



State Comptroller of Israel | Local Government Audit | 2021

Government Ministries and
Institutions Audit Division

Protection Against Flood Damage



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Background

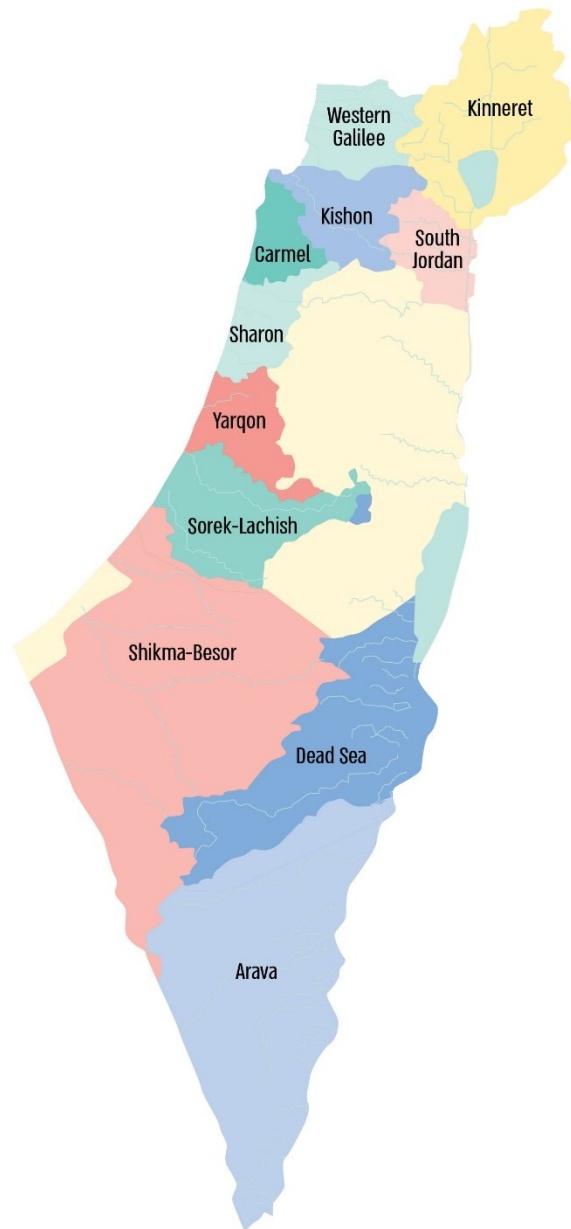
Floods and flooding are mainly caused by heavy rains falling in a relatively short time. Runoff water is rainwater that flows or pools on the ground (surface runoff or runoff). Every year, the floods in Israel cause significant damage to property, infrastructure, agricultural land and disrupt economic activity, and even claim lives. In the winter of 2019/20, seven people drowned in floods.

Urbanization has accelerated in Israel in recent decades, resulting in the decrease of open areas, thus increasing the impervious surface for runoff seepage. These factors have increased the risk of flood damages and require infrastructure preparation to treat runoff water and prevent future flood events.

There are 11 drainage authorities in Israel whose role is to regularly drain the area assigned to them. To this end, they develop drainage plans, which are in fact construction or infrastructure projects that are supposed to prevent flood damage or hold an area or strip of land in order to preserve stream areas (drainage project). The Ministry of Agriculture and Rural Development (the Ministry of Agriculture or the Ministry), is entrusted with land conservation and the runoff management under the law; and it is the regulator of the drainage authorities. Local authorities are authorized to manage drainage in their area.



Division of the State of Israel into Districts under the Responsibility of the Drainage Authorities




Data of the Ministry of Agriculture, processed by the Office of the State Comptroller.



Key figures

49%	1,133%	132 million	NIS 2.5 billion
Rate of floods out of the total nature disasters that occurred in 2019.	Rate of increase in the number of floods in the world in the years 1971–2019.	Number of people in the world who are expected to be affected by flood damage each year until 2030.	The total compensation paid by insurance companies to policyholders for flood damages in the years 2010–2021.
11	NIS 55 million	Approx. NIS 6 billion	NIS 347 million
Number of drainage authorities whose responsibility it is to drain the area assigned to them.	The annual support of the Ministry of Agriculture for drainage projects in the years 2013–2020.	Total cost of drainage projects required in Israel.	Total expected revenue for all the drainage authorities for 2020.
NIS 160–200 million	NIS 2.4 million	243	Approx. NIS 702 million
Estimated cost of implementing the June 2019 plan to protect the Hatzor Air Force Base from flood damage.	The cost required to operate the Flood Forecast Center for one year.	Active hydrometric stations.	The amount of open claims filed against the drainage authorities in the years 2013–2020.

