

Report on the Status of the Hebron-Besor-Wadi Gaza Basin



Besor Stream flooding, January 2018 (Photo: Charlotte De Bruyne)

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ABBREVIATIONS

AFD	Agence Française de Développement
COGAT	Coordination of Government Activities in the Territories
GDP	Gross Domestic Product
GRM	Gaza Reconstruction Mechanism
IEC	Israel Electric Corporation
IWA	Israeli Water Authority
JWC	Joint Water Committee
MCM	Million Cubic Metres
MoU	Memorandum of Understanding
NGEST	North Gaza Emergency Sewage Treatment Plant
NRW	Non-Revenue Water
PA	Palestinian Authority
PCBS	Palestinian Central Bureau of Statistics
PPP	Polluter Pays Principle
PWA	Palestinian Water Authority
USAID	U.S. Agency for International Development
Red Sea-Dead Sea MoU	Memorandum of Understanding on the Red Sea-Dead Sea Water Conveyor Pilot Project
WASH	Water, Sanitation, and Hygiene
WHO	World Health Organisation
WRP	Water Resources Program
WSRC	Water Sector Regulatory Council
WWTP	Wastewater Treatment Plant

EXECUTIVE SUMMARY

This report presents the current state of the freshwater and wastewater conditions in the Hebron-Besor-Wadi Gaza Basin. Current challenges and risks to water security, public health, and environment are highlighted with further exploration of impacts within the context of gender. This drainage basin originates in the Hebron Hills of the West Bank, flows downstream west across the Negev, and drains into the Mediterranean through Gaza. The basin spans over 3,500 km² and is a significant source of surface and groundwater for human, agricultural, and industrial use.

Challenges

The failure of the current arrangements to address appropriate and fair mechanisms for Israeli-Palestinian water cooperation have resulted in limited access to freshwater for Palestinians and the persistent pollution of the environment through the discharge of untreated wastewater. Problems in advancing upstream wastewater treatment infrastructure, compounded with the discharge of effluents from domestic, agricultural, and industrial facilities into the Hebron Stream directly impact environmental and public health in the region. Thus, both surface and groundwater quality are heavily tainted in the basin. Girls and women are placed at an even higher risk according to community, as they face Water, Sanitation and Hygiene (WASH) challenges first. Despite innumerable indications during the last few decades of widespread contamination across Israeli-Palestinian catchments, and in this basin particularly, the situation to date remains largely unchanged.¹

Conditions in Gaza are even more critical, as over 97% of the Coastal Aquifer is contaminated by sewage and seawater intrusion and over two million people lack adequate access to safe drinking water and sanitation services. Persistent lack of reliable energy supply, Israeli restrictions on trade and the import of materials, consecutive rounds of violence and war between Hamas, the de-facto government in the Gaza Strip, and the Government of Israel exacerbate the water and wastewater crisis for Palestinians in Gaza.

Recommendations

- Facilitate third party involvement to reconcile differences between the parties and relevant authorities.
- Reduce non-revenue water (NRW) in the Hebron Governorate.
- Increase supply from non-conventional resources and plan/implement reuse component of the Hebron Waste Water Treatment Plant (WWTP) in parallel with the treatment facility.

1 Tal, A. and Katz, D., 2012. Rehabilitating Israel's Streams and Rivers. *International Journal of River Basin Management*, 10(4), pp.317-330 ; Holzer, J., Albrecht, T., Westheimer, N. and Lipchin, C., 2014. Leveraging Environmental Data to Promote Cooperation Toward Integrated Watershed Management in the Hebron/Besor Watershed. *Palestine-Israel Journal of Politics, Economics, and Culture*, 19(4/1), p.56.

- Enhance transparency of large-scale infrastructure planning and awareness about the benefits of wastewater reuse in the Hebron Governorate.
- Negotiate a detailed purchasing agreement and prioritise finalising infrastructure for receiving the full Red Sea-Dead Sea water quantities.
- Prevent sewage spills from Gaza into the Mediterranean, including to Israel, by completion of wastewater infrastructure and increasing power supply to wastewater infrastructure in Gaza.
- Increase monitoring of the public health crisis in Gaza and its cross-boundary effects.
- Increase gender-awareness in the design of WASH policy and infrastructure

INTRODUCTION

There are 16 streams shared between Israel and the Palestinian Territories, with roughly two-thirds originating in Palestinian territory to the east, flowing across Israel and emptying into the Mediterranean Sea to the west. The failure of the past and current arrangements to address appropriate and fair mechanisms for Israeli-Palestinian water cooperation have resulted in the limited access to freshwater for Palestinians and the persistent pollution of the environment by the discharge of untreated wastewater. Water security is particularly worrisome in the Hebron Basin, as it traverses parts of the West Bank Hebron Governorate, the Israeli Negev and Eshkol Region, and Gaza. Problems in advancing upstream wastewater treatment infrastructure, compounded with the discharge of effluents from domestic, agricultural, and industrial facilities into the Hebron Stream directly impact environmental and public health in the region. Thus, both surface and groundwater quality is heavily tainted in the basin. Despite innumerable indications during the last few decades of widespread contamination across Israeli-Palestinian catchments, and in this basin particularly, the situation to date remains largely unchanged.² Conditions in Gaza are even more critical, as over 97% of the Coastal Aquifer is contaminated by sewage and seawater intrusion and over two million people lack adequate access to safe drinking water and sanitation services. Persistent lack of reliable energy supply, Israeli restrictions on trade and the import of materials, consecutive rounds of violence and war between Hamas, the de-facto government in the Gaza Strip, and the Government of Israel exacerbate the water and wastewater crisis for the Gazan population.

This report seeks to present the most updated information on the state of freshwater resources and wastewater conditions in the Hebron-Besor-Wadi Gaza Basin and proposes recommendations for improving water and wastewater management that are tailored to the particular issues and challenges in the basin.³

1. Socio-economic Profile of the Basin

The Hebron-Besor-Wadi Gaza Drainage Basin covers 3,500 square kilometres. The Hebron Stream originates in the mountainous Wadi system of the Hebron Hills in the West Bank, flowing downstream into the Israeli city of Be'er Sheva where it merges with the Be'er Sheva Stream and joins the Besor that originates in Israel's Southern Negev. The stream then flows downstream through the Northern Negev and the Wadi Gaza, after which it meets the Mediterranean Sea (Figure 1). Like many of the streams in the West Bank, the Hebron

2 Tal, A. and Katz, D., 2012. Rehabilitating Israel's Streams and Rivers. *International journal of river basin management*, 10(4), pp.317-330 ; Holzer, J., Albrecht, T., Westheimer, N. and Lipchin, C., 2014. Leveraging Environmental Data to Promote Cooperation Toward Integrated Watershed Management in the Hebron/Besor Watershed. *Palestine-Israel Journal of Politics, Economics, and Culture*, 19(4/1), p.56.

3 *In the past, significant efforts have been made to develop guidelines for regional transboundary water cooperation, such as the FoEME Agreement to Share Water Between Israelis and Palestinians of 2012.*

