



Report of the State comptroller of Israel | January 2024

The Government Water and Sewage
Authority

Wastewater Reclamation, its Quality and Use



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Background

About 600 million cubic meters of wastewater are discharged annually into Israel's sewage system. Most of this wastewater is treated in wastewater treatment plants, with over 80% subsequently utilized for agricultural irrigation through effluent reclamation plants¹. Using effluents resolves wastewater disposal and contributes to environmental protection and the quality of natural water sources. Effluent reclamation plants serve as a vital transmission system, transferring effluents from producers (wastewater treatment plants) to consumers (farmers). The effluent sector is comprised of numerous suppliers, most of which are in the private sector².

The effluents sector is subjected to various regulators, including the Water Authority, the Ministry of Health, and the Ministry of Environmental Protection, under an array of laws and regulations, such as the Water Law, 1959, and the Public Health Regulations (Effluent Quality Standards and Rules for Sewage Treatment), 2010 (the Effluent Quality Regulations). Developing the transmission infrastructure and improving effluent quality will optimize this valuable resource's utilization and mitigate environmental and health risks associated with its utilization.

- 1 In this report, the term "effluents" will be used, unlike the legislation on the subject, in which use of the term "effluent". Both terms are correct.
- 2 Operating alongside them is the Mekorot company, which, up until 2019, possessed plants treating approximately 40% of the sector. However, according to Government Resolution 4514 dated February 24, 2019 on "Creating infrastructure aimed at augmenting the water sector's development capacity for the purpose of combating prolonged spells of drought and rectifying prior governmental resolutions", a number of plants were subsequently divested from the Mekorot company and transferred to private entrepreneurs.



Key Figures

592 million cubic meters

of wastewater were treated in wastewater treatment plants in 2020 (about 95% of the total wastewater produced)

80%

of the wastewater in Israel is used for agricultural irrigation every year. Israel ranks first in the world in this regard

40 out of 87 (46%)

of the large wastewater treatment plants treated the effluents at a lower level than the level set by the Regulations. These plants treated about 34% of the total effluents treated in the large wastewater treatment plants in 2021

about 40%

of the effluent water in 2021 was not treated to a tertiary level that allows agricultural irrigation without restrictions

13

large wastewater treatment plants treating 40% of the effluents reached full capacity in 2021 and even exceeded it

8%–9%

of the effluents were used in 2018–2020 for irrigation in areas with high hydrological sensitivity. According to an examination by the Water Authority, based on the effluent survey for 2016, 100% of the effluents used for irrigation in areas with high hydrological sensitivity did not meet the quality requirements outlined in the Regulations

1,544 malfunctions


were recorded in the sewage and effluents systems in 2022, a 135% increase compared to 2017

about 103 million cubic meters

of treated effluents were discharged into the environment in 2020 (about 17% of the treated wastewater), including about 13.5 million cubic meters discharged to restore the Yarkon River. About 87% of those effluents were discharged as excess and did not meet the quality required by the Regulations for discharge into the environment





Audit Actions


 From July 2022 to February 2023, the State Comptroller's Office examined the functioning of the effluents industry, including the scope of wastewater treatment, its quality, the regulators' activities regarding the treatment of wastewater, improving the quality of effluents, wastewater reclamation and use thereof. The audit was conducted at the Government Water and Sewage Authority (the Water Authority), the Ministry of Health, and the Ministry of Environmental Protection. Completion examinations were carried out at the Ministry of Agriculture and Rural Development (the Ministry of Agriculture), the Budget Division at the Ministry of Finance (the Budget Division), the Israel Land Authority (ILA), at Mekorot Water Company Ltd. (Mekorot) and the Civil Administration. Meetings were also held with academic researchers.

Key Findings



 **The Quality of Wastewater Treatment** – 40 of the 87 largest wastewater treatment plants in Israel (46%) did not treat the effluents at a tertiary level of treatment, which allows agricultural irrigation without restrictions on the type of crop irrigated. These wastewater treatment plants provided 185.2 million cubic meters, about 34% of the total effluents treated in the large wastewater treatment plants in 2021. Of these 40 wastewater treatment plants, 30 treated the effluents to a secondary level, with restrictions on the type of agricultural crop irrigated, and 10 treated the effluents to a lower level. This contradicts the regulations by which large wastewater treatment plants will treat effluents to a tertiary level by 2015. Using effluents that do not meet the standards required by the Regulations may endanger public health. The effluents may seep into the groundwater and contaminate it, as well as the soil, streams, and seawater.