Audit actions


-  In the period of February 2020 to January 2021, the State Comptroller Office examined aspects related to the management of the surface runoff in Israel and the reduction of flood damage. The State Comptroller Office examined the normative framework of the matter; aspects of planning and construction relating to the runoff and drainage projects; the budgetary conduct of the drainage authorities, including aspects of insurance and legal claims due to flood damage; the deployment of the hydrometric stations, the establishment of the Flood Forecast Center and the drainage of streams flowing from the




Palestinian Authority to the State of Israel. The state comptroller office examined in depth two test cases: The integration of drainage solutions in the plan to build the fourth railway track in Ayalon and the flood damage in the winter of 2019/20 at the Hatzor Air Force Base.

The audit was conducted at the Ministry of Agriculture and the drainage authorities. Completion audits were conducted at the Ministry of Finance, the Planning Administration, the Water Authority, the Ministry of Environmental Protection, the Ministry of Defense and the IDF (Israel Defense Forces), the Ministry of Transportation, the Federation of Local Authorities in Israel, the Israel Land Authority (ILA), Netivei Israel – National Transport Infrastructure Company Ltd., and at the Ariel Sharon Park Company Ltd. In order to present a broad and comprehensive picture of the issue of drainage, the State Comptroller office is currently completing another audit on the subject of “Preparedness of Local Authorities for Floods and Flooding and their Functioning during the winter of 2020”.

Key findings

-  **Amendment of the Drainage Law** – In July 2014, the government submitted to the Knesset an amendment memorandum of the Drainage and Flood Protection Law, 1957 (intended to address many changes that have taken place in the field of drainage since the law was enacted in 1957). As of the audit’s completion date, approximately six years after the submission of the amendment memorandum date, the Ministry of Agriculture and the Federation of Local Authorities in Israel have not reached an agreement on the subject, and therefore the legislative procedures to regulate the field of drainage were not advanced.







-  **Marking the Area of the Streams and their Floodplains in NOP1** – NOP1¹ determines the provisions on how to lay out a plan aimed at management, drainage and optimal utilization of surface runoff water, as well as optimal planning of the stream, in a local or detailed plan. Its provisions express an acknowledgment of the importance of maintaining the proper functioning of the stream, but this is not reflected in the NOP blueprint, where the streams are marked as a line and not as a polygon² that reflects all areas of the stream and its various uses, although the marking of the stream as a polygon in the NOP1 blueprint could constitute a planning basis for the provisions and

1 NOP is a National Outline Plan – a zoning and development statutory plan in a specific subject (such as transport, antiquities and other) on a national level in Israel. NOP1 is a national outline plan that determines the provisions on how to lay out a plan for management, drainage and optimal utilization of surface runoff water, as well as optimal planning of the stream.

2 A graphic expression for the stream's area in the blueprint.







blueprints of the plans that are subject to the NOP. In accordance with the examinations of the ministry and the drainage authorities, the flood plains³ listed in NOP1 are not updated.