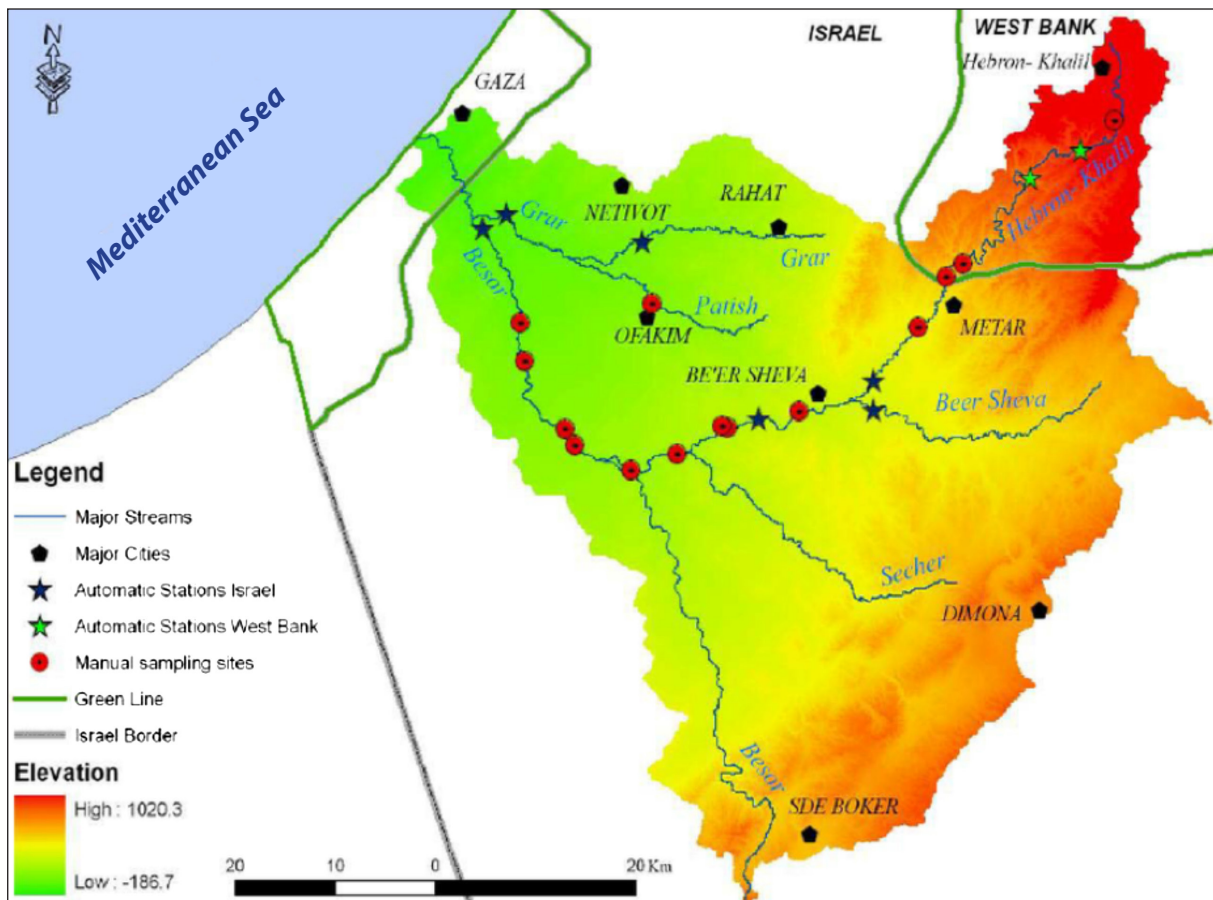


Figure 1. Hebron–Besor–Wadi Gaza Basin Source: Tal et al. 2010

Stream was originally a seasonal stream, with water flowing in the watershed six to seven times a year during a rainy year.⁴ For many years, however, the stream has flowed year-round, with wastewater making up its permanent base flow.⁵ The basin is the largest of the coastal streams, and is characterized by many land uses: urban, rural, industrial, agricultural (both crop and livestock) grazing, firing ranges, and open spaces.⁶

The upstream Hebron Governorate is the largest governorate in the West Bank in terms of area and population. It is also considered the heart of the Palestinian economy, holding more than 40% of the industrial activities in the Palestinian Authority. Hebron holds more than 60% of the activities in the limestone, leather and pottery sectors and is responsible for producing over 33% of all agricultural goods in the West Bank⁷. The Hebron economy is

4 Kahana, R., et al., 2002. Synoptic climatology of major floods in the Negev desert, Israel. *International Journal of Climatology*, 22, 867–882.

5 Hassan, M.A. and Egozi, R., 2001. Impact of wastewater discharge on the channel morphology of ephemeral streams. *Earth Surface Processes and Landforms*, 26, 1285–1302 ; Tal, A., et al., 2010. Chemical and biological monitoring in ephemeral and intermittent streams, lessons learned from a study of two transboundary Palestinian – Israeli watersheds. *Journal of River Basin Management*, 8 (2), 185–205.

6 Tal, et al. 2010. 'Chemical and biological monitoring in ephemeral and intermittent streams: a study of two transboundary Palestinian-Israeli watersheds'; *International Journal of River Basin Management*, 8: 2, 185 — 205.

7 Charalambous B. 2016. "RAPID ASSESSMENT of the Current Non-Revenue Water Situation in Hebron Municipality"; World Bank Group.

largely dependent on trade, with nearly 50% of the local labour force engaged in the trade sector. Despite this, the governorate also has the highest poverty rate in the West Bank (not including refugee camps), with 32.5% of its population classified as poor, as compared to the West Bank average of 18%.⁸

Hebron faces political challenges preventing the governorate from fully utilizing its economic potential. This includes restrictions in access that are a consequence of the division of the entire Palestinian territory of the West Bank into Areas A, B and C since the Oslo Accords of 1995.⁹ Moreover, the Hebron Governorate itself was further fragmented into Area A (24%), Area B (22%) and Area C (48%), with the remaining 6% covered by a natural reserve area.¹⁰ Area C contains 11% of the Hebron Governorate's population and 51.1% of the agricultural land in the area, and over which Israel retains full control including over planning and construction¹¹. Water scarcity in this region is one of the main factors pushing vulnerable families to poverty and food insecurity, impacting living conditions and hygiene practices.¹²

A number of Israeli settlements were built in and around the outskirts of the Hebron municipality. This was done in violation of Article 49 of the Fourth Geneva Convention, to which Israel is a party, and which prohibits the transfer of an occupying power's civilian population into occupied territory.¹³ In 1997, the Palestinian Authority and the Government of Israel signed a protocol concerning the redeployment in Hebron under which the city of Hebron was divided for an interim period into two sectors: H1 and H2 until the commencement of final status negotiations as a continuation to the Oslo Accords.¹⁴ Until this day, Zone H2 is comparable to Area C, as it falls under exclusive Israeli control and houses a number of Israeli settlements. Today, 500 to 800 Israeli settlers live inside the Old City of Hebron--Kiryat Arba being the largest adjacent settlement with up to 9,000 residents. The total settler population in the Hebron area is around 15,000.¹⁵

8 UNSCO "Joint UN Strategy for Hebron", 28 November 2016, available at: https://unsco.unmissions.org/sites/default/files/joint_un_strategy_for_hebron.pdf

9 The 1995 Oslo Agreement divided the West Bank into Areas A, B, and C, each with clearly defined but differing levels of civil and security control and responsibility assumed by both the Israelis and the Palestinian Authority; Area A is exclusively administered by the Palestinian Authority, Area B is administered by the Palestinian Authority on civil aspects and by Israel on security aspects; and Area C, which contains the Israeli settlements is administered by Israel. This was supposed to be an interim, 5-year measure, dividing the West Bank into different security and administrative zones. See Israeli-Palestinian Interim Agreement on the West Bank and Gaza Strip, Washington DC, September 28, 1995.

10 The Applied Research Institute of Jerusalem (ARIJ), "Locality Profile and Needs Assessment in the Hebron Governorate", 2009.

11 Idem

12 United Nations Office for the Coordination of Humanitarian Affairs (OCHA), "Occupied Palestinian Territory - Humanitarian Needs Overview", 2017.

13 See Convention (IV) relative to the Protection of Civilian Persons in Time of War. Geneva, 12 August 1949. Israel disputes that the Fourth Geneva Convention applies to the Palestinian territories, as they were not legally held by a sovereign prior to Israel taking control of them. This view has been rejected by the International Court of Justice, (July 9, 2004 "Legal Consequences of the Construction of a Wall in the Occupied Palestinian Territory"), and the International Committee of the Red Cross.

14 See Protocol Concerning the Redeployment in Hebron, January 15, 1997.

15 Supra note 7.

The Hebron Stream subsequently flows along the Palestinian city of Yatta, which has a population of over 100,000 residents most of whom work in construction and agriculture. In Yatta's proximity, there are an additional nine Israeli settlements (Otniel, Carmel, Maon, Susia and Bet Yati, Shima, Hagai, Shani-Livna and Ma'ale Hever) amounting to more than 4,000 residents.¹⁶ After crossing the separation barrier, the stream passes between the Meitar local municipality (8,000 residents), Bnei Shimon Regional Council and the Bedouin municipality of Hura in Israel. Further south, the Bedouin village of Um-Batin, part of Al-Qasum Regional Council, (recognized by the Israeli government in 2003) lacks essential municipal infrastructure due to land ownership disputes between Israeli government authorities and Bedouin communities.¹⁷ The stream then passes between Omer, a Jewish local council, and Tel Sheva, a Bedouin local council. Hura, Laquia and Tel Sheva are three state-planned Bedouin towns near the stream and its tributaries, each numbering several thousand residents.

In the city of Be'er Sheva, the stream crosses the neighborhoods of Neveh Noy and Neve Zeev, in which tens of thousands of residents live. Further on its path, the stream merges with other tributaries and flows downstream, through the Eshkol Regional Council, home to 31 Israeli communities, predominantly moshavim and kibbutzim. From a socio-economic perspective, the Israeli part of the watershed is very heterogeneous. Be'er Sheva is a rapidly growing city with a population of 200,000 with a developed service industry, three industrial zones and an emerging high-tech center¹⁸. The population of the state-planned Bedouin communities faces high unemployment risks and relies mainly on work outside of the community¹⁹. In the Eshkol Regional Council, agriculture and light industries are the main sources of livelihood.²⁰

The Hebron Stream eventually flows into Wadi Gaza and then drains into the Mediterranean Sea. The population of the Gaza Strip reached 2 million by the end of 2016 and is projected to increase to 2.2 million by 2020 and to 3.1 million by 2030.²¹ Over the past 20 years Gaza has undergone deindustrialization and the economy has become largely dependent on foreign aid and monetary transfers from outside. The economic downfall of Gaza accelerated after the violent Hamas take-over in 2007 and the subsequent Israeli blockade, which until today imposes restrictions on all movement and trade to and from Gaza. The productive base of the economy eroded with the combined size of the manufacturing and agriculture sectors

16 Applied Research Institute of Jerusalem (ARIJ) 2017, Interactive map: available at: http://mapping.arij.org/maplite/?mapID=2850-1850&x=34.39&y=31.42&zoom=9&baseMap=GOOGLE_SATELLITE

17 Imad al-Sana, Director of the Water Association Rahat, Challenges and Opportunities in the WASH sector in Bedouin communities in Israel, Symposium Ben Gurion University May 8th, 2018.