 **The Quality of Effluents in Israel and the OECD Countries** – even though Israel leads the world in the effluent's usage scope for agricultural irrigation (Israel reclaims more than 80% of the effluents for agricultural irrigation. The second country after Israel in reclaiming effluents for agriculture is Spain, which uses approximately 30% of its effluents for agricultural irrigation); the extent of tertiary treatment of effluents in Israel in 2020 was low compared to developed countries (about 56% in 2020). In 12 of the 19 countries examined in the audit (including the Netherlands, France, and Japan), the rate of effluents treated at a tertiary level was more significant than in Israel.

 **Discharge of Excess Wastewater and Effluents into the Environment** – excess effluents that are not treated as required by the Regulations or raw sewage discharged



into the environment may pollute the streams and constitute an environmental and sanitary hazard. Among other things, the following was found:

- In 2010–2016, there was a downward trend in the volume of effluents discharged into the environment (both in absolute terms and as a percentage of the total effluents). However, since 2016, there has been an increasing trend in the scope of effluents and wastewater discharged into the environment (both in absolute terms and as a percentage of the total effluents), and their rate out of the total effluents in 2020 was more significant than it was in 2010. Thus, in 2020, 115.45 million cubic meters were discharged into the environment (including about 14 million cubic meters that were treated and discharged for stream restoration and about 12.3 million cubic meters of raw sewage), 72% higher than in 2010, and the rate of these effluents out of the total effluents increased from 16.1% to 17.5%.
- The quality of about 88% of the wastewater and effluents discharged in 2020 into the environment does not correspond to the quality set in the Effluent Quality Regulations regarding the discharge of effluents into a stream.

📌 The Capacity of Wastewater Treatment Plants – about 40% of the effluents were treated in 13 wastewater treatment plants that exhausted their capacity (more than 100%); About 8.8% of the effluents were treated in 9 wastewater treatment plants working at 90%–100% capacity; And about 19.5% of the effluents were treated in 8 wastewater treatment plants that reached 80%–89% of their designed capacity. Exhaustion of wastewater treatment capacity and slow development of wastewater treatment infrastructures increase the risk of non-treatment of wastewater due to exhaustion of the treatment capacity in existing wastewater treatment plants. This problem is expected to worsen due to the natural increase in the quantity of wastewater.

📌 Irrigation in Areas with High Hydrological Sensitivity – due to the danger of contaminating the soil and groundwater, it is essential to implement the guidelines regarding irrigation with effluents. Particularly in the areas defined as having moderate hydrological sensitivity and high hydrological sensitivity, where the potential for the seeping of contamination into the groundwater is considerable. Among other things, the following was found:

- As of 2018, 9% of the effluents (including from the Dan Region Wastewater Treatment Plant SHAFDAN) were used for irrigation in areas with high hydrological sensitivity. For example, irrigation with effluents is treated at a secondary level in the southern coastal plain area (between Ashdod and Ashkelon), defined as high and moderate hydrological sensitivity. Additional examples are the Upper Galilee area and the west of the Sea of Galilee, which are also considered areas of high hydrological sensitivity. About 8% of the effluents (including from the SHAFDAN) were used in 2020 for irrigation in areas of high hydrological sensitivity.



- According to an examination by the Water Authority based on the effluents survey data for 2016, 100% of the effluent used for irrigation in areas with high hydrological sensitivity did not meet the quality requirements; About 32% of the effluents used for irrigation in areas with moderate hydrological sensitivity did not meet the quality requirements.

📌 Deviation from the Effluent Quality Regulations – 18% to 42% of the wastewater treatment plants (15 to 34 of the largest wastewater treatment plants that reported) exceeded in 2021 at least one of the target values in the various parameters outlined in the Effluent Quality Regulations. It should be noted that deviations in the effluent quality were recorded in wastewater treatment plants in previous years as well. Furthermore, a State Comptroller Office's sample test at 30 reclamation plants found that 24 of them (80%) have a website. Of the 24 plants that have a website, 16 (about 67%) reported on their website the quality of the effluents in the reservoirs they own. No such data was found on the website of the other 8 plants (about 33%). 6 of the 30 sampled plants (20%) do not have a website. Consequently, deviations from the Regulations are not fully reported to the public.

📌 Malfunctions in the Sewage and Reclamation Systems – some discharges of effluents into the environment are also a result of malfunctions. Among other things, the following was found:

- There has been an increase of about 135% in the number of malfunctions in the sewage and effluent systems reported to the Environmental Call Center in 2017–2022 (from 657 malfunctions in 2017 to 1,544 in 2022).
- However, the fine notice rate that constitutes optional court rulings for discharging effluents and wastewater into the environment is about 4% to 5% of the total malfunctions recorded yearly. For example, in 2021, the Nature and Parks Authority sent only 60 fine notices out of 1,422 malfunctions.
- The State Comptroller's Office randomly sampled 150 malfunctions reported to the Environmental Call Center in 2022 (about 10% of the total sewage and effluent-related malfunctions reported to the Environmental Call Center that year) and found that no malfunction was reported to the public in real-time.