-  **Exemption from Submitting a Document for Runoff Management** – According to NOP1, in some cases a planning institution may exempt a submitter of a plan that covers a large area, or that may impact drainage outside the plan's boundaries in surface runoff, flooding or groundwater issues, from submitting a runoff management document. The drainage authority's recommendation is not required for granting the exemption, and it is not obligatory to bring this matter to the drainage authority's attention, although the authority is responsible by law for the drainage in its area, and has the professional information and overall basin perspective regarding the runoff in the area.
-  **Flood Risk Management** – The Ministry of Agriculture is leading the formation of runoff management methodology according to flood risk management plans; however, the runoff management methodology focuses on managing the regional risks of each authority separately, and does not provide guidance on the integration of regional plans for a national flood risk management program in a nationwide perspective.
-  **Treatment of Drainage Projects Plans and their Approval Procedures** – The approval process of a drainage projects, involving several entities, including the Planning Administration, drainage authorities and the Ministry of Agriculture, which relies on extensive information, was carried out without being based on a uniform procedure and template for the submission of plan documents.
-  **Public Participation in the Provisions of Approved Drainage Project Plans and in their Blueprints** – The information made available to the public by the Ministry of Agriculture on its website, regarding the plans of drainage projects, does not include the plan documents and their blueprints. The geographic information layer of approved drainage project blueprints is also not included in the government map site.
-  **The Government Budget of the Drainage Authorities** – The government budget intended to support the drainage authorities, totaling NIS 550 million for ten years, was set in 2010 and does not reflect current and future drainage needs affected by urbanization and weather changes estimated, as of 2019, at NIS 6 billion.
-  **Determining the Quota Rates Charged by the Drainage Authorities** – The plenum of the drainage authorities (most of whose members are representatives of the relevant local authorities) determine the quota rates for the local authorities (NIS 11 – 62 per household – a difference of more than 500% between the rates) and of ILA (NIS 1.9 – 6 per dunam (1,000 m² – approx. 0.25 acre) – a difference of more than 300%

³ Flow that the stream cannot convey.








between the rates), and there is no orderly and uniform mechanism that takes into account the level of the quota rates compared to the rates of the other drainage authorities and the needs of the drainage authorities; additionally, minimum and maximum rates have not been set. Therefore, there is concern that the rates to be determined will not be based on a financial calculation for the needs of every drainage authority.

-  **The Drainage Quotas Paid by ILA** – The calculation of the areas for which ILA pays is done by subtracting the areas of the local authorities from all the areas under the responsibility of every drainage authority. The calculation is based on the data of the areas as they were with the establishment of the 11 drainage authorities, in 1997, and has not been updated since. Additionally, the entrenched practice, according to which the quotas of the drainage authorities imposed on ILA will be paid subject to a government resolution to be made each year anew, delays the payments of the quotas to the drainage authorities.
-  **Debts of the Local Authorities to the Drainage Authorities** – It was found that the local authorities have debts of approximately NIS 11 million to the drainage authorities, 79% of which are debts from the years 2019–2020 and the rest are older.
-  **The Ministry of Agriculture's Participation in Projects of the Drainage Authorities** – The Ministry of Agriculture's participation in projects (between 60% and 90% of the project costs) is also based on the rate for a household set by the drainage authorities, and as a result important drainage projects might not receive sufficient funding and therefore will not be executed.
-  **Lawsuits** – In the years 2011–2020, more than 500 lawsuits were filed against the drainage authorities. 95 lawsuits that ended between 2013 and 2020 amounted to approximately NIS 37 million, of which NIS 4.6 million was imposed on the drainage authorities. 410 lawsuits that started between the years 2013–2020, and have not yet ended, amount to approximately NIS 702 million.
-  **Drainage Authorities Insurance** – Due to the large number of claims filed for flood damage, the number of local insurance companies willing to insure the drainage authorities is limited, the insurance premiums paid by some drainage authorities are high, and they even have difficulty obtaining the necessary insurance, and as of 2021 three drainage authorities are not insured at all. In addition, a government resolution from 2002 to oblige the drainage authorities to insure themselves has not been implemented.
-  **Hydrometric Stations** – There is a shortage of ten hydrometric stations in open areas causing a lack of essential hydrological data that relies on the data of the hydrometric stations used to monitor and document information about the flow height and speed and the flowrate of stream runoff. Additionally, due to professional disputes between



the Hydrological Service of Israel and the Soil Erosion Research Station at the Ministry of Agriculture, not all the information collected at the hydrometric stations is stored in the Hydrological Service of Israel database.

