



WSRC

مجلس تنظيم قطاع المياه
WATER SECTOR REGULATORY COUNCIL

The Establishment of the
Wastewater
Monitoring Program
Water Sector Regulatory Council



January 2019





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Abbreviations

BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
CMWU	Coastal Municipality Water Utility
GS	Gaza Strip
JSC	Joint Service Council
KPI	Key Performance Indicator
NO3-N	Nitrate Nitrogen
PO4-P	Phosphorus
O&M	Operations and Maintenance
PA	Palestinian Authority
PCBS	Palestinian Central Bureau of Statistics
PWA	Palestinian Water Authority
SPs	Service Provider's
TSS	Total Suspended Solids
WB	West Bank
WW	Wastewater
WWTP	Wastewater Treatment plant
W&WW	Water and Wastewater
WRIS	Water Regulator Information System
WSP	Water Service Provider
WSRC	Water Sector Regulatory Council
WSRP	Water Sector Reform Program

Executive Summary

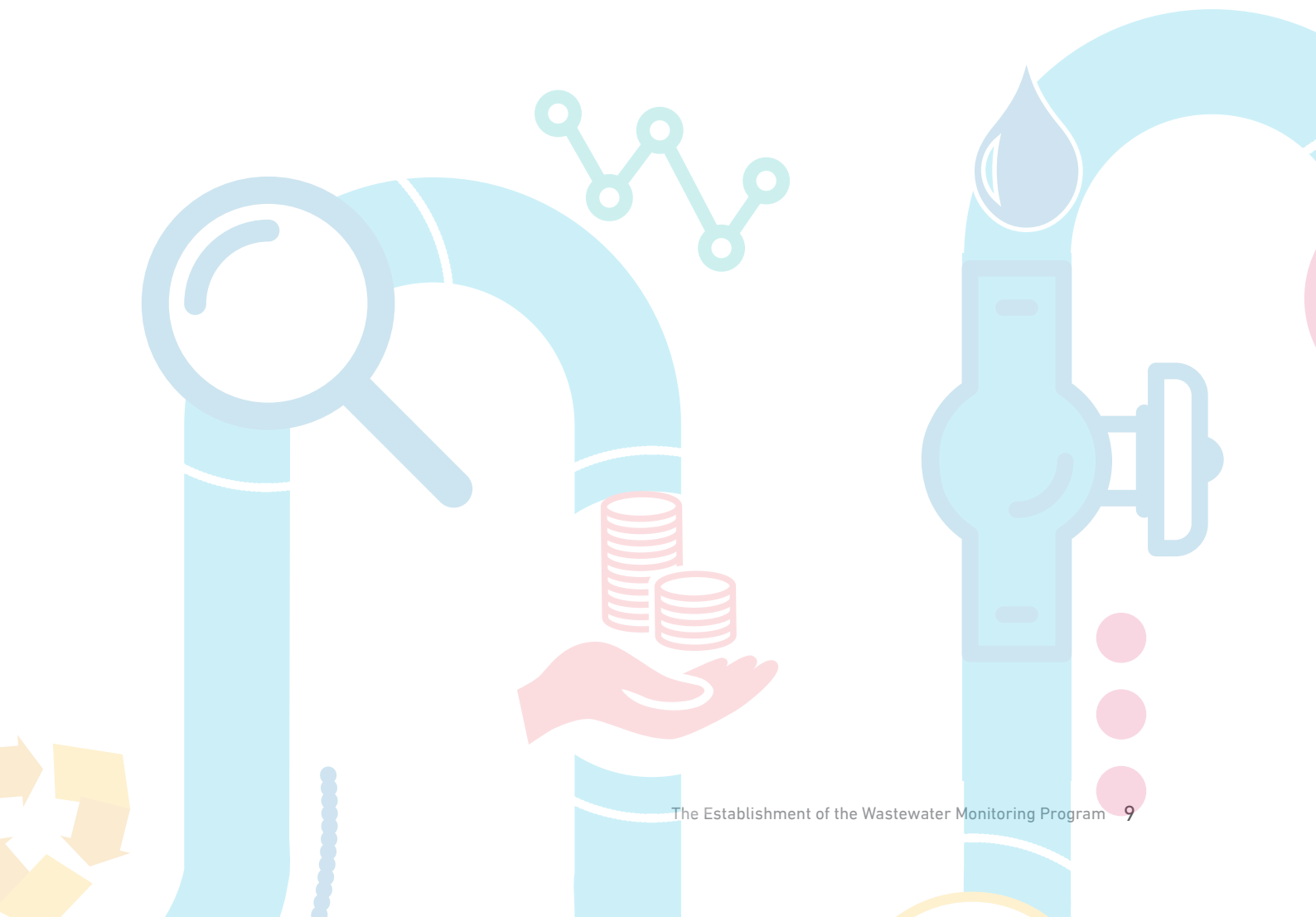
As Decree-by-Law NO. 14 of 2014 stands, the Water Sector Regulatory Council (WSRC) has been established and dedicated to 'monitor all matters related to the operation of water Service Providers including production, transportation, distribution, consumption and wastewater management, with the aim of ensuring water and wastewater service quality and efficiency to consumers in Palestine at affordable prices'. Driven to lay the groundwork of the wastewater (WW) service monitoring program, WSRC conducted a national survey of the wastewater service providers (SPs) in the West Bank and the Gaza Strip in 2015 and updated and updated it in 2017. The survey included 71 SPs- 54 of them are based in the WB versus only 17 in the GS. This report builds on and wields the information and findings of the updated survey to elaborate on the causes of the results and arrive at a set of recommendations to enhance the service delivery.

The survey was given over to shed light on the planning of the WW service and connection rates, categories of WW SPs, complaint systems, network maintenance and rehabilitation as well as the main challenges in service provision and tariff and financial systems, including cost recovery.

The outcome of the survey served to finalize the KPIs of WW SPs to be set in motion from 2019 onward. To begin with, the KPIs are expected to be applicable to SPs with a sewerage coverage of 20% and more, and those serve a population of over 1,000 inhabitants. The 2019 monitoring program includes a list of the necessary information within the Water Regulatory Information System (WRIS) and is mainly rock-bedded on the developed KPIs. A set of procedures is anticipated to be in place before collecting the information to ensure its accuracy as it shows to be the primary challenge to the success of the monitoring program.

This report also includes a list of proposed 21 KPI's, based on the Wastewater Performance Monitoring Index that was developed in parallel with this report. However, the council will continue assessing new indicators to be included in its monitoring program to have a more comprehensive assessment over time.

1. Introduction



1.1 Background

The main objective of the Water Sector Regulatory Council (WSRC) as outlined in the Decree No. (14) for the year 2014 relating to the Water law (Water Law) is to monitor all matters related to the operation of water service providers including production, transportation, distribution, consumption and wastewater management, with the aim of ensuring water and wastewater service quality and efficiency to consumers in Palestine at affordable prices.

Article (24) of the mentioned law, have stated the responsibilities of the council related to wastewater as follows:

- Paragraph 7: "Monitoring operation processes related to the production, transport, and distribution of water and operational processes of wastewater management," for wastewater, that includes all the phases from the customer's side until it is treated or discharged.
- Paragraph 9: "Ensuring that production, transport, distribution and wastewater treatment costs takes into consideration the interests of all concerned parties", the council must ensure that the treatment process is cost effective and can be accessed by possible customers such as farmers or others at an affordable price.
- Paragraph 10: "Setting Quality assurance standards for the provision of technical and administrative services by service providers to consumers, in line with relevant laws and regulations, and their dissemination to the public,".
- Paragraph 11: "Monitoring the compliance of the National Water Company and Service Providers with the adopted standards for the provision of water and Sanitation services,".
- Paragraph 12: "The establishment of a database for technical, financial and statistical information and the publication of this information periodically," which is one of the main objectives of this report, to establish a baseline database for wastewater service providers.

The WSRC already set several tools in motion to monitor the water-related operations. Nevertheless, such tools do not apply to the WW service operations. This leads to the primary objective of this report. Wielding baseline survey tools, this report is given over to explore the WW status in Palestine, including the existing WW SPs. It also moves to developing the monitoring indicators to assess the quality of the service provided by SPs. Bottom line, this report aims to lay concrete foundations for the WSRC to kick off the WW monitoring program. Of note, the baseline survey covered the WSPs in the WB and the GS in 2017.

This baseline survey covers the wastewater service providers for both West Bank and Gaza for the year 2017.

1.2 Objectives of the report

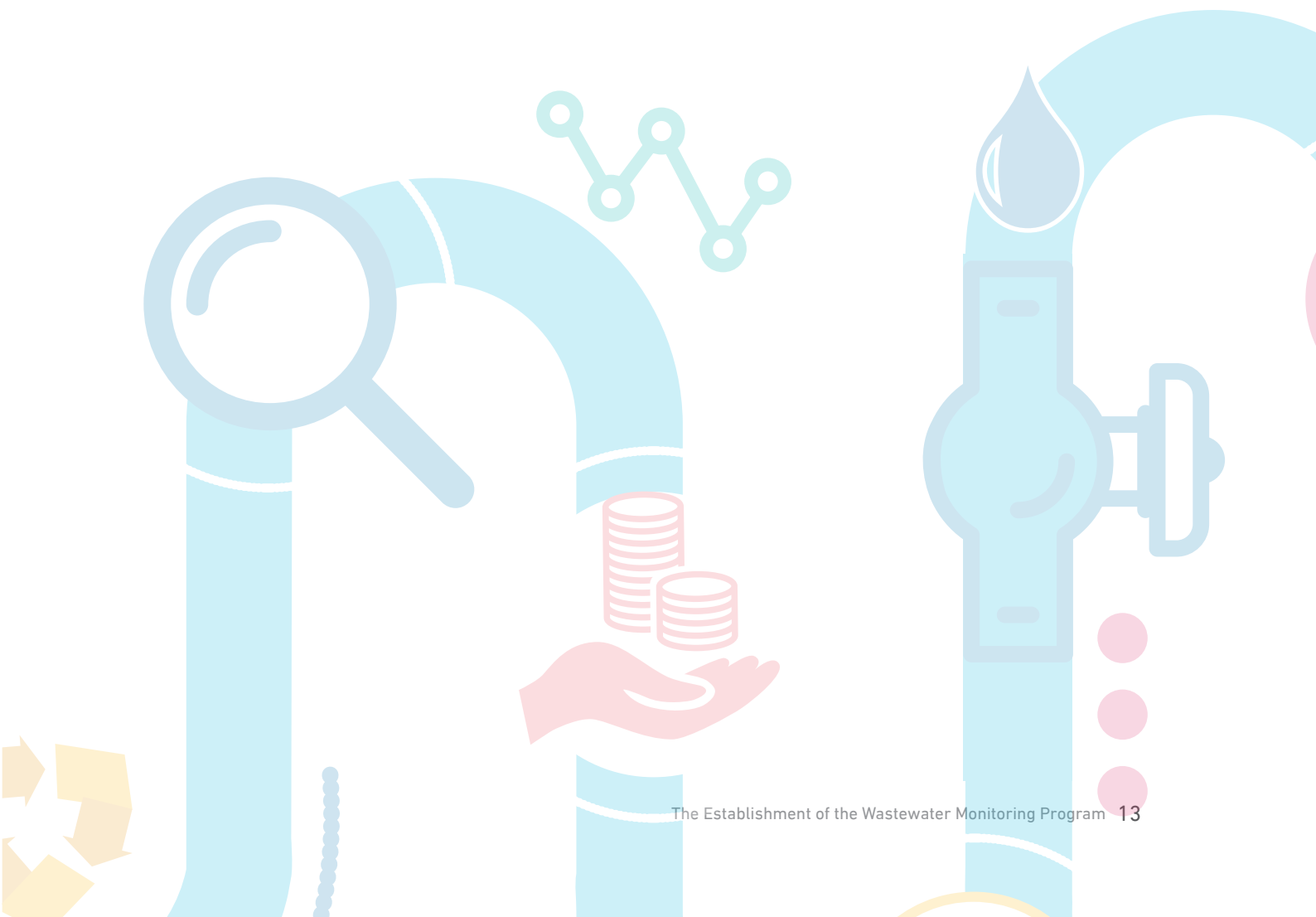
This report examines survey study that has been carried out in order to bring further insights into the situation of the wastewater service in Palestine.

The main objectives of the study include the following:

- Technical and financial analysis of existing and current wastewater system including the WWTP technologies applied in Palestine.
- Identification and inventory analysis of WW service providers in West Bank and Gaza Strip.
- Identification of the key data to be collected from the service providers and how to verify each data entry before uploading to the WSRC database.

The finding from this study is expected to bring and develop a set of monitoring indicators, for the wastewater monitoring program in Palestine.

2. Study Plan and Methodology



2.1 Introduction

The baseline survey was conducted on all WW SPs that operate and provide wastewater services. The total number of SPs covered in the survey study is 71, including 54 in the West Bank and 17 in the Gaza Strip, however not all service providers were able to provide all the required information and some were taken out from the survey as they are either having a low sewerage coverage ratio or very small population. taking this into account, the report covers the basic information of 71 service providers, but the council was able to obtain the financial data for only 64 service providers only, 47 in the WB and 17 in GS.

2.3 Survey and Data Collection Limitations

The survey questionnaire was designed based on the indicators proposed by WSRC, which are related to technical, financial and operational issues.

Limited percentage of the data was estimated as some WW SPs do not have a documented, verified or measured data. For example, wastewater quantity was estimated based on the water consumption and the coverage of the sewer network for many service providers, while some have provided this quantity based on their assumptions and available data.

The survey aims at (i) deriving enough information on the provided WW service, (ii) assessing selected indicators that to be presented in the WW Performance Indicators Index, (iii) testing their functionality against the available information. Some information was not available because some WW SPs lack separate accounts or cost centers for WW service. Most of these SPs record their financial transactions within one account for both water and WW services. Thus, some information was estimated as opposed to that collected.

2.3 Challenges and Difficulties

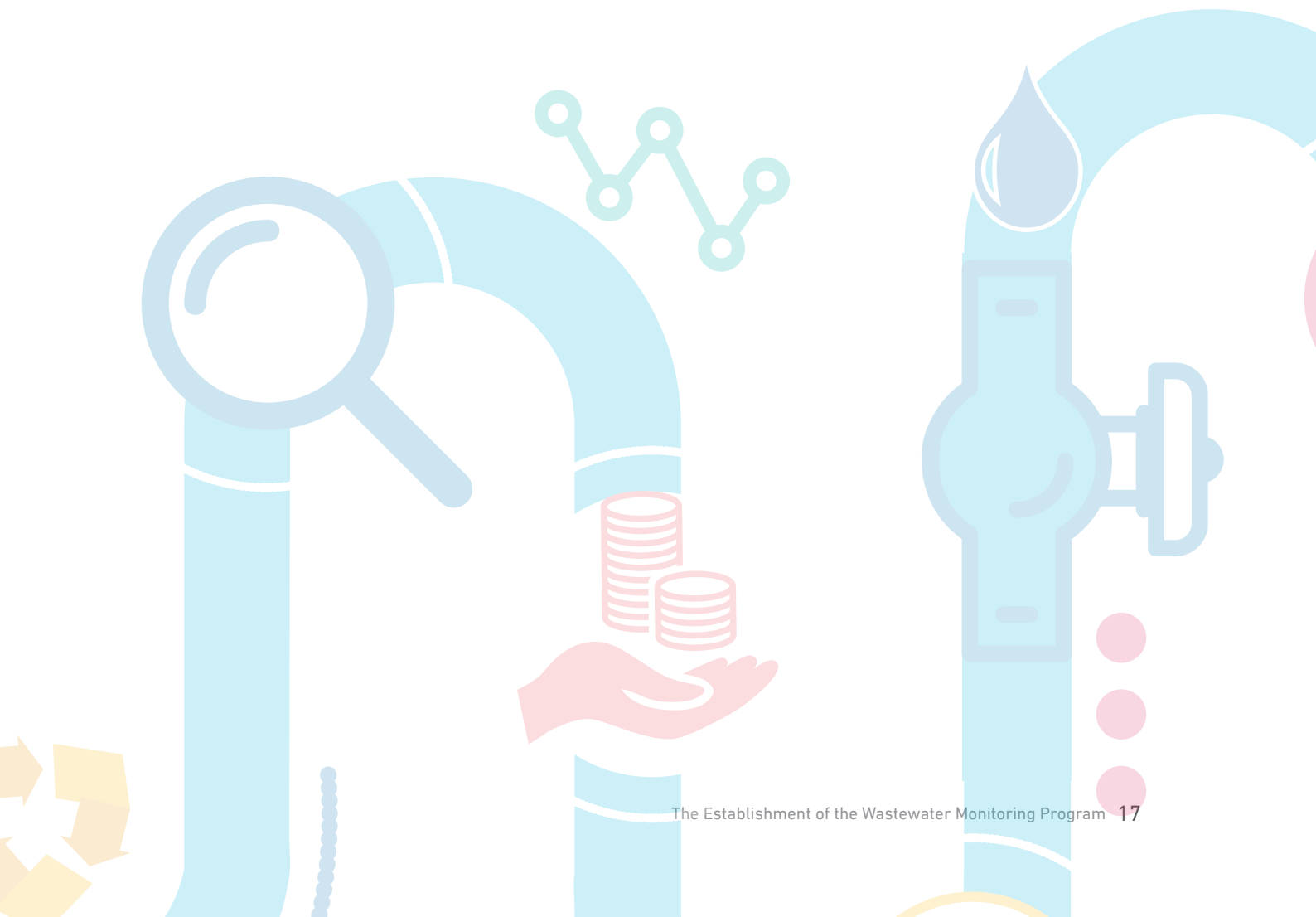
Some difficulties have caused delaying the completion of the survey. The major difficulties were the following:

- The proposed indicators and their related data required a different type of experts from the service provider. And that has caused a delay in gathering the data as coordination obstacles were noticed either between the council and the SP or between the staff of the service providers themselves.
- Getting the needed information created a challenge for many service providers due to the lack of proper documentation or measurements.
- Lack of documented information and experts in several municipalities but mainly in village councils and refugee camps.
- The accuracy of the data is questionable for many service providers, especially SP's of small population and low coverage, as most of them do not have a qualified staff specialized in the operation of the wastewater service, let alone a separate wastewater department.

- The verification of data took a long time since some of the data were provided in a de-coherent manner.

The main results and findings will be outlined in this chapter, which will be divided into 5 sections: Service provider's general information, Planning and documentation, Sewer networks, Wastewater treatment and the Tariff and financial status of the service providers.

3. Survey Results



3.1 Service Providers (General Information)

This chapter is given over to the main results and findings of the survey. To that end, the chapter is broken down into six sections as follows: Section 1 presents general information on service providers — section 2 moves to planning and documentation. Section 3 is given over to sewer networks. Section 4 tackles the WW treatment processes. Section 5 presents a general summary of the wastewater service in Palestine. Finally, Section 6 digs deep into the tariff and financial status of the SP's.

3.1.1 Institutional Framework

The surveyed service providers are operating under different institutional frameworks, In the West Bank the majority of the wastewater SP's (over 85%) are operating under either a municipality or a village council, only one Joint Service Council (JSC) and one Utility operate wastewater services in the West Bank, JSC for Taybeh and Ramoun and a Utility for Bethlehem Governate. The situation in Gaza Strip was a bit different as 16 out of the 17 surveyed service providers were municipalities while the 17th service provider was a utility (Coastal Municipalities Water Utility CMWU - Rafah).

Chart 3.1.1 outline the distribution of the institutional framework in the West Bank and Gaza Strip for 2017, and table 6.11 outline the 2015 survey results regarding this issue.

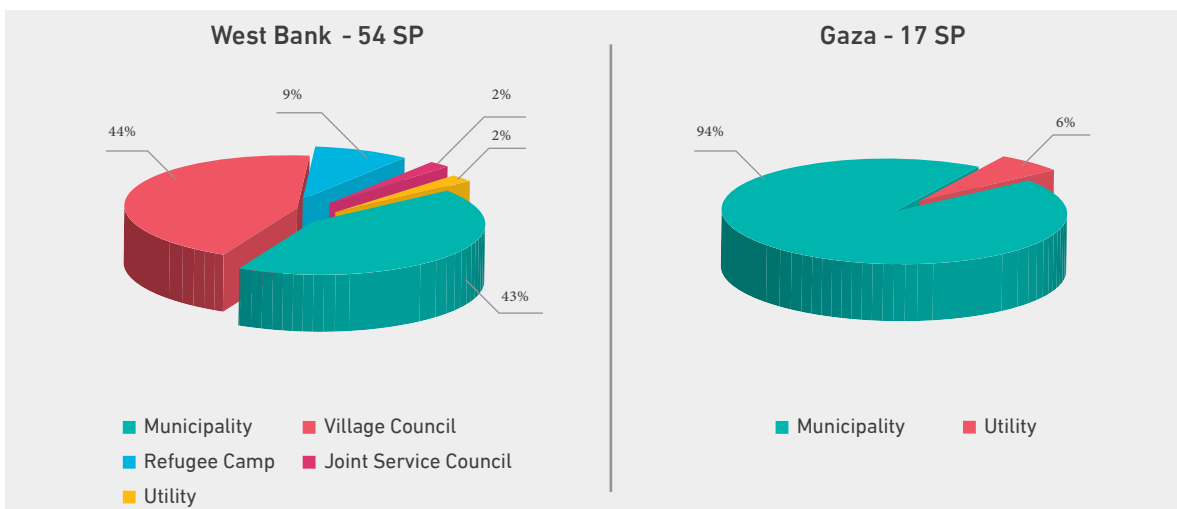


Chart 3.1.1: Institutional framework of wastewater service providers

In the West Bank, the number of wastewater service providers have increased from 52 SP's in 2015 to 54 SP's by the end of 2017, the two new SP's are located in Tulkarm governorate (Kufr Al-labad & Beit Lid) and they manage their wastewater service in cooperation with Wadi' Alzummr's Join Service Council which is supposed to assist several service providers in Tulkarem governorate in providing wastewater services. Unlike the West Bank, the wastewater service providers in Gaza did not differ from 2015.

3.1.2 Provided Services

This section will outline the SPs based on the services they are providing (water supply, wastewater collection, and wastewater treatment), In the WB over 70% of the surveyed service providers are providing water supply along with the wastewater services they provide, while all the wastewater service providers in GS are providing the water

service to their customers, but when it comes to the wastewater treatment, only 35% of the wastewater service providers in the West Bank are providing the service and less than a third of them are providing the wastewater treatment in GS. However, it should be noted that many of the service providers who provide the treatment service are providing it for other service providers.

The following Chart 3.1.2 shows the distribution of the service providers depending on the services they provide for their customers for the year 2017, and table 6.11 outline the results of 2015 survey.

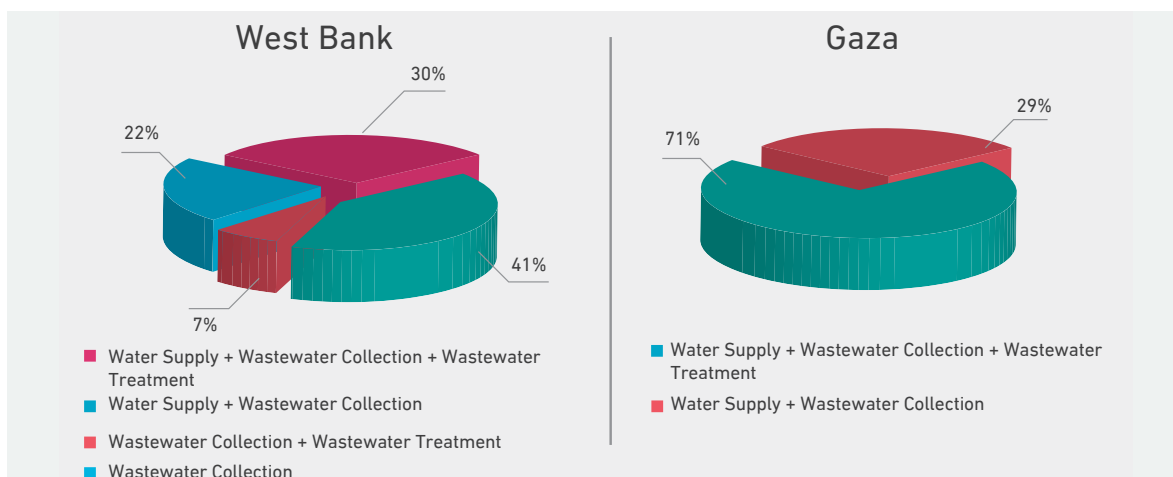


Chart 3.1.2: Water related services that is provided by wastewater service providers

This survey detected the following changes between 2015 and 2017:

- The service providers who are providing the three services (water supply, wastewater collection, and treatment) had decreased as three wastewater treatment plants have stopped functioning, which are Tulkarm WWTP, Ein Sinya WWTP and both of Zeita's WWTP's due to their inability to deal with the high volumes of the collected wastewater and/or the lack of routine maintenance of those plants.
- The service providers that are providing the water supply and the wastewater collection have increased, this change resulted from two factors; the first was the establishment of two new wastewater collection services in Kufr Al-Labad and Beit Lid in Tulkarm Governorate, the second factor was the closure of several WWTP's which was elaborated in the past paragraph.
- The service providers whom they provide only the wastewater collection service have increased by one, as Ein Sinya have been added since they provide only wastewater collection as their WWTP have ceased to function anymore.
- In Gaza, there was no change between 2015 and 2017.

3.2 Planning & Documentation

3.2.1 Strategic / Master Planning

Strategic planning is an important step for any service provider as it provides a sense of direction, outlines measurable goals and milestones and it enables the service providers to be proactive rather than reactive. And the planning process cannot be considered complete without having a master plan that will set the blueprints of the desired future.

Strategic and master planning are not only helpful for the service provider to enhance the level of its services but can be relevant to all the different stakeholders; the served community, businesses, government institutions and NGO's.

Unfortunately, in the WB most of the service providers did not have strategic and master plans for wastewater management, as only 18 out of the 54 service providers have confirmed an active master plan in place, while only 10 of the SP's have confirmed a strategic plan in place.

However, the service providers with the highest number of customers were more likely to have an active plan as 8 service providers (serving 80% of the population connected with a sewer network in the WB) have all stated that they either have an active plan or in the process of updating their plans for wastewater management, and in GS all 17 service providers have stated that they have an active strategic plan and over 80% of them have stated that they have an active master plan of wastewater management.

3.2.2 Complaints System

To raise the level of accountability (an important principle of governance), The WSRC encourages SP's to utilize complaints systems to help increasing customer service and improve service provision. This also provides valuable prompts to review the organizational performance, as the complaint system is not just a process to measure customer satisfaction, but rather a technique to gather information that allows the SP's to improve their services and give customers the trust in the organization which in turn improve its reputation and strengthen public confidence.

In the WB, the majority of the service providers do not have a functional complaint system, and around one-third of them have a general complaint system, while only 3 service providers have a complaint system that is designed and operated for the water and/or wastewater service.

On the contrary, the majority of the WW SP's in Gaza have an active general complaint system but only two of them have a system for water and wastewater services, and only one service provider does not have an active complaint system.

