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# The Water Economy of Israel

Yoav Kislev

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■ Internet edition

# The Water Economy of Israel

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Yoav Kislev

## *Preface to the English Edition*

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The English version of this survey was translated from the original Hebrew edition.\* A map was added and minor changes were made along the way; but it remained a translation of a monograph prepared for Israeli readers. For non-Israelis, the survey is evidently too detailed in more than a few places and it may be short on explanations in others. Also, most references to Hebrew sources of information were omitted. Interested readers may turn to the sections on the water sector of Israel in two recent OECD publications, *Taxation, Innovation and the Environment* and *OECD Review of Agricultural Policies: Israel*.\*\*

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\* <http://taubcenter.org.il/tauborgilwp/wp-content/uploads/H2011.15-Water-Economy-in-Israel.pdf>

\*\* Monetary values and prices are quoted in the survey in New Israeli Sheqels. The exchange rate varied between NIS 3.80 to US\$1 in 2009 to NIS 3.60 in 2011.

# The Water Economy of Israel

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Yoav Kislev\*

## *Abstract*

In general, the water economy of Israel fulfills its functions properly thanks to an up-to-date technical system, knowledge accumulated over the years, a solid legal base, and the professional cadre working today as well as those who contributed to its development and advancement in the past. Recently, the water sector has undergone major changes, amongst them: the growth of seawater desalination plants, the limiting of the supply of freshwater for agricultural purposes, the establishment of water and sewage corporations under the local authorities, the founding of a Governmental Water and Sewage Authority, and a recognition that we may be facing – what many have called – global climate change. Despite the successes, failures can also be identified in the water economy. The source of the failures is in the limited abilities, sometimes even readiness, of government agencies to completely fulfill the complex challenges that the economy presents. In the future, these tasks will be even more difficult; hence the importance of examining the structure of the water economy and its suitability for the job and especially the strengthening of public participation in its on-going activities.

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\* Hebrew University Faculty of Agriculture:  
[http://departments.agri.huji.ac.il/economics/teachers/kislev\\_yoav/index.htm](http://departments.agri.huji.ac.il/economics/teachers/kislev_yoav/index.htm) .  
Several parts of the survey are based on material contained in the report of the Bein Committee (2010), on which I served. Chapter 10 is based on an article written with Yulia Cogan (2011).

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## *Foreword*

Israel's water economy is extensive and complex. As an introduction, the survey opens with a brief review of the economy's history and a few clarifying notes.

## *History in a Nutshell*

Israel's natural water source is rainfall and its quantity varies from year to year. The accepted estimate is that the country's average annual rainfall is 8 billion CM (cubic meters), of which 1.5 billion irrigate fields, parks, orchards, and groves; 5 billion are lost to evaporation and transpiration from forests and natural vegetation, drain into the Mediterranean, the Gulf of Eilat, and the Dead Sea; and 2 billion CM – and some years far less – accumulate in the reservoirs: the Sea of Galilee and the aquifers (subterranean reservoirs). This accumulated quantity is at the disposal of the water supply to households, agriculture, and industry.

Despite the impressive conveyance systems – among others, from Solomon's Pools to Jerusalem or Amikam's Springs to Caesarea – in the past only small quantities of reservoir water were used. Consumption rose in the 19<sup>th</sup> century with the introduction of the mechanical drill and modern pumps. Now the quantities that collect annually and that are available for use depend not only upon rainfall, but also upon reservoir management. For example, if the Sea of Galilee is maintained full up to its banks, in other words to its “upper red line,” all rainwater that collects in the lake will exit to the Jordan River and beyond to the Dead Sea. Yet if water is withdrawn<sup>1</sup> in the summer, part of the lake's volume will be freed to accept the winter