📌 Impact on Public Health – studies conducted in Israel found evidence of the presence of pollutants originating from drugs. These pollutants were found in industrial and agricultural products and crops irrigated with effluents, particularly in fruits and vegetables. Evidence of low concentrations of these pollutants was found among people who consumed agricultural produce irrigated with effluents. Although researchers estimate that there is no health risk arising from the consuming of this produce, since the concentration of pollutants found was negligible, the Ministry of Health did not



perform a comprehensive risk assessment of the effects of micropollutants on public health despite the extensive scope of irrigation of crops with effluents.

📌 Wastewater Treatment Plants as Barriers to Housing – ILA data shows that 4 out of 14 wastewater treatment plants that were examined handle quantities of wastewater over 90% of their designed capacity, and it is impossible to connect to them all the additional housing units that already today are to be connected. All other wastewater treatment plants treat 65% to 90% of their designed capacity, and their non-expansion will prevent housing units from being connected to them in the coming years, 2024–2028. By the year 2028, about 116,000 planned housing units may be built. Suppose the existing wastewater treatment plants are not expanded, or new ones are not built, there is a risk of not connecting these housing units to any wastewater treatment plant.

📌 Absence of a Master Plan for Water and Agriculture – at the audit end date, the Ministry of Agriculture and the Water Authority did not have a master plan for water for agricultural purposes. In the absence of an approved joint master plan for water and agriculture, the Water Authority does not have the necessary information to weigh all the water needs necessary for agriculture as well as the long-term agricultural needs for effluents.





📌 Pollution of Streams in the Judea and Samaria Sewage – most of the wastewater in the Judea and Samaria territories – domestic and industrial – does not undergo adequate treatment to remove the pollutants and is discharged into streams or cesspits. About 84 million cubic meters out of 124 million cubic meters (about 68%) of wastewater produced in Judea and Samaria in 2022 was discharged into streams and the environment without treatment. According to the Water Authority documents from December 2021, the wastewater from the cities of Nablus, Tul-Karem, Qalqilya, Beit Jala, West Bethlehem, and part of the Gaza Strip are treated at facilities in Israel and are discharged as effluent for agricultural irrigation in Israel. Moreover, "the wastewater from the cities of Hebron, Halhul, and Jenin flow in streams in the territories of the Palestinian Authority, cross the barrier fence and flow in the streams in Israel; Some of this wastewater is treated in Israel and discharged for agricultural irrigation." The flow of raw sewage and effluent that is not adequately treated from Judea and Samaria causes severe pollution of the spring water. Such pollution may seep and contaminate the aquifers' groundwater and affect drinking water quality.



Effluent Reclamation in Israel – Israel is the leading country in the world regarding the reclamation rate of effluents and their utilization for agricultural irrigation, and it uses over 80% of the effluents.