The following chart 3.2.1 shows the distribution of the service providers based on their complaint systems.

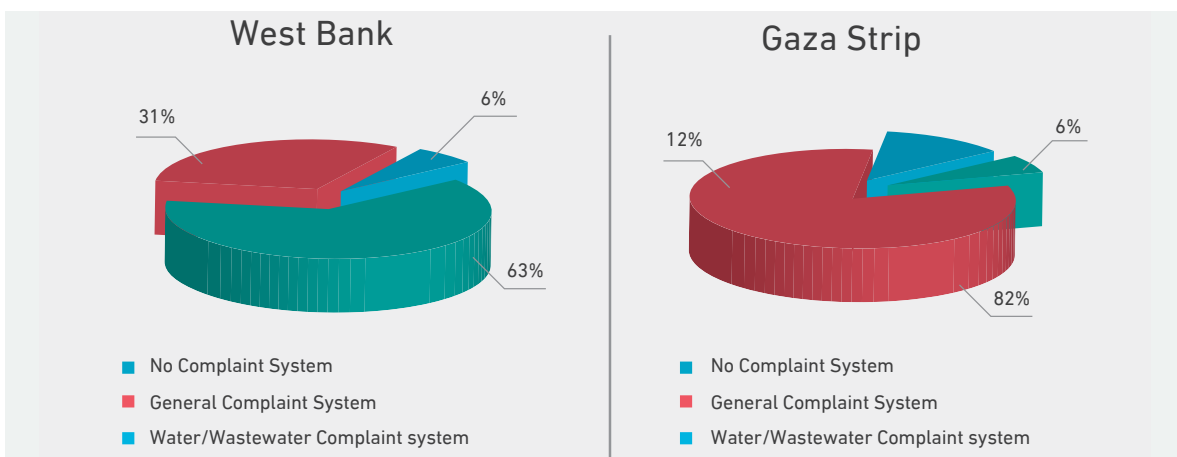


Chart 3.2.1: Utilized Complaint System

Documentation

Being dedicated to monitoring the SP performance, SPs need to present a trusted source of information to the WSRC. Otherwise, the monitoring process is neither effective nor reflexive of the SP status. If any, this warrants a process of regular documentation of relevant information. Documentation is considered a key issue for the monitoring process, but that is not the only advantage of the documentation as it provides some other key advantages, it presents an indication of commitment of the service provider for improving the services and its efficiency, and it can also be regarded as an important tool to assist the staff of the service provider for accomplishing their job in an efficient manner and detect the major issues that incapacitate them from providing a good reliable service for their customers.

At the documentation front, the conducted survey aimed at three issues that should be documented, flooding's, maintenance operations and complaints, those topics are outlined in the following Charts (3.2.5 & 3.2.6 & 3.2.7)

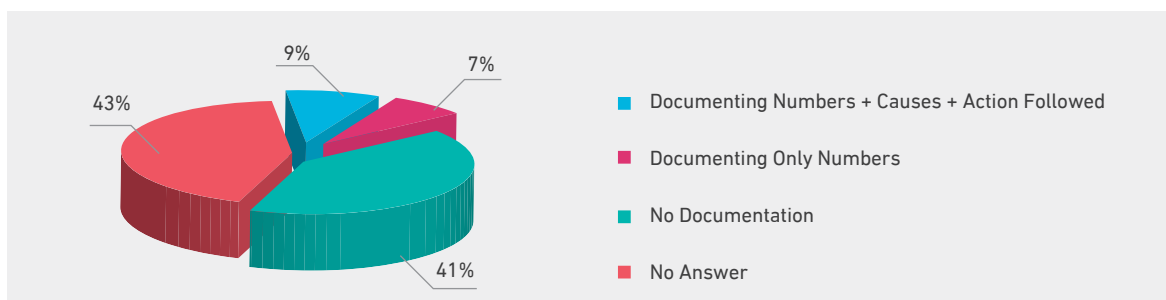


Chart 3.2.2: Documentation of Flooding occurrences

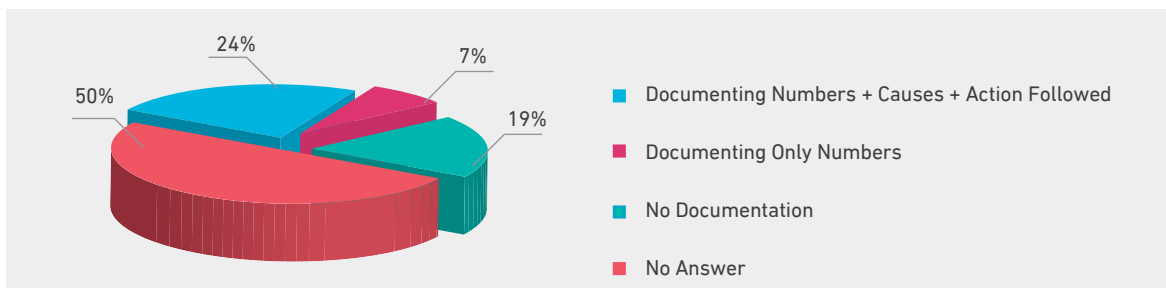


Chart 3.2.3: Documentation of Maintenance Operations

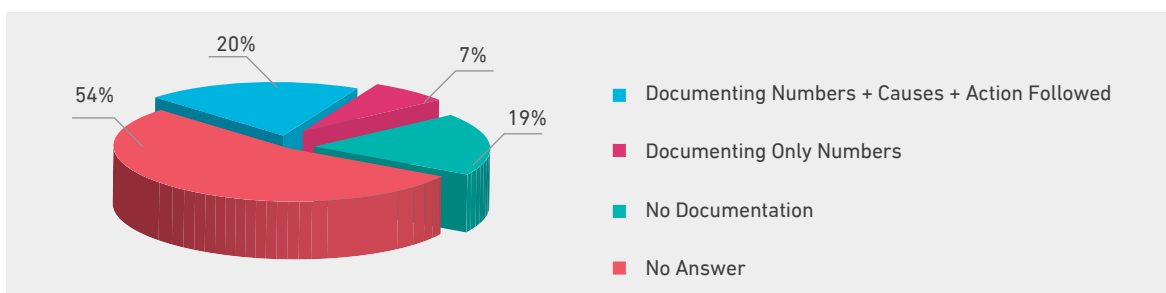


Chart 3.2.4: Documentation of Complaints

In the West Bank, most of the service providers have not documented the flooding's they have experienced as only 16% have had any sort of documentation regarding the flooding's that their network has experienced.

And when it comes to the maintenance operations, more than a quarter of respondents

in the West Bank have stated that they have documented the maintenance operations they had performed, while less than a third the SP's in the West Bank have stated that they document the complaints they receive.

3.3 Sewer Network

The condition of the sewer network

The condition of the sewer network can be a deciding factor on whether the service provider is able to provide wastewater collection service in a proper, functional and a sustainable way, and it has major effects on economic, social and environmental aspects, as the sewer is not only a pipe for conveying wastewater, it is also a reactor where microorganisms are breaking down the organics and consuming the very limited dissolved oxygen.

Chart 3.3.1 & 3.3.2 outline the condition of the sewer network as classified by the service providers themselves.

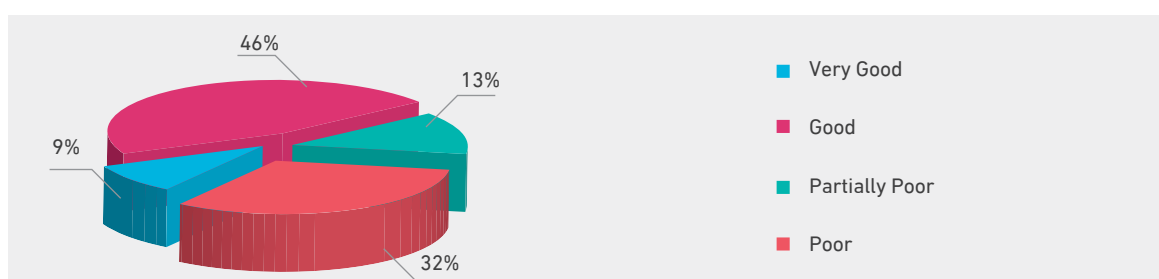


Chart 3.3.1: Sewer Network Condition - West Bank

In the WB, the condition of the sewer networks as assessed by the service providers themselves have revealed that almost half of the service providers (45%) have assessed their networks as either poor or partially poor, and (55%) stated that their network is in a good/very good condition and that have increased from 2015, as two new service providers have started the wastewater collection service in 2017 and several have stated that they have enhanced their network by expansion and rehabilitation.

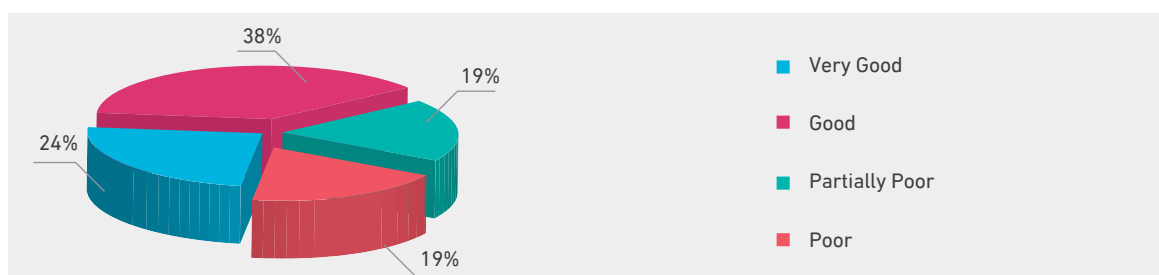


Chart 3.3.2: Sewer Network Condition - Gaza

As presented in the figure above, 38% of the SPs in the GS stated that the condition of their sewer network is poor or moderately poor, while 62% stated that their sewer network is in a good or very good condition.

Having the classification of SPs by their network performance adopted, the question on the poor/partially poor conditions rose and lead us to the next section to spell out the leading causes.

3.3.2 Wastewater Management, Issues and Challenges

To provide an efficient WW collection service, two significant factors need to be taken into account to efficiently operate the sewer network, namely, the condition of the sewer network and the sufficiency of resources.

For the purposes of this survey, the WSRC requested from the SPs to outline the primary reasons behind their poor/moderately poor classification.

Depreciation was the most common cause, standing for 96% of the SPs with a poor/partially poor condition, as they were unable to rehabilitate it for years due to their inability to handle maintenance costs.

The instalment of an inefficient diameter on the pipes was another cause. 43% of the SPs with poor/partially poor network performance stated that the pipes were too narrow to handle the amounts of collected wastewater. Besides, 30% of the SPs with bad/partially bad network performance stated that their networks have serious leakage kinks. In a similar vein, around 9% linked the situation to the inefficient implementation of the sewer network. Of note, those issues were reported only from the WB.

Service providers have a number of challenges that stands in the way of an efficient wastewater management approach, one of the main pressing challenges was the financial sustainability of the service as 48% of the service providers have stated that their tariff is not sufficient to cover the O&M cost of the wastewater services they provide and 52% of the SP's complained of their low collection rates (even if the tariff is sufficient).

Another challenge was the lack of resources to operate the wastewater services, as 63% of the SP's have expressed staffing shortages and 65% expressed the lack of proper equipment and tools.

The following illustration provides an insight for the main issues and challenges for the WW SP's.

Wastewater Network Main Issues and Management Challenges

Sewer Network Main Issues

Almost half of the wastewater service providers in the WB and GS have classified their sewer network as in a "Bad/Partially Bad" condition, they were asked to list the main issues leading them up to this classification.



96%

of those SP's have listed the age of the network as one of main issues for the sewer network condition



43%

of SP's have expressed dissatisfaction with the small size of the network pipes



30%

of SP's listed leakage as a main issue with their sewer network



9%

of those SP's have expressed dissatisfaction with the poor implementation of their sewer network

Wastewater Management Main Challenges



65%

of SP's have expressed a shortage of essential equipment's to maintain the service



63%

of SP's have expressed a shortage of staff to operate the service



52%

of SP's have complained of low collection efficiency for the wastewater services



48%

of SP's have expressed dissatisfaction with the applied tariff

3.3.3 Flooding frequency

Sewerage flooding is the most unpleasant aspect of a blocked or overloaded sewer network and brings misery to the area of service. The reasons behind it can be caused by customers discharging non-flushable products in the toilet or kitchen sink as this leads to cases of solidification in the pipes that build blockages.

But customer's waste is not the only cause of flooding as it can come from contractor's who constructed the sewer network "faulty implementation" and even from the service providers who operate the network "weak inspection & maintenance in an

irregular fashion”, as frequently inspecting the sewer network can decrease the frequency and the severity of the flooding’s, and in the WB the shortage of water in the summer can cause sedimentation in the pipes which can cause partial or full blockage hence, a flooding.

The following Charts (3.3.3 & 3.3.4) presents the distribution of the service providers based on the frequency of the flooding occurrences in their networks.

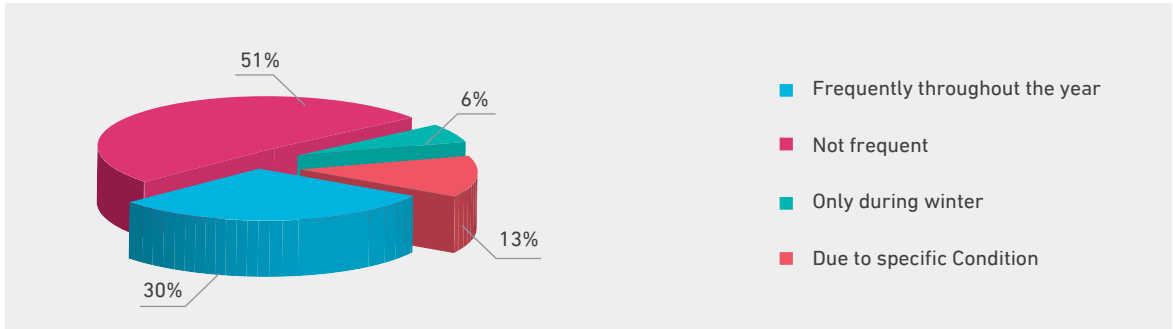


Chart 3.3.3: Flooding Frequency – West Bank

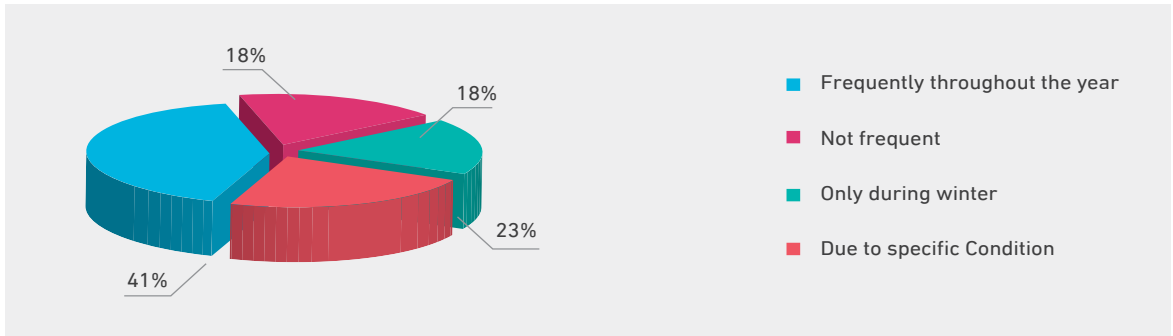


Chart 3.3.4: Flooding Frequency - Gaza

In the WB over half of the respondents (51%) have stated that their network does not experience frequent flooding’s throughout the year, while a third of the SP’s have stated that flooding is frequent in their sewer network, and the rest did have flooding but it was for a specific condition such as faulty implementation and sometimes due to the lack of water in the summer as the solids start to sediment in some sections of the network or just in the winter due to heavy rain.

In GS, over 40% of the SP’s experienced frequent flooding’s and an equal percentage said that it is frequent but can be tied to specific conditions or just in the winter, and only 18% of SP’s have stated that flooding is infrequent in their sewer network.

3.3.4 Destination of Collected wastewater

The main goal of the wastewater services is to transfer wastewater from the customers in the area of service to wastewater treatment plant so that the wastewater is treated to a certain degree depending on its final destination, whether it is to be reused or to be discharged into the environment, in order to negate the effects of the untreated wastewater on the population and the environment.

Unfortunately, the capacities of the service providers in Palestine does not enable them to provide the treatment service as described above, In the WB, only 43% of the service providers send wastewater collected in their network to a wastewater treatment plant. while 26% discharge raw sewage into wadis (valleys) and 31% cross the green line through an Israeli connection.

76% of tankers collected wastewater is discharged into wadis, and only 17% goes to wastewater treatment plants and the rest id discharged into a sewer network connected through an Israeli connection.

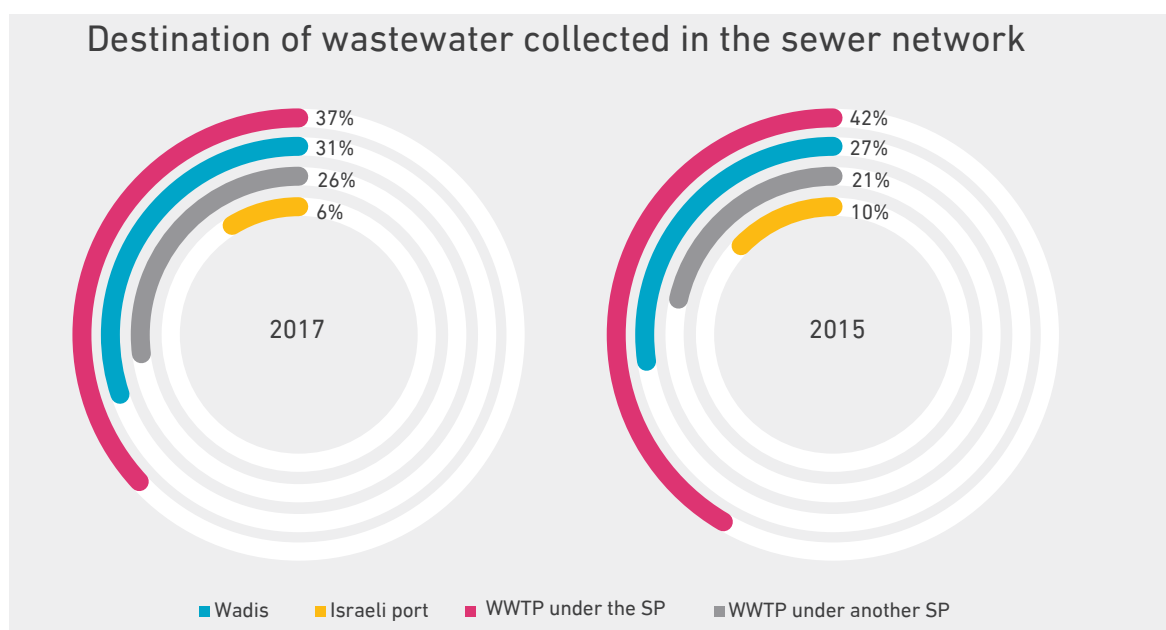


Chart 3.3.5: Destination of collected wastewater - West Bank

3.4 Wastewater Treatment

More than two thirds of the wastewater collected in the West Bank and Gaza is treated in wastewater treatment plants, in GS it is over 90% of the collected wastewater and around 35% in the West Bank, the treated volumes are outlined in the general quantitative summary, but it should be noted that not all treated wastewater is in compliance with the relevant specifications and standards as many of the wastewater treatment plants do not operate as efficiently as it should.

3.4.1 Technologies, Capacities and population served by WWTP's

There are twenty-five wastewater treatment plants in Palestine, twenty in the WB and five in GS. In this survey, eight types of treatment technologies are being used in Palestine as shown in Chart 3.4.1.

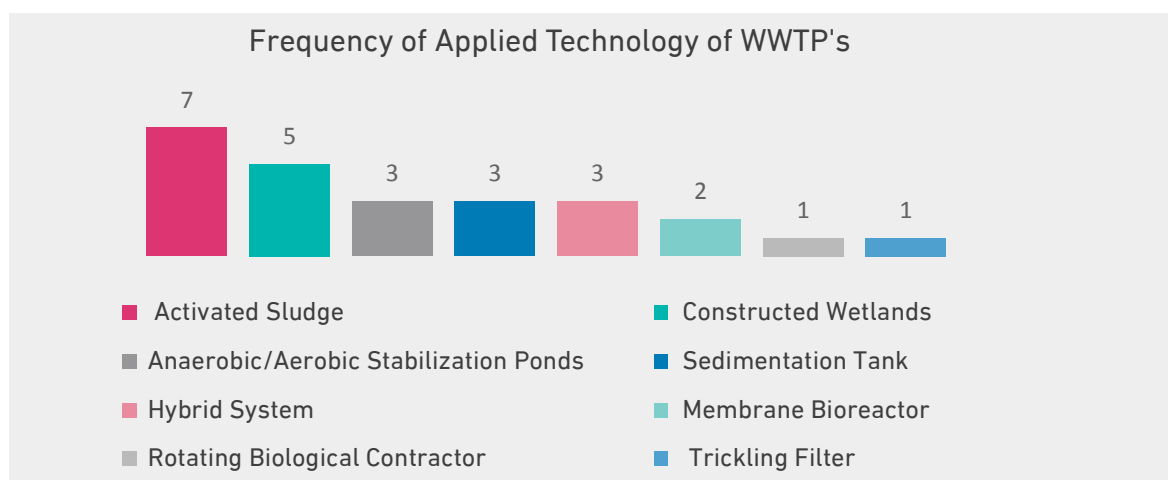


Chart 3.4.1: WWTP's Technologies in Palestine

- **Activated sludge:** 7 WWTPs have a total capacity of around 32,000 m³ per day, and serve a population of over 220,000.
- **Constructed Wetlands:** 5 WWTPs use constructed wetlands to provide primary treatment with a cumulative capacity close to 1000 m³ per day, and serve a population of around 11,000.
- **Sedimentation Tanks:** 3 WWTPs use sedimentation tanks to provide primary treatment (settling of suspended solids). Those tanks have a cumulative capacity of around 150 m³ per day and serve a population of for over 1000.
- **Anaerobic/Aerobic Stabilization Ponds:** 3 WWTPs use either anaerobic or aerobic stabilization ponds, with a cumulative capacity of 58,000 m³ per day, and serve a population of over 540,000.
- **Hybrid Systems:** Consists mainly of anaerobic lagoons-attached biofilm, re are 3 WWTP's that use this technology. All of them in GS, with a capacity of over 100,000 m³ per day, and serve a population of over 1.1 million inhabitants.
- **Membrane Bio-Reactors (MBR):** 2 WWTPs use this technology, both in Ramallah, with a cumulative capacity of 2,500 m³ per day, and serve a population of over 20,000.
- **Trickling Filter:** only 1 small WWTP uses this technology with a capacity of 15m³ per day, and serves a population of 250.
- **Rotating Biological Contractor:** only 1 WWTP, with a capacity of 450m³ per day, and serves a population of 2500.

The following Charts (3.4.2 & 3.4.3 & 3.4.4) presents each WWTP with its design capacity, actual average daily flow that reaches the wastewater treatment plant and the served population, the WWTP's have been distributed into three groups depending on the design capacity of the WWTP, the first group includes the WWTP's with low design capacities not exceeding 300m³/day, the second group includes WWTP's with capacities between 300-2500 m³/day and the third group includes WWTP's with a design capacity of at least 5000 m³/day.

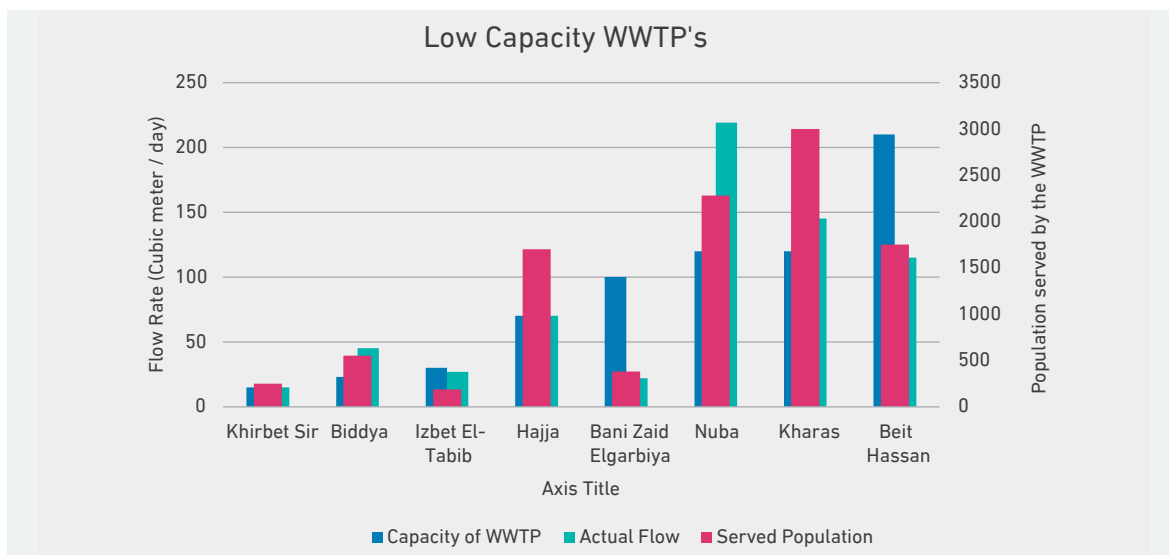


Chart 3.4.2: WWTP's Capacity & Actual flow (WWTP's with capacity under 300 m³/day)

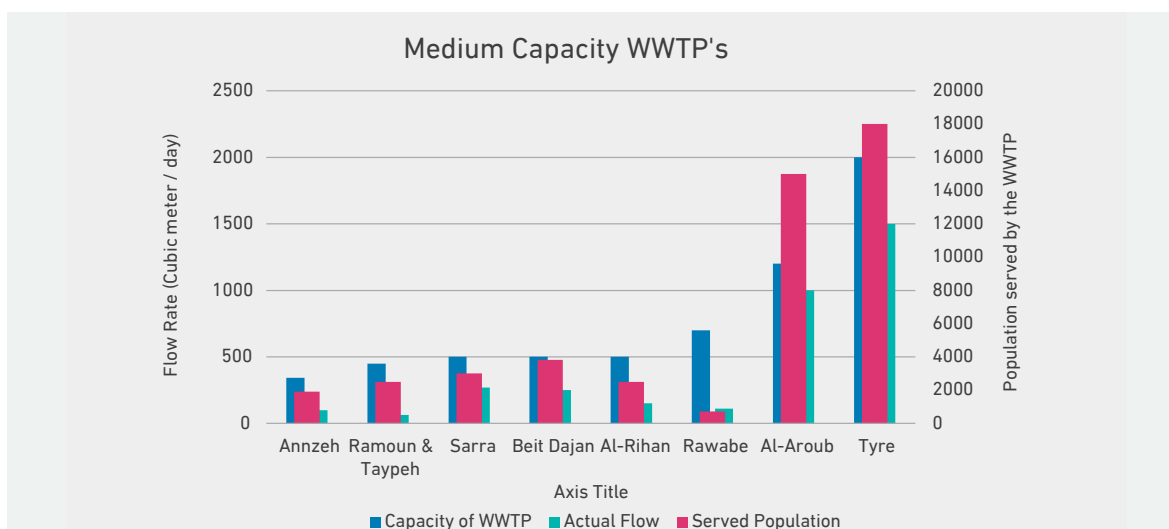


Chart 3.4.3: WWTP's Capacity & Actual flow (WWTP's with capacity between 300-2500 m³/day)

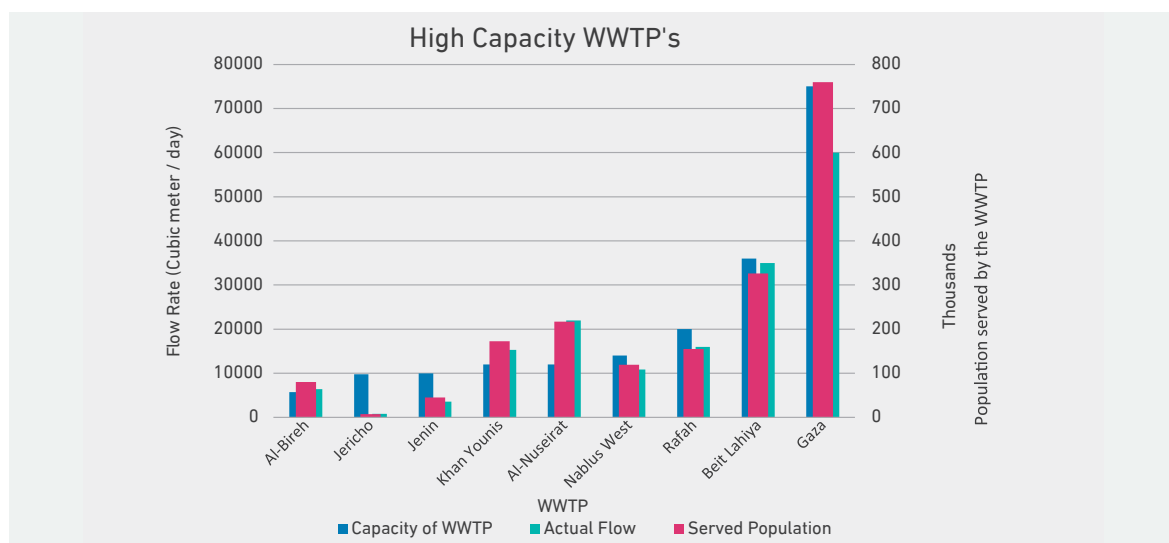


Chart 3.4.4: WWTP's Capacity & Actual flow (WWTP's with capacity above 5000 m³/day)

3.5 General Summary

In this section, the main quantitative information of the wastewater status in Palestine will be presented, those will include the sewerage coverage, the estimated volume of the collected wastewater and the volume of treated wastewater.