18 Goldenberg R., "Be'er Sheva: Israel's Emerging High Tech Hub" in *Globes*, 4 December 2015.

19 Marx, E. and Meir, A., 2016, 'Land, Towns and Planning: The Negev Bedouin and the State of Israel', *Geography Research Forum* (Vol. 25, pp. 43-61; Negev Coexistence Forum (NCF) 2012. 'Israel's violation of the Convention on the Elimination of All Forms of Racial Discrimination with Regard to the Negev Bedouin'; Israeli State Comptroller Report, May 2016, available at: <http://www.mevaker.gov.il/he/publication/Articles/Pages/67b.aspx?AspxAutoDetectCookieSupport=1>

20 Sagive M. and T. Shamir. 'Neighbours Path, Besor River'. *FoEME*, March 2010.

21 UNSCO, 'Gaza. Ten Years Later', United Nations, July 2017.

falling from 27% of GDP in 1994 to 13% today.²² Real per-capita incomes have fallen by a third since 1994. Three rounds of armed hostilities between Israel and Hamas – with the most devastating round in 2014 – have also exacted a toll, dealing repeated blows to the Gazan economy and damaging essential infrastructure.²³ Today, unemployment is high at 44%²⁴, a number that is even higher among women (65%) and youth between the age of 15 and 29 (60%).

2. Scope and Methods

This report focuses on the state of water resources and wastewater in the Hebron-Be'er Sheva/Besor/Wadi Gaza Watershed, highlighting current challenges and risks to water security, public health and the environment. Data was collected through desk research of secondary sources, including key policy documents and reports, records, maps, surveys, data and through primary fieldwork with a participatory approach using key-informant interviews and consultations with Palestinian and Israeli stakeholders, as well as with representatives of the international community. The study formulates a set of recommendations for addressing issues of water security and public health in the basin, which will be presented to all relevant parties and stakeholders.

3. An Overview of the WASH Situation in the Basin

The following section provides a brief overview of the WASH situation in the basin: first of the upstream area of the Palestinian Hebron Governorate, second of the middle area of the Israeli Besor-Negev-Eshkol Region, and third of the downstream area of Wadi Gaza and the Gaza Strip respectively.

3.1 West Bank – The Hebron Stream

3.1.1 Water Supply

In the framework of the “Memorandum of Understanding on the Red Sea-Dead Sea Water Conveyor Pilot Project” of December 9th, 2013, the Government of Israel, Jordan and the Palestinian Authority agreed on the allocation and sale of 20 to 30 million cubic meter (MCM) of potable water per year from Israel to the West Bank and Gaza. Under the agreement, 20 MCM per year would be made available to the Palestinian population of the West Bank, while 10 MCM would be used to serve Gaza. In July 2017, under the auspices of U.S. Special Representative Jason Greenblatt, a verbal agreement was reached regarding the implementation of this MoU and the parties agreed on the sale of 33 MCM of desalinated water per year, of which 23 MCM/Y would be destined to the West Bank at a price of 3.3 NIS per cubic meter and 10 MCM/Y to Gaza at a price of 3.2 NIS per cubic meter.²⁵ Besides the price and quantity, the

22 World Bank, Palestine's Economic Outlook, April 2018. Available at: <http://www.worldbank.org/en/country/westbankandgaza/publication/economic-outlook-april-2018>

23 Supra note 17.

24 Supra note 18.

25 Office of the Quartet, Report to the Ad Hoc Liaison Committee, September 2017.

parties were also able to agree on the connection points and a general timeframe for the supply of the water; an extra 5-6 MCM would be supplied to Gaza in 2017 and additional 4-5 MCM in 2018, while 22 MCM will be supplied to the West Bank in the period between 2017-22. The agreed tentative timeline for the supply schedule, is however subject to signing a more detailed purchasing agreement between the parties, that defines the commercial terms, roles and responsibilities of each party including monitoring of quantities and quality; in addition to the timely completion of the infrastructure upgrades required on both the Israeli and the Palestinian side.

Supply to the West Bank will be delivered at three main connection points: Jenin in the North, Ramallah (Aboud) in the Center, and Deir Sha'ar in the South.²⁶ The upgrade of the Deir Sha'ar connection point and pipeline is to be completed with financial and technical support of the U.S. Agency for International Development (USAID). Currently, a portion of the additional water quantities is being provided through the Deir Sha'ar pipeline which feeds into the Halhul Reservoir. From there, water is transmitted throughout most of the southern West Bank via an existing network that includes the Ras At Tawil pipeline, which USAID completed in 2015.²⁷

Initial obstacles inhibited the Palestinian Water Authority (PWA) from obtaining permits through the Joint Water Committee (JWC) for the construction of infrastructure in the West Bank, especially for the sourcing of groundwater, thus severely impacting access to adequate WASH services for many Palestinian communities, particularly in Area C²⁸. In January 2017 Israeli and Palestinian officials announced the revival of the JWC on a different basis, where, the working modalities of the JWC have changed slightly- but the allocation of shared natural water between the parties remains unchanged. Under the new arrangement, there is some loosening of Israeli control that allows for Palestinian infrastructure projects in Areas A and B to advance without seeking approval from the JWC; however, Israeli Civil Administration approval is still needed for Palestinian projects in Area C. In January 2017 Israeli and Palestinian officials announced the revival of the JWC on a different basis, where, the working modalities of the JWC have changed slightly, but the allocation of shared natural water between the parties remains unchanged. Under the new arrangement, there is some loosening of Israeli control that allows for Palestinian infrastructure projects in Areas A and B to advance without seeking approval from the JWC (Footnote 29); however, Israeli Civil Administration approval is still needed for Palestinian projects in Area C. Since the signing of this modified arrangement, the parties agreed to prioritise three agenda items for the West Bank: increasing Palestinian abstraction of groundwater, the purchase of additional bulk quantities of water from the Israeli National Water Company Mekorot (by implementation of the Red Sea-Dead Sea MoU) and advancing the wastewater treatment and reuse agenda.²⁹

26 Idem.

27 U.S. Consulate General in Jerusalem, "USAID announces the Opening of the Deir Sha'ar Pipeline in Southern West Bank", press release, 17December 2015.

28 Supra note 7.

29 Supra note 21.

Meanwhile, water supply in the Hebron area remains fragile and access to WASH services varies depending on the jurisdiction area. The main sources of drinking water in the Hebron Governorate are domestic wells and springs, agricultural wells, and resources purchased from the Israeli water company, Mekorot. Less than 2% of the governorate's supply, and for Hebron municipality only, is sourced from the wells owned and operated by the PWA.³⁰ Each of the following municipalities: Beit Ummar, Sa'ir, Halhul, Tarqumiya, Hebron, Dura, Beni Na'im and Yatta are thereby serviced by a different provider. Connection to the water network alone, however, does not automatically translate into a regular and constant water supply; water is provided according to a rationing program, which is publicly announced through local media so that consumers in different neighbourhoods are aware of when they will receive water. These neighbourhoods effectively constitute an area of a few streets only, which is why the number of different neighbourhoods in the rationing program reaches a total of 119.³¹ Residents are typically notified one day before water is provided through the network. A more restrictive summer rationing program is implemented every year from April 1st. This intermittent supply regime constitutes a major operational hazard and results in potential public health risks, such as contamination of water during distribution, increased coping costs to consumers and faster deterioration of existing infrastructure. During the summer, when the Hebron Governorate faces exceptional water scarcity, some communities are forced to purchase tanker water, costing them 20-25 NIS per cubic meter as compared to 4 NIS for the water of the public network. Purchasing water through water tanks increases the vulnerability of the poor families and exposes them to unsafe health risks. While the city of Hebron and the surrounding villages are relatively well connected, the governorate is also host to many small rural communities, largely Bedouin that lack access to water services and rely solely on tanker water.

A 2017 World Bank report summarising the performance of Palestinian local governments further confirms that water shortages and quality remain critical challenges in this area of the West Bank.³² Due to the rationing program, Hebron residents report receiving piped water on an average of once every three weeks. There is also an extremely high level of physical losses through the network, mounting to 26%; meaning that just over a quarter of the water put into the system under intermittent water supply conditions is lost through leakages.³³ PWA has developed a NRW reduction strategy to investigate, assess, and reduce water losses throughout the Palestinian Territory, but funding to implement this program is still outstanding.³⁴

Table 1 presents average water availability per capita in the different municipalities of the Hebron Governorate. The Table shows that water consumption in all areas is well below the 100 l/c/day World Health Organization (WHO) recommended standard. Residents of Yatta

30 Water Sector Regulatory Council (WSRC). 'Bridge to Sustainability, Water and Wastewater Service Providers, Performance Monitoring Report for the Year 2016', January 2018.

31 Supra note 6.

32 World Bank, The Performance of Palestinian Local Governments, An Assessment of Service Delivery Outcomes and Performance Drivers in the West Bank and Gaza, June 2017.

