasing population, the required water and wastewater infrastructure is operating at times far above the original design capacity which in turn causes rapid deterioration of the infrastructure.

To date, CAPEX is basically covered by donor countries while OPEX is covered by the service providers. The donor community focuses on financing new infrastructure usually with minimal full life evaluation – creating inexpensive systems that are not as efficient for operation.

Water is supplied by over 280 services providers. Previous initiatives for consolidating these are challenging due to technical, financial and political issues. Even in developed countries consolidating service providers is difficult at best. The current practices have created a situation where operating and maintaining the water and wastewater systems are unsustainable. Water tariffs do not cover daily operations and as a result leaks in pipes exacerbate the water losses and the need for ever larger water quantities to be supplied.

Changing the water sector can only be conducted over a very long period – most likely decades. And as the famous quote states “a journey of a thousand miles begins with a single step”. This step is financing realistically the operations and maintenance while starting to provide public awareness that water in the region is scarce, and it costs money to provide.

**Actions:**

- Financing should be tied to mechanisms that incentivize service providers to improve their efficiency annually by reducing dependency on external funds. This can be achieved by requiring progressive enhancements in operational performance and tariff collection systems. Transparent benchmarking of service delivery is essential to provide the data necessary for evaluating progress and ensuring accountability.
- Comprehensive public awareness campaigns should be launched to educate communities about the financial and operational costs associated with water supply and wastewater treatment. These campaigns should aim to foster an understanding of the value of these

services, the challenges of providing them in a water-scarce region, and the importance of equitable cost-sharing to ensure sustainability.

## 6.2. INFRASTRUCTURE DEVELOPMENT

The persistent lack of financial resources for both the development of new infrastructure and the rehabilitation of facilities damaged by hostilities has severely exacerbated the challenges in the water and wastewater sectors. This has resulted in increasingly intermittent water supply, with prolonged intervals between distribution in many areas, and a critically inadequate wastewater collection and treatment system, further jeopardizing public health and environmental sustainability.

Water and wastewater projects are expensive endeavors and entail an overall perspective of what should be done. The donor community does not provide for a single comprehensive project but rather "bits and pieces" to the puzzle over many years. Moreover, the projects are not always related and a long term commitment is not available so an overall vision is not obtained.

**Actions**:

- Develop a comprehensive masterplan for regional water and wastewater networks to serve as a blueprint for integrating various local projects. This masterplan should outline a phased approach for implementation over several decades, ensuring alignment with long-term sustainability and resource management goals.
- Establish a clear prioritization framework for infrastructure development across the country, allocating resources based on a design horizon of at least 40 years. This framework should evaluate and prioritize projects using criteria such as:
    - Reduction of local water losses.
    - Per capita water supply levels.
    - Availability and accessibility of water resources.
    - Strategies to minimize or eliminate intermittent water supply.
    - Expansion of sewer systems and elimination of cesspools.
    - Improvements in water quality and mitigation of public health risks.
    - Potential for agricultural reuse of treated wastewater.
    - Identification and enhancement of water storage locations.
- Engage the donor community in transparent and collaborative discussions to secure the long-term financial commitments necessary for sustainable infrastructure development. This approach should emphasize creating a shared vision for sector improvement, fostering accountability, and building trust among stakeholders to drive meaningful and lasting progress.

## 6.3. POLICY AND COORDINATION

The Palestinian Territories and Israel share both water and transboundary wastewater issues. Even without political confrontations, the technical and financial challenges are immense. Coordination

between the Palestinian Territories and Israel is crucial in preventing overlapping resources and inefficient investments.

The current political situation does not assist in obtaining the donor community trust in financing various long term development projects but rather focusing on humanitarian aid.

Cooperation between the Palestinian Territories and Israel is currently difficult and best coordination may be possible through donor community assistance and involvement.

**Actions**:

- Recognize the critical need for resource coordination and investment alignment between the Palestinian Territories and Israel, facilitated through the involvement of neutral third-party entities such as the donor community. These efforts should aim to minimize resource overlap, optimize financial allocations, and encourage mutually beneficial infrastructure development.
- Conduct a comprehensive stakeholder mapping exercise to identify and understand the interests, concerns, and priorities of all relevant parties, including government entities, local communities, service providers, and international donors. This mapping should form the basis for developing a coordinated strategy that addresses the diverse needs and challenges faced by both countries.
- Leverage donor community assistance to develop joint funding mechanisms and technical support for transboundary water and wastewater management projects, ensuring a balanced approach that prioritizes sustainability, equity, and long-term impact.