3.5.1 Sewerage Coverage

The sewer network coverage is the main indicator for identifying the level of the wastewater service, the sewerage coverage has increased in both the West Bank (by 5%) and in Gaza (by 6%) over the past two years. Two new service providers have started to provide the wastewater service in the WB (Kufr Al-Labad & Beit Lid), while GS had no change in the number of wastewater service providers, Chart 3.5.1 presents the sewerage coverage in Palestine.

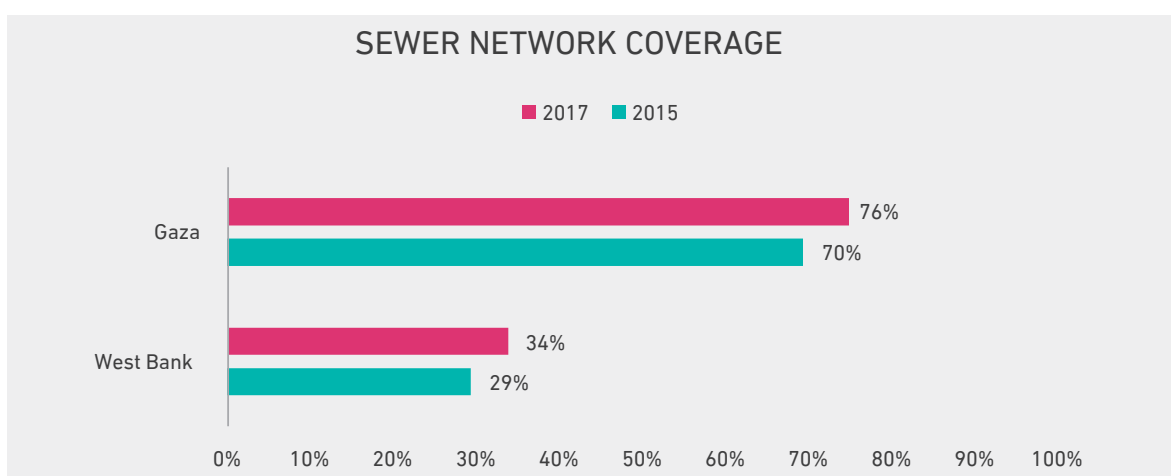


Chart 3.5.1: Sewerage Coverage - Palestine

3.5.2 Collected & Treated Wastewater

The Volume of the collected wastewater has also naturally increased in both West Bank and Gaza, whereas it increased by almost 3 million cubic meters of collected wastewater, for both WB and GS.

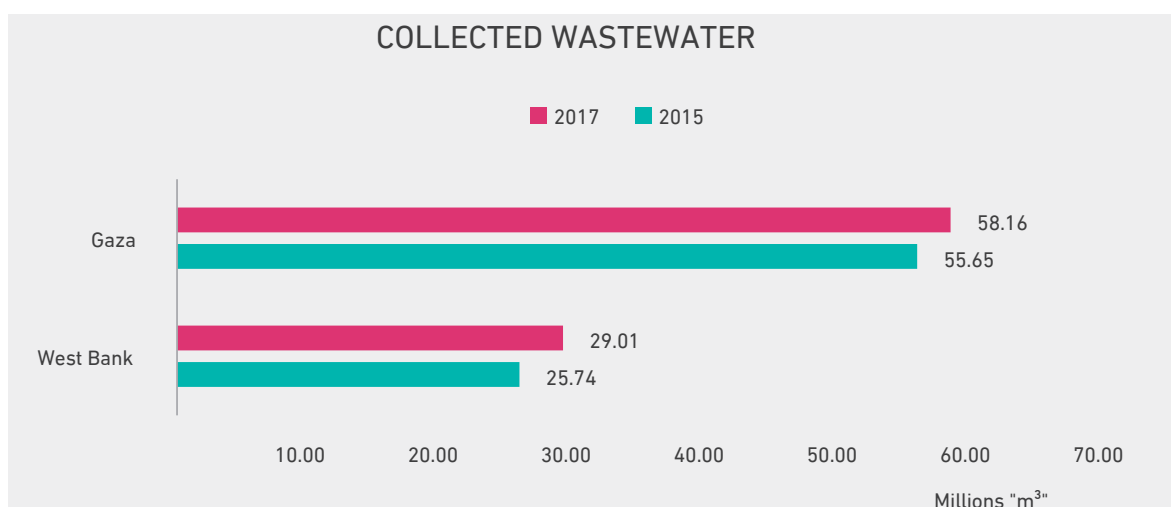


Chart 3.5.2: Volume of collected wastewater - Palestine

The volume of the collected wastewater was estimated based on the water consumption of the residents under the area of service and taking into account the coverage ratio and the expected losses due to consumptions and leakage (the council considers those losses to amount around 30% of the supplied water), and those estimations were compared with any relevant data that have been collected from the service providers themselves.

In the WB the collected volume of wastewater as obtained from the service providers amounted to just over 28 million cubic meters (those numbers were estimated by either the service provider themselves or by the council using the same concept that was explained in the past paragraph), and when taking the total amount of supplied water and multiplying it by the weighted sewerage coverage of the wastewater service providers (46%) and subtracting the 30% estimated losses, the volume of the collected wastewater was estimated to be around 29 Million Cubic meters, with a difference of less than 5% of the estimation based on the collaboration of the council and the service providers.

The same concept was applied to GS where the collected volume of wastewater was estimated to be around 58 million cubic meters, unfortunately the council was not able to follow the same process of estimation with the service providers in GS, but this Chart came in line with the total volume of treated wastewater which was obtained from the five wastewater treatment plants in GS which amounted to over 53 million cubic meters as illustrated in the following Chart 3.5.3.

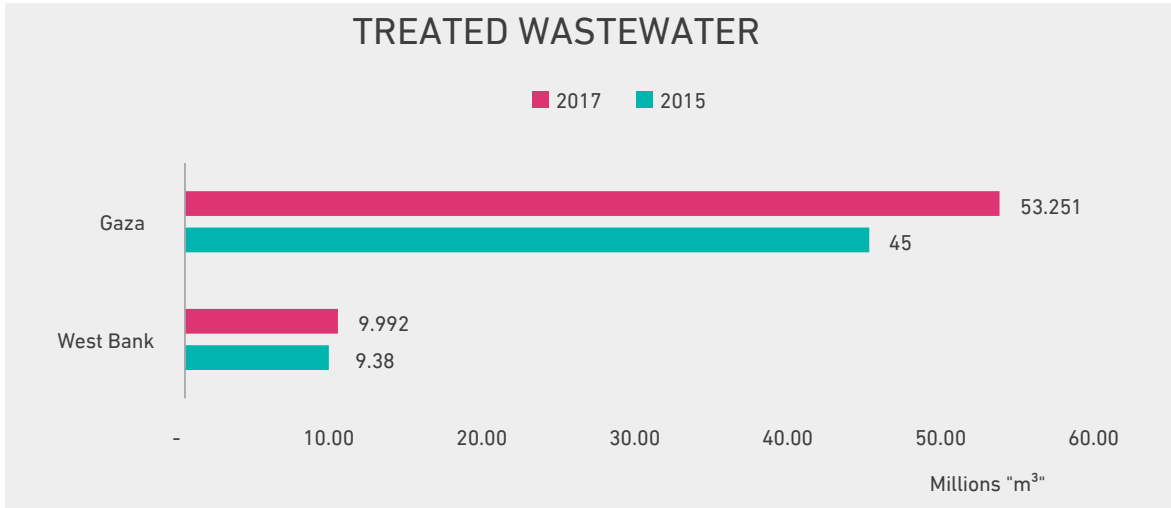


Chart 3.5.3: Volume of Treated Wastewater - Palestine

The treated wastewater has also increased in GS, by over 8 million cubic meters of wastewater, but in the WB, although many wastewater treatment plants have increased the quantity of treated wastewater, no significant change was observed and that can be attributed to the closure of three wastewater treatment plants between 2015 and 2017 (Tulkarem WWTP, Zeita North, and Zeita South WWTP) due to their inability to deal with the high volumes of the collected wastewater, the lack of routine maintenance of those plants and the lack of funding.

The volume of the treated wastewater shown in Chart 3.5.3 was obtained directly from the wastewater treatment plants.

3.6 Tariff and Financial Status

As mentioned in chapter (2), this section describes and presents the outcomes of the financial survey applied on only 64 WW SPs out of 71 in Palestine. The data includes 47 WW SPs in the West Bank and 17 WW SPs in GS.

The institutional framework of these 64 WWSPs which are included in the financial analysis, varies among utilities, municipalities, village councils and JSCs.

The WW SPs in the WB include 22 municipalities, 19 village Councils, 4 refugee camps, one utility and one JSC. However, all WW SPs in GS are municipalities except for the CMWU in Rafah. Tables 6.1 & 6.2 in the Annex describes the SPs included in this baseline study in depth.

According to the provided services; only 21 SPs out of 64 have WWTPs and provide WW treatment service; 16 of them operate in the WB & five in the GS. The other 43 SPs collect WW without treatment.

3.6.1 Wastewater Department

The results were different between the WB and the GS in the aspect of having a separate WW department in their institutions. Only 12 WW SPs in the WB (i.e. 26% of the total number), note that they do have a separate WW division. The situation looks better in the GS, as 10 municipalities out of 17 have a separate WW division.

Most of these SPs do not run WW operations in a separate department but work within the water department, under the supervision of the engineering directorate.

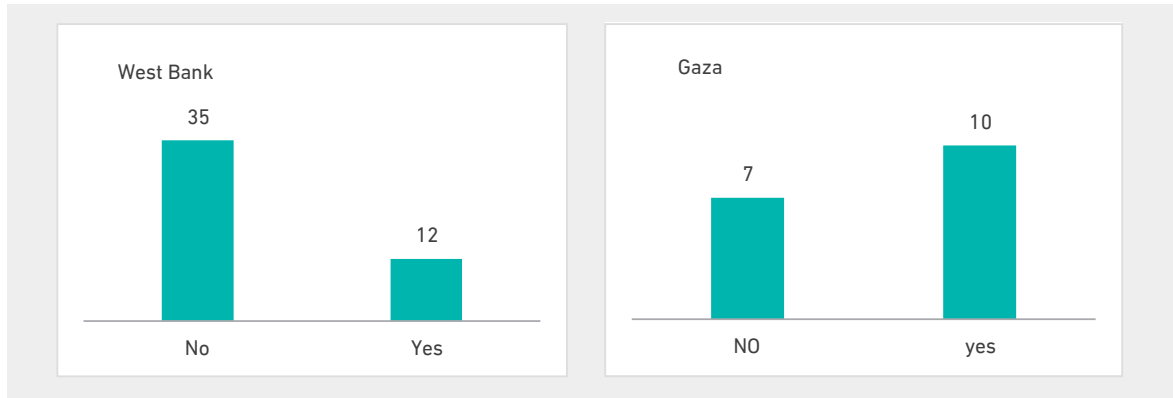


Chart 3.6.1: Separation of Wastewater Department

3.6.2 Accounting System

Most SPs use cash basis accounting. Recently, the general orientation for Ministry of Local Government (MOLG) started to encourage municipalities to convert their accounting systems into modified accrual accounting. This shift is meant to be made based on a preset schedule for the targeted municipalities.

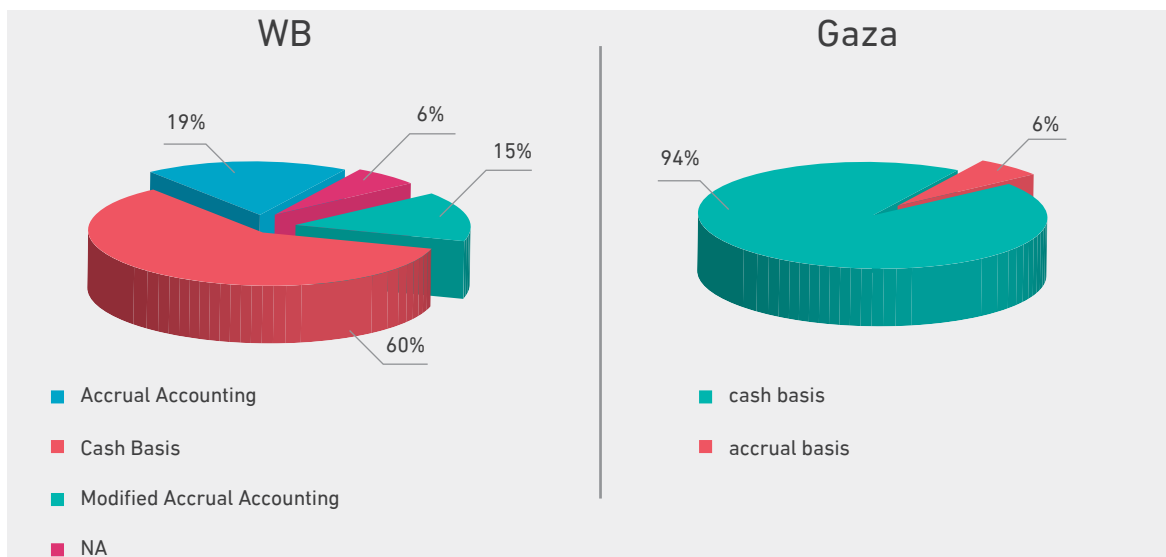


Chart 3.6.2: The Applied Accounting System

The results of our survey indicate that 60% of WW SPs in the WB apply cash basis accounting. The users of modified accrual accounting ranked second at 19%, followed by 15% for accrual accounting. The rest of the SPs did not provide answers.

As for WW SPs in the GS, only the CMWU in Rafah applies the accrual accounting system. Other municipalities still cleave to cash basis accounting. Some of them took preliminary steps forward to the modified accrual basis.

3.6.3 Billing Cycle

Most of the WW SPs issue a monthly bill. Nevertheless, some of them issue bills bi-monthly or yearly. Some SPs link the monthly fixed amount of WW to the electricity charges, others do not have a WW tariff in the first place

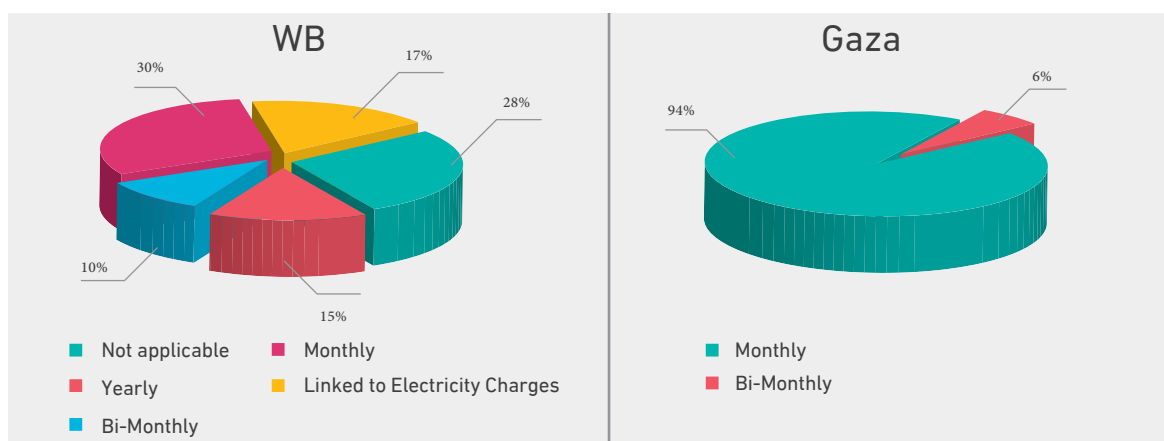


Chart 3.6.3: Wastewater Billing Cycle

As the charts stand, 30% of SPs in the WB issue a monthly bill for WW, 10% issue bills every two months, 15% issue a yearly bill and 17% of SPs link the monthly WW fees to the electricity charges. 13 SPs, which stand for 28% of SPs, do not issue bills at all since they do not have any tariff for WW. In plain English, they do not get paid for the service they provide.

In the GS, most SPs follow a monthly billing cycle for WW except Beit Lahiya Municipality that follows a bi-monthly billing system for WW bills.

3.6.4 Classification of Customers

Concerning the classification of customers into domestic, commercial, industrial and touristic, most WW SPs do not have this kind of classification. Even SPs which have classification for water customers, treat WW customers equally, and record the generated revenues from billed WW as a lump sum without distributing by the consumption type.

Most of the surveyed SPs in the WB stated that they do not classify WW consumers according to the type of consumption. In the GS, however, more than 50% said that they apply this classification of customers.

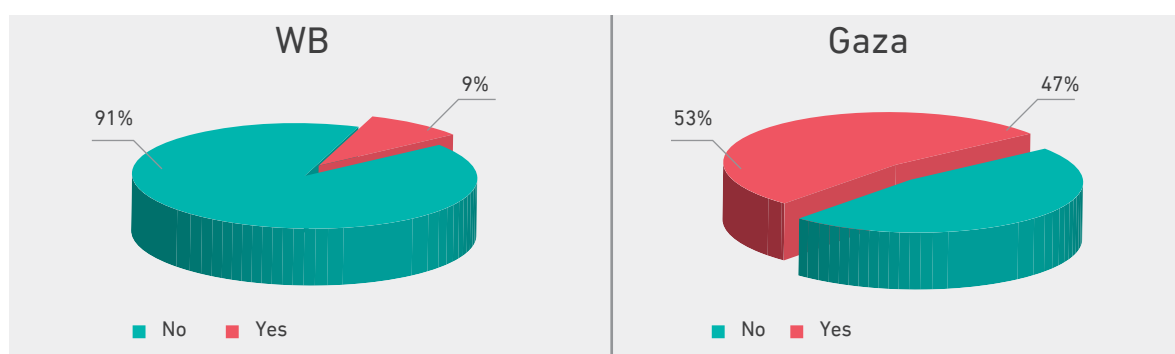


Chart 3.6.4: Classification of Wastewater Customers

3.6.5 Wastewater Tariff

Concerning the applied tariff of WW service, the following graphs show the results arrived at in the WB and the GS, respectively. As the results reveal, 38% of SPs in the WB charge a monthly fixed fee for WW service; 13% charge a yearly fixed fee, and 17% charge a fixed volumetric tariff based on the water consumption. The WSSA in Bethlehem is the only SP across the WB that applies a tariff to the WW as a percentage of the water consumption bill (i.e. 28% of water bill). Ramallah, on the other hand, is the only SP in both the WB and the GS that applies a tariff based on built area (0.45 JD per m²).

On that account, 13 SPs out of 47 in the WB, which were covered in this baseline survey, have no tariff for WW. For the GS, more than 80% of SPs have a WW tariff as a percentage of the water bill. Some charge 15%; another charges 25% of the water bill. Still, the rest of the SPs in the GS charge a monthly fixed fee for WW service.

As this baseline survey shows, all SPs have the same amount of WW tariff (fees) for all customers regardless of their consumption type. Standing out of the crowd, CMWU in Rafah charge NIS 30 for domestic consumption and NIS 60 for commercial consumption, and Beit Hanun municipality charge 25% of the water bill for domestic use and 30% for industrial use.

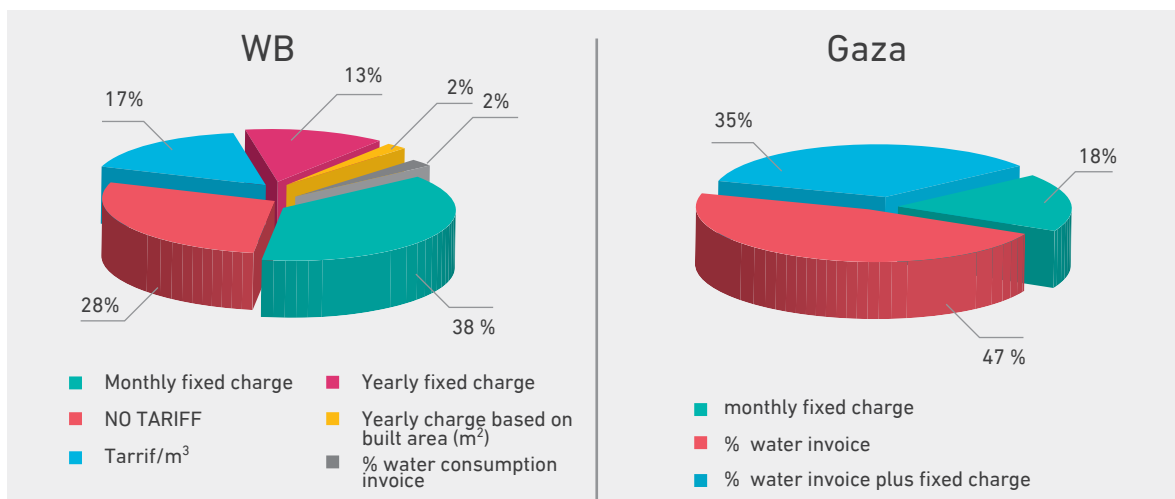


Chart 3.6.5: Wastewater Tariff

Based on charts above, 20% of wastewater collected in the sewer network in the WB was not billed. This also implies that 23,058 wastewater connections in the WB are using the service without paying for it.

Table 3.6.1: List of SPs with No Wastewater Tariff

#	Name of SP	Wastewater Collected (m ³)	WWTP service	# of WW Connections
1	Al Arrub Camp	220,000	Yes	1,200
2	Al Fawwar Camp	214,620	No	1,800
3	Al Jalazun Camp	136,638	No	4,500
4	Al Jeeb	129,730	No	800
5	Al Ram	749,637	No	1,141
6	Al Zayeem	136,615	No	400
7	Azmout	22,404	No	400
8	Barta'a	135,967	No	554
9	Beit Hasan	23,000	Yes	120
10	Hebron	3,650,000	No	9,863
11	Iktaba	27,500	No	250
12	Qalandiya	2,192	No	130
13	Qalandiya Camp	174,887	No	1,900

As the figure unveils, there is a recent increase in the number of SPs that started to implement WW tariff in the WB. For SPs in the GS, the WW tariff was used and implemented earlier than their counterparts in the WB.

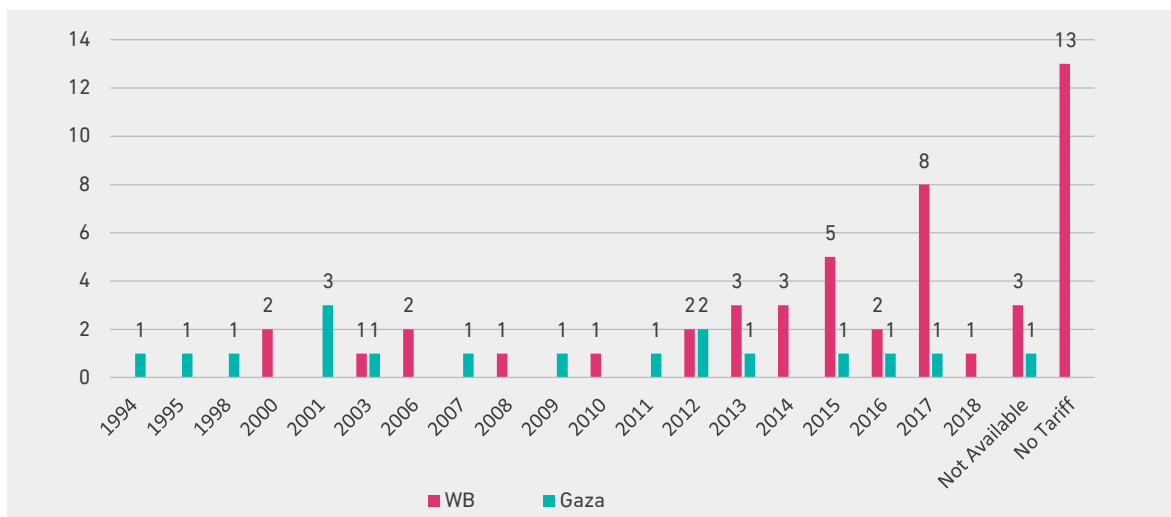


Chart 3.6.6: Wastewater Tariff Implementation Date

For most SPs, the municipality or the village council was the party who approved the tariff for WW. Some of them have approved the tariff in coordination with MOLG and/or PWA.