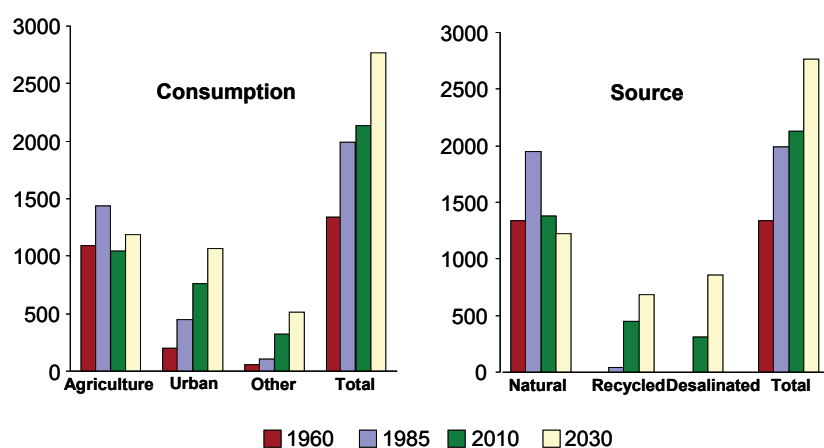
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<sup>1</sup> I use the terms water withdrawal, extraction, abstraction, and drafting interchangeably.

rainfall. At the same time, mismanagement is liable to compromise the reservoirs' ability to store water.

Over time, two sources were added to the rainfall, nature's gift: wastewater collected, purified, and diverted to agricultural use (and a small quantity to the environment); and desalinated seawater, particularly on the Mediterranean coast. The right hand side panel in Figure 1 shows the main water sources in a historical overview of the years 1960 and 1985, and planning forecasts for 2010 and 2030 (statistical data for 2010 have not been made available as yet).

Figure 1  
**Sources and consumption of water in Israel, 1960-2030**  
 by source and consumption, million cubic meters



**Note:** 2010 and 2030 are forecasts.

**Source:** Yoav Kislev

**Data:** For 1960 and 1985 – Central Bureau of Statistics, *Statistical Abstract of Israel*, various years; for 2010 and 2030 – Water Authority, 2010b.

In the bars representing natural water, the high use in 1985 is outstanding; as will be seen later in the survey, this was an overdraft, a policy followed also in other years. Current plans call for using less than that in the upcoming period. Only tiny quantities of recycled water (effluent) were used in 1960 but with time its quantity grew and it was an important source of water in 1985. The increased supply of effluent is a function of population, the volume of wastewater, and the development of treatment and recycling facilities.

The water economy entered the Age of Desalination in 2005, and as such, in Figure 1 desalinated water is recorded for the first time in 2010; its importance will grow and its quantities are expected to exceed 685 million CM by 2030. The Total bars in the figure are testimony to both the historical and the planned growth of water use and provision from the different sources.

The left hand panel in Figure 1 shows water usage by sector for the four selected years. Agriculture claimed the main share of water at the beginning of the period surveyed, particularly the overdraft in 1985. Agriculture was expected to receive less water in 2010 but supply to this sector is expected to grow, mainly owing to increased use of recycled water. The supply to the urban sector increases with the population; the supply to "others," among them nature, Jordan, and the Palestinian Authority, is also expected to increase.

### ***Preliminary Remarks***

Generally, our water economy succeeds in accomplishing its functions owing to advanced engineering systems, knowledge collected over decades, a solid legal foundation, and the professionalism of its present personnel as well as those who contributed to its development and progress in the past. With the exception of a few "unplanned" communities (mostly Bedouins not yet settled), both economic sectors and households enjoy regular water supply.



The past decade has seen far-reaching changes in the water sector, among them:

- In the wake of a years-long downward trend in rainfall, awareness has grown of the risk that our future natural water supply may further decrease.
- The economy has entered the Age of Desalination with the opening in 2005 of the Ashkelón facility.
- The Water Authority was formed, concentrating responsibilities that were previously dispersed among many government agencies.
- The urban water departments – both in cities and local councils – have been transferred to independent corporations.
- In agriculture, fresh water has been replaced by marginal water, particularly effluent and recycled.

In terms of Israel's national economy, the water sector is not large; nevertheless, water does not disappear from the public agenda. At the center of the current discourse lies the worsening shortage due to drought in recent years, and the high tariffs recently set. Yet water and its management also won attention in the past, two mentions of which serve to illustrate: the national water carrier, that conveys water from the Sea of Galilee to the center and south, was the largest project built in the early years of the State of Israel; and the collected wastewater from Greater Tel-Aviv, and its treatment and conveyance to the Negev, actually saved Tel-Aviv's bathing beaches, and removed serious health hazards. We are all dependent upon reliable water supply and sewage removal; it can therefore be expected that they will continue to attract keen interest in the coming years.