-  **Flood Forecasting Center** – The State Comptroller office notes positively the establishment of the forecast center, but the disparities regarding its involvement in flood event warnings have not yet been mapped, and no insights have been formulated regarding the regulatory and organizational preparation required to regulate its activity. In addition, the dates of the information transfer, its content and how it is updated have not yet been formulated and coordinated with the consumers of the forecast center. The allocation of the budget required for its day-to-day operation and development of its capabilities has also not been decided upon.
-  **Cleaning Streams from Sewage Coming from the Palestinian Authority territories** – Despite the Ministry of Environmental Protection's advancement of a solution for sewage pollution flowing from the Palestinian Authority to Israel, there has been virtually no real change in the situation. The streams are still polluted, and the sewage that reaches Israel causes serious sanitation hazards.
-  **The Cost of Drainage Solutions in the Fourth Railway Track Plan in Ayalon** – The costs of drainage solutions required for the addition of the fourth railway track and narrowing the canal of the Ayalon Stream which were presented in 2016, and served as a parameter in choosing the drainage solutions to be implemented in the project, were under calculated. The cost of all drainage solutions as presented in the National Infrastructure Committee in 2016 amounted to approximately NIS 2.1 billion, while during the audit time it emerged that the cost of all the solutions amounts to approximately NIS 3.1–3.6 billion, and there is a gap of 1.5 billion between the previous cost estimate and the cost estimate at the time of the audit.
-  **The Duct from the Ariel Sharon Park to the Sea** – Although the 2016 decision stated that the fourth railway track plan in Ayalon will also include the duct to the sea (a canal that will serve as an exit route of excess water towards the sea), National Infrastructure Plan 33A, which was submitted for comments and observations in September 2020, indeed specifies the drainage solutions required prior to the completion of a project except for the solution of a duct to the sea but does not require its continued advancement. In the absence of the duct, which will lead the runoff to the sea, the risk of flooding is only once in 35 years and even more often if the urbanization trend in the area continues, compared to the risk of flooding once in 100 years with the duct.
-  **The Flooding at the Hatzor Air Force Base** – Flooding resumes every few years. The position of all parties is that if the issue of drainage in the streams near the Hatzor Base is not resolved, the danger of flooding and damage to the base and its



surroundings will remain in future. The cost of implementing the Sorek-Lachish Drainage Authority's plan of June 2019 to protect the base is estimated at NIS 160–200 million, but at the end of the audit in 2021, no budget has yet been allocated for funding, and no timetable has been set for its implementation.



Damages in the IDF Air Force Base – The findings of the investigations of the flooding events that occurred at the Air Force base in 1991, 2013, 2014 and 2020, and the conclusions that followed regarding the actions required to properly prepare for flooding in the base and reduce its damage, were repeated. Failure to implement the full recommendations contributed to the fact that the flooding, even if, as the Air Force claims, had exceptional characteristics, caused repeated damage to infrastructure, aircraft and valuable military equipment as well as a decrease in activity, and may have even led to endangerment of human life. As for the flooding in 2020, the cost of the damage that followed was estimated at NIS 42 million. In addition, even though the Air Force already completed the plan to protect the base from flooding in December 2015, the implementation of some of the plans sections was not fully done until the flooding event in January 2020 – some of the sections of the plan depend on the Air Force and some depend on other parties. As a result, the ability to delay the penetration of water and reduce the damage caused to the base or prevent some of it was impaired.



The State Comptroller Office commends the actions of the Ministry of Agriculture to promote a specific amendment of the Drainage Law; to establish a methodology for managing flood risks by the drainage authorities; and the joint initiative of the Ministry of Agriculture and the Planning Administration to prepare a NOP for the mitigation of floods and the management of runoff at the basin level.





The State Comptroller Office also commends the recommendation of the strategic planning team at the Planning Administration to mark the entire area of the streams on the blueprint of NOP1 and to update the floodplains on the blueprint.

Key recommendations



It is proposed that the Ministry of Agriculture, the Federation of Local Authorities in Israel and the other parties involved promote a comprehensive and all-inclusive regulation of the drainage area, which implement the conclusions of the ministry's strategic process. If necessary, disputes between the parties should be resolved by the Ministers of Interior and Agriculture. It is also proposed that the Ministry of Agriculture, in cooperation with the Planning Administration and its planning bureaus, complete the formulation the procedure to improve the approval procedures of drainage projects.