For most of SPs, customers receive one bill for both water and WW. 16 SPs out of 34 in the WB that have a WW tariff use the one bill system. The remaining 18 SPs issue a separate bill for WW or, in some cases, link it to the electricity charges. On the other hand, all SPs in the GS issue one bill for water and WW services.

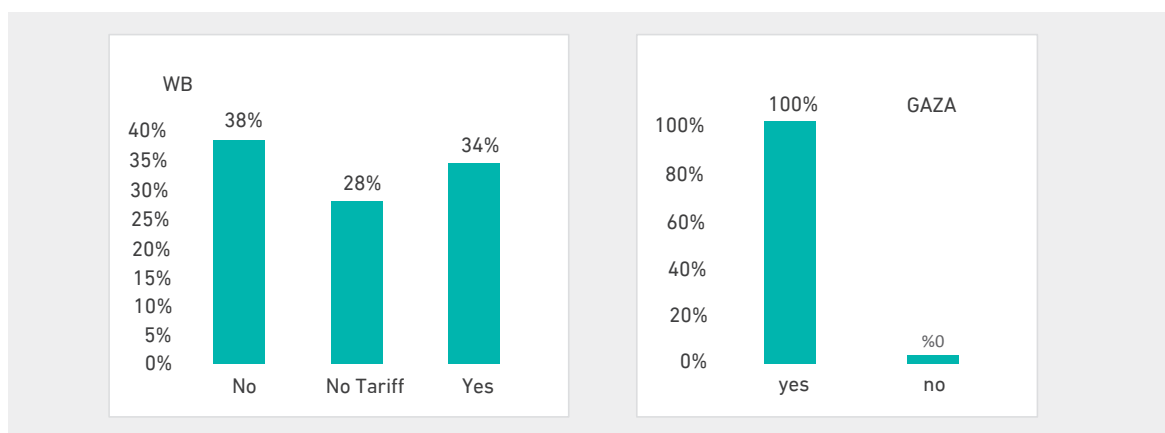


Chart 3.6.7: Receiving a Single Bill for Water & Wastewater

3.6.6 WW Treatment Revenues

Only a small percentage of SPs with WWTPs sell and generate revenues out of treated WW. For example, in the WB and the GS; there are 21 SPs -included in this financial analysis- provide treatment service. Only four of them generated revenues in 2017 by selling the treated quantities. Most SPs with WWTPs do not benefit from treated quantities. Encouraging farmers to use it, SPs would offer it for free to them. In the GS, for example, 53,251,800 m³ was treated during 2017 at a total cost of approximately NIS 2.76 million with zero revenues in return. Of note, the cost does not include the treatment cost of Beit Lahiya WWTP. For the 16 SPs in the WB (out of 64 which have

been included in this financial analysis), the total treated quantity was 9,330,930 m³ in 2017 at a total cost of NIS 8.72 million. The total treated quantity and the total cost of treatment do not include the data for both Bani Zaid municipality and Al Arrub Camp. In the final analysis, the total generated revenues from selling these quantities amounted to NIS 0.23 million.

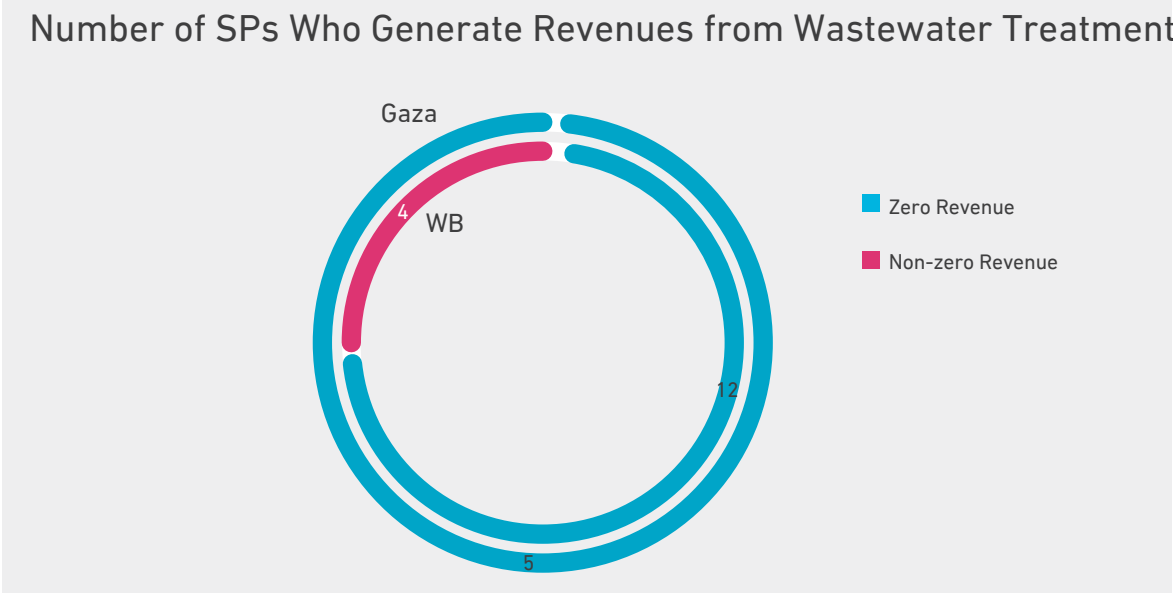


Chart 3.6.8:Wastewater Treatment Revenue

3.6.7 Separation of Wastewater Accounts Receivables

Some SPs do not separate their accounts receivables into A/R for water and A/R for WW. Instead, they crowd the total debt under one account called accounts receivables of customers. They tend to do this since it is easier for them because customers receive one bill for both services- not to mention the simplicity of the accounting and financial systems they use.

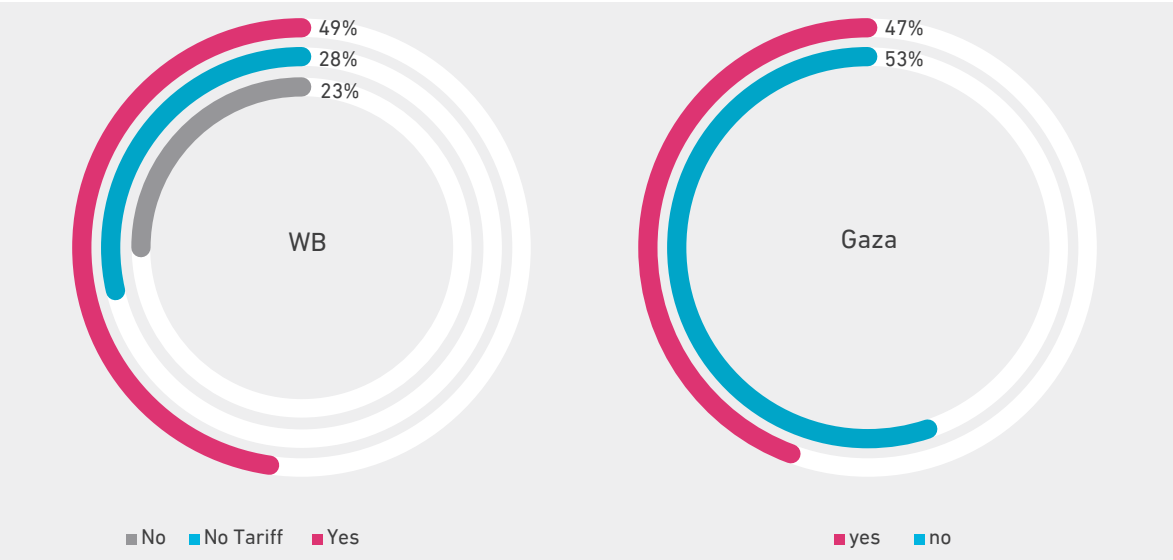


Chart 3.6.9: Separation of Wastewater Accounts Receivables

3.6.8 New Connection Fees

WW tariff varies among different SPs, so does the new connection fee. Some fees are imposed in NIS where others are in JD. In the WB, 47% of SPs have a lump sum connection fees that differ per use category. 23% of SPs charge the connection fee based on built/land area (per square meter). In the same vein, these fees differ per the use category.

8 SPs out of 47 (17%) in WB have zero-connection fees. In other words, SPs may include a new connection fee even if they have no WW tariff. Both Beit Hanina Municipality and Kherbit Sier Village Council have a zero-connection fee although they have a WW tariff. In the GS, all SPs charge a lump sum fees for WW new connections. In general, these fees tend to be lower in the GS compared to the WB as tables 6.3 and 6.4 show.

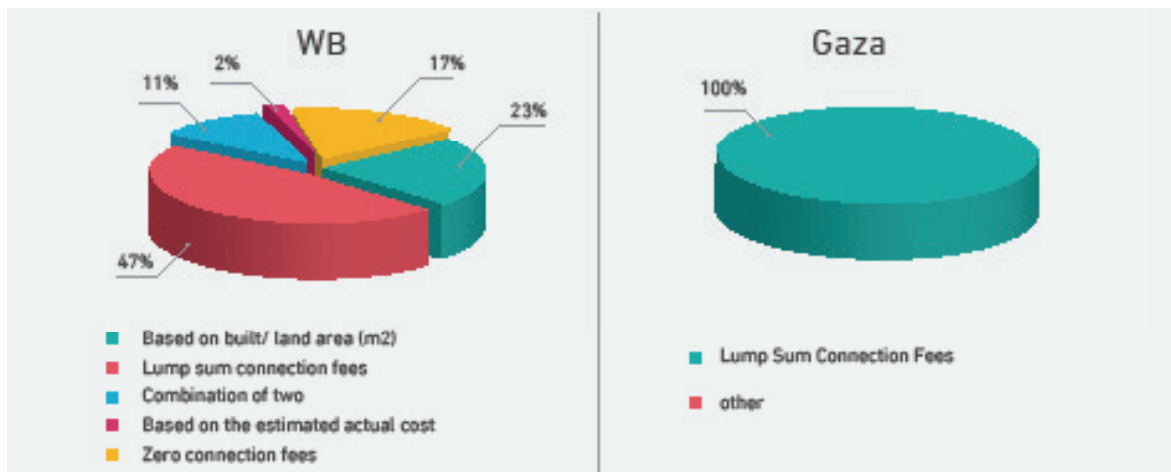


Chart 3.6.10: Wastewater New Connection Fees

3.6.9 Wastewater Revenues

In 2017, the total billed WW revenues of 64 SPs across the WB and the GS stood for NIS 45.61 million. Besides, the total collection amounts of bills in the same year amounted to NIS 28.03 million, indicating a collection rate of 61.5%.

A more in-depth look at the WB and the GS reveals that the situation is totally different. In 2017, the total billed revenue of 2017 in WB was NIS 20.29 million, and the collection amounted to NIS 21.54 million, (collections during the year include both invoices of the current year and previous debts) results in a 106% collection rate.

Collections in the year of 2017 include both collections of current year bills and collections of old debt/bills.)

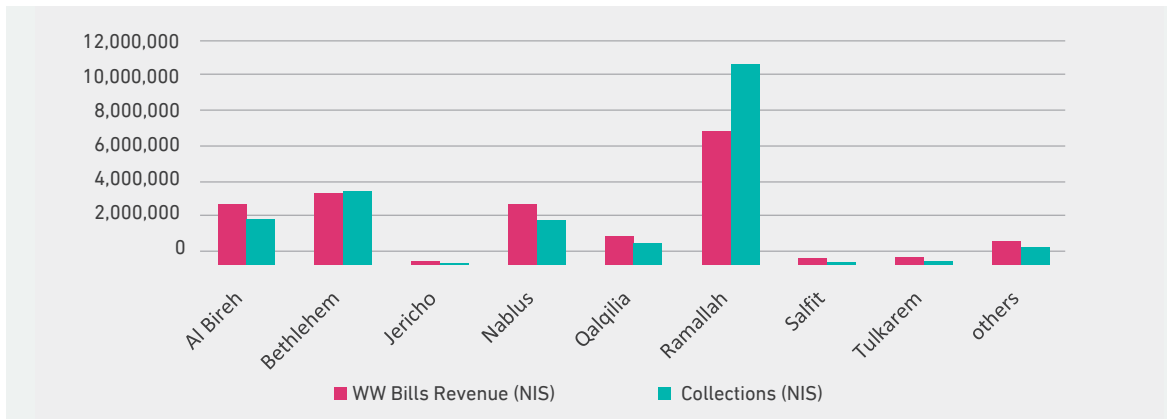


Chart 3.6.11: Revenues & Collections of Wastewater Bills in West Bank 2017

This overall increase of collection rate is driven by the high collection rates of both Ramallah municipality and WSSA of Bethlehem at 152% and 103%, respectively. If any, this improvement indicates the efficiency of collection. Linking WW fees to electricity charges through prepaid meters is another cause of the overall increase. This measure was implemented by some SPs, leading to a 100% collection rate, as in Baqa Al Sharqiyah, Bidya, Anza, Habla, Beit Dajan, Beit Lid, Izbat Salman and Khirbet Sier.

On the contrary, the GS demonstrate low collection rates compared to that of WB. In 2017, the total billed revenue was NIS 25.32 million, and the collection stood for NIS 6.49 million, and thus a 26% collection rate. Al Zahra municipality recorded the highest collection rate in the GS at 58%, followed by CMWU-Rafah and Jabalya municipalities.

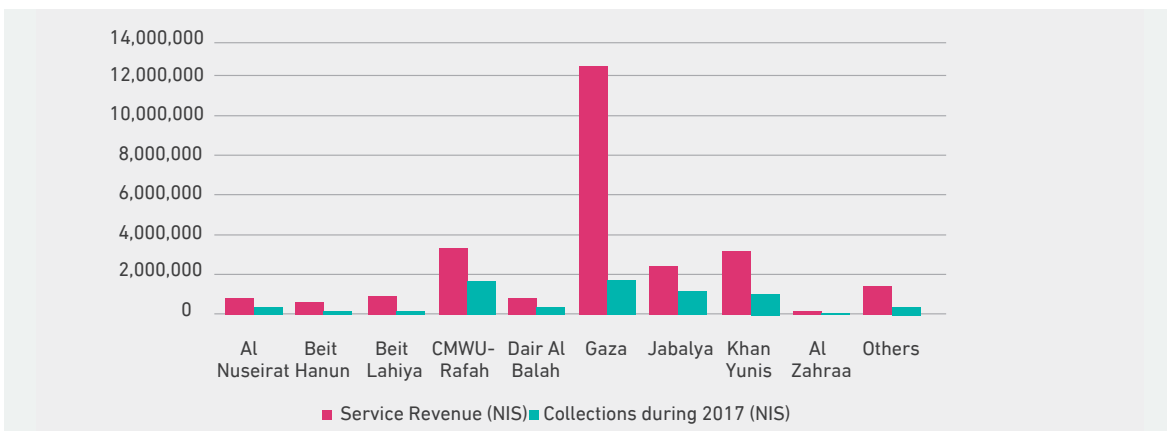


Chart 3.6.12: Revenues & Collections of Wastewater Bills in Gaza Strip 2017

In 2017, the total revenues generated from WW new connections fees in the WB reached NIS 16.27 million. The graph below shows that Hebron municipality gained the highest revenues, followed by Ramallah, Al Bireh and WSSA-Bethlehem, respectively.

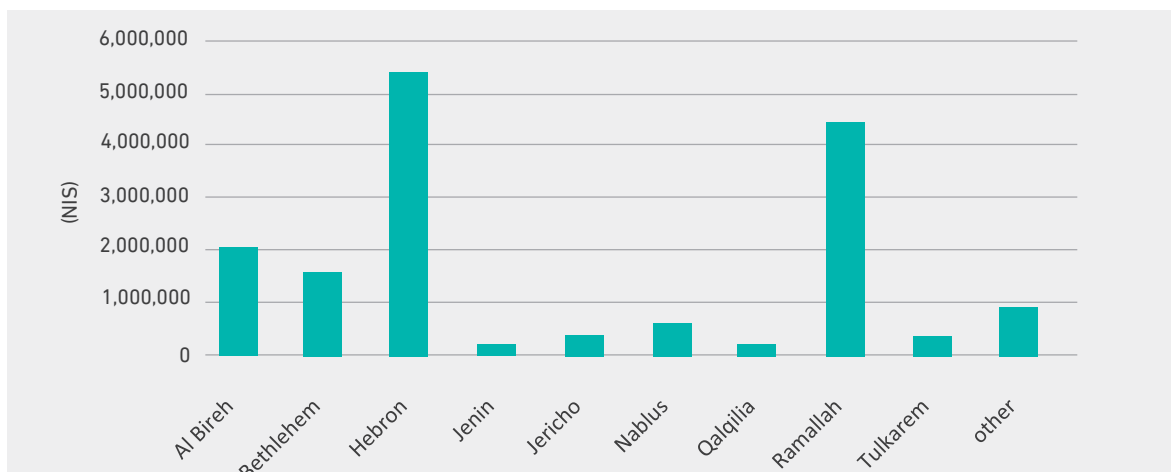


Chart 3.6.13: Revenue of Wastewater New Connection Fees in West Bank 2017

The total revenue from new connections in GS amounted to NIS 1.42 million. Khan Yunis municipality recorded the highest revenues followed by Jabalya municipality.

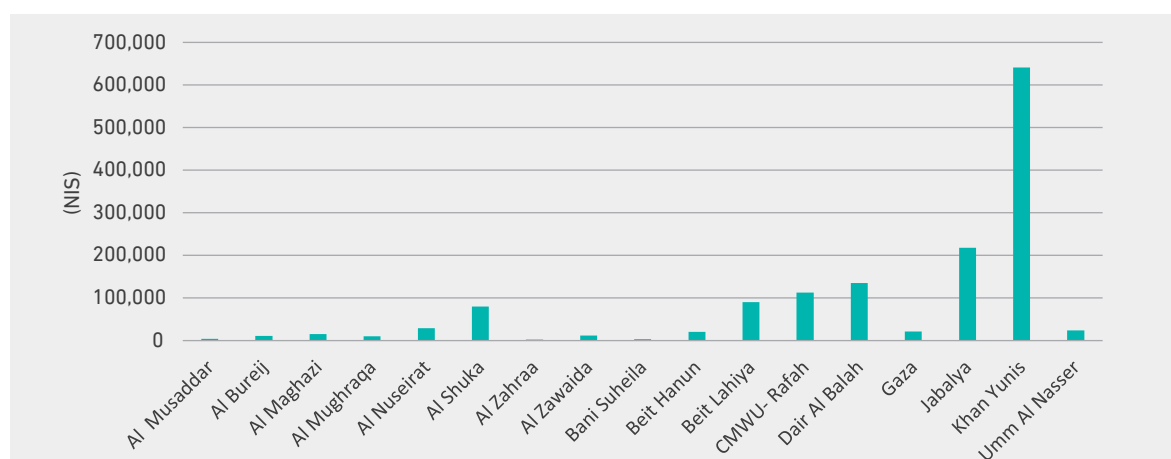


Chart 3.6.14: Revenue of Wastewater New Connection Fees in Gaza Strip 2017

3.6.10 Wastewater Costs

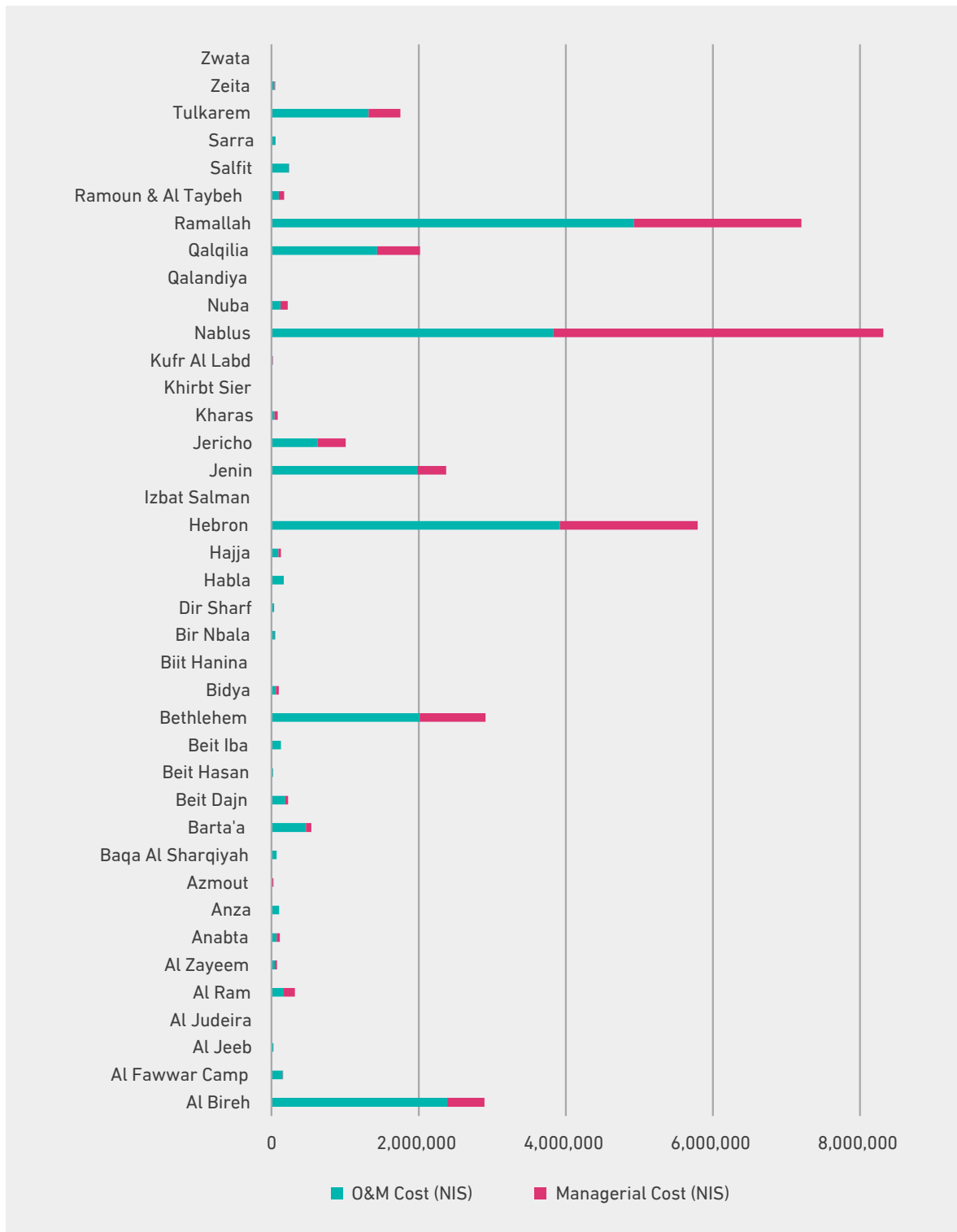


Chart 3.6.15: Wastewater Cost Structure in the West Bank 2017

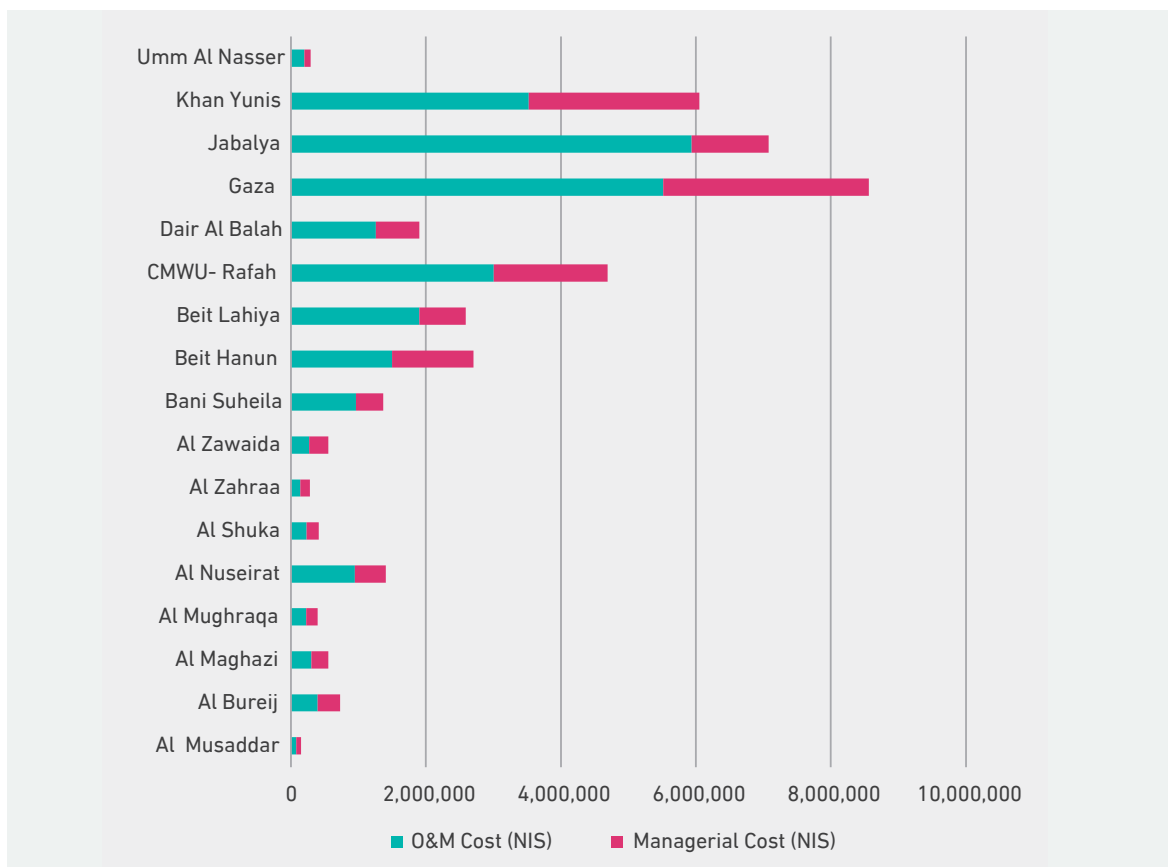


Chart 3.6.16: Wastewater Cost Structure in Gaza Strip 2017

The two graphs above show the classification of WW into operational and administrative (managerial) costs per SP individually in the WB and the GS. It is evident that almost all SPs have higher operational costs than administrative costs.