33 Supra note 6.

34 Non-Revenue Water Reduction Strategy, Palestinian Water Authority, available at: <http://www.pwa.ps/userfiles/server/policy/NON-REVENUE%20WATER%20REDUCTION%20STRATEGY.pdf>

live with an average of 21-23 l/c/day.³⁵ Construction and operation of the USAID-funded Deir Sha'ar Pipeline allowed for an increase in the transmission capacity to Hebron, also reducing water losses through the network. The old Deir Sha'ar pipeline had a transmission capacity of 4.75 million cubic meters (MCM) per year, but nearly half was lost due to leaks. The new pipeline has the capacity to transmit up to 26.3 MCM per year. The pipeline is used to feed the Halhul Reservoir, from which water will be transmitted throughout most of the southern West Bank via an existing network that includes the Ras At Tawil Pipeline that USAID completed on October 31, 2015.

As of May 2018, transmission was still at low capacity, as the amount of water provided through this system reached around 11,000m³/day according to figures from the Israeli Water Authority (IWA), and between 13,000m³/day and 18,000m³/day depending on the time according to Palestinian figures. While downstream Yatta is supposed to benefit from the increase in provision through the Deir Sha'ar network, persistent problems related to non-revenue water – with water losses through the network reported up to 50% in this area – still affect the actual quantity available to local consumers. This explains why residents of Yatta have, so far, experienced little benefit from the extra water provided through the system. The only other source of water is an unreliable groundwater well; Al Rihyya well is the only groundwater source that serves Yatta municipality and operates at a frequency of one or two months on, four or five months off. The situation is similar for other communities in the Hebron area, such as the Fawwar Refugee Camp, which are connected to the water network but still rely on drinking water brought by trucks due to unreliable supply. Consequently, most households have no choice but to purchase water from these water tankers, spending more than half of their monthly expenditures to buy water.³⁶

Table 1. Water data (network) per municipality 2016

Hebron Governorate Municipality	Average daily per capita water consumption (l/c/d) ³⁸	Water Purchase Cost per m ³ for consumer (NIS)
Hebron	59*	3.97
Halhul	66	3.27
Dura	28	3.05
Beit Ummar	78	5.21
Beni Na'im	49	3.27
Sa'ir	59	3.16
Tarqumiya	59	3.12
Yatta	23	3.58

* Reported increase to 62 l/c/day in 2017 (WSRC)
 Source: Water Sector Regulatory Council, *The Performance of Water and Wastewater Service Providers in Palestine, Summary of 2015-2016*.

35 Interview, World Bank, March 12, 2018.
 36 Palestinian Water Authority (PWA), April 2015.
 37 Includes all types of water consumption.

In contrast to the precarious water situation throughout the Hebron Governorate, the Israeli settlements in the area are connected to the Israeli water network, have access to reliable water supply, and only spend an average of 0.9 per cent of their income on water.³⁸

3.1.2 Wastewater and Treatment

Of a total population of 729,139 in the Hebron Governorate (PCBS, 2007-2016), only 167,289 can rely on wastewater services, or an average of 23% of all inhabitants.³⁹ The majority of serviced people live in the Hebron municipality where almost 60% of the population is connected to the sewerage network. Because there is no wastewater treatment plant at the end of the sewer system, most of the municipal sewage entering the system from the city and its environs is discharged directly to Wadi as-Samen, just south of the city. The presence of stone- and marble-cutting industries complicates the wastewater situation further, as these industries discharge their effluents into the sewer system, leading to high concentrations of slurry in the wastewater and eventually the Wadi. The untreated wastewater then flows south towards the green line, exposing communities along the Wadi to environmental hazards and polluting the underlying Eastern Aquifer. This was identified as a serious issue even in the 1970's, and while plans for a regional solution for wastewater of Hebron city and the surrounding communities have been developed over time⁴⁰, they have not yet been implemented due to lack of funding or opposition of local residents to proposed infrastructure in their area.

In 2001, detailed plans for a regional wastewater solution in the Hebron Governorate were elaborated within the framework of the USAID-funded Water Resources Program (WRP, 2001-2006). The WRP developed a vision for addressing the regional wastewater management issues in phases, as part of 'The Stormwater, Domestic Wastewater and Industrial Wastewater Master Plan for Hebron'. The first phase would address the immediate needs for treatment and reuse of the sewage stream coming from Hebron city, through the treatment and reuse scheme for reclaimed effluents and bio-solids south of Hebron. In subsequent phases, additional communities in the area would be connected to the network. Within the framework of the WRP, a site for the wastewater treatment plant (WWTP) was identified and detailed feasibility studies were completed in 2005 for implementation of the first phase. This included the WWTP with secondary treatment for around 15,000 cubic meters of wastewater per day, as well as facilities for the reuse of treated effluents and biosolids. In addition, an environmental assessment was conducted and conceptual designs were developed. Based on this documentation, the project was submitted to and approved by the Joint Water Committee. The Israeli Civil Administration in the West Bank subsequently

38 B'Tselem, *Dispossession and Exploitation*, 2011. Available at: https://www.btselem.org/download/201105_dispossession_and_exploitation_eng.pdf

39 Water Sector Regulatory Council, 2017. "The Performance of Water and Wastewater Service Providers in Palestine, Summary of 2015-2016", WSRC.

40 PWA, 2014. *Environmental, Social and Cultural Heritage Impact Assessment to Support Additional Financing for the Hebron Wastewater Management Project*.

issued the required permits. In 2005, USAID published a Request for Proposals for the design and building of the plant, however, high costs, opposition of local residents to planned infrastructure, and diplomatic tensions between the US representation and the PA at the time caused a change in strategy. Consequently, the project was not included in the USAID portfolio.⁴¹

After a delay of over a decade, EcoPeace Middle East advocacy efforts contributed to prompting the World Bank and the French Development Agency (AFD) to renew donor commitment and investment in the project. In May 2011, the donors confirmed their intention to support the PWA with the establishment of the Hebron Wastewater Treatment Plant at the cost of 45 million USD, of which 10 million USD would be invested by the World Bank and the rest by other contributors under the French Development Agency. Internal disagreement between Palestinian local and national governments, mainly regarding the site's location, further delayed the implementation process an additional 5 years. This issue was resolved recently, with a MoU signed by the PWA along with the municipalities of Yatta and Hebron, approving the location of the wastewater treatment plant, and enabling the project to move forward, finally commencing the bidding process. EcoPeace Middle East here also played a significant role by engaging with the local communities and councils, highlighting the importance of constructing a wastewater treatment plant and bringing attention to the high risk that funders would withdraw their financial support if construction did not begin. The mediation efforts of EcoPeace aimed at bringing parties closer together to look at their common interests, where EcoPeace had participated as a neutral external party in developing the first draft of the MoU between the PWA and Yatta and Hebron Municipalities.

The renewed wastewater treatment project currently does not include a reuse component, but foresees the development of this in sequence, pending additional funding. A regional reuse strategy had been developed in the past by the World Bank but was shelved due to poor results in other areas of the West Bank where reuse components were included in the WWTPs. A reused plan should be developed in parallel to enable farmers in the Hebron Governorate to benefit from the potential economic gains of increased agricultural production through irrigated cultivated land. Utilization of wastewater reuse would positively impact the livelihoods, incentivizing production and bolstering their willingness to pay for wastewater services in the long term. Moreover, the scenario in which the treated wastewater would be discharged back into the Hebron Stream and environment, only to be treated and paid for again on the Israeli side, would be avoided (see Box 2, p. 13).

While the operation of the Hebron WWTP would greatly reduce current risks to water security, public health, and the environment, the network will not service the many, mostly rural, villages and communities. On the national level, the PWA is currently in process of preparing the Terms of Reference for a comprehensive broader strategy for sewerage systems, wastewater treatment, reuse and transboundary wastewater issues, through

41 Idem.

funding from USAID. This strategy is expected to lay out priority actions, including reducing Palestinian tax deduction for treatment of West Bank wastewater in Israel and getting more clarity over the quantities of sewage produced by Palestinian communities in the West Bank, disaggregated from the settlements.⁴² This comprehensive strategy for (transboundary) wastewater treatment and reuse would need to offer an inclusive framework, that addresses the critical situation of under-serviced communities in the Hebron Governorate, such as downstream Yatta. This city will remain without connection to a sewage system and will only be able to dispose of wastewater in cesspits that are emptied into the local wadi intermittently. The current precarious wastewater situation continues to threaten the larger community's drinking water sources, creating extreme health hazards, coupled with foul odour, mosquitos and other disease-vectors, groundwater pollution, and land degradation that cause long lasting harm for the environmental and public health.

⁴² Interview, World Bank, March 12, 2018.