-  It is proposed that a planning institution, that deals with granting an exemption from submitting a runoff management document for a plan that applies to a large area, or for a plan that may have an impact outside its boundaries on issues of surface runoff, flooding or groundwater, positively consider bringing the issue of exemption to the attention of the drainage authority in whose area the plan is located, and it is also appropriate that the planning institutions examine the need to appoint an observer on behalf of the relevant drainage authority in the committee discussing the said plan.
-  It is recommended that the Ministry of Agriculture complete its plan to establish the methodology for managing flood risks and also include in it tools for formulating decisions to address the flooding risks that will be identified and to determine the priority of risk management at a national level. The ministry must work with the Ministry of Finance to complete the formulation of the budget response required for the purpose of completing the said risk mapping. The collection of information and the preparation of flood risk management programs should be done in cooperation with local authorities. This will also allow the drainage planners in the local authorities to act in coordination with the drainage authorities according to the insights collected. Furthermore, it is recommended that the Ministry of Finance, Ministry of Agriculture and ILA formulate an updated multi-year budget agreement to allow the drainage authorities to carry out their role in preventing flood damage.
-  It is recommended that the Ministries of Finance, Agriculture, and Interior, in cooperation with the Federation of Local Authorities in Israel, conduct a comprehensive economic examination of the resources required for drainage authorities compared to the sources available to them and formulate an updated economic model for collection of quotas required from local authorities and ILA. It is also appropriate to create congruence between the drainage needs, the degree of their urgency, and the damage that may be caused if they are not addressed, and the level of the Ministry of Agriculture's participation in financing the projects. At the same time, all drainage authorities must act to collect the debts of local authorities on an ongoing basis. It is recommended that the Ministry of Agriculture monitor the actions of the drainage authorities to collect the debts from the local authorities within their area of authority.
-  It is proposed that the Hydrological Service of the Water Authority, in coordination with the Ministry of Agriculture and other parties involved in drainage planning and infrastructure construction, including the National Transport Infrastructure Company Ltd, conduct an examination procedure designed to ensure that the network of hydrometric stations will provide optimal response for drainage solution planning. It is recommended that after completion of the examination procedure, the service will formulate a multi-year plan for the construction and operation of all the hydrometric stations required in Israel. It is also recommended to establish professional guidelines regarding the manner in which the hydrometric stations are to be constructed and operated, in such a way that



all the information gathered from them is collected and made available to all relevant parties.



It is proposed that the National Emergency Management Authority, the Israel Meteorological Service and the Water Authority jointly establish an inter-ministerial committee that will manage the preparations for flood and flooding forecasting and warning, regulate the operations of the forecasting center and its interfaces with all relevant bodies, and establish a mechanism that will ensure the allocation of the required budget.



It is recommended that the Planning Administration complete the approval of the detailed plans for the drainage solutions for flood prevention in the Ayalon stream, whether they include the duct to the sea or whether they adopt alternative solutions insofar as they are found to be preferable to the duct solution. Provided, it is the combination of these solutions that will meet the conditions set out in NOP1, which requires protection against flooding in rain events with a probability of once every 100 years.



It is recommended that the Air Force draw conclusions from the non-implementation of some of the lessons learned from the sequence of flooding events that were investigated and complete their implementation, so that in the future unusual weather event, it will work optimally to reduce similar damages. To this end, the Air Force is required to renew the monitoring of implementation of the recommendations of the commissions of inquiry, that have been closed, that require further treatment, as well as to continue to periodically monitor the implementation of the full recommendations given following previous investigations it has conducted.