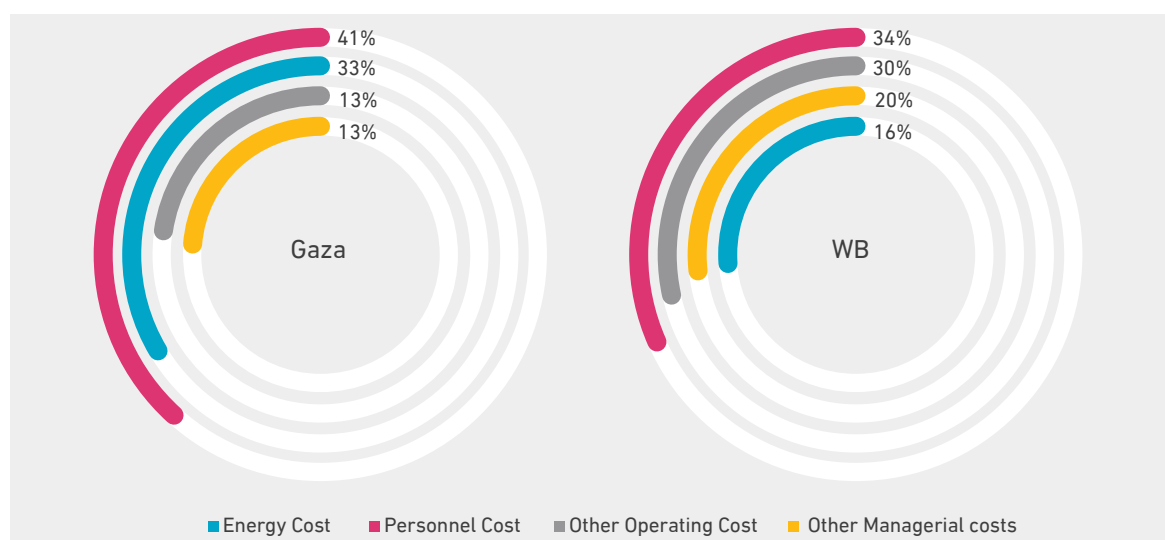


Chart 3.6.17: Cost Structure for Wastewater in Palestine 2017

Another classification of cost structure reveals that personnel costs rank first at 34% and stand for 41% of total WW costs in the WB and the GS, respectively. The second highest cost component in WB is the other operating cost (all other operational costs

except for energy and operational personnel costs). This cost includes, among others, maintenance and fleet costs. It constitutes 30% of the total cost. However, the second highest cost in the GS is the energy cost at 33% of the total costs.

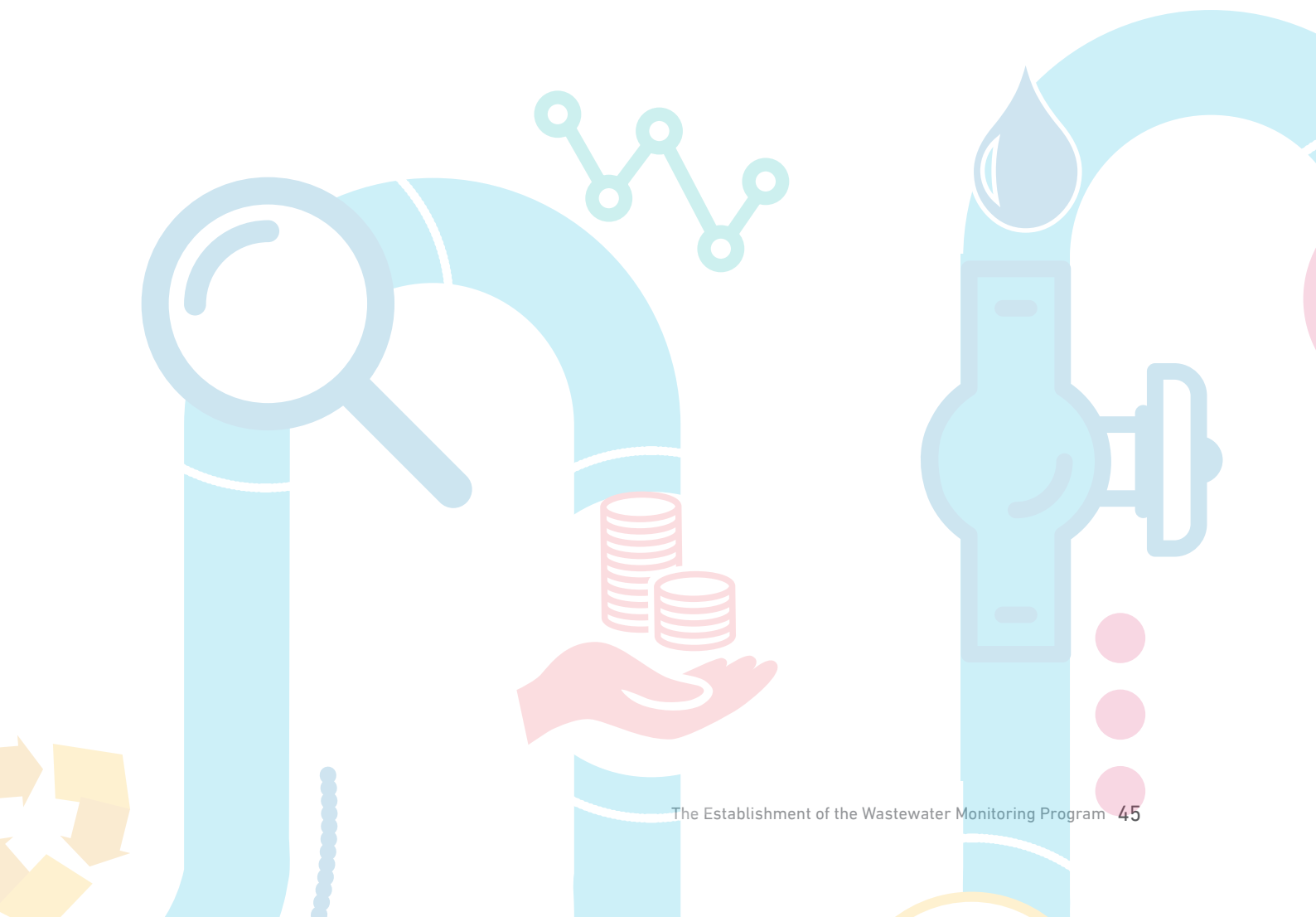
The total personnel cost is a combination of both administrative and operational costs.

3.6.11 Wastewater Fixed Assets

The net book value of total fixed assets cost of WW is NIS 921.33 million as of 31/12/2017 in WB and GS, based on the available data obtained from SPs.

This figure is drawn from the available data and estimations by SPs. About 21 SPs have no record for fixed assets. Others record their assets without the depreciation. Eventually, only 31 SPs have provided answers for both; total cost of fixed assets and the accumulated depreciation at the end of 2017

4. Performance Indicators



The following indicators are based on the wastewater performance monitoring indicators index which is published by the water sector regulatory council as part of its monitoring program, and in this report, they have been divided into two categories, technical indicators, and financial indicators

4.1 Technical Indicators

Based on the collected data from 71 SPs,

The following table lists the technical indicators used for the wastewater monitoring program:

#	Indicator	Number of SPs Included
1	Sewer Network Coverage ratio	71
2	The ratio of collected wastewater to billed water	68
3	Wastewater Treatment Plant coverage ratio	22
4	The ratio of treated wastewater	22
5	Utilization of Wastewater treatment plant	22
6	Wastewater Reuse	8
7	Sludge Utilization	0
8	Average efficiency of the wastewater treatment process	8
9	Treated wastewater used for irrigation compliance	8
10	Staff Productivity Index	62

4.1.1 Sewerage Coverage

Indicator	WW.1 Sewerage Coverage
Description	The percentage of the population connected to the sewer network based on the total population in the area of the service provider
Main Obstacles	(1) The variables used for this indicator were estimated by the service provider and there were no measurements for verification. (2) Some service providers protested the coverage ratio as they cover a significant part of the area of service but the served population are not motivated to connect to the network (especially for new WW SP's like Jericho and Beit Lid)
Number of SPs Included	71 (54 in the WB and 17 in GS)

The summary of the results of this indicator are outlined in Chart 4.1.1 for the WB & GS, the following Chart divided the service providers based on their coverage ratio by five groups, with a bin size of 20%. The majority of the service providers in GS have a very high coverage ratio, unlike the WB where only 35% of the service providers have a high coverage ratio.

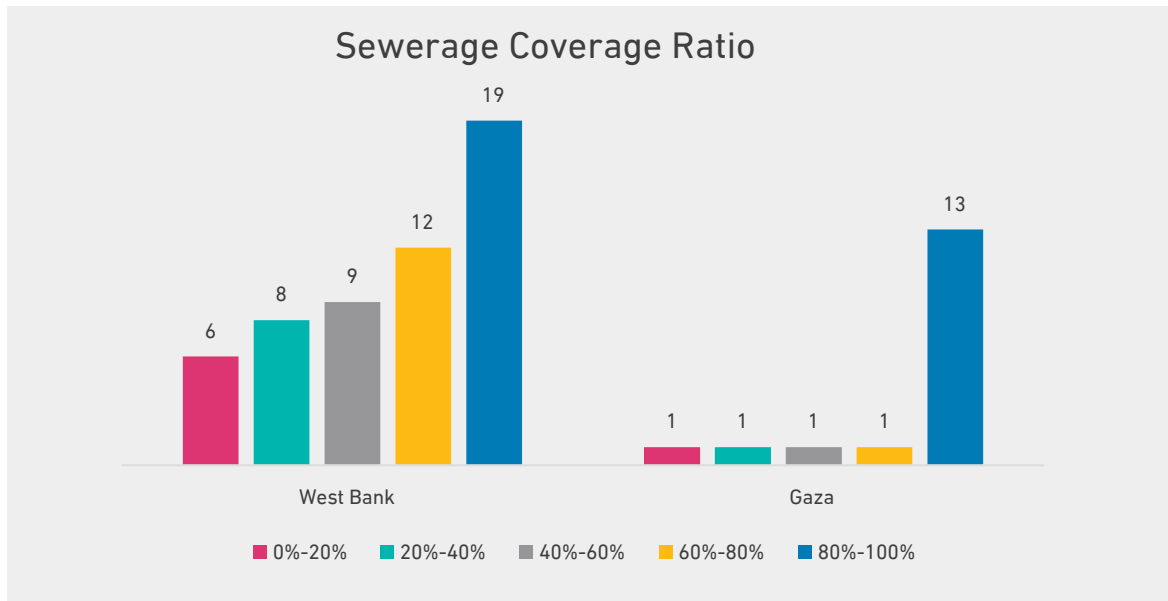


Chart 4.1.1: Sewerage Coverage Ratio (Groups)

Table 4.1.1 & 4.1.2 presents the indicator results for each service provider

Table 4.1.1: Sewerage Coverage Ratio – WB

SP Type	Service Provider	Coverage	SP Type	Service Provider	Coverage	SP Type	Service Provider	Coverage
Municipality	Jenin	82%	Village Council	Annzeh	95%	Refugee Camp	El Far'a Camp	44%
	Barta Al-Sharqiya	28%		Iktaba	21%		Jalazun Camp	96%
	Tulkarem	77%		Beit Dajan	85%		Qalandiya Camp	100%
	Anabta	79%		Sarra	100%		Al Fawwar Camp	100%
	Zeita	80%		Azmut	63%		Al Arroub Camp	100%
	Baq ash Sharqiya	76%		Beit Iba	50%	Joint Service Council	Ramoun and Al Taybeh	45%
	Beit Lid	21% *		Deir Sharaf	88%			
	Kufr Al-labad	60%		Zawata	50%	* The sewer network covers a higher ratio of the area of service but the population is not motivated to connect to the network, resulting in such a low coverage ratio.		
	Attil	5%		Beit Hassan	53%			
	Nablus	98%		Hajja	55%			
	Qalqilya	98%		Habla	78%			
	Salfit	37%		Izbat at Tabib	67%			
	Bediya	6%		Izbat Salman	85%			
	Ramallah	80%		Khirbt Sir	58%			
	Al Bireh	93%		Qalandiya	79%			
	Bani Zeid Al Gharbiya	4%		Beit Hanina	35%			
	Jericho	8% *		Al Judeira	94%			
	Al Ram	50%		Al Jib	90%			
	Bir Nabala	92%		An Nabi Samwil	77%			
	Anata Municipality	77%		Az Za'ayyem	65%			
	Hebron	70%		Ein Siniya	25%			
	Nuba	38%		Dura El Qare	33%			
	Kharas	38%		Jifna	7%			
Utility	WSSA	70%	Deir Samit	3%				

Table 4.1.2: Sewerage Coverage Ratio - GS

SP Type	Service Provider	Coverage
Municipality	Al Bureij	93%
	Al Maghazi	93%
	Al Mughraqa	82%
	Al Musaddar	58%
	Al Nuseirat	81%
	Al Shuka	18%
	Al Zahraa	84%
	Al Zawaida	93%
	Bani Suheila	32%
	Beit Hanun	82%
	Beit Lahiya	94%
	Dair al Balah	89%
	Gaza	89%
	Jabalya	93%
	Khan Yunis	80%
	Umm Al Naser	77%
Utility	Coastal Municipalities Water Utility - Rafah	93%

4.1.2 The Ratio of Collected Wastewater to Water Sold

Indicator	WW.2 The ratio of collected wastewater to water sold
Description	The ratio of the collected wastewater to the water sold, in other words, it is the amount of wastewater collected resulting from water consumption.
Main Obstacles	(1) The variables used for this indicator were estimated by the service provider and there were no clear measurements for verification. (2) The council was not able to obtain an estimation of the collected wastewater for each service providers in GS and therefore the same concept explained in section 3.5.2 was applied to all the service providers in GS.
Number of SPs Included	70 (53 in the WB & 17 in GS)

This indicator can be wielded for future planning to provide an estimation of the resultant WW from the water consumption. However, some of the results remain open to question. This can be attributed to three main factors: (i) inaccurate estimation of the collected WW; (ii) the population served by the sewer network, (iii) and the non-revenue water.

For example, the highest ratio in the WB was 222% for Al-Ram, followed by Anata with 182% whereas the highest ratio in the GS was in Al Mughraqa with 216%. The common factor of a high ratio with SPs is the high non-revenue water. To say the least, the non-revenue water in Anata and Al Mughraqa exceeds 60%. Although WSRC could estimate the non-revenue water of Al-Ram because the JWU is the water supplier and not the municipality. On the other hand, the ratio of Salfit stands at 148%, and the NRW is only 15%. If any, this lays the first two factors open to questions. To enhance the reliability of this indicator, WSRC should wield extra measures to ensure the accuracy of the collected information.

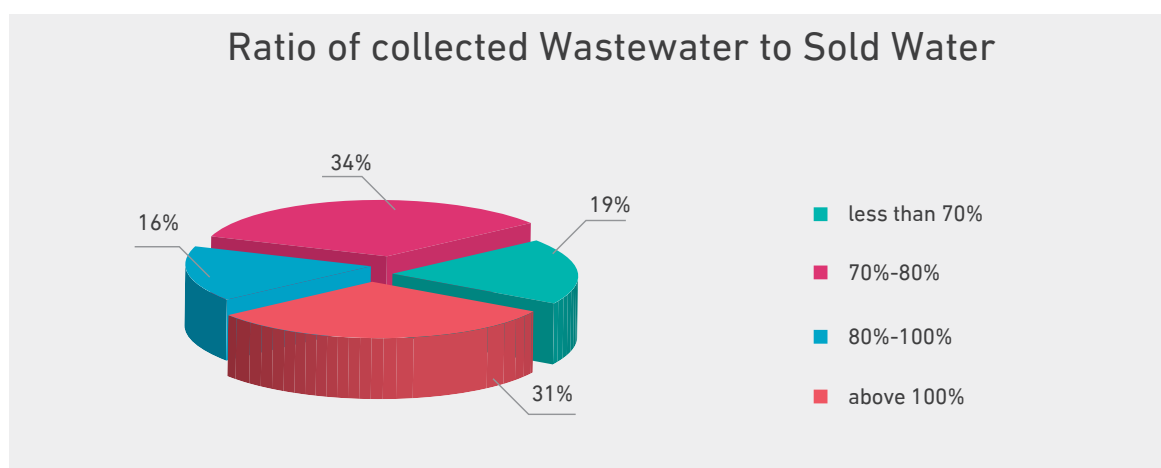


Chart 4.1.2: Ratio of collected wastewater to water sold - Palestine

Table 4.1.3: Ratio of collected wastewater to water sold - GS

Service Provider	Ratio of collected water to water sold (%)
Al Bureij	101%
Al Maghazi	118%
Al Mughraqa	216%
Al Musaddar	119%
Al Nuseirat	109%
Al Shuka	101%
Al Zahraa	96%
Al Zawaida	93%
Bani Suheila	105%
Beit Hanun	138%
Beit Lahiya	115%
Coastal Municipalities Water Utility - Rafah	103%
Dair al Balah	130%
Gaza	108%

Service Provider	Ratio of collected water to water sold (%)
Jabalya	122%
Khan Yunis	95%
Umm Al Naser	90%

Table 4.1.4: Ratio of collected wastewater to water sold - WB

Service Provider	Ratio of collected water to water sold (%)	Service Provider	Ratio of collected water to water sold (%)
Jenin	173%	Bediya	78%
Barta Al-Sharqiya	77%	Ramallah	71%
Anzeh	74%	Al Bireh	91%
El Far'a Camp	NA	Ramoun and Al Taybeh	29%
Tulkarem Municipality	80%	Bani Zeid Al Gharbiya	84%
Anabta	70%	Ein Siniya	69%
Zeita	70%	Jalazun Camp	70%
Baqash Sharqiya	69%	Dura El Qare	141%
Beit Lid	102%	Jifna	75%
Kufr Al-labad	67%	Jericho	155%
Iktaba	49%	Al Ram	224%
Attil	113%	Bir Nabala	73%
Nablus	113%	Qalandiya	70%
Beit Dajan	53%	Qalandiya Camp	70%
Sarra	69%	Beit Hanina	70%
Azmut	69%	Anata Municipality	188%
Beit Iba	74%	Al Judeira	68%
Deir Sharaf	80%	Al Jib	70%
Zawata	170%	An Nabi Samwil	70%
Beit Hassan	36%	Az Za'ayem	82%
Qalqilia	67%	WSSA	70%
Hajja	62%	Hebron	95%
Habla	70%	Nuba	113%
Izbat at Tabib	83%	Kharas	56%
Izbat Salman	70%	Deir Samit	70%
Khirbt Sir	70%	Al Fawwar Camp	70%
Salfeet	148%	Al Arroub Camp	73%

4.1.3 Wastewater treatment plant coverage ratio

Indicator	WW.3 Wastewater treatment plant coverage ratio
Description	The ratio of the population served by the WWTP's to the population served by the sewer network.
Main Obstacles	(1) Several wastewater treatment plants serve customers under other service providers, especially in GS.
Number of SPs Included	22 (17 in the WB and 5 in GS)

Most of the WWTP's are providing the treatment service to all customers connected to the sewer network under the service provider, however many wastewater treatment plants provides the treatment service for customers served by a sewer network under another service provider, the next table outlines the results for this indicator:

Table 4.1.5: Wastewater treatment plant coverage ratio

WWTP	WWTP's Coverage Ratio	WWTP	WWTP's Coverage Ratio
Jenin	100%	Al-Bireh	100%
Annzeh	100%	Ramoun & Taybeh	100%
Nablus West	55%*	Bani Zeid Al-Garbiya	95%
Beit Dajan	100%	Jericho	100%
Sarra	86%	Nuba	100%
Beit Hassan	100%	Kharas	86%
Hajja	98%	GAZA	100%
Izbet El Tabib	93%	Rafah	100%*
Siir	67%	Al Nuseirat	100%*
Biddya	92%	Beit Lahiya	100%*
Ramallah (Tyre)	98%	Khan Younis	100%

* Providing service for customers connected to sewer network under the management of other service providers.

4.1.4 The Percentage of Treated Wastewater

Indicator	WW.4 The percentage of the treated wastewater
Description	The ratio of the treated wastewater to the collected wastewater by the service provider.
Main Obstacles	(1) Many service providers lack the proper documentation of either or both the collected wastewater and the treated wastewater.
Number of SPs Included	22 (17 in the WB and 5 in GS)

The majority of WWTP's are treating the entire volume of wastewater collected through the network, however, there should be a distinction between WB and GS as GS's sewer networks covers the majority of GS and even the population that are not served by a sewer network dump their wastewater into the sewer network through tankers.

Table 4.1.6: The Percentage of the treated wastewater

WWTP	WWTP's Coverage Ratio	WWTP	WWTP's Coverage Ratio
Jenin	68%	Al-Bireh	100%
Anzeh	100%	Ramoun & Taybeh	100%
Nablus West	50%	Bani Zeid Al-Garbiya	100%
Beit Dajan	100%	Jericho	100%
Sarra	100%	Nuba	100%
Beit Hassan	100%	Kharas	100%
Hajja	100%	Gaza	100%
Izbet El Tabib	100%	Rafah	100%
Siir	20%	Al Nuseirat	100%
Bidya	98%	Beit Lahiya	100%
Ramallah	100%	Khan Younis	100%

4.1.5 Utilization of the wastewater treatment plants

Indicator	WW.5 Utilization of the wastewater treatment plants
Description	Measuring the capability of the wastewater treatment plant to receive the peak volume of collected wastewater on a daily basis.
Main Obstacles	(1) Many service providers lack the proper documentation of the volume of wastewater that enters the plant on a regular basis, and most service providers estimated the maximum volume received at the WWTP rather than obtaining from documentation.
Number of SPs Included	22 (17 in the WB and 5 in GS)

Almost half of the WWTP's are exceeding their design capacity which can reach up to four times of the design capacity, while four of the WWTP's did not even reach 50% utilization of the WWTP, the results of this indicator for each wastewater treatment plant can be seen in the following table:

Table 4.1.7: Utilization of WWTP's

WWTP	Utilization of WWTP (%)	WWTP	Utilization of WWTP (%)
Jenin	400%	Al-Bireh	131%
Annzeh	44%	Ramoun & Taybeh	18%
Nablus West	183%	Bani Zeid Al-Garbiya	50%
Beit Dajan	70%	Jericho	8%
Sarra	54%	Nuba	250%
Beit Hassan	60%	Kharas	125%
Hajja	129%	Gaza	100%
Izbet El Tabib	120%	Rafah	97%
Siir	133%	Al Nuseirat	60%
Bidya	196%	Beit Lahiya	80%
Ramallah	61%	Khan Younis	128%

4.1.6 Wastewater Reuse Ratio

Indicator	WW.6 Wastewater reuse
Description	The ratio of the treated wastewater that has been reused to the volume of treated wastewater.
Main Obstacles	(1) Many service providers lack the proper documentation of volume of wastewater that enters the plant on a regular basis.
Number of SPs Included	8 (7 in the WB and 1 in GS)

Only 8 service providers have an active reuse program, 7 out of the 8 are for irrigation purposes and all of them are in the WB, while only one for recharging of underground water in GS.

Table 4.1.8: Wastewater Reuse

Service providers	Wastewater Reuse	Service providers	Wastewater Reuse
Jenin	62%	Beit Lahiya	100%
Annzeh	100%	Bidya	31%
Nablus West	5%	Al Bireh	1%
Jericho	81%	Beit Hassan	76%

4.1.7 Sludge Utilization

Indicator	WW.7 Sludge Utilization
Description	The ratio of the sludge being reused to the sludge produced from the wastewater treatment process.
Main Obstacles	(1) There were no active sludge reuse programs. (2) Many service providers do not follow any clear procedure for documenting the amount of the sludge that is produced by the WWTP.
Number of SPs Included	0

None of the active wastewater treatment plants have stated that they utilized sludge for any kind of purpose.

4.1.8 Average efficiency of the wastewater treatment process

Indicator	WW.8 Average efficiency of the wastewater treatment plant
Description	The efficiency of the wastewater treatment process to remove BOD, COD, and TSS from the wastewater.
Main Obstacles	(1) The Majority of the WWTP's does not perform frequent testing of either the influent or the effluent, mainly due to the lack of materials and even a specialized lab at the WWTP .
Number of SPs Included	8 (3 in the WB and 5 in GS)

All WWTP's in the WB that followed the quality of their influent and effluent have achieved a high efficiency that is in line with the PWA 2014 strategy goals for the efficiency of the 's (95%), but on the other hand all of GS's wastewater treatment plants have failed to deliver the desired outcome due to the surrounding poor conditions such as the insufficient power supply and the high volume of wastewater that has exceeded the capacity of those plants.

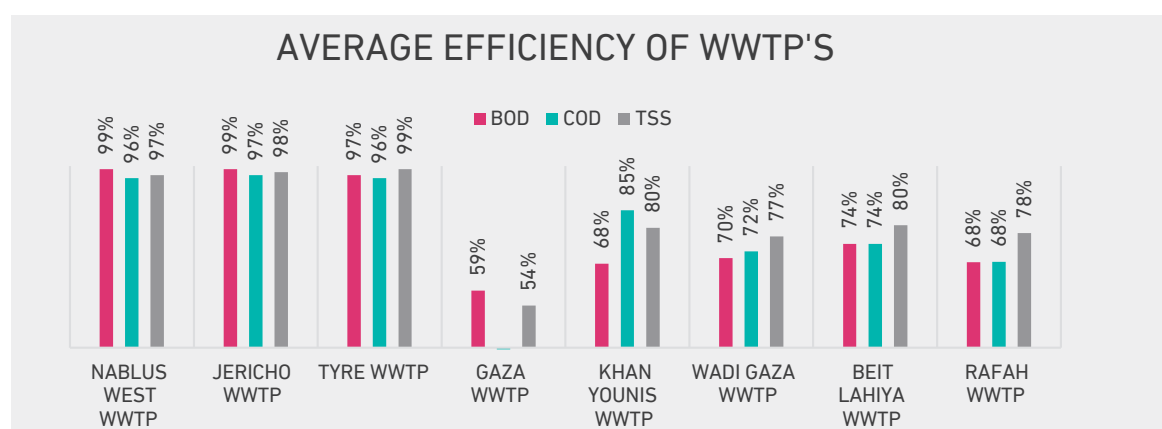


Chart 4.1.3: Average efficiency of the 's (BOD, COD & TSS)

4.1.9 Compliance of the treated wastewater with irrigation standards

Indicator	WW.9 Treated wastewater used for irrigation compliance
Description	Measures the compliance of the treated wastewater with the relevant Palestinian standards for irrigation.
Main Obstacles	(1) The Majority of WWTP's do not take frequent testing of either the influent or the effluent.
Number of SPs Included	8 (3 in the WB and 5 in GS)

All of the WWTP's in the WB that monitored the quality of their influent and effluent have achieved are compatible with the Palestinian specifications for the use of treated wastewater for irrigation purposes, it should be noted that these results are based on the lowest quality that can be used for irrigation. The situation in GS showed some stark differences, as the BOD & COD results have all crossed the maximum threshold for irrigation usage, TSS, on the other hand, showed better results and there were no tests performed to measure Total Nitrogen and Phosphorus in GS, as it requires some materials that are not available in GS due to the blockade.