Box 1. WASH in the Hebron Governorate - Gender Perspective⁴³

Throughout the Palestinian Territories, and the Hebron Governorate particularly, women have the primary responsibility for the household management of water and sanitation. Water is therefore not only essential for drinking, but also for food production and preparation, hygiene, medical care, cleaning, washing and waste disposal. Women and girls primarily encounter the consequences of water shortages in the household. Because of their role on the household and community levels, women in Hebron Governorate, especially in marginalized communities, have gained considerable knowledge about how to manage WASH related challenges. Despite this, the central role of women and girls in water and sanitation management is often overlooked. Hygiene and sanitation are often considered women's tasks. While women are teachers and leaders in WASH practices in the private sphere of the house, they rarely participate in decision-making in the public domain. Generally, women perceive that current water management policies and processes do not sufficiently consider their needs, and that water allocation is prioritised for agricultural and industrial production as well as to service public institutions. This comes at the expense of families and households.⁴⁴

A recent survey about water and sanitation problems from a gender perspective in the Hebron Governorate confirmed that access to WASH services differs considerably depending on the community; women in the city of Hebron are generally in a better position compared to women from Bedouin or marginalised communities, including Yatta and Dura. In many of the communities surveyed, women's views on WASH are under-represented in public decision-making.⁴⁵ At the same time, almost half of the respondents considered women to play an essential role in the alleviation of local WASH problems and there appears to be a general interest to include women in decision-making, particularly to increase the level of accountability. Of significance the survey demonstrates that over 93% of the respondents in the area, both men and women, view the establishment of wastewater and reuse infrastructure as urgent and important to enhance water availability for purposes other than drinking, and to reduce the burden on freshwater resources in the area. Wastewater and sanitation problems are particularly relevant to women living in marginalised communities (Bedouin and rural), where women and girls often lack access to any safe and private sanitary infrastructure, making them increasingly vulnerable to health problems and disease. These issues persist in the school environment, negatively impacting the overall safety and education potential of girls and women.

43 For a comprehensive overview on gender and WASH in the Hebron Governorate: Alkawashmeh S.Y., "Report on Water and Sanitation Hebron Governorate – Gender Perspective", Eco Palestine Foundation, May 2018

44 Supra note 43

45 Supra note 43

Most Israeli settlements in the Hebron area, except for Kiryat Arba, treat or partially treat their wastewater prior to it being discharged in the surrounding wadis. The quality of the treatment differs for each community, as does the type of contaminants, pollutants, and dilution rates. A very small percentage of the treated wastewater is reused for irrigation. The wastewater from the largest settlement, Kiryat Arba, is mainly from domestic sources and is discharged untreated into the Hebron stream, contributing an estimated 10% to the total wastewater flow from the Hebron Governorate towards Israel.⁴⁶

Israeli military camps and infrastructure in the area further exacerbate the problem of environmental pollution. Historically, the vast majority of military zones in the West Bank were not connected to a sewage system. Currently, in the Hebron area, there are three military zones, one of which has adequate wastewater infrastructure, and two others that discharge their wastewater untreated into the environment.⁴⁷ While the Israeli Ministry of Environment currently has a department that addresses environmental concerns related to the activities of the military, the Israeli State Comptroller concluded in a recent report that insufficient action was being undertaken to prevent environmental harm.⁴⁸

3.2 Israel – The Besor Stream

3.2.1 Water Supply

Downstream, across the Green Line, water supply also varies by community; while water supply to all Israeli cities and communities in the Negev and Eshkol regions is constant, the water supply of Bedouin localities in the same region is not governed by the IWA but indirectly by the Bedouin Authority (part of the Israel Land Administration and under the supervision of the Ministry of Agriculture), which has full control over the allocations of water quotas and connections to water supplies. Both state-planned Bedouin towns and unrecognised Bedouin villages suffer from inadequate water and sewage infrastructure and services, often due to disputes over land ownership between community representatives and national authorities. Further downstream in the Eshkol region and Gaza periphery, Israeli farmers can rely on the supply of treated wastewater from the greater Tel Aviv and Gush Dan area, and can therefore produce over 70% of all vegetables in the country. A frequently deteriorating security situation and consecutive wars between Hamas in Gaza and the Israeli government cause restrictions to farmers in this region. During the hostilities in 2014, farmers were forced to leave their land⁴⁹, while the latest round of violence, in May and June 2018, saw the destruction of over 10,000 dunams of farmland and forests in the Gaza periphery.⁵⁰

46 Municipal Association for Environmental Quality – Judea, 2018

47 Supra note 42.

48 Supra note 15.

49 Haim Yelin at The Negev Conference on Agricultural Research and Development, February 2015.

50 Times of Israel, 3 June 2018 “Gaza fire kites cause 3000 fires, burn 2500 acres of Israeli farmland”.

3.2.2 Wastewater and Treatment

Due to inadequate treatment in upstream Hebron, wastewater flows downstream, across the Green Line and towards the city of Be'er Sheva. Prior to reaching Be'er Sheva, the wastewater is intercepted at the small local council of Meitar, where it is partially treated. A sewage separation facility situated next to Meitar separates the slurry and crushed stone residue of the stone cutting industries from Hebron city's wastewater. This treatment however is minimal. The strong smells of sewage and sludge treatment are a serious annoyance to Meitar residents and surroundings. High amounts of industrial effluents have in the past challenged the capacity of this treatment facility. Sewage originating from un-serviced Bedouin communities living close to the banks of the stream, adds to environmental nuisances in this area of the basin. Septic pits are used in all unregulated Bedouin villages in the Negev. Even in localities that have been recognized in recent years as part of the regional councils of Neveh Midbar and Al-Magh, most of the population is not connected to sewage infrastructure (responsible for an average of 22% of the sewage).⁵¹

Another wastewater treatment plant is located near Sde Teyman, in the jurisdiction of the Bnei Shimon Regional Council and the vicinity of Be'er Sheva. Since 2002, the plant has been operating and treating around 45,000 cubic meters of effluents every day, from Be'er Sheva, Ofakim, Tel Sheva, Segev Shalom, Mishmar Ha'negev and Eshel Ha'nasi. Major river restoration efforts on the route of the watercourse in this part of the basin have resulted in an ecological park that covers an area of 5,200 dunams, 8km long, on both banks of the riverbed.



The Hura Waste Water Treatment Plant near Shoket Junction
Photo Credit: Shlomit Tamari



The Wastewater Treatment Plant, Bnei Shimon Regional Council
(source: Mey Sheva Regional Corp. for Water and Sewage Ltd.)

⁵¹ Supra note 16

Box 2: The Financial Offset Mechanism for Israeli Treatment of West Bank Wastewater

A significant amount (30%) of wastewater from the West Bank is treated within Israel, with Israel applying an offset mechanism to compensate for its treatment costs. This offset mechanism is unilaterally applied, based on a decision by the Israeli Ministerial Committee for Social and Economic Affairs (06/01/2003). This offset mechanism is based on the Polluter Pays Principle (PPP) and the financial resources it generates are used by Israel to install the required wastewater treatment facilities. Although the Palestinian Authority accepts the PPP, the offset mechanism itself is contested. The first reason often mentioned is its unilateral character. Moreover, the disagreement is magnified due to the lack of clarity over which costs exactly are included in the offset price or tax deduction. The Israeli Sewage Infrastructure Development Administration determines charges for wastewater treatment together with the Ministry of Finance's Chairman's Office, it implements deductions on Palestinian tax transfers (custom and trade taxes collected by Israel). These deductions are based on the annual capital and operational expenditures of the downstream wastewater treatment in Wadi An-Nar, Hebron and Wadi Al Zomar. Over the period of 1994-2008 this amounted to 34 million USD. Since then, this annual tax deduction figure has continued to grow exponentially, reaching over 31 million USD for the year of 2017. (Figure 2).

Findings in 2016 by the Israeli State Comptroller stated that 'serious and unreasonable gaps have been discovered between the Water Authority and the Israel Nature and Parks Authority data' in regard to the quantities of Palestinian wastewater treated in Israel. Examples of this are a gap of approximately 500% in the quantities of wastewater from Palestinian communities treated by sewage treatment plants in Israel, and a gap of about 170% in the quantities of wastewater discharged to cesspits or to rivers without treatment.⁵² Such large discrepancies between the data of these entities significantly impact the amount of unilateral wastewater related tax deductions from the Palestinian Authority's budget. While it is acknowledged that the tax deduction comprises deductions not only for the treatment of wastewater but also for every related externality of wastewater pollution (i.e. mosquito relief measures downstream, the upgrade of WWTPs on the Green Line, etc.), the actual breakdown of the total deductible amount has long been lacking transparency. A PA Cabinet decision of December 2017 allocated 55 million NIS per year for a period of five years to help mitigate the environmental, political and financial challenges of transboundary wastewater pollution by co-funding the construction of wastewater treatment plants and reuse schemes. Hebron was thereby identified as one of the priority areas. For wastewater treatment projects to effectively reduce significant portions of the wastewater that currently flows from the West Bank to Israel and to increase the availability of treated effluent for reuse, it is imperative that all wastewater facilities operational or planned will include adequate plans for reuse.