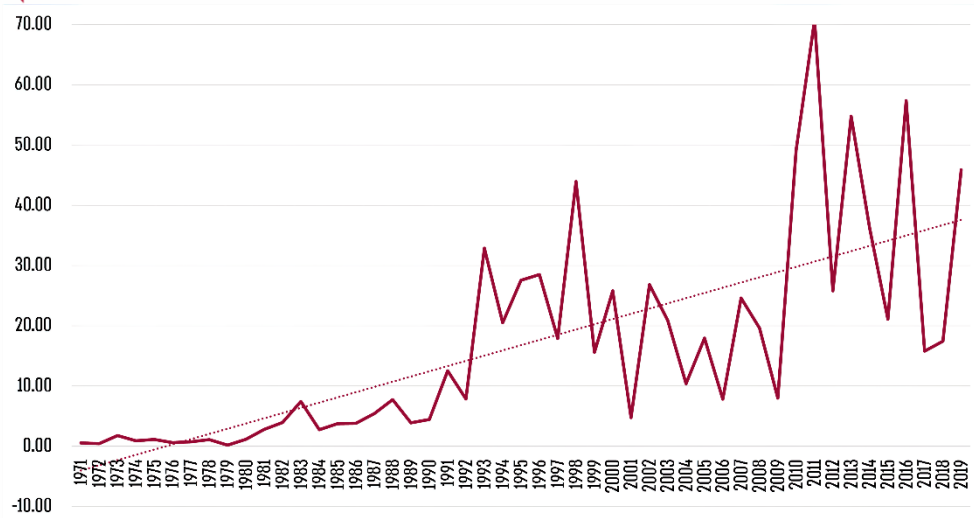


The State Comptroller Office recommends that the Ministry of Finance, the Ministry of Defense, the Air Force and the Sorek-Lachish Drainage Authority, in coordination with the Ministry of Agriculture, implement a drainage plan to protect the Air Force base and its surroundings from floods and reach an agreement as to its funding.



Management of the Surface Runoff and Protection from Flood Damage, in Data

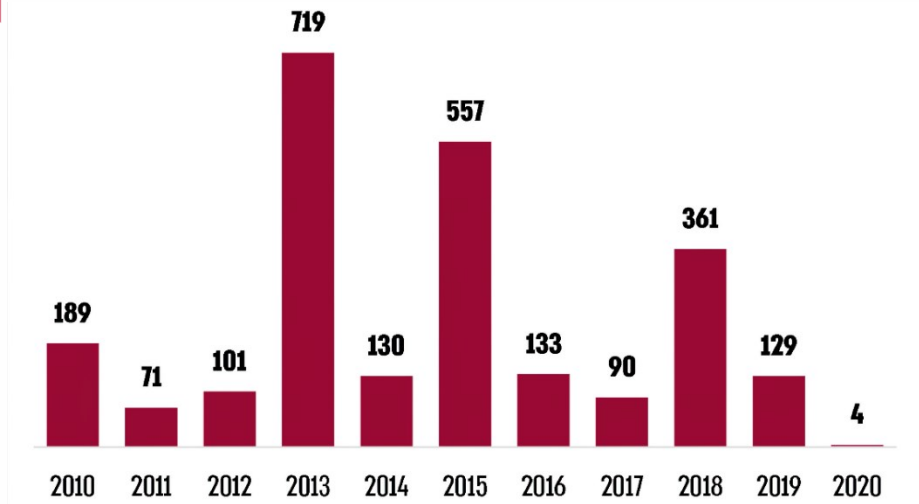
Economic Damage in the World in the Wake of Floods, 1971–2019 (In USD billion)



The data of the Our World in Data website,
<https://ourworldindata.org/grapher/economic-damage-from-natural-disasters?country=~Flood>
 Processed by the Office of the State Comptroller.



The Total Compensation Paid by the Insurance Companies to policyholders for Flood Damage, 2010–2020⁴ (in NIS million)



Data from the Capital Market, Insurance and Savings Authority, processed by the State Comptroller Office.

Types of Property Damaged by Floods and Insurance Companies' Payments for the Damages, 2010–2020 (in NIS million)⁵



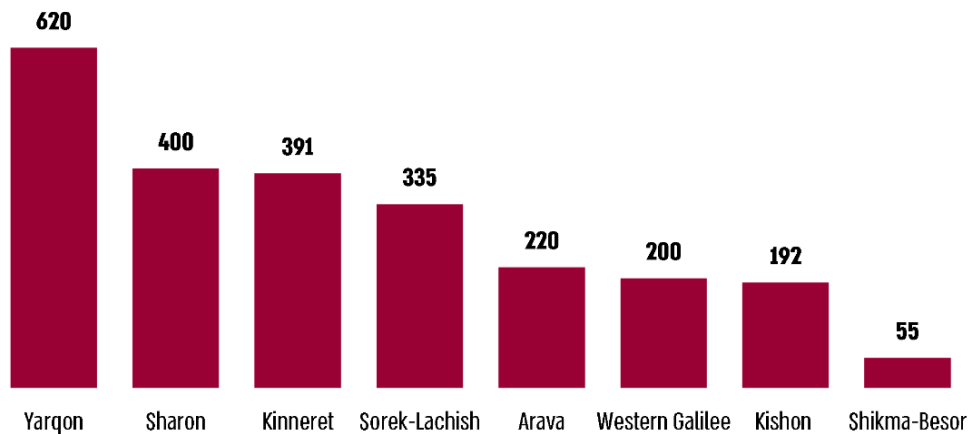
Data from the Capital Market, Insurance and Savings Authority, processed by the State Comptroller Office.