Table 4.1.9: Compliance of the treated wastewater with irrigation standards (BOD, COD & TSS)

	BOD	COD	TSS	TN	P
Nablus West	87%	87%	57%	98%	89%
Tyre	87%	75%	94%	77%	76%
Jericho	75%	62%	96%	83%	92%
Gaza	-133%	NA	20%	NA	NA
KHAN YOUNIS	-92%	-15%	0%	NA	NA
Wadi Gaza	-33%	-75%	22%	NA	NA
BEIT LAHIYA	-17%	-50%	28%	NA	NA
RAFAH	-83%	-130%	0%	NA	NA

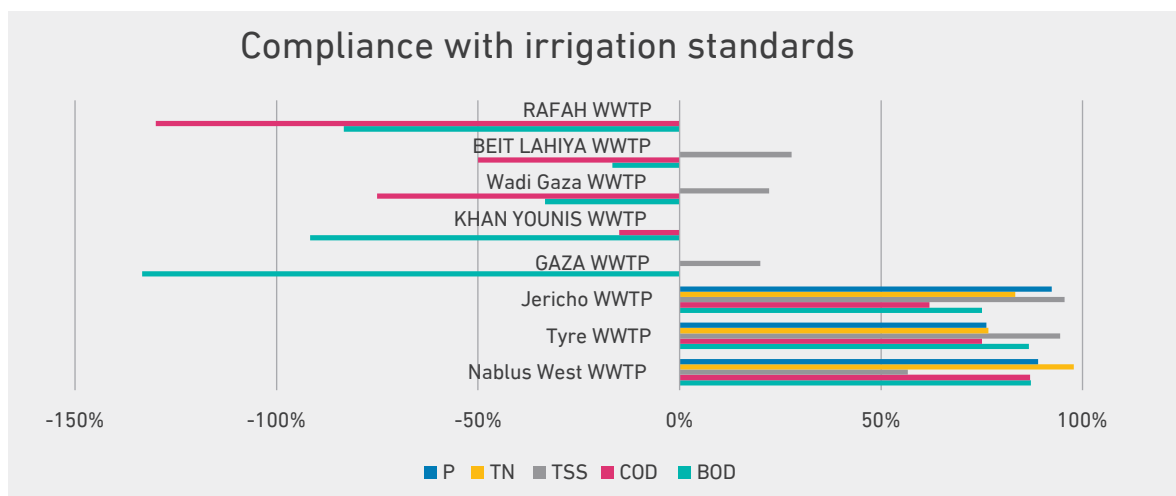


Chart 4.1.4: Compliance of the treated wastewater with irrigation standards (BOD, COD & TSS)

The results of this indicator can be divided into two groups, positive in which it indicates that the treated wastewater is in compliance with the Palestinian specification and any increase means that the concentration of the substance is lower, and negative which suggests that the treated wastewater is not in line with the Palestinian specifications and each time the results is lower means that the substance has a higher concentration.

4.1.10 Staff Productivity Index

Indicator	WW.10 Staff Productivity Index
Description	An indication of the sufficiency of the staff operating the wastewater service, and it illustrates the number of employees for each 1000 subscription.
Main Obstacles	(1) Many of the service provider's staff work on more than one issue leading up to difficulty in separating the staff working on the wastewater service from other services (eg: water) or tasks that the service provider. (2) This indicator applies only to the service providers with more than 1000 customers.
Number of SPs Included	29 (16 in the WB and 13 in GS)

This indicator included only the SPs that have over 1000 connections, which counted only 29 out of the 71 SPs. The results in the WB were close to those in the GS. The average of the staff productivity index was 2.2 and 2.1 in the WB and the GS, respectively. The standard deviation of the results was also close with 1.38 and 1.32 in the WB and the GS, respectively.

Table 4.1.10: Staff Productivity Index (employee per 1000 connections)

	Service Provider	Staff Productivity Index
West Bank	Jenin	1.9
	Tulkarm	1.5
	Anabta	2.2
	Nablus	4.1
	Qalqiliya	2.1
	Habla	0.6
	Salfit	2.9
	Ramallah	0.9
	Al-Bireh	0.6
	Al-Ram	4.4
	Bir Nabala	0.7
	Qalandiya Camp	1.6
	WSSA - Bethlehem	1.2
	Hebron	5.5
	AL-Fawwar Camp	2.2
	Al'Aroub Camp	2.5
Average	WB	2.2
Gaza Strip	Al Bureij	0.6
	Al Maghazi	1.6
	Al Nuseirat	1.1
	Al Zahraa	1.8
	Al Zawaida	1.3
	Bani Suheila	3.7
	Beit Hanun	1.4
	Beit Lahiya	2.1
	Coastal Municipalities Water Utility - Rafah	1.7
	Dair al Balah	1.3
	Gaza	2.1
	Jabalya	5.9
	Khan Yunis	2.6
Average	GS	2.1

4.2 Financial & Economic Indicators

Based on the baseline survey for 64 SPs, a number of financial and economic indicators have been chosen and employed to analyze the data for the wastewater sector in Palestine. The indicators are listed in the following table:

Table 4.2.1: List of Financial & Economic Indicators

#	Indicator	Number of SPs Included
1	Service Revenue (Billing Revenue)	46
2	Energy Cost	55
3	Administrative Cost	55
4	Personnel Cost	55
5	Wastewater Treatment Cost	18
6	Total Cost Coverage Ratio	55
7	Operating Cost Coverage Ratio	55
8	Return on Net Fixed Assets	29
9	Collection Efficiency of Wastewater Service	44
10	WW Treatment Cost Per m ³ of Treated Quantity	18
11	Net Surplus Per m ³ of Generated Wastewater	64

4.2.1 Service Revenue (Billing Revenue)

Indicator	WWF1. Service Revenue (WW Billing Revenue)
Description	This indicator shows the proportion of WW fees billed to customers during the assessment period to the total revenues of WW during the same period
Main Obstacles	1. Lack of information for SPs that lack a tariff for WW or other SPs that only started applying the tariff in 2017; 2. Absence of separate accounts for WW which complicates the process of providing answers.
Number of SPs Included	46: 29 in WB and 17 in GS

Chart 4.2.1 below shows the variation in WW billing revenue among different SPs. Most SPs are clustered in the last category with billing revenue greater than 81%. Of note, the SPs with no tariff for WW were excluded. A small number was also excluded due to the unavailability of the required data.

All municipalities in the GS have a WW tariff, and for most of them, the billing revenues make the most considerable portion of the total revenue of WW. In WB, however, some SPs have billing revenues of less than 20% form the total. This may refer to either the late adoption of a WW tariff during the year of the study as in Beit Lid and Kufr Al Labd, or to the rise of other operating revenues of WW, compared to that of billing revenues as in Anabta.

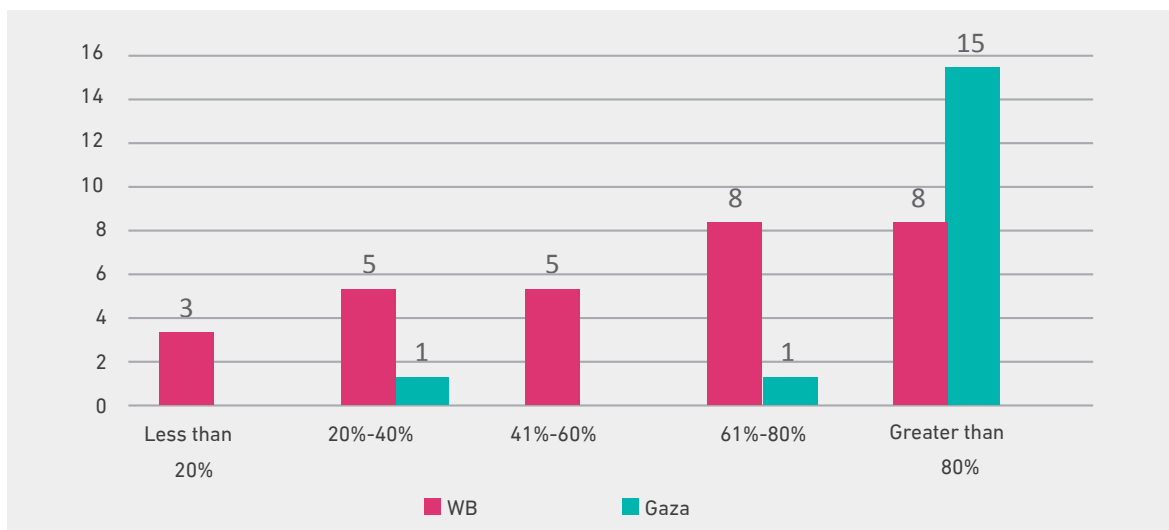


Chart 4.2.1: Classifying SPs According to The Billing Revenue (WWF1)

4.2.2 Energy Cost

Indicator	WWF2. Energy Cost
Description	This indicator shows the proportion of the WW energy cost to total costs of WW (without depreciation) during the assessment period
Main Obstacles	1. Absence of records or arbitrary estimations of costs in refugee camps; 2. Absence of separate accounts for WW which complicates the process of providing answers.
Number of SPs Included	55: 38 in WB and 17 in GS

Energy costs represent a small portion of the total costs of WW for most SPs. In fact, 38 SPs have energy costs less than 20%. Among them 18 SPs with zero WW energy costs. However, Jenin municipality has the highest energy costs with NIS 1.88 million standing for 79% of their total costs.

The following graph illustrates the classification of SPs by their energy costs in the WB & the GS

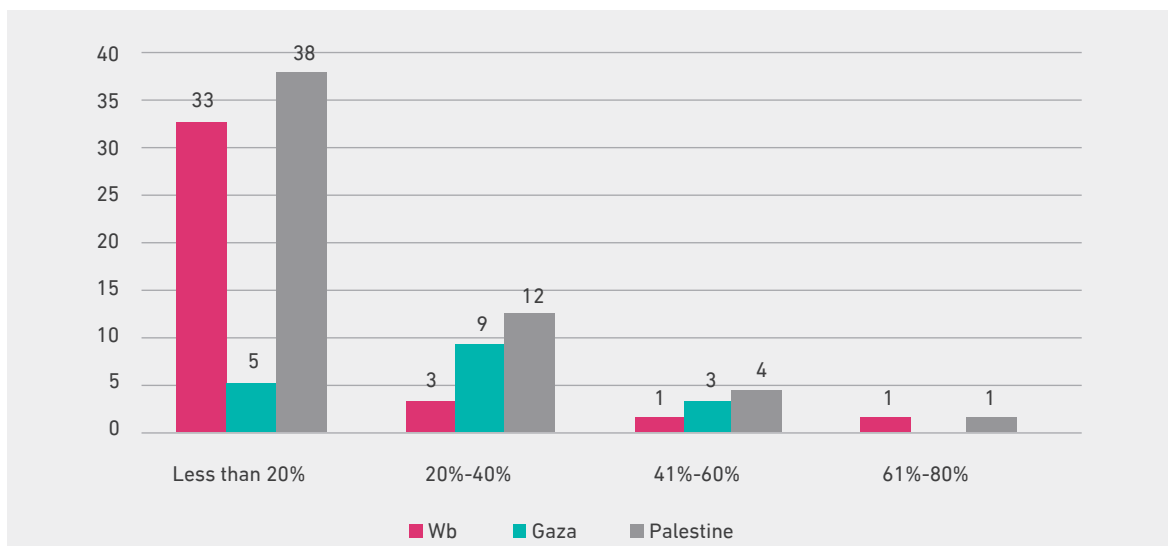


Chart 4.2.2: Classifying SPs According to the Energy Cost (WWF2)

4.2.3 Administrative Costs

Indicator	WWF3. Administrative Costs
Description	This indicator shows the proportion of the administrative costs of SPs to their total costs of WW (without depreciation) during the assessment period.
Main Obstacles	1. Absence of records or arbitrary estimations of costs in refugee camps; 2. Absence of separate accounts for WW which complicates the process of providing answers.
Number of SPs Included	55: 38 in WB and 17 in GS

Most SPs have a low percentage of administrative costs (i.e. less than 20%). However, looking at the WB and the GS separately; SPs in the GS seem to demonstrate a higher ratio than those in the WB, which reflects the efficiency in resource management.

In the GS, nevertheless, nine municipalities out of 17 have administrative costs that make more than 40% of their total costs, which is relatively high. Along these lines, Azmout Village Council stood for the highest administrative cost in 2017 at 64% of its total costs

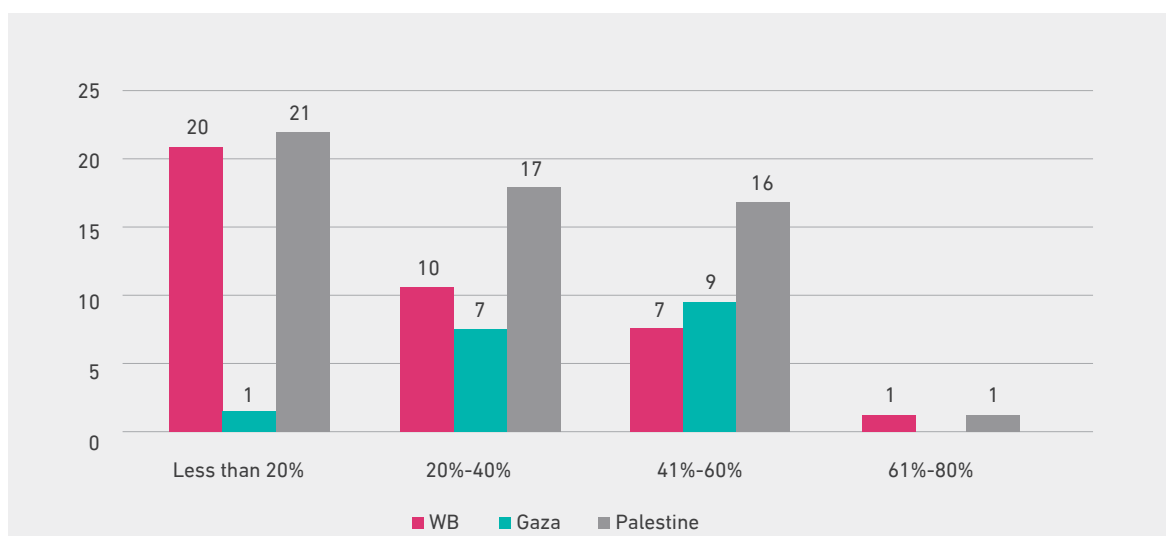


Chart 4.2.3: Classifying SPs According Administrative Costs (WWF3)

4.2.4 Personnel Cost

Indicator	WWF4. Personnel Cost
Description	This indicator measures the proportion of personnel cost to the total cost of WW the SPs shouldered (without depreciation) during the assessment period.
Main Obstacles	1. Lack of records or arbitrary estimations of costs in refugee camps 2. Lack of separate accounts for WW which complicates the process of providing answers; 3. Many SPs with the same personnel for both water and WW services were unable to estimate the portion of their contribution in WW service.
Number of SPs Included	55: 38 in WB and 17 in GS

23 SPs (42% of SPs in this survey) have personnel cost that ranges between 41%-60% of the total cost of WW. This cost includes both operational and administrative personnel costs. 7% of SPs fall within the last block recorded personnel cost greater than 80% of their total costs. Such a percentage is relatively high and may indicate an inefficient allocation of resources. Analyzing by region, SPs with the highest percentages of personnel costs are in the WB. Zeita and Baqa Al Sharqiya municipalities, for example, have a relatively high percentage of personnel costs with 85% and 92% respectively.

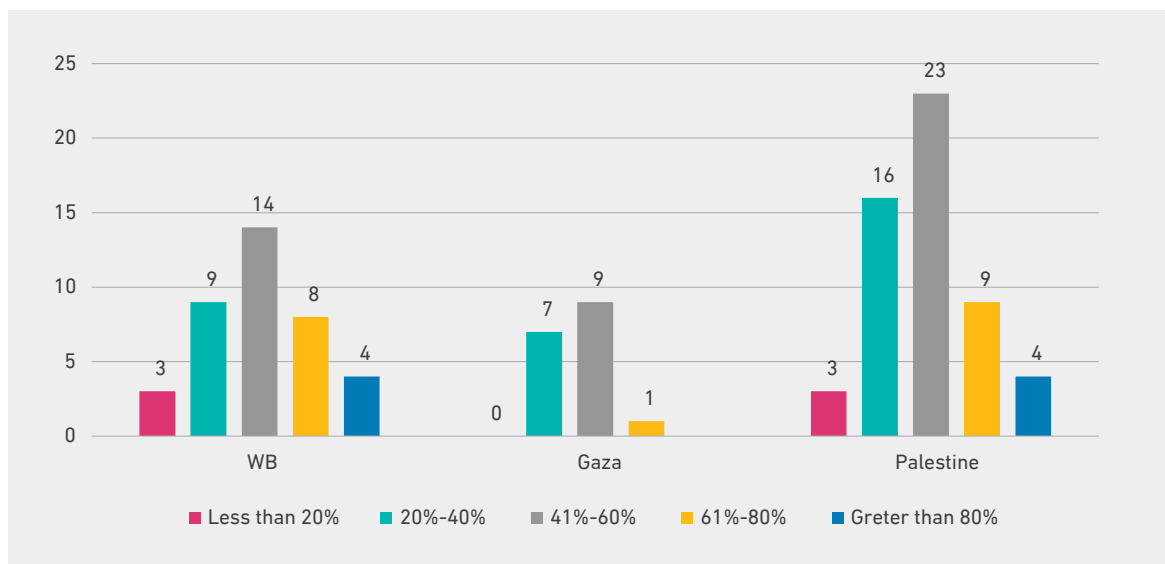


Chart 4.2.4: Classifying SPs According to Personnel Cost (WWF4)

4.2.5 Wastewater Treatment Cost

Indicator	WWF5. Wastewater Treatment Cost
Description	This indicator shows the proportion of WW treatment cost to the total cost of WW (without depreciation) during the assessment period (applied to SPs which have WWTPs only)
Main Obstacles	1. Absence of separation of accounts for water & wastewater; 2. Absence of separation of accounts for wastewater treatment plants only.
Number of SPs Included	18: 14 in WB and 4 in GS

As mentioned earlier, there are 21 SPs (out of 64 included in this survey) provide treatment service, and only 18 of them are included in this indicator. Bani Zaid Municipality was excluded because of the absence of water and WW accounts separation, which make the municipality unable to provide the required data. On the other hand, the Municipality of Beit Lahiya in GS, and Al Arrub Camp in WB were also excluded because of the lack of data.

For most SPs, the treatment cost is less than 40% of their total cost. Anza village council has the highest percentage of treatment costs, followed by Jericho and Al Bireh municipalities respectively.

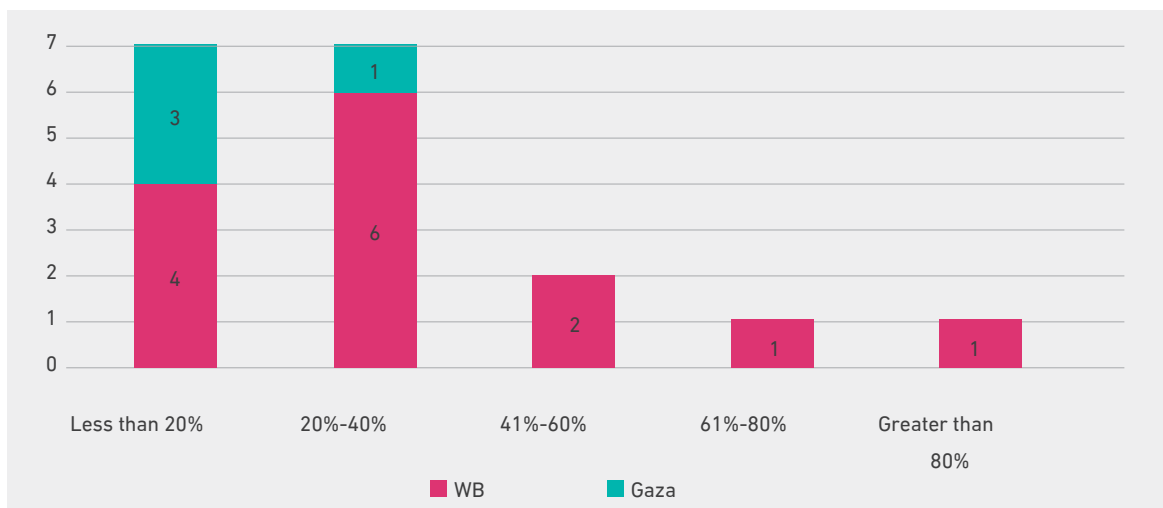


Chart 4.2.5: Classifying SPs According to Wastewater Treatment Cost (WWF5)

4.2.6 Total Cost Coverage Ratio

Indicator	WWF6. Total Cost Coverage Ratio
Description	This indicator shows the ability of SP to recover its total WW costs (operating & administrative without depreciation) through WW generated revenues during the assessment period
Main Obstacles	1. Absence of records or arbitrary estimations of costs in refugee camps and some small village councils; 2. Absence of separate accounts for WW which complicates the process of providing answers.
Number of SPs Included	55: 38 in WB and 17 in GS

This indicator shows that only 19 SPs out of 55 recovered their costs (without depreciation) by generating higher revenues than costs. This means that the rest of the SPs are operating in deficit. Therefore, according to current results, the wastewater tariff structure for many SPs shall be reviewed to improve the process of cost recovery.

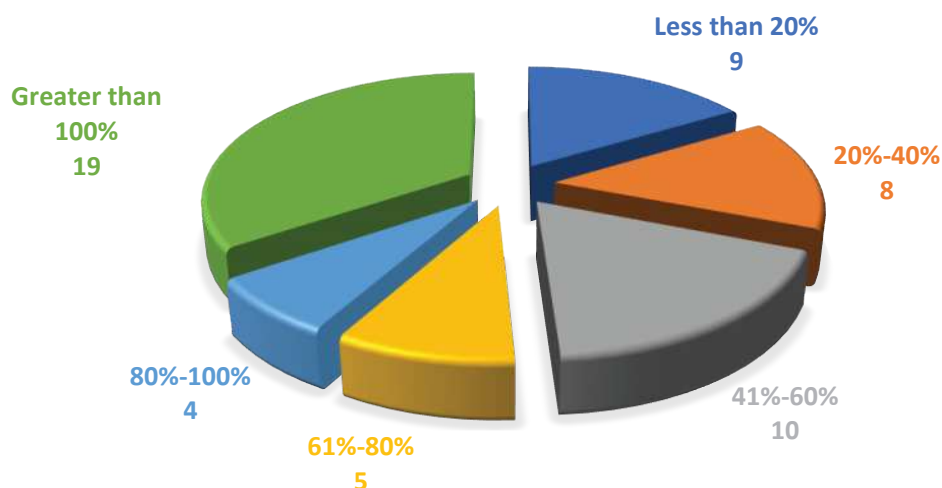


Chart 4.2.6: Classifying SPs according to the Total Cost Coverage Ratio (WWF6)

4.2.7 Operating Cost Coverage Ratio

Indicator	WWF7. Operating Cost Coverage Ratio
Description	This indicator shows the ability of SP to recover its WW operating costs (without depreciation) through WW generated revenues during the assessment period
Main Obstacles	1. Absence of records or arbitrary estimations of costs in refugee camps and some small village councils; 2. Absence of separate accounts for WW which complicates the process of providing answers.
Number of SPs Included	55: 38 in WB and 17 in GS

This indicator shows that only 25 SPs recovered their operational costs during 2017 (without depreciation). Comparing this result to that of the previous indicator; among these 25 SPs there are 6 SPs which were able to recover their operational costs only, but when it comes to the total costs, they started to run in a deficit. So, according to these results, the wastewater tariff structure for many SPs shall be reviewed to improve the process of cost recovery.

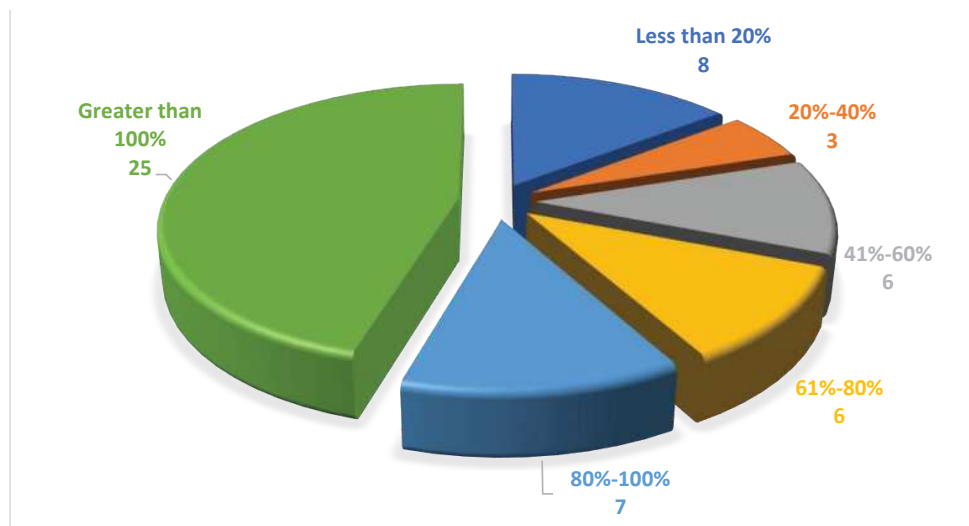


Chart 4.2.7: Classifying SPs according to the Operating Cost Coverage Ratio (WWF7)

4.2.8 Return on Net Fixed Assets

Indicator	WWF8. Return on Net Fixed Assets
Description	This indicator shows the efficient use of WW fixed assets to generate income.
Main Obstacles	1. Lack of records for fixed assets; 2. Inaccuracy of fixed assets and related costs estimations; 3. Lack of records for depreciation, since many SPs do not calculate annual depreciation expense or keep a record for accumulated depreciation.
Number of SPs Included	29: 23 in WB and 6 in GS

For comparison, the survey only includes SPs that have total fixed assets and accumulated depreciation to calculate the return on net fixed assets indicator.

More than 50% of these SPs have losses, which indicates a deficit in their result of operations, and a poor utilization of wastewater fixed assets. Among them, five SPs have no tariff for wastewater service, which may also contribute in these bad results. Further, even for those SPs with a positive return on net fixed assets, the results were poor & humble.