52 Idem.

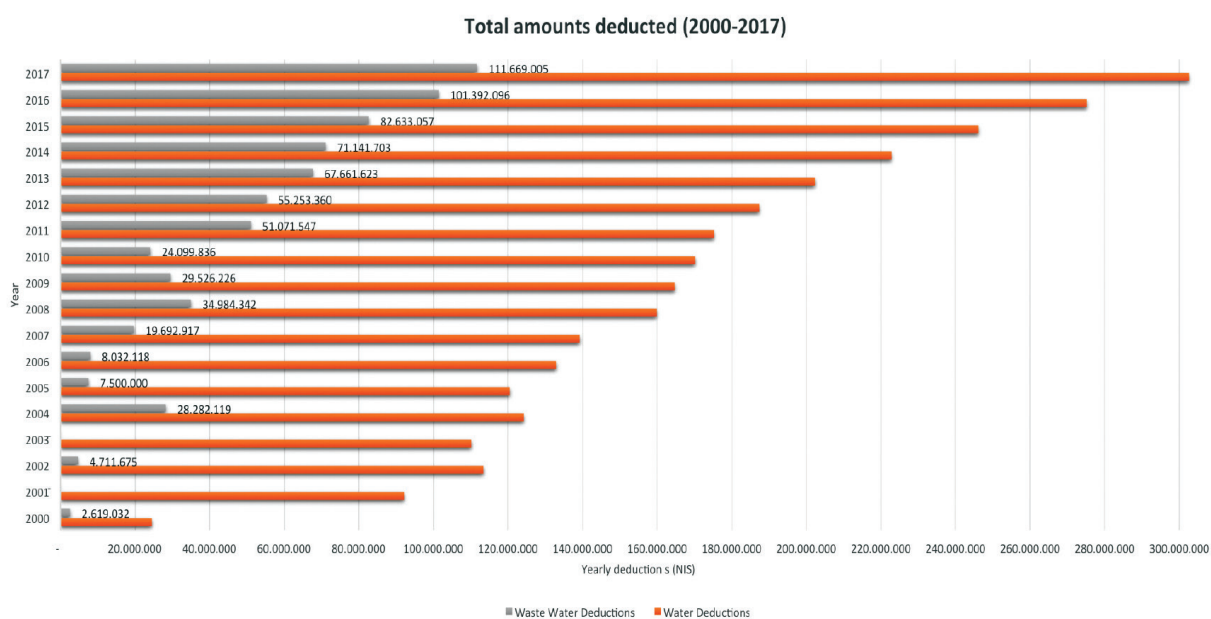


Figure 2: Tax Deductions of PA Budget for Water and Wastewater 2000-2017
 Source: Palestinian Water Sector Regulatory Council, 2018.

3.3 The Gaza Strip – Wadi Gaza

3.3.1 Water Supply

Further downstream in the Gaza Strip, over 97% of the Coastal Aquifer is contaminated by sewage and seawater intrusion. Overexploitation of the aquifer has led to the situation where 260 municipal wells in Gaza do not meet the salt and nitrate maximum thresholds set by the World Health Organization (WHO). This forces 97% of the population in Gaza to acquire the majority of their drinking water from private tankers and vendors⁵³, despite the significant increase in price compared to water supplied from the main distribution network. Only 1% of Gazan households have access to what is considered an improved drinking water resource.⁵⁴ The implementation of planned interventions, such as the construction of wastewater treatment plants with reuse components and the construction of a Gaza Central Desalination Plant are expected to increase safe water supply dramatically. Even with the rollout of these interventions, which would only benefit Gaza over the long term, there will still be a present supply deficit of an estimated 37 MCM per year⁵⁵. To alleviate the current water supply crisis, the international community has repeatedly suggested the increase of direct imports from Israel or other regional cooperation projects.

53 World Bank Group. 2017. Reducing Inequalities in Water Supply, Sanitation, and Hygiene in the Era of the Sustainable Development Goals : Synthesis Report of the WASH Poverty Diagnostic Initiative.

54 The following drinking water sources are considered improved: Piped water into dwelling, yard, or plot; public tap or stand- pipe; tubewell or borehole; protected dug well; protected spring; rainwater collection; bottled water; Supra note 27.

55 Supra note 21.

The challenges to water supply in Gaza are manifold and require closer assessment. First, as demonstrated by Table 2 below, there appear to be discrepancies between the water supply figures of the PWA, the Israeli Water Company Mekorot, and the IWA.

Table 2. Water supply from Israel to PA for Gaza Strip 2016-2018

Water supply Israel to PA	Palestinian Water Authority (invoices from Mekorot)	Palestinian Water Authority (Water Meter Readings)	Israeli Water Authority
2016	8.995 MCM/Y	8.047 MCM/Y	11 MCM/Y
2017	11.449 MCM/Y	10.746 MCM/Y	11.9 MCM/Y
Current – May 2018	-	10.53 MCM/Y	15 MCM/Y

According to the IWA, Gaza currently receives 15 MCM/Y from Israeli supply; 10 MCM/Y is provided through Nahal Oz, while 5 MCM is provided through the Beni Suhail connection point. An additional 5 MCM/Y could be provided through the southern connection point, pending finalization of infrastructure on the Israeli side (by end of 2018) and finalisation of infrastructure on the Palestinian side.⁵⁶ Under this scenario, Gaza is already receiving 5 of the 10 MCM agreed upon under the framework of the Red Sea-Dead Sea Memorandum of Understanding, which foresees the sale and import of an extra 10 MCM to the Gaza Strip.

According to the PWA’s meter readings between July 2017 and May 2018, Gaza currently receives 10.53 MCM/Y from Israel; 5 MCM is provided through the northern (Nahal Oz) connection point, while another 5 MCM is provided through the Beni Suhail connection point, serving the Gaza Middle Area and Khan Younis. In this scenario, Gaza would not receive any of the additional quantities as verbally agreed in the Red Sea Dead Sea MoU. If and when implemented, these additional quantities (10 MCM) could be provided through both the connection points of Nahal Oz and Beni Suhail in the North and Middle Area of the Gaza Strip, and the Rafah connection point in the South. The northern connection point would be able to receive up to additional 5 MCM pending construction and operation of additional infrastructure (storage, mixing infrastructure) inside Gaza; the PWA plans to mix this share of the imported desalinated water with brackish water, which would double its amount to 10 MCM/Y.⁵⁷ On the Israeli side, infrastructure to supply the northern connection point at Nahal Oz is finalized.

Until this moment, both sides, the PA and the Government of Israel contend that the other side is responsible for the delay to move from the verbal agreement on the Red Sea-Dead Sea

⁵⁶ The Government of Kuwait committed to funding (as part of the Gaza Reconstruction Fund and the Gaza Central Desalination Project and Associated Works Programme) for the construction of the receiving infrastructure (pipelines, reservoirs, and pumping station) on the Gaza side. Construction is pending agreement between the donors and the PA over implementation timelines and agreement to move ahead with this part of the infrastructure, disregarding the timelines of the Gaza Central Desalination Project and Associated Works.

⁵⁷ PWA, 2018.

MoU to implementation. The Israeli side wants to see the MoU verbally agreed to signed and questions the need for additional agreements. The Palestinian side requests the signing of a detailed purchase agreement together with the signing of the MoU. Although Israeli supply capacity is near completion and Palestinian receiving infrastructure in Gaza is in progress, implementation of the price of any additional quantities is pending an agreement reached. Without an agreement reached, Israel is charging the PA at the former (and higher) cost as compared to the price agreed upon by the parties in the new verbal agreement.

Second, the Gaza water crisis is further aggravated by the lack of reliable energy supply. While demand for power has grown in Gaza over the past decade to approximately 450 MW, total supply has remained largely static since 2006, at around 210 MW capacity, and falling to around 135 MW in recent months. In April 2017, a dispute between Hamas and the PA over the taxation of fuel led to the temporary closure of the Gaza Power Plant, resulting in a reduction of the power supply to Gaza to an average of four hours a day. The situation deteriorated further in June 2017, when the Government of Israel was asked to reduce PA payments for electricity supply to Gaza. Consequently, power imports to Gaza from the Israel Electric Company (IEC) were reduced from 120 MW to 70 MW. This fluctuation with regards to PA coverage of electricity cost in Gaza is bound to either the advancement or deterioration on the reconciliation efforts between the PA and Hamas.⁵⁸

Meanwhile the IEC restored the 120 MW supply to Gaza, making it currently the most reliable source of electricity. Electricity imports over the Egyptian lines continue to be unstable, supply of Egyptian fuel served to partially operate the Gaza Power Plant, but lack of long-term financing and a low collection rate make it impossible to foresee sufficient fuel to operate the plant at full capacity. In the two months prior to the publication of this report, Hamas has sold Egyptian fuel to private buyers only, further impacting on the electricity supply for the public. This energy crisis also heavily affects water production and treatment; prior to the current crisis, the production of desalinated water for drinking was estimated to be 108,000 m³/week. Since the start of the crisis, production has dropped to 49,000 m³/week, indicating an overall 45% decrease.