The purpose of the survey is to depict the structure of the water economy, its functioning, changes of the past and of the present, and the difficulties and failures that are revealed to the eye of the observer. The survey is presented in three parts. The first part deals with the water economy, its development, and its problems. The discussion of

this part will also point to the important influence that the law and the activities of the government have on the water sector. However, these aspects will be scattered among other issues; they will be dealt with separately in the other parts of the survey. The second part will present the State budget expenditures in the last decade – the budget is the principal instrument the government uses to direct the state's economy and its development. The third part is devoted to a concise discussion, in parts critical, of the functioning of the government and the Knesset (the parliament). The aim of this discussion is to explain and clarify the institutional structure and the conceptual approach.

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## Part 1: Development and Operation

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### Chapter 1: Available Water

Most of the area of the globe is covered by water. The large quantities are of salty water in the oceans. However the quantities of fresh water are also abundant. The larger share of fresh water, though, is far away from fields and residential centers and therefore its utilization in agriculture, households, and industry is small relative to the existing quantity. Many large projects were built in the twentieth century to catch and divert water to places long distances away from the source; but this development has slowed down recently, in particular, the construction of big dams as the recognition of the human and environmental cost of the dams grew and food prices – that were low for many years – did not encourage heavy investments. In parallel with the deceleration of the construction of new projects, the quality of water in its sources has been deteriorating and continues to deteriorate. This change also forces a slowdown of development and reduction of future supply – or the transition to expensive desalination.

The Middle East is a thirsty region – per capita water provision in several of the region's countries is presented in Table 1. These quantities are supplied for all uses: households, industry, and agriculture. Egypt and Syria have comparatively large quantities thanks to the rivers that flow into their territories from the rainy parts of their drainage basins. The available per capita quantity in the other countries is much smaller; in particular, in Jordan and in the areas of

the Palestinian Authority. These quantities do not suffice for food production (see Chapter 6).

Table 1. **Water in Israel and its neighbors, 2007**  
cubic meters per capita

Egypt	937
Syria	814
Lebanon	315
<b>Israel</b>	<b>282</b>
Jordan	158
The Palestinian Authority	104

Note: The data for Egypt is for 2002.

Source: Food and Agriculture Organization of the UN, *Aquastat*.

## Chapter 2: A General Outline of the Water Economy

Israel is located on the boundary of a desert, its north rainy, and its south dry. Rain falls only in the winter, and water consumption is highest in summer. Rainy years alternate with dry years in no discernible pattern. The main traditional role of the natural water sector has been to collect the winter rainfall for summer use, to store water from rainy years for dry periods, and to move water from the north southward to Israel's populous center and to the Negev, where the existence of modern agriculture depends on irrigation.

Israel's main reservoirs are the Sea of Galilee,<sup>2</sup> the Coastal Aquifer, and the Mountain Aquifer (the western portion of the latter being referred to as the Yarkón-Tninim). Other aquifers are to be found in the Western Galilee, on the Carmel Coast, in the Jordan Valley, and in the Arava. The national water system (project) links most parts of the country one to another; the National Carrier conveys water from the Sea of Galilee westward and southward; and other systems, most of which are linked to the National Carrier, supply water to the Upper Galilee, Western Galilee, the big cities, and the Negev.

With the expansion of desalination of seawater along the coast, large parts of the water supply are expected to be modified, and in certain segments of the system, water will flow from south to north – opposite to the original direction of the flow in the national project. Systems not linked to the National Carrier serve Eilat, the Arava, and

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<sup>2</sup> See map where the Sea of Galilee is marked as Lake Tiberias and the National Carrier is marked Kinneret-Negev Conduit. Note also, the survey covers the water economy of Israel. The green line, the boundary between Israel and the Palestinian territories in the West Bank and Gaza Strip, is marked on the map by a broken and dotted line.