Chart 4.2.8: Classifying SPs According to the Return on Net Fixed Assets (WWF8)

4.2.9 Collection Efficiency

Indicator	WWF9. Collection Efficiency
Description	This indicator shows the ability of service providers to collect/retrieve their bills from customers.
Main Obstacles	1. Absence of separate accounts for water & wastewater, since many SPs issue a single bill for both services; 2. Absence of a wastewater tariff for a number of SPs.
Number of SPs Included	44: 27 in WB and 17 in GS

Some WW SPs were not included in this indicator due to the inseparability of collections for water & wastewater. Collection efficiency varies between SPs as shown in the following graphs:

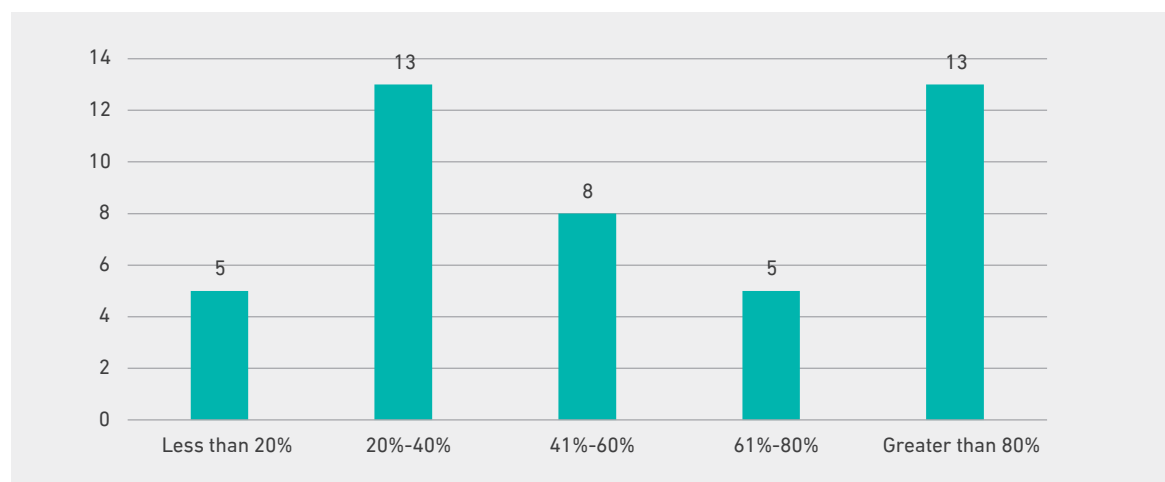


Chart 4.2.9: Classifying SPs According to Collection Efficiency (WWF9)

Only 13 service providers collect more than 80% of their bills. 8 of them have a 100% collection ratio since they linked the monthly fees to the electricity charges via prepaid meters. Ramallah municipality, Zeita municipality & WSSA in Bethlehem have collection rates of 152%, 130 & 103% respectively. This is because collections of wastewater fees include all the collected amounts during the year for both the bills of the current year 2017 & collections for previous debts (bills). 26 SPs collect less than 60% of their bills which indicates a collection inefficiency, and 5 SPs collect between 61%-80% of their bills.

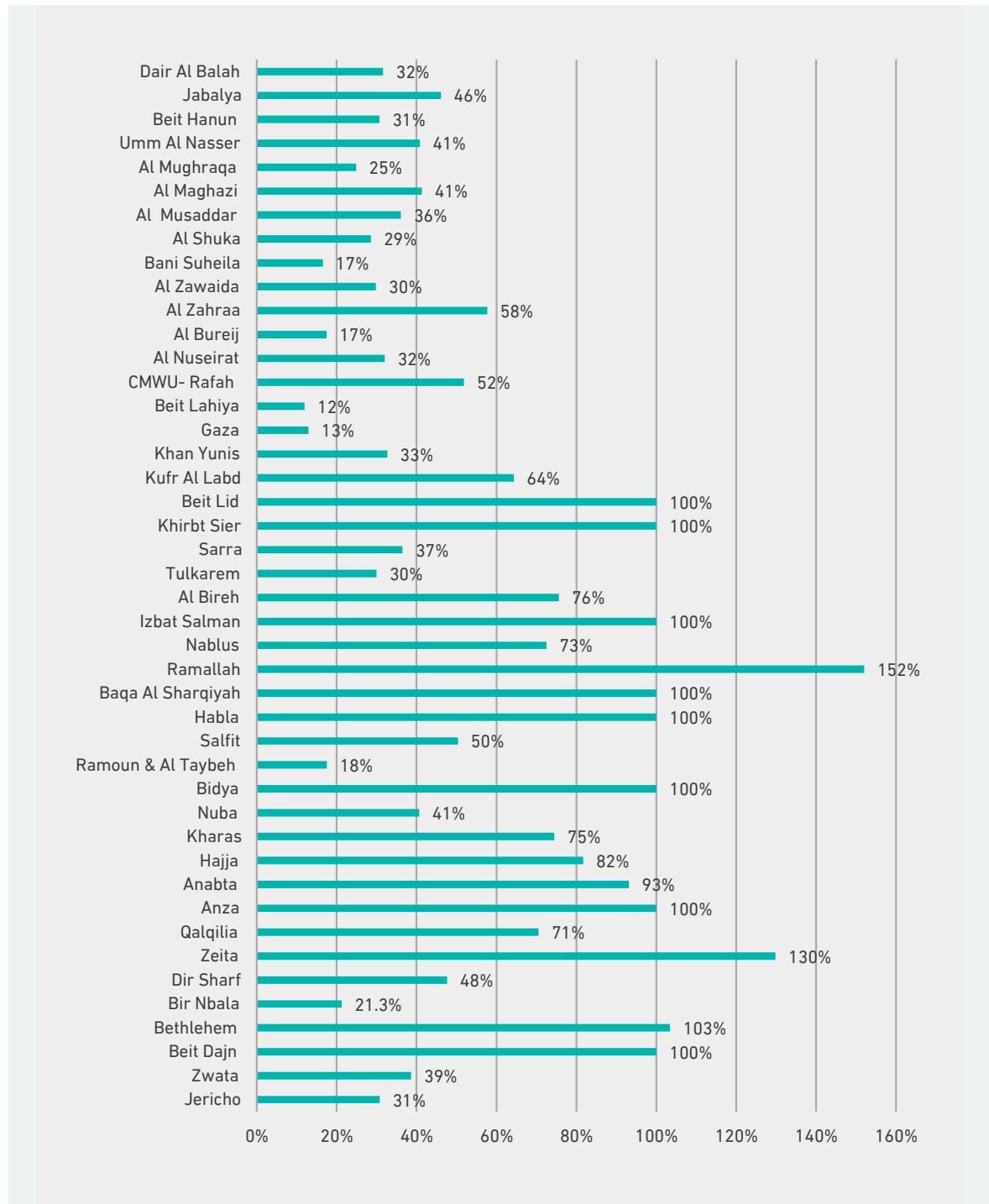


Chart 4.2.10: Collection Efficiency of Wastewater Service Among SPs

All SPs with a 100% collection rate in the Chart above, link their wastewater fees to electricity charges using prepaid meters (Beit Lid, Kherbit Seir, Izbet Salman, Baqa Al Sharqiyah, Habla, Bidya, Anza& Beit Dajn).

4.2.10 WW Treatment Cost Per m³ of Treated Quantity

Indicator	WWF10. WW Treatment Cost per m ³ of Treated Quantity
Description	This indicator shows the cost for treating one cubic meter of wastewater
Main Obstacles	1. Absence of separation of accounts for water & wastewater; 2. Absence of separation of accounts for WWTPs only. 3. Lack of data for some SPs
Number of SPs Included	18: 14 in WB and 4 in GS

The wastewater treatment costs per cubic meter of treated wastewater vary tremendously between the SPs. Anza village council, Ramoun & Al Taybeh JSC, Ramallah municipality & Jericho municipality have the highest treatment costs compared to other SPs with a cost of no less than 2.2 NIS/m³. Bnai Zaid municipality and Al Arrub camp have been excluded because of the unavailability of relative data.

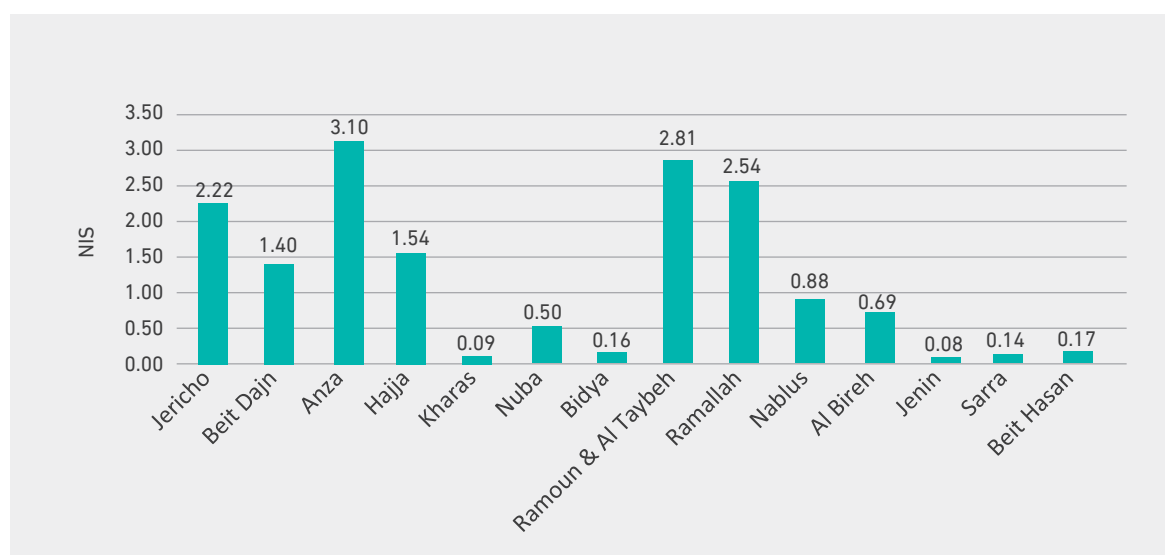


Chart 4.2.11: Wastewater Treatment Cost Per m³ of Treated Quantity (WWF10)

The situation of GS is a slightly complicated; WWTPs do not treat only the collected amounts of wastewater within the service area of SP, they also treat the collected amounts from neighbor municipalities and SPs with no treatment plant. This enlarges the volume of treated quantities and results in cost reduction per cubic meter. Therefore, this indicator was not calculated for WWTPs in GS because of the lack of accurate cost centers.

4.2.11 Net Surplus Per m³ of Generated Wastewater

Indicator	WWF11. Net Surplus Per m ³ of Generated Wastewater
Description	This indicator shows the net surplus per one cubic meter of generated wastewater.
Main Obstacles	1. Absence of separation of accounts for water & wastewater; 2. Lack of data for some SPs.
Number of SPs Included	64: 47 in WB and 17 in GS

Based on the collected data from wastewater SPs for the year of 2017, the total generated revenues from wastewater (billing revenues, new connection fees & others) was compared to the total costs of wastewater (operating & administrative costs which also include the treatment costs and exclude depreciation).

The chart below shows the results:

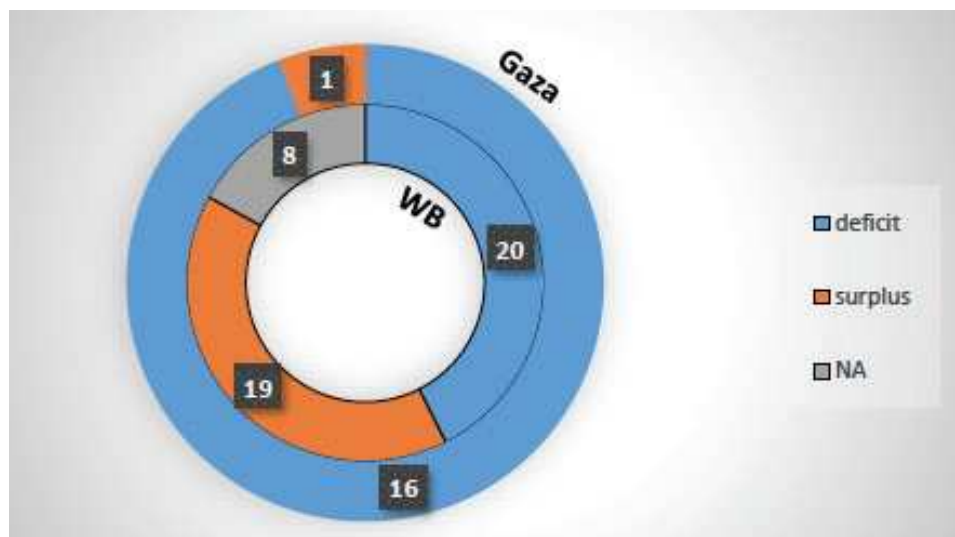


Chart 4.2.12: SPs' Result of Operations for Wastewater Services

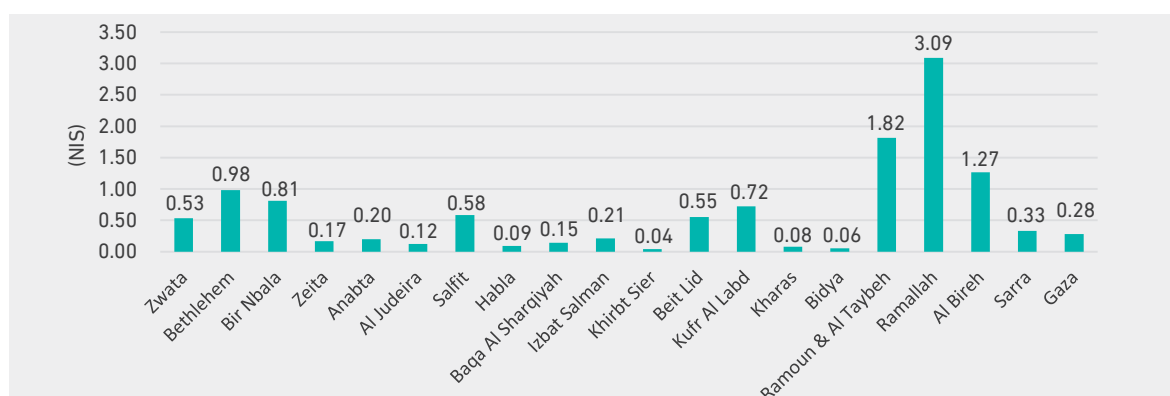
The result of operations shows that only 31% of SPs in this report had a surplus during 2017. Almost all of the SPs are in the WB.

Table 4.2.2: Net surplus Per m³ of Wastewater for SPs

Wastewater Provided Services	Name of SP	Total Revenues Per m ³ of Generated Wastewater (NIS)	Total Costs Per m ³ of Generated Wastewater (NIS)*	Net Surplus Per m ³ of Generated Wastewater (NIS)
Collection Only	Zwata	0.76	0.23	0.53
	Bethlehem	2.18	1.20	0.98
	Bir Nbala	1.16	0.35	0.81
	Zeita	0.68	0.51	0.17
	Anabta	0.57	0.37	0.20
	Al Judeira	0.31	0.19	0.12
	Salfit	1.21	0.63	0.58
	Habla	0.78	0.68	0.09
	Baqa Al Sharqiyah	0.95	0.80	0.15
	Izbat Salman	0.49	0.28	0.21
	Khirbt Sier	0.23	0.18	0.04
	Beit Lid	0.55	0.00	0.55
	Kufr Al Labd	0.90	0.18	0.72
	Kharas	0.55	0.47	0.08
Collection & Treatment	Bidya	0.43	0.38	0.06
	Ramoun & Al Taybeh	3.18	1.36	1.82
	Ramallah	8.02	4.94	3.09
	Al Bireh	2.87	1.60	1.27
	Sarra	1.03	0.70	0.33
	Gaza municipality	0.89	0.61	0.28

* Cost does not include depreciation

As demonstrated in the table, Ramallah municipality achieved the highest amount of net profit per m³ of wastewater with 3.1 NIS/m³, followed by Ramoun & Al Taybeh JSC and Al Bireh municipality with 1.82 NIS/m³ and 1.27 NIS/m³ respectively. It is notable that these three SPs provide wastewater service only. All three SPs are in Ramallah & Al Bireh Governorate, where customers receive water through Jerusalem Water Utility and not through a municipality or a JSC.

Chart 4.2.13: Net surplus Per m³ of Wastewater

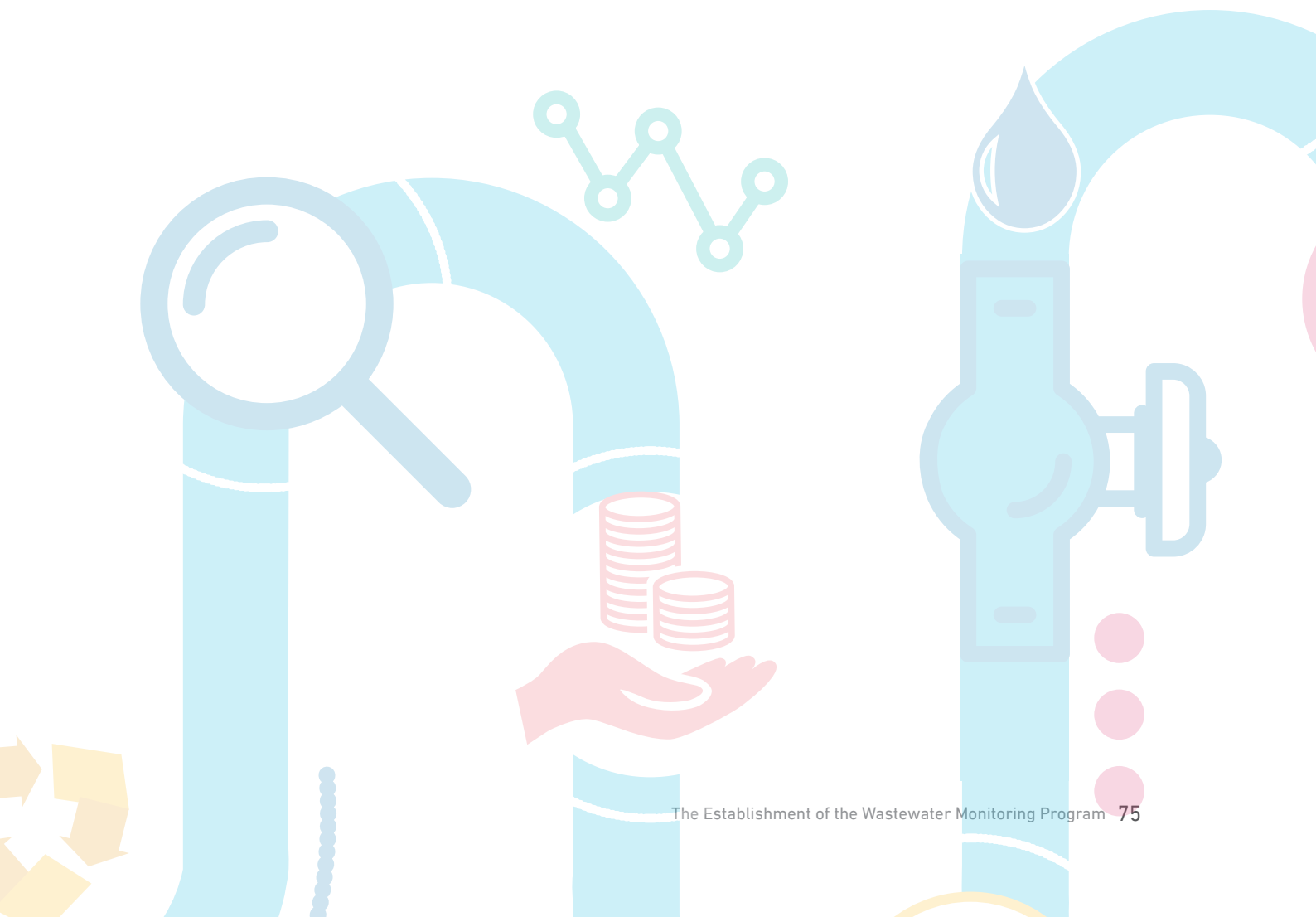
The following table shows the result of operation & net deficit per cubic meter of generated wastewater for SPs which had deficit in 2017:

Table 4.2.3: Net deficit Per m³ of Wastewater

Wastewater Provided Services	Name of SP	Total Revenues Per m ³ of Generated Wastewater (NIS)	Total Costs Per m ³ of Generated Wastewater (NIS)*	Net Deficit Per m ³ of Generated Wastewater (NIS)
Collection Only	Beit Iba	0.45	0.62	(0.17)
	Barta'a	0.13	2.18	(2.04)
	Al Fawwar Camp	0.00	0.71	(0.71)
	Al Ram	0.30	0.67	(0.37)
	Dir Sharf	0.32	0.37	(0.05)
	Azmout	0.02	0.62	(0.60)
	Qalqilia	0.75	0.93	(0.18)
	Al Zayeem	0.02	0.35	(0.33)
	Hebron	1.42	1.52	(0.10)
	Tulkarem	0.26	0.61	(0.35)
	Biit Hanina	NA	NA	NA
	Al Jeeb	0.01	0.17	(0.16)
	Al Bureij	0.38	0.85	(0.47)
	Al Zahraa	0.65	1.29	(0.64)
	Al Zawaida	0.44	1.00	(0.56)
	Bani Suheila	0.40	1.51	(1.11)
	Al Shuka	0.44	1.66	(1.22)
	Al Musaddar	0.35	1.81	(1.46)
	Al Maghazi	0.35	0.99	(0.64)
	Al Mughraqa	0.69	2.47	(1.78)
	Umm Al Nasser	0.52	2.20	(1.69)
	Beit Hanun	0.41	1.81	(1.40)
	Jabalya	0.50	1.37	(0.88)
	Dair Al Balah	0.55	1.20	(0.64)
Collection & Treatment	Jericho	0.35	0.62	(0.28)
	Beit Dajn	2.07	2.47	(0.40)
	Anza	2.14	3.30	(1.16)
	Hajja	1.41	2.38	(0.98)
	Nuba	0.84	1.68	(0.84)
	Nablus	1.56	1.65	(0.09)
	Jenin	0.20	2.53	(2.33)
	Beit Hasan	0.00	0.22	(0.22)
	Khan Yunis	0.83	1.36	(0.52)
	Beit Lahiya	0.46	1.31	(0.85)
	CMWU- Rafah	0.88	1.23	(0.35)
	Al Nuseirat	0.38	0.74	(0.36)

* Cost does not include depreciation

5. Conclusion



5.1 Goals and Objectives

The main goal of this report is to lay out the basis for the establishment the WSRC's wastewater monitoring program in order to assess the wastewater services that is provided to the Palestinian customers.

The first component of the report is to survey the existing wastewater systems in Palestine in order to identify the service providers that will be included in the monitoring program and to conduct a baseline survey of the status of the wastewater services they are providing, in order to identify the key issues that this program need to take into account.

The second component of the wastewater monitoring program is the data collection. One of the main objectives of this report is to outline the key data that is needed for the monitoring program to be effective at describing the condition of the provided wastewater service, and to develop a clear sound procedure for the verification of the collected data.

The collected data will be used for measuring the financial and economic viability of the wastewater service, monitoring environmental effect of the wastewater service whether its collection or treatment and assess whether the service provider is in compliance with the relevant Palestinian standards and specification and is in step with the strategies outlined by the Palestinian Water Authority "PWA.

5.2 Status of the existing wastewater service providers

Much of the information that was collected in this survey will not be a part of the regular monitoring program, but it will help in understanding the general situation of the wastewater service and might further our insight of the quantitative variables that will be gathered on a routine basis, the following sections will take a closer look at some of the key findings of the survey.

5.2.1 Institutional Framework

Municipalities: the vast majority of the population served by a sewer network are being served by municipalities, around 81% in the WB generating 87% of the collected Wastewater, and 88% in GS representing 90% of the collected wastewater.

Village councils: represent over 40% of wastewater service providers in the WB, however, less than 5% of the served population are being served by a village council generating less than 4% of the collected Wastewater.

Refugee Camps: only 5 refugee camps provided the service for 5.5% of the population connected to a sewer network which resulted in 3% of the collected wastewater.

Utilities and Joint Service Councils: only one JSC is providing this service to around 8.4% and 0.2% respectively resulting in collecting 6% and 0.1% of the collected wastewater in the WB, while GS had one Utility (CMWU) providing the service for over 12% of the served population and collecting close to 10% of the collected wastewater in GS, those figures have been derived from table 6.9 & 6.10.

5.2.2 Planning, Complaints & Documentation

As outlined in section 3.2.1, the majority of the service providers in the WB lack either/ neither a strategic or a master plan, on the other hand, all of GS's service providers had either an active strategic plan or/and a master plan for wastewater.

Municipalities are more likely to have an active strategic/master plan rather than village councils, as around half of the municipalities in the WB have an active strategic plan, while only a fifth of the village councils have a strategic plan, in light of this, a chi-square test has been applied to the existence of a master/strategic plan along with the total population of the service provider, the population served with wastewater and the coverage of the sewer network, the only factor that showed a statistical significance was the total population.

Other tests were performed on the complaint system and the documentation of complaints & maintenance, in which it showed that those that are performing those tasks are more likely to occur under service providers with either a higher total population or/and higher population served with wastewater, and that can be explained by the lack of the proper capacities for the small service providers and that's where the council needs to take action in order to assist the smaller service providers in those fields.

5.2.3 Sewer Network condition

More than half of the service providers in the WB have classified the condition of their network as in a good/very good condition serving over 60% of the population served in the WB, while around 45% have classified the condition of the network as poor/partially poor serving over 38% of the population served in the WB.

In GS, 62% of the service providers have stated that their network is in a Good/very good condition serving just a nod over 50%, while 38% of the service providers in GS had classified the condition of their network as in a poor/partially poor condition serving just a nod under 50% of the population served by a sewer network.

In the Palestinian territories, the population distribution (table 6.9) showed that 55% of the population is being served by sewer network in a bad/partially bad condition, while 45% are being served by a network in a good/very good condition, but the situation appeared to be worse in Gaza.

5.2.4 Major Issues and Challenges of wastewater management

The main issues leading up to the condition of the sewer network have four main components;

- The age of the sewer network insinuating that the network had not been maintained/ rehabilitated properly overtime.
- The inappropriate diameter of the pipes came second as many service providers have stated that the diameter of their network's pipe is not enough to handle the amount of the wastewater that it is conveying, leakage from the network.
- Leakage was considered a leading factor leading to the poor classification for 30%

of the SP's.

- The faulty implementation of the sewer network that have caused some problems in the sewer network such as flooding, blockage ..etc.

When it comes to wastewater management challenges, service providers have presented two main challenges:

- The lack of staff and equipment to properly operate the wastewater service.
- The financial sustainability of the service as over half the SP's in the WB has stated that either their tariff or/and collections are not sufficient to cover the costs of running the service.

5.2.5 Tariff and Financial Status

- 20% of wastewater SPs do not charge any fee/ tariff for wastewater services. These SPs must start implementing a tariff for wastewater, so they can recover all or at least part of their costs.
- Most SPs have mutual accounts for both water and wastewater, which complicate separating wastewater relative costs, revenues & accounts receivables. SPs must start separating accounts of wastewater using cost centers, which also help in separating costs of wastewater services such as costs of treatment.
- More than 50% of SPs have a lower collection rate than 60%. Therefore, SPs must work on increasing the collection efficiency by taking certain measures, such as imposing penalties for late payments, provide incentives to encourage customers to pay their bills & launching social awareness campaigns.
- Around 60% of wastewater SPs operate in a deficit, which emphasize the importance of reviewing the current tariff structure implemented by SPs, to ensure the implementation of cost recovery principle.
- Most SPs which have a treatment plant, do not charge revenue for treated quantities, either because they don't use it at all or to encourage farmers to use it for agricultural purposes. This must be changed and SPs should provide treatment with a good quality so farmers can reuse treated wastewater for a specific fee in return. This will help SPs to increase the coverage ratio of their total costs.
- Most SPs do not record their assets or calculate related depreciation. Thus, assets should be re-evaluated and recorded. And depreciation expense should be calculated yearly and recorded in the accumulated depreciation record

5.3 Suggestions and possible improvements

The main objective of this survey is to establish the monitoring program of wastewater services, and three issues must be addressed to start an effective monitoring program

The first issue is which wastewater service providers will be included in the program, hence a clear criteria should be set by the council, and that criteria may be based on the sewerage coverage ratio and the population, as it is almost impossible to obtain accurate data from service providers with low coverage as most service providers with

small coverage have a tendency to neglect the wastewater service (especially when it comes to documentation), the next step is to set up threshold coverage for entering the wastewater monitoring program?, if the council takes 20% as this threshold, 48 out of 54 service providers will be included in the monitoring program (it should be noted that there are at least three new wastewater service providers that we know of) and all the wastewater service providers will be included as the lowest recorded coverage is 18%, which is very close to the suggested threshold.