Key Recommendations

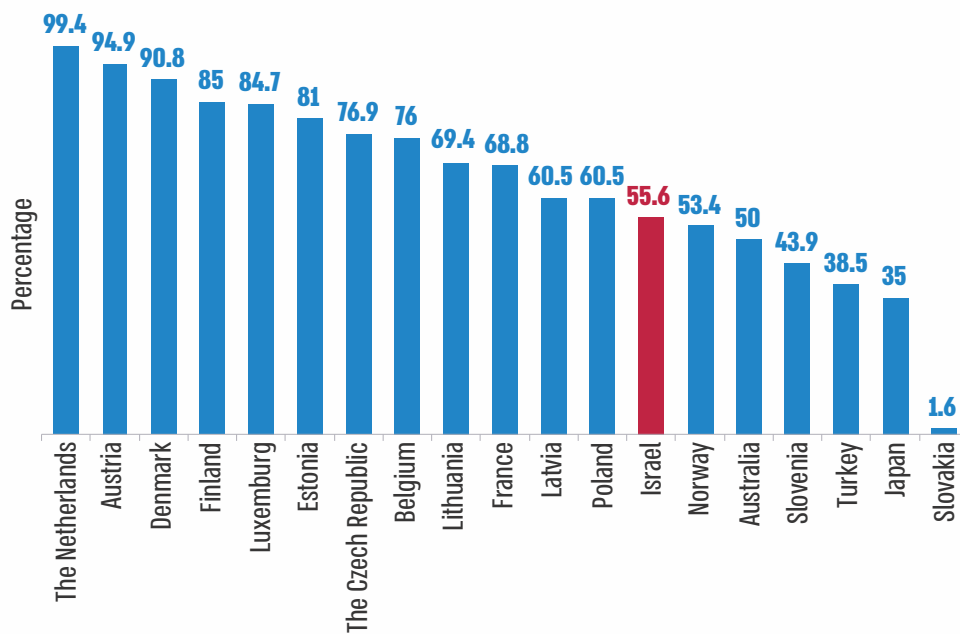
-  The Water Authority should examine all wastewater treatment plants and formulate a detailed plan with a forward-looking view in cooperation with the planning authorities, ILA, and the Budget Division. Such a plan is recommended to include priorities, an outline for expanding wastewater treatment plants in the required locations and their upgrade to a tertiary level, and the establishment of detailed timetables for carrying out all of these for each wastewater treatment plant. Furthermore, the Water Authority should monitor the implementation of its plans in real time to connect the housing units to wastewater treatment plants on time and prevent the formation of barriers on the subject.
-  Given the expected increase in the excess of effluents and the production of wastewater due to the rise in the population and the increase in water consumption, and the lack of solutions regarding the use of the entire quantity of effluents, which can be discharged to the environment and streams – it is recommended that the Water Authority and the Ministry of Environmental Protection consider different solutions to expand the use of effluents³, thus reducing the discharge of wastewater and effluents to the streams.
-  It is recommended that the Ministry of Environmental Protection examine the reasons for the increase in reports of malfunctions in the sewage and effluent systems. It is also recommended that the Ministry of Environmental Protection, together with the Water Authority, reduce incidents of sewage leakage and effluents into the environment and the damage caused by such incidents, by encouraging the establishment and expansion of infrastructures. In addition, it is recommended that the Ministry of Environmental Protection publish real-time data regarding this type of malfunction, including the location of the malfunction, the danger it poses to the public, and instructions to the public (for example, a ban on entering the contaminated area). Upon fixing the malfunction, it should notify the public of the passing of the danger and changes in its instructions on the matter.
-  It is recommended that the Ministry of Health, the Ministry of Environmental Protection, and the Water Authority, in consultation with members of the academia, continue to jointly investigate the health and environmental consequences of irrigation with effluents, including the consequences of continuous exposure to drug residues and cross-effects between drugs. It is recommended that they conduct a comprehensive risk survey and update it from time to time according to updated information. It is further recommended that they publish their recommendations to the public, reduce the risk, and regulate this issue as necessary.

3 Such as the expansion of uses for industry and public gardening, the desalination of effluents and use thereof in lieu of potable water, as is customary in some European countries, or the use of treated wastewater of the quality required for the restoration of streams. The alternatives must be examined while paying attention to economic viability and applicability, as required by the Regulations.



It is recommended that the Water Authority formulate a long-term plan for developing the effluents sector in cooperation with the Ministry of Agriculture. This is based on agricultural needs stipulated in the Ministry of Agriculture policy and is subject to examining alternatives and analyzing their economic viability.

The Tertiary Treated Effluents Rate in OECD Countries, 2020



According to the OECD website, processed by the Office of the State Comptroller.



Summary

In recent decades in Israel, there has been an increase in the scope of wastewater treatment and use for agricultural irrigation and other uses. This is due, among other things, to the rise in population and the increase in water consumption derived from it, which increases the quantity of wastewater produced. The audit findings indicate that most wastewater is treated in wastewater treatment plants, which exhaust their treatment capacity. Furthermore, about a third of the effluents produced do not meet the required Quality Regulations when these effluents are used for irrigation in sensitive areas and are a potential danger to the environment and public health. The increased quantity of wastewater and the slow development of the necessary wastewater treatment infrastructures have resulted in effluents being discharged into streams without proper treatment and, contrary to Quality Regulations, causing environmental and sanitary hazards. It was further found that in recent years, there has been an increase in the number of malfunctions in the sewage and effluents system, which have not been reported to the public.

The increasing use of wastewater for agricultural irrigation requires strict adherence to its quality and tightening supervision and control over the treatment processes and the use of such water. The Water Authority and the Ministry of Health and Environmental Protection must cooperate to fully implement the Effluent Quality Regulations and upgrade all wastewater treatment plants to the required level. Furthermore, they should maintain the quality of the effluents in all segments, from their production to their use by the farmers. Moreover, the Water Authority, the Ministry of Health, the Ministry of Environmental Protection, the Ministry of Finance, and the Ministry of Agriculture should cooperate to efficiently and optimally plan the effluents sector to maximize the utilization of the effluents and ensure the safe use thereof, while minimizing the health and environmental risks that may arise therefrom.