A third factor contributing to the dire state of the water sector in Gaza is the limited commercial viability due to high poverty. The collection rate is low, there is a weak tariff structure (currently, the price of water does not cover its cost), and like the West Bank there is a high level of NRW - meaning water that is not accounted for, caused by losses through the network or apparent water losses (generally through theft or metering inaccuracies). A compounding factor is the fact that the fees that are collected from the supply network are not necessarily spent within the sector.⁵⁹

Advancement of the Palestinian water sector regulatory reform, including the adoption of a unified tariff structure, the development of regional water utility regulations, increasing collection rates and implementing the strategy to reduce NRW are all initiatives that would contribute to enhancing the financial sustainability of the sector in the long term. Adopting

58 Supra note 21.

59 Supra note 21.

rules and enforcement regarding abstraction and licensing is equally urgent; decreasing the number of unauthorised wells, currently over 8000 in Gaza alone, will reduce abstraction from the aquifer by about 7 MCM/yr.⁶⁰

However, considering that the economic situation and the living conditions of the people in Gaza have worsened significantly over the last decade, which further impacted the capacity of Palestinians to pay for water services, financial sustainability of the sector will not succeed without concrete steps of all relevant authorities to pave the way for economic growth and development in Gaza.⁶¹

3.3.2 Wastewater and Treatment

The wastewater problem is particularly acute in the Gazan part of the basin, where both wastewater collection and processing infrastructure are severely deficient. The pollution resulting from the outflow of untreated wastewater has worsened significantly in recent years and has negatively affected the environment in Gaza, the Mediterranean Sea and neighbouring communities in Israel. In 2012, wastewater networks covered about 84% percent of the population and households in Gaza. The remaining part of the population that is not connected to a sewage network uses cesspits and open drains to dispose of their wastewater. The sewage network, however, is in a state of disrepair, and due to the very low water per capita rate, the produced wastewater has higher than average concentrations of salinity, nitrate, and heavy metals, which require more effective treatment methods to achieve successful reuse.⁶² Since 2012, only 25 percent of all wastewater in Gaza could be collected, treated and reused for irrigation.⁶³

Meanwhile the capacity of existing and older wastewater facilities (Beit Lahia, south of Gaza City, Khan Yunis, Rafah and Wadi Gaza) is largely inadequate, which is a problem exacerbated by insufficient power supply to operate the facilities in a sustainable manner. The devastating destruction of the war in 2014 only worsened the situation. The import of materials for the repair and construction of vital WASH infrastructure through the Gaza Reconstruction Mechanism, established in the aftermath of the 2014 war, remains cumbersome and hampered by Israeli import restrictions as many material items for the water sector are classified and treated as 'dual use'.⁶⁴

60 Aiash M. and Y. Mogheir, Comprehensive Solutions for the Water Crisis in the Gaza Strip, Journal of Natural Studies, Vol.25, N°3.

61 See also: World Bank Press Release, 'A Sustainable Recovery for Gaza is Not Foreseen without Trade', March 15, 2018. Available at: <http://www.worldbank.org/en/news/press-release/2018/03/15/a-sustainable-recovery-in-gaza-is-not-foreseen-without-trade>

62 Palestinian Water Authority (PWA) (2012), "Water Demand Management Plan and Its Implication of the Water Resources Deficit on Gaza Strip", Gaza Strip, Palestine.

63 Efron et al. 2017. Gaza's Water and Sanitation Crisis: The Implications for Public Health. EcoPeace Middle East, available at: http://ecopeaceme.org/wp-content/uploads/2018/02/GazaCrisis_WayOut_87-103.pdf

64 OXFAM Briefing Paper, March 2017. 'Treading Water: The Worsening Water Crisis and the Gaza Reconstruction Mechanism, available at: <https://www.oxfam.org/sites/www.oxfam.org/files/bp-treading-water-gaza-reconstruction-mechanism-220317-en.pdf>

BOX 3. Wadi Gaza

Wadi Gaza is both the most downstream part of the basin and an important natural wetland in the region. The risks to groundwater contamination and broader environmental harm are aggravated by the existence of irregular solid waste dumpsites in the area.⁶⁵ Due to severe damage to the ecosystem and biodiversity, fauna and flora in Wadi Gaza border on extinction. Several plans and recommendations have been formulated for the restoration of the area, including the AECOM – Portland Trust 2016 Spatial Vision for Gaza Governorates and the 2017 report of the PWA and the Middle East Desalination Research Center.



Wadi Gaza, 2017 (source: PWA-MEDRC Report, Assessment of Wadi Gaza – Environmental Mitigations, May 2017)

The inability to treat wastewater implies that over 108,000 cubic meters of untreated sewage flows daily into the Mediterranean Sea through 9 sewage outlets distributed along the Gaza coastline, a quantity equivalent to 43 Olympic-size swimming pools.⁶⁶ This results in widespread pollution of both the sea and the groundwater, further constituting a severe risk to the health of all Gazan residents. In spring and summer 2017, 50 to 70% of the beaches in Gaza were closed to the public as a public health protection measure.⁶⁷ The threat of waterborne diseases increases further since hospitals and medical services have become reliant upon costly back-up generators, with water supply being limited to just a few hours per week. The WHO reports that contaminated water and the lack of sanitation are currently responsible for 26% of all diseases in Gaza. In its turn, the possible risk of disease transmission through waterborne pathogens is exacerbated by poor infrastructure and insufficient access to clean water sources. 51% of Gaza's population are children (age 0-17) and waterborne diseases are the primary cause of illness in children in Gaza, particularly diarrheal diseases. Waterborne diseases also have indirect effects on a child's ability to absorb nutritional content, leading to a higher incidence of childhood malnutrition. In 2009, 12% of deaths among young children and infants in Gaza were caused by diarrhea, an eminently treatable and avoidable disease.⁶⁸

The challenges to effective wastewater treatment in Gaza also constitute a direct risk to the public health of neighbouring communities in Israel; viral pathogens like polio have the

65 PWA/ MEDRC, Assessment of Wadi Gaza – Environmental Mitigations, April 2017.

66 Supra note 17.

67 GISHA, Gaza Gateway Facts and Analysis about the Crossings, July 2017

68 UNICEF, "Protecting Children from Unsafe Water in Gaza: Strategy, Action Plan and Project Resources," March 2011.

potential to travel through the sewage and waterways outside of the Gaza Strip. Polio has already been found in the Israeli sewerage systems, attributed to the sewage runoff from the Gaza Strip into Israeli waterways.⁶⁹ Especially in the summer, the consequences of the Gazan wastewater crisis extend beyond the border, with Israeli beaches forced to close in the summer of 2017 due to contamination of the shores.⁷⁰

In the same period, the Israeli Ministry of Health had instructed Mekorot to close two pumping stations near Moshav Nativ HaAsara over fears of groundwater pollution stemming from Gaza sewage dumping. In addition, in January and February 2016, the Ashkelon Desalination Plant, which supplies 15% of Israel's drinking water, was forced to shut down due to sewage discharge into the Mediterranean Sea from Gaza. The Israeli public is often unaware of these events and the news was only released to the media following a confirmation obtained by EcoPeace Middle East under a Freedom of Information request.⁷¹

A recent report focusing on water management from a gender perspective in the region, confirmed that residents living in the vicinity of Gaza are not familiar with current water issues, and specifically transboundary issues, despite the health risks posed by the water and wastewater crisis in Gaza.⁷²

In the same period, the sewage pumping stations from Beit Lahiya ceased to operate, according to Coordination of Government Activities in the Territories (COGAT) intentionally by Hamas, at a distance of 200 meters from the border with Israel. Large quantities of sewage flow across the border threatening ground water reservoirs of the Hof Ashkelon Regional Council. The IWA trucked and now pumps the sewage to an Israeli sewerage treatment plant in Sderot for treatment.

These incidents encouraged 14 members of the U.S. Congress, Democrats and Republicans equally, to send a letter (July 13, 2016) to Israeli Minister of Defense, Avigdor Lieberman; and Israeli Minister of National Infrastructure, Energy and Water Resources, Yuval Steinitz, urging them to take due measures to guarantee additional supply of electricity to the internationally-funded Northern Gaza Emergency Sewage Treatment (NGEST) plant. Establishing a high voltage (161 kV) line to increase electricity supply from Israel and a dedicated line to the NGEST is considered to be the only reliable energy solution to addressing the wastewater crisis in Gaza for the short-to-medium term⁷³ and this option was subsequently approved by the Israeli Cabinet. There is however, also an outstanding financial gap of an estimated 16.8 million USD to cover operation and maintenance costs of the NGEST, as well as to enable cost recovery at the municipality

69 Eran O., G. Bromberg, and M. Milner, "The Water, Sanitation, and Energy Crises in Gaza: Humanitarian, Environmental and Geopolitical Implications, with Recommendations for Immediate Measures," EcoPeace Middle East, August 11, 2014, available at: http://ecopeaceme.org/uploads/EcoPeace-INSS_Gaza_Report_Final.pdf

70 <https://www.jpost.com/Israel-News/Gaza-sewage-crisis-Israeli-Beach-closed-as-a-new-pipeline-is-considered-498897>

71 EcoPeace Middle East, The Institute for National Security Studies (INSS), "Gaza on the Edge, the Water and Energy Crisis in Gaza", 2017.

72 Carmit Lubanov, "Hebron-Negev-Gaza: Challenges and Opportunities for Water Management – Gender Perspective", May 2018.

73 Supra note 60.

level. According to the PA's Gaza Power Sector Development Plan, the 161 kV line requires construction on both the Gaza and Israeli side, including rehabilitation of the Gaza North Substation. The estimated cost, according to the Palestinian Energy and Natural Resources Authority, is 45 million USD. The new connection would be able to supply Gaza with an additional 100 MW in 3-4 years. In the meantime, the IEC would be able to provide 25 MW on a temporary basis within 12 months. Due to disagreement over billing issues between the Hamas government in the Gaza Strip and the PA government in Ramallah, a purchasing agreement to buy and supply an additional 100MW for Gaza has not materialized. This further jeopardizes the long-term operation of the NGEST plant as well as other wastewater treatment infrastructure in Gaza.