The second issue is what are the variables that will be requested from the wastewater service providers, in this report over 120 different variables were collected from the service providers and one main aspect that is vital to the success of this program is the availability of this data preferably through measurement and documentation or at least by a sound estimation of the variables that cannot be measured such as the volume of the collected wastewater. In order to avoid unrealistic figures, the council need come up with a standard method for the estimation of several variables, but to guarantee the success of such method, this issue should be discussed with the different service providers for their important input as many service providers may have some special conditions that do not apply to the rest.

The third issue is how will we consider the wastewater treatment plants in the monitoring program, as a separate unit or within the managing service providers, knowing that many wastewater treatment plants provide the service for customers outside the area of the service provider, and most of the indicators relating to the treatment process can be directly related to the treatment plant itself rather than the managing service provider, therefore WSRC will collect the wastewater treatment data for each WWTP, even if those plants were managed by the same entity.

6. Annex

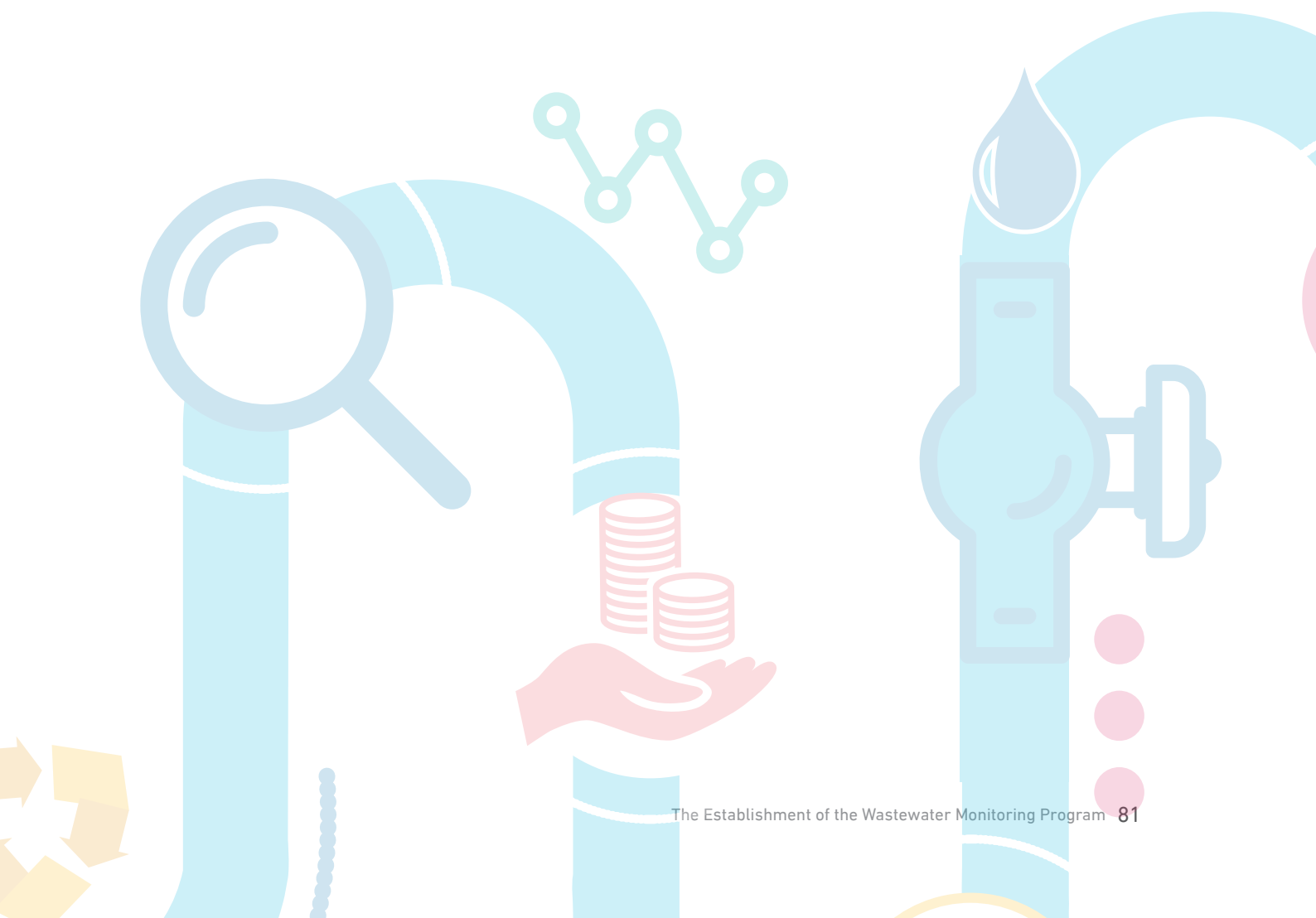


Table 6.1: Wastewater Tariff in the WB

#	Name of SP	WW Tariff	Type of WW Tariff
1	WSSA Bethlehem	28% from water invoice	% water consumption invoice
2	Anabta	10 NIS	Monthly fixed charge
3	Baqa Al Sharqiyah	10 NIS	Monthly fixed charge
4	Beit Lid	10 NIS	Monthly fixed charge
5	Nuba	10 NIS	Monthly fixed charge
6	Anza	15 NIS	Monthly fixed charge
7	Beit Dajn	15 NIS	Monthly fixed charge
8	Khirbt Sier	15 NIS	Monthly fixed charge
9	Sarra	18 NIS	Monthly fixed charge
10	Tulkarem	2 NIS	Monthly fixed charge
11	Kharas	20 NIS	Monthly fixed charge
12	Hajja	25 NIS	Monthly fixed charge
13	Bidya	50 NIS	Monthly fixed charge
14	Beit Iba	6 NIS	Monthly fixed charge
15	Izbat Salman	10 NIS	Monthly fixed charge
16	Kufr Al Labd	8 NIS	Monthly fixed charge
17	Zeita	8 NIS	Monthly fixed charge
18	Habla	8 NIS	Monthly fixed charge
19	Izbat Al Tabib	20 NIS	Monthly fixed charge
20	Dir Sharf	0.5 NIS/m ³	Tariff/m ³
21	Jenin	0.5 NIS/m ³	Tariff/m ³
22	Jericho	0.5 NIS/m ³	Tariff/m ³
23	Nablus	0.5 NIS/m ³	Tariff/m ³
24	Salfit	1 NIS/m ³	Tariff/m ³
25	Bani Zeid Al Gharbiya	1.5 NIS/m ³	Tariff/m ³
26	Al Bireh	1.8 NIS/m ³	Tariff/m ³
27	Ramoun & Al Taybeh	2 NIS/m ³ over 80% of water consumption	Tariff/m ³
28	Qalqilia	120 NIS	Yearly fixed charge
29	Al Judeira	50 NIS	Yearly fixed charge
30	Biit Hanina	50 NIS	Yearly fixed charge
31	Bir Nbala	60 NIS	Yearly fixed charge
32	Zwata	60 NIS	Yearly fixed charge
33	Dura Al Qare	180 NIS	Yearly fixed charge
34	Ramallah	0.45 JD/m ²	Yearly charge based in built/land area (m ²)
35	Al Arrub Camp	No Tariff	-
36	Al Fawwar Camp	No Tariff	-

#	Name of SP	WW Tariff	Type of WW Tariff
37	Al Jalazun Camp	No Tariff	-
38	Al Jeeb	No Tariff	-
39	Al Ram	No Tariff	-
40	Al Zayeem	No Tariff	-
41	Azmout	No Tariff	-
42	Barta'a	No Tariff	-
43	Beit Hasan	No Tariff	-
44	Hebron	No Tariff	-
45	Iktaba	No Tariff	-
46	Qalandiya	No Tariff	-
47	Qalandiya Camp	No Tariff	-

Table 6.2: Wastewater Tariff in GS

#	Name of SP	Type of WW Tariff	WW Tariff
1	CMWU- Rafah	30 NIS for domestic use 60 NIS for commercial use	monthly fixed charge
2	Al Musaddar	10 NIS	monthly fixed charge
3	Al Shuka	10 NIS	monthly fixed charge
4	Beit Lahiya	25% of water invoice	percentage of water invoice
5	Jabalya	25% of water invoice	percentage of water invoice
6	Umm Al Nasser	25% of water invoice	percentage of water invoice
7	Al Nuseirat	15% of water invoice	percentage of water invoice
8	Al Bureij	15% of water invoice	percentage of water invoice
9	Al Zawaida	15% of water invoice	percentage of water invoice
10	Al Maghazi	15% of water invoice	percentage of water invoice
11	Beit Hanun	25% of water invoice for domestic use 30% of water invoice for industrial use	percentage of water invoice
12	Khan Yunis	15% of water invoice plus 6 NIS	percentage of water invoice plus fixed charge
13	Al Zahraa	15% of water invoice plus 7 NIS	percentage of water invoice plus fixed charge
14	Gaza	16% of water invoice plus 4 NIS for each floor	percentage of water invoice plus fixed charge
15	Bani Suheila	15% of water invoice plus 6 NIS	percentage of water invoice plus fixed charge
16	Al Mughraqa	15% of water invoice plus 7 NIS	percentage of water invoice plus fixed charge
17	Dair Al Balah	15% of water invoice plus 5 NIS	percentage of water invoice plus fixed charge

Table 6.3: Wastewater New Connection Fees in the WB

#	Name of SP	WW New Connection Fees
1	Al Arrub Camp	zero connection fees
2	Al Bireh	3 JD per m ² 1 JD per m ² for sheltered cars parking 300 FILS for empty lands
3	Al Fawwar Camp	zero connection fees
4	Al Jalazun Camp	zero connection fees
5	Al Jeeb	3 JD per m ² plus 150 NIS one-time connection fee
6	Al Judeira	3 JD per m ² plus 30 JD one-time connection fee
7	Al Ram	3 JD per m ²
8	Al Zayeem	1000 NIS
9	Anabta	1 JD per m ² plus 50 JD one-time connection fee
10	Anza	700 NIS
11	Azmout	50 JD
12	Bani Zeid Al Gharbiya	100 JD per apartment plus materials & supplies needed for each connection
13	Baqa Al Sharqiyah	700 NIS
14	Barta'a	1500 NIS
15	Beit Dajn	1000 NIS
16	Beit Hasan	zero connection fees
17	Beit Iba	300 JD for 1st floor 150 JD for 2nd floor
18	Beit Lid	750 NIS for domestic use 350 NIS for commercial use
19	Bethlehem	1550 NIS up to 4 meter length
20	Bidya	500 JD
21	Biit Hanina	zero connection fees
22	Bir Nbala	3 JD per m ²
23	Dir Sharf	800 NIS plus 200 NIS/m (600 minimum) plus 100 NIS (labor cost)
24	Dura Al Qare'	Zero connection fees

#	Name of SP	WW New Connection Fees
25	Habla	Based on the number of electricity connections: 1000 NIS for one connection 800 NIS for two connections 700 NIS for three connections 500 NIS over three connections
26	Hajja	1000 NIS
27	Hebron	Domestic use: 2 JD per m ² plus 40 JD one time connection fee Commercial use: 20 JD fixed legal fees plus 100 JD for the first 42 m ² plus 2 JD per m ² over 42 m ²
28	Iktaba	150 JD
29	Izbat Salman	1000 NIS
30	Izbat Al Tabib	150 NIS
31	Jenin	65 JD for domestic use 90 JD for commercial use
32	Jericho	13 NIS per m ²
33	Kharas	1.5 JD per m ²
34	Khirbt Sier	zero connection fees
35	Kufr Al Labd	850 NIS for domestic use 350 NIS for commercial use
36	Nablus	1.5 JD per m ² for domestic use 3 JD per m ² for commercial & industrial use
37	Nuba	1.25 JD per m ² up to 150 m ² 0.75 JD per m ² over 150 m ²
38	Qalandiya	2 JD per m ²
39	Qalandiya Camp	zero connection fees
40	Qalqilia	50 JD
41	Ramallah	3 JD per m ² for a previous licensed established building For New Building Construction: 0.3 JD/m ² for land's area 3 JD /m ² for the licensed constructed area 0.3 JD/m ² for the reclamation area
42	Ramoun & Al Taybeh	2 JD per m ²
43	Salfit	4.15 NIS for construction area 1 NIS for empty land

#	Name of SP	WW New Connection Fees
44	Sarra	1200 NIS or 220 JD
45	Tulkarem	150 JD for domestic use 75 JD for storage 69 JD for basement
46	Zeita	520 NIS for the 1st floor 300 NIS for the 2nd floor
47	Zwata	1500 NIS for domestic use 25 NIS per m ² for commercial use

Table 6.4: Wastewater New Connection Fees in GS

#	Name of SP	WW New Connection Fees
1	Khan Yunis	600 NIS for Sement construction 400 NIS for Zinc houses
2	Gaza	Domestic use: 80 NIS per connection for one floor apartment, 120 NIS for a five storey house & 500 NIS for a five storey house with a roof. other uses: 200 NIS per connection.
3	Beit Lahiya	400 NIS for one floor 500 NIS for two floors
4	CMWU- Rafah	Domestic use: 400 NIS Industrial use: 600 NIS
5	Al Nuseirat	200 NIS
6	Al Bureij	250 NIS
7	Al Zahraa	200 NIS
8	Al Zawaida	200 NIS
9	Bani Suheila	390 NIS for one floor 480 NIS for more than one floor
10	Al Shuka	500 NIS
11	Al Musaddar	400 NIS
12	Al Maghazi	200 NIS
13	Al Mughraqa	200 NIS for each floor
14	Umm Al Nasser	300 NIS
15	Beit Hanun	Domestic use: 350 NIS for one floor plus 60 NIS one time connection fee, & 150 NIS for each extra floor Industrial use: 750 NIS plus 60 NIS one time connection fee
16	Jabalya	330 NIS
17	Dair Al Balah	Domestic use: 400 NIS Industrial use: 1000 NIS

Table 6.5: Coverage & Population served by Sewer Network

Service Provider	Sewer Network Coverage “%”	Served Population “Inhabitants”	Governorate
Jenin	82%	45,000.00	Jenin
Barta’a Al-sharqia	56%	5,000.00	
Annzeh	95%	1,900.00	
El Far’a Camp	43%	3,500.00	Tubas
Tulkarm	86%	71,600.00	Tulkarm
Anabta	79%	7,500.00	
Zeita	80%	2,800.00	
Baqa ash Sharqiya	76%	3,800.00	
Beit Lid	21%	1,200.00	
Kufr Al-labad	60%	3,000.00	
Iktaba	21%	1,250.00	
Attil	5%	500.00	
Nablus	98%	216,986.00	Nablus
Beit Dajan	85%	3,825.00	
Sarra	97%	3,500.00	
Azmut	63%	2,500.00	
Beit Iba	100%	2,000.00	
Deir Sharaf	88%	2,900.00	
Zawata	50%	1,500.00	
Beit Hassan	53%	850.00	
Qalqiliya	98%	54,000.00	
Hajja	55%	1,730.00	
Habla	78%	6,300.00	
Izbat at Tabib	67%	200.00	
Izbat Salman	85%	850.00	
Khirbt Sir	25%	375.00	
Salfit	37%	6,000.00	Salfit
Biddya	6%	600.00	

Service Provider	Sewer Network Coverage “%”	Served Population “Inhabitants”	Governorate
Ramallah	80%	53,000.00	Ramallah & Al Bireh
Al Bireh	100%	80,000.00	
JSC - Ramoun & Taybeh	45%	2,240.00	
Bani Zaid Al Gharbia	4%	400.00	
Ein Siniya	25%	250.00	
Jalazun Camp	96%	13,500.00	
Dura El Qare	33%	465.00	
Jifna	7%	250.00	Jericho
Jericho	8%	2,475.00	
Al Ram	45%	27,384.00	Jerusalem
Bir Nabala	92%	5,500.00	
Qalandiya	79%	1,000.00	
Qalandiya Camp	97%	15,000.00	
Beit Hanina	35%	416.00	
Anata	77%	27,000.00	
Al Judeira	94%	2,550.00	
Al Jib	77%	4,050.00	
An Nabi Samwil	77%	230.00	
Az Za'ayem	65%	5,850.00	Bethlehem
WSSA	70%	81,301.00	
Hebron	70%	169,000.00	Hebron
Nuba	38%	2,280.00	
Kharas	38%	3,500.00	
Deir Samit	3%	250.00	
Al Fawwar Camp	100%	12,000.00	
Al 'Arrub Camp	100%	8,941.00	
WB	34%	969,998.00	WB

Table 6.6: Collected Wastewater & Length of Sewer Network

Service Provider	Collected Wastewater (Cubic meter/ year)	Length of Sewer Network "km"	Governorate
Jenin	1,900,000.00	110	Jenin
Barta'a Al-sharqia	135,967.00	20	
Annzeh	30,727.00	13.5	
El Far'a Camp	90,000.00	6	Tubas
Tulkarm	2,472,433.79	110	Tulkarm
Anabta	244,380.87	32	
Zeita	74,385.36	11	
Baqash Sharqiya	109,500.00	18.5	
Beit Lid	27,000.00	6	
Kufr Al-labad	60,000.00	11	
Iktaba	27,500.00	2.85	
Attil	18,250.00	1.9	

Service Provider	Collected Wastewater (Cubic meter/ year)	Length of Sewer Network "km"	Governorate
Nablus	8,000,000.00	222	Nablus
Beit Dajan	58,400.00	15	
Sarra	76,650.00	12	
Azmut	22,404.00	5	
Beit Iba	109,500.00	6.8	
Deir Sharaf	94,306.24	7	
Zawata	47,450.00	4	
Beit Hassan	23,000.00	2.5	
Qalqiliya	2,166,293.00	115	
Hajja	21,900.00	7.5	
Habla	205,752.96	16	
Izbat at Tabib	7,000.00	0.75	
Izbat Salman	29,750.00	5	
Khirbt Sir	27,470.93	2	
Salfit	297,419.00	45	Salfit
Biddya	16,551.00	3.6	

Service Provider	Collected Wastewater (Cubic meter/ year)	Length of Sewer Network "km"	Governorate
Ramallah	1,003,750.00	110	Ramallah & Al Bireh
Al Bireh	2,345,911.00	93	
JSC - Ramoun & Taybeh	22,963.00	13	
Bani Zaid Al Gharbia	8,000.00	5	
Ein Siniya	7,500.00	1.2	
Jalazun Camp	136,637.55	6.5	
Dura El Qare	21,900.00	1	
Jifna	6,000.00	1.4	
Jericho	281,878.00	62	Jericho
Al Ram	749,637.00	25	Jerusalem
Bir Nabala	126,764.00	15	
Qalandiya	2,192.00	3	
Qalandiya Camp	174,886.60	7.5	
Beit Hanina	15,045.33	2	
Anata	511,000.00	NA	
Al Judeira	43,800.00	5	
Al Jib	129,729.60	4.5	
An Nabi Samwil	4,293.33	0.8	
Az Za'ayyem	136,615.00	12.5	

Service Provider	Collected Wastewater (Cubic meter/ year)	Length of Sewer Network "km"	Governorate
WSSA	1,695,166.41	250	Bethlehem
Hebron	3,650,000.00	200	Hebron
Nuba	80,000.00	9	
Kharas	53,000.00	18	
Deir Samit	6,470.30	0.9	
Al Fawwar Camp	214,620.00	8	
Al 'Arrub Camp	220,000.00	9	
WB	28,041,750.28	1,675.20	WB

Table 6.7: WWTP's, Technology & Communities Served

	Technology	Served Communities	Governanate
Jenin	Aerobic Stabilization Ponds	Jenin city, Jenin Refugee Camp	Jenin
Annzeh	Activated Sludge	Annzeh	
Nablus West	Activated Sludge	Western Nablus, Beit Iba, Zawata, Dier Sharaf	Nablus
Beit Dajan	Activated Sludge	Beit Dajan	
Sarra	Constructed Wetlands	Sarra	
Beit Hassan	Constructed Wetlands	Beit Hassan	
Hajja	Constructed Wetlands	Hajja	Qalqilya
Izbet El-Tabib	Sedimentation Tank	Izbet El-Tabib	
Khirbet Sir	Trickling Filter	Khirbet Sir	Salfit
Biddya	Sedimentation Tank	Biddya	
Al-Rihan	Membrane Bioreactor	Al-Rihan	Ramallah & Al-Bireh
Tyre	Membrane Bioreactor	Ramallah	
Ramallah (Industrial)	Extended Aeration	Ramallah	
Al-Bireh	Activated Sludge	Al-Bireh	
Ramoun & Taybeh	Rotating Biological Contractor	Ramoun & Taybeh	
Bani Zaid Elgarbiya	Sedimentation Tank	Bani Zaid Elgarbiya	
Rawabe	Activated Sludge	Rawabe	Jericho
Jericho	Activated Sludge	Jericho	
Nuba	Constructed Wetlands	Nuba	Hebron
Kharas	Constructed Wetlands	Kharas	
Al-Aroub	Activated Sludge	Al-Aroub Refugee Camp, Shoukh Al-Aroub, Qwaziba	
GS	Hybrid System	GS	GS
Al-Nuseirat	Hybrid System	Dier Al-Balah, Al-Nuseirat, Al-Buriej and Al-Magazi	
Rafah	Hybrid System	Rafah, Al-Shouka	
Khan Younis	Anaerobic/Aerobic Stabilization Ponds	Khan Younis	
Beit Lahiya	Anaerobic/Aerobic Stabilization Ponds	Beit Lahiya, Jabaliya, Beit Hanun, Um Alnasser	

Table 6.8: WWTP's, Capacity, Flow & Population Served

WWTP	Capacity (m ³ /day)	Actual Flow (m ³ /day)	Served Population (Inhabitants)	Governorate
Jenin	10,000	3,562	45,000	Jenin
Annzeh	342	100	1,900	
Nablus West	14,000	10,858	119,342	Nablus
Beit Dajan	500	250	3,825	
Sarra	460	220	3,000	
Beit Hassan	200	115	1,750	
Hajja	70	70	1,700	Qalqilya
Izbet El-Tabib	30	27	185	
Khirbet Sir	15	15	250	
Biddya	23	45	550	Salfit
Al-Rihan	500	2,750	52,000	Ramallah & Al-Bireh
Tyre	2,000			
Ramallah (Industrial)	1,200			
Al-Bireh	5,750	6,427	80,000	
Ramoun & Taybeh	450	63	2,500	
Bani Zaid Elgarbiya	100	22	380	
Rawabe	700	110	710	
Jericho	9,800	772	7,000	Jericho
Nuba	120	219	2,280	Hebron
Kharas	120	145	3,000	
Al-Aroub	1,200	1,000	15,000	
GS	75,000	60,000	760,000	GS
Al-Nuseirat	12,000	22,000	217,000	
Rafah	20,000	16,000	155,000	
Khan Younis	12,000	15,320	172,200	
Beit Lahiya	36,000	35,000	326,439	
WB (Total)	121,380	85,670	1,068,872	WB (Total)
GS (Total)	155,000	148,320	1,630,639	GS (Total)
Palestine	276,380	233,990	2,699,511	Palestine

Table 6.9: Population Distribution

Population Distribution (Served by Sewer Network)					
WB			GS		
	Population Equivalent	Percentage		Population Equivalent	Percentage
Sewer Network Condition					
Bad/ Partially Bad	370881	38.20%	Bad/Partially Bad	719682	50.10%
Good / Very Good	599752	61.80%	Good / Very Good	716759	49.90%
Total	970633	100.00%	Total	1436441	100.00%
Destination of WW					
Israel	182430	18.79%	Wadis	123154	8.60%
Wadis	464461	47.85%	WWTP's	1154739	80.40%
WWTP's	323742	33.35%	Others	158548	11.00%
Total	970633	100.00%	Total	1436441	100.00%
Complaint System					
Complaint System	699226	72.00%	Complaint System	1435018	99.90%
No Complaint System	271407	28.00%	No Complaint System	1423	0.10%
Total	970633	100.00%	Total	1436441	100.00%
Institutional Framework					
Municipality	791025	81.50%	Municipality	1259259	87.70%
Village Council	43126	4.40%	Village Council	0	0.00%
Refugee Camps	52941	5.50%	Refugee Camps	0	0.00%
JSC	2240	0.20%	JSC	0	0.00%
Utility	81301	8.40%	Utility	177182	12.30%
Total	970633	100.00%	Total	1436441	100.00%

Table 6.10: Collected Wastewater Distribution

Collected Wastewater Distribution					
WB			GS		
	Collected Wastewater Equivalent	Percentage		Collected Wastewater Equivalent	Percentage
Sewer Network Condition					
Bad/Partially Bad	11510498	41.0%	Bad/Partially Bad	719682	50.1%
Good / Very Good	16531203	59.0%	Good / Very Good	716759	49.9%
Total	28041701	100.0%	Total	1436441	100.0%
Destination of WW					
Wadis	13118802	46.8%	Wadis	4906137	8.4%
WWTP's	9880315	35.2%	WWTP's	53251800	91.6%
Israeli Joint	5042584	18.0%	Israeli Joint	0	0.0%
Total	28041701	100.0%	Total	58157937	100.0%
Complaint System					
Complaint System	22370175	79.8%	Complaint System	58065567	99.8%
No Complaint System	5671526	20.2%	No Complaint System	92370	0.2%
Total	28041701	100.0%	Total	58157937	100.0%
Institutional Framework					
Municipality	24428372	87.1%	Municipality	52397937	90.1%
Village Council	1059055	3.8%	Village Council	0	0.0%
Refugee Camps	836144	3.0%	Refugee Camps	0	0.0%
JSC	22963	0.1%	JSC	0	0.0%
Utility	1695167	6.0%	Utility	5760000	9.9%
Total	28041701	100.0%	Total	58157937	100.0%

2015 Summary			
West Bank		Gaza Strip	
Feature	Percentage	Feature	Percentage
Institutional Framework			
Municipality	40%	Municipality	94%
Village Council	46%	Village Council	0%
Refugee Camps	10%	Refugee Camps	0%
JSC	2%*	JSC	0%
Utility	2%*	Utility	6%*
Provided Services			
Water Supply, Wastewater Collection and Wastewater Treatment	38%	Water Supply, Wastewater Collection and Wastewater Treatment	29%
Water Supply and Wastewater Collection	33%	Water Supply and Wastewater Collection	71%
Wastewater Collection and Treatment	8%	Wastewater Collection and Treatment	0%
Wastewater Collection	21%	Wastewater Collection	0%
Planning			
SP's with an active Strategic Plan	19%	SP's with an active Strategic Plan	100%
SP's with an active Master Plan	23%	SP's with an active Master Plan	82%

* Each of these ratios represent only one utility/ JSC.

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