## 6.4. INSTITUTIONAL SUPPORT

Improving the technical capability of Service Providers is time consuming exercise. As in most countries, employees' wages are relatively low and the staff turnover rate is high. Service providers are constantly facing a challenge in retaining their staff's organizational knowledge. Smaller Service Providers are prone to more severe consequences. In the WB where salaries are paid partially due to the ongoing fiscal crisis, the effect is more pronounced.

**Actions**:

- Establish a centralized team dedicated to developing, documenting, and disseminating standard operating procedures (SOPs) for managing various technical challenges, particularly during crisis events. This centralized approach will ensure consistency, streamline responses, and build institutional resilience.
- Facilitate partnerships with international water and wastewater operation companies through twinning agreements. These partnerships, supported by donor funding, will enable service providers to gain practical, hands-on experience in operation and maintenance (O&M). Such partnerships are critical, as O&M companies bring practical expertise that complements the theoretical knowledge of engineering firms, which are often focused on design rather than implementation.
- Expand the application of twinning agreements to include not only individual service providers but also the centralized team. This will foster wider acceptance and integration of standardized procedures across the sector.

- Promote local collaboration among operators in different technical disciplines by organizing workshops, training sessions, and team-building activities. These initiatives will enhance technical knowledge-sharing, strengthen professional networks, and improve coordination across the sector.

## 7. CONCLUSION

The WB's water and wastewater services face multifaceted challenges rooted in political, economic, and environmental constraints. Recent reductions in water supply and deteriorating wastewater management have intensified public health and environmental risks. To ensure sustainable development and resilience, stakeholders must adopt a holistic approach to address these issues.

The water crisis is perpetuated by growing demand, limited resources, and infrastructure constraints. With Israel controlling a significant share of water resources and declining investments in the sector, service providers struggle to meet the population's needs. High unaccounted-for water and revenue losses further undermine operational capacity, threatening the long-term sustainability of water and wastewater systems.

Failure to address these challenges will lead to severe repercussions for public health, economic stability, and environmental sustainability. Immediate action is essential to upgrade infrastructure, secure investments, and foster regional collaboration. By implementing the recommended measures, stakeholders can alleviate the water crisis, improve service quality, and ensure sustainable development in the WB.

Collaborative efforts between local and international actors are critical to overcoming existing barriers, mitigating climate impacts, and enhancing service delivery. By implementing the outlined recommendations, the region can progress toward achieving equitable and sustainable water and wastewater services, improving the quality of life for all residents.

# ANNEXES

## ANNEX I: LIST OF INTERVIEWED AGENCIES AND INSTITUTIONS

- Palestinian Water Authority (PWA):
- Palestinian Water Sector Regulatory Council (WSRC)
- Palestinian Central Bureau of Statistics (PCBS)
- Jerusalem Water Undertaking (JWU)
- Hebron Municipality
- Jenin Municipality
- Tulkarem Municipality

## ANNEX II: LIST OF DATA AND STATISTICS

**Table 1: Water Quantities, Supply, and Statistics**

| Year | Population | Total amount of water supplied [MCM/y] | Amount of water supplied by Mekorot [MCM/y] | Amount of investment [US$/y] | Water quality compliance | Billing rate [%] |
|---|---|---|---|---|---|---|
| **2023** | 3,291,406 | 150.4 | 85.9 | 44,898,067 | 92 | 76 |
| **2024** | 3,370,398 | 119.5 | 55 | 11,561,144 | 80 | 72 |
| **Difference [%]** | ↑2.4 | ↓20.5 | ↓36 | ↓ 74 | ↓10 | ↓5.3 |

Note: in 2023 the government allocated USD 2,959,738 from its budget for investment, with the remainder covered by donor contributions. However, in 2024 no funds were allocated from the government budget.

**Table 2: Water Supply in the West Bank**

| Water supply for domestic use. Quantities are in MCM | | | | |
|---|---|---|---|---|
| **Month** | 2023 | 2024 | Oslo II | WHO |
| **Jan** | 7 | 7 | 12.5 | 9.73 |
| **Feb** | 7 | 7 | 12.5 | 9.73 |

| | | | | |
|---|---|---|---|---|
| **Mar** | 7 | 7 | 12.5 | 9.73 |
| **Apr** | 7 | 7 | 12.5 | 9.73 |
| **May** | 9.3 | 6.73 | 12.5 | 9.73 |
| **Jun** | 9.3 | 6.73 | 12.5 | 9.73 |
| **Jul** | 9.3 | 6.73 | 12.5 | 9.73 |
| **Aug** | 9.3 | 6.73 | 12.5 | 9.73 |
| **Sep** | 9.3 | 6.73 | 12.5 | 9.73 |
| **Oct** | 7 | 7 | 12.5 | 9.73 |
| **Nov** | 7 | 7 | 12.5 | 9.73 |
| **Dec** | 7 | 7 | 12.5 | 9.73 |