RECOMMENDATIONS

- **Facilitate third party involvement to reconcile differences between the parties and relevant authorities:**

Important discrepancies regarding water and wastewater data exist between all relevant authorities in the Hebron-Besor-Wadi Gaza Basin. First, supply figures and estimates regarding water current sale and provision from Israel to the South of the West Bank (through the Deir Sha'ar pipeline to Hebron) vary according to source (PWA, WSRC and IWA). Second, supply figures and estimates regarding current water sale and provision from Israel to Gaza vary significantly; Palestinian water meter readings indicate a provision of 10.5MCM/Y while the IWA accounts for 15MCM/Y. Third, the Israeli State Comptroller in 2016 unveiled unreasonable gaps between the Israel Nature and Parks Authority and the IWA's data with regards to the quantities of Palestinian wastewater treated in Israel. Examples of this are a gap of approximately 500% in the quantities of wastewater from Palestinian communities treated by sewage treatment plants in Israel, and a gap of about 170% in the quantities of wastewater discharged to cesspits or to rivers without treatment. These discrepancies do not only illustrate the need for enhanced data collection, monitoring and coordination among and between Israeli and Palestinian authorities, but also demonstrate the urgency for third party involvement to help settle the differences that exist, particularly with regards to the implementation of the Red Sea Dead Sea Memorandum of Understanding and the negotiation of a more detailed bilateral purchasing agreement. In addition, third party efforts could facilitate approvals sought by the PWA for the development of groundwater resources from the Western and Eastern Aquifer Basins that would provide additional amounts of fresh water to the Hebron Governorate water system.

- **Reduce NRW in the Hebron Governorate:**

The high level of unbilled or unaccounted water in the Hebron Governorate implies a significant loss of income for the Palestinian water sector. NRW in Hebron city mounts to 26%, and a survey of the water systems in the Hebron Governorate unveils a number of problems among which: low coverage, low service levels, problems with hydraulic designs, high NRW, frequent pipeline bursts, problems with billing and collection of revenue, and faulty water meters.⁷⁴ This demonstrates the urgency for implementing and specifying the interventions proposed under the PWA Non-revenue Water Reduction Strategy⁷⁵ along with the overall need for more adequate monitoring and enforcement, including network and storage rehabilitation. Increasing the number of qualified local staff available to execute the activities related to leak detection, use of appropriate

74 Jabari S., Non-Revenue Water Management in Palestine, International Journal of Urban and Civil Engineering, vol. 11, N° 7, 2017.

75 PWA, Non-Revenue Water Reduction Strategy, available at: <http://www.pwa.ps/userfiles/server/policy/NON-REVENUE%20WATER%20REDUCTION%20STRATEGY.pdf>

technologies to reduce water losses and undertake sufficient maintenance are among the suggested measures to enhance the performance of the local water network in Hebron.⁷⁶

- **Increase supply from non-conventional resources and plan/implement reuse component of the Hebron WWTP in parallel with the treatment facility:**

Considering the overall water shortages and/or unreliability of water supply for residents in the Hebron area, investing in the development of more non-conventional resources such as storm/rainwater harvesting and the use of treated wastewater for agriculture would boost water availability to consumers. Recent research shows that a majority of the Hebron population shares this perspective regarding the benefits of wastewater treatment and reuse. Therefore, the Hebron WWTP should include in its design a reuse component, to avoid that upon completion of the facility the treated wastewater will be discharged back into the environment, only to be billed for by the Israeli side for second treatment downstream, as well as to make more and lower-cost water available for farmers in the area. For the same reasons, surrounding villages and communities that are currently not connected to the sewage system should be connected to adequate treatment and reuse facilities.

- **Enhance transparency of large-scale infrastructure planning and awareness about the benefits of wastewater reuse in the Hebron Governorate:**

Due to the negative externalities associated with the operation of large-scale wastewater treatment plants, they are usually constructed outside of population centers. However, because of limited Palestinian sovereignty over land in the Hebron area, and the planning risks associated with developing infrastructure in Area C, it is unavoidable that WWTP sites will be adjacent to population centres and villages. To avoid local opposition to the construction of large-scale wastewater facilities, decision-making would benefit from being more inclusive and transparent. It would be helpful to communicate strategies to local communities and to serve the needs of off-grid communities and underserved villages by connecting them to the sewage network. The capacity of the regulatory authority (WSRC) could be further enhanced by enforcing and monitoring the water quality, and moving forward with implementing water quality standards, and supporting the training and certification of local regulatory inspectors for the control of operational and environmental standards of the industries in the Palestinian Authority and the Hebron area. The WSRC and Hebron municipality could also play a role in increasing local awareness about the benefits of wastewater reuse, particularly for agriculture.

- **Negotiate a detailed purchasing agreement and prioritise finalising infrastructure for receiving the full Red Sea-Dead Sea water quantities:**

These measures are especially urgent to alleviate the drinking water and sanitation crisis in Gaza. The construction of infrastructure required to receive additional quantities on the Palestinian side should be prioritised, both at the Nahal Oz connection point north of the Gaza Strip (blending reservoirs) and at the southern connection point. Israeli infrastructure

⁷⁶ Supra note 68

to Nahal Oz is complete and Israeli infrastructure to the south will be completed by the end of 2018. The present verbally agreed-upon MoU needs to be signed, including a detailed purchasing agreement specifying the commercial terms and price the PA will pay for the water imports.

- **Prevent sewage spills from Gaza into the Mediterranean, including to Israel, by increasing power supply to wastewater infrastructure (NGEST) in Gaza:**

The first step to alleviate the wastewater crisis in Gaza (and increase the availability of water for agriculture) would be enabling the full-time operation of the Northern Gaza Emergency Sewage Treatment Plant and reliable electricity supply to all wastewater treatment facilities in Gaza (including the German-funded Central WWTP that is under construction). In addition, it is important to increase electricity supply from Egypt, and to increase domestic generation from solar energy. The import of solar panels through the Gaza Reconstruction Mechanism (GRM) should receive higher priority. The 161 kV line would also improve the commercial viability of the energy sector, as bulk electricity would be purchased at the less costly high-voltage tariffs and reduce technical losses. The Government of Israel agreed to the 161 kV line, and a political decision by the PA could give a final green light for its implementation and the alleviation of the wastewater crisis in Gaza.

- **Increase monitoring of the public health crisis in Gaza and its cross-boundary effects:**

Limited data on the consequences of polluted water on public health is available; both the Palestinian Ministry of Health in Gaza and the local representation of the World Health Organisation in Gaza have very limited means available to assess and monitor the impact of sewage contamination on the population. More trained staff, technical equipment and financial resources would be necessary to increase data availability and enable urgent response. Given the transboundary impact of sewage pollution, information on public health risks should also be available and accessible to the general public in Israel; currently this information is missing, and one is required to submit a freedom of information request to receive this information. Access to information is particularly relevant from a gender-perspective; to engage more women in the discussion about water issues, information relevant to public health, security and education should be made more readily available.

- **Increase gender-awareness in the design of WASH policy and infrastructure:**

The society in the Palestinian Territories remains predominantly patriarchal; the burdens of childcare and household duties fall primarily on women. In general, women and girls will be affected positively after improving the WASH conditions and facilities on the household level. Access to adequate drinking water and wastewater facilities in Hebron and Gaza will reduce the time women need to spend on daily chores, allowing for more time to be allocated to girls' education, and ameliorating conditions for feminine hygiene.⁷⁷ Appropriate WASH facilities also result in reduced household conflict, improved quality

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of life, and a significant decline of health problems (especially for children).⁷⁸ Project and policy impacts on women should be designed into the program evaluation and analysis. In addition to increasing access, specific measures could be taken to build and raise women's capacity in managing water resources and sanitation, and to support their leadership in the sector. To enable this, women should be trained at the technical and decision-making level, including on water management technologies regarding agriculture, irrigation, rainwater harvesting, and sanitation. The management of agricultural water resources as a path to gender equality requires recognition of the role of women as farmers, and the rectification of their disproportionate access to productive resources, services, and decision-making areas. Therefore, it is imperative to ensure that a gender perspective is mainstreamed into all governance and decision-making processes for agricultural water resource management. This includes 1) recognizing women as independent water users, 2) granting their access to water use rights regardless of land tenure, 3) strengthening their leadership positions in water policy and decision-making, 4) supporting their membership in specialised water and sanitation institutions and various local decision-making bodies, and 5) reducing membership fees in order to increase their representation in decision-making.⁷⁹



Water tank in cave, covered with a transparent cloth used to filter the water.

Photo Credit: Dr. Sahar Yousef AlKawasmeh

⁷⁸ Supra note 72

⁷⁹ For a comprehensive overview of gender-related recommendations for the WASH sector in the Hebron Governorate refer to supra note 43



Beer Sheva Stream 2017 Photo Credit: Shlomit Tamari

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