⁴ The data for 2020 is not complete as it was received from the insurance companies before the year ended.

⁵ In addition, small sums were paid for damages to agriculture, liabilities, and third parties in the amount of NIS 14 million.



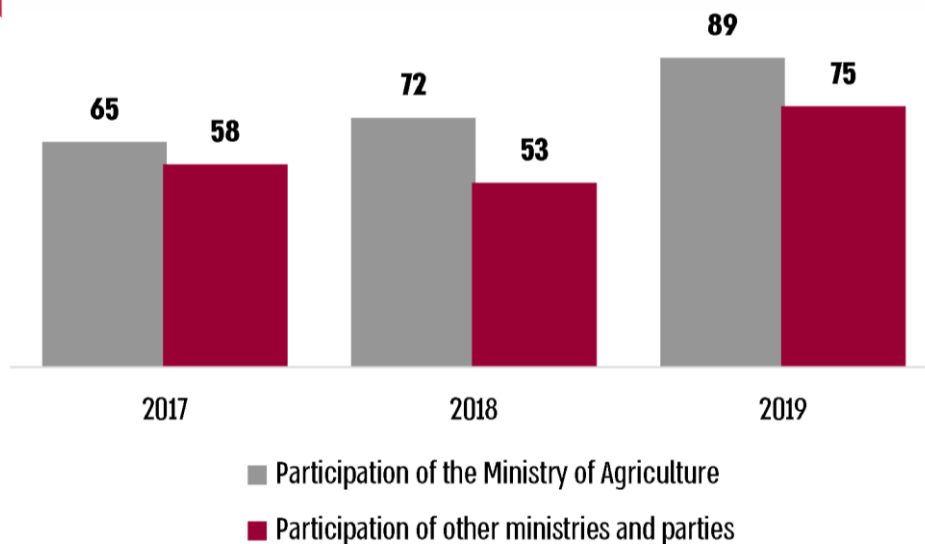
The Cost Required to Carry Out all the Required Drainage Projects, 2019–2020 (in NIS million)*



Data from the Ministry of Agriculture, processed by the State Comptroller Office.

* Without the Kishon project and the fourth railway track project.

Total Budgets Received by all the Drainage Authorities from the Ministry of Agriculture and Other Parties, 2017–2019 (in NIS million)



Data from the Ministry of Agriculture, processed by the Office of the State Comptroller.



Summary

The audit indicated that the State of Israel's actions to reduce flood damage, for years, has been carried out mainly by local authorities and drainage authorities operating in various basins throughout Israel and does not rely on an integrative basin perspective and nationwide analysis. The audit also found that there is no single regulator dealing with the issue of runoff, and that the issue is distributed amongst many government and local authorities with different interests and priorities. As a result, over the years, deficiencies have accumulated in the drainage infrastructure in Israel. Moreover there is a need to examine the allocation of resources to bridge the gap between needs and resources.

In view of this, all parties in charge of water, runoff, streams, and drainage project management, headed by the Ministry of Agriculture and the drainage authorities, together with the Water Authority and the Ministry of Finance, are required to work together, with a nationwide strategic perspective, to reduce risks and prevent flood damage. Among other things, they must promote the regulation of all required runoff issues, complete the process of mapping information on all flood risks, integrate this information in creating a national flood risk management plan in a nationwide perspective, and accordingly prioritize projects for execution through a cost-benefit review, and give expression to this in annual and multi-year plans. There is also a need to improve transparency on the subject and the information provided to the public in the field of runoff management and flood prevention, and to publish forecasts, alerts and warnings about weather disasters and floods that can also be used by emergency bodies.

At the same time, the functions of the drainage authorities should continue to be monitored on an ongoing basis, taking into account the challenges facing them, to ensure that they operate in accordance with their purpose and to examine the national budget allocated to drainage projects. The damage caused by future floods to life and property can often be immeasurably higher than the cost of the projects required to prevent these floods, and therefore there is great value in investing in projects and infrastructure based on full information and their prioritization.