**Table 3: Liquid Chlorine Supply in m3**

| **Month** | **2023** | | **2024** | |
|---|---|---|---|---|
| **Jan** | 7 | 230 | 7 | 200 |
| **Feb** | 7 | 230 | 7 | 200 |
| **Mar** | 7 | 230 | 7 | 200 |
| **Apr** | 7 | 230 | 7 | 200 |
| **May** | 9.3 | 300 | 6.73 | 170 |
| **Jun** | 9.3 | 300 | 6.73 | 170 |
| **Jul** | 9.3 | 300 | 6.73 | 170 |
| **Aug** | 9.3 | 300 | 6.73 | 170 |
| **Sep** | 9.3 | 300 | 6.73 | 170 |
| **Oct** | 7 | 230 | 7 | 200 |
| **Nov** | 7 | 230 | 7 | 200 |
| **Dec** | 7 | 230 | 7 | 200 |

**Table 4: of Existing Wastewater Collection and Treatment Plants in West Bank**

## GAZA

| Governorate | Name | Population | Scale | Technology | Year of operation | Design capacity (m3/d) | Current influent flow (m3/d) | Cost (US$) | Cost/cap. (US$) | Status of reuse |
|---|---|---|---|---|---|---|---|---|---|---|
| Gaza North | NGEST | 300,000 | Large | Activated sludge | 2018 | 35,600 | 44,000 | 81,000,000 | 270 | Yes |
| Gaza Central | Central | 600,000 | Large | Activated sludge | 2020 | 60,000 | | 97,000,000 | 162 | Yes |
| Gaza South | Khan Younes | 217,000 | Large | Activated sludge | 2014 | 26,000 | 13,000 | 57,000,000 | 263 | Yes |
| | | 1,117,000 | | | | | | 235,000,000 | 210 | |

## WEST BANK

| Governorate | Name | Population | Scale | Technology | Year of operation | Design capacity (m3/d) | Current influent flow (m3/d) | Cost (US$) | Cost/cap. (US$) | Status of reuse |
|---|---|---|---|---|---|---|---|---|---|---|
| Jericho | Jericho TP | 52,800 | Large | Activated sludge | 2014 | 9,600 | 500 | 32,000,000 | 606 | Yes |
| Nablus | Nablus west | 150,000 | Large | Activated sludge | 2013 | 14,000 | 9,000 | 36,900,000 | 246 | Yes |
| Ramallah | AlBireh | 50,000 | Large | Activated sludge | 2000 | 5,750 | 5,750 | 18,450,000 | 369 | No |
| Nablus | Nablus East | 130,000 | Large | Activated sludge | | 15,000 | | 52,890,000 | 407 | |
| Ramallah | Ein-Jariout | 60,000 | Large | Activated sludge | | 10,000 | | 32,595,000 | | |
| Hebron | Hebron Regional | 225,000 | Large | Activated sludge | 2022 | 26,000 | NA | 47,000,000 | 209 | |
| Tubas | Tayasir WWTP | 25,000 | Large | Activated sludge | 2021 | 4,400 | NA | 27,060,000 | 1082 | |
| Jenin | Jenin TP (rehabilitation) | 45,000 | Large | Aerated ponds | 2014 | 9,000 | 4,000 | 3,690,000 | 82 | Yes |
| | | | | | | | | | | |
| Hebron | Sa'ir TP | 8,000 | Medium | Activated sludge | 2016 | 1,500 | 1,200 | 1,476,000 | 185 | No |
| Salfit | Salfit City | 12,000 | Medium | Activated sludge | | 4,000 | | 9,840,000 | 820 | |
| | | | | | | | | | | |
| Ramallah | Ramoun-At-Tayba | 5,000 | Small | RBC | 2014 | 450 | 100 | 3,690,000 | 738 | Yes |
| Nablus | Sarra | 3,000 | Small | Wetland | 2014 | 300 | 150 | | | No |
| Ramallah | Al-Rihan WWTP | 5,000 | Small | MBR | 2013 | 500 | 100 | 2,000,000 | 400 | No |
| Nablus | Beit Dajan | 2,000 | Small | Activated sludge | 2014 | 350 | 150 | | | Yes |
| Jenin | Missilya | 4,000 | Small | Wetland | 2016 | 500 | NA | 3,444,000 | 861 | |
| Ramallah | Diplomatic Compound | 5,000 | Small | Activated sludge | 2014 | 500 | NA | 1,500,000 | 300 | No |
| | | 781,800 | | | | | | 272,535,000 | 349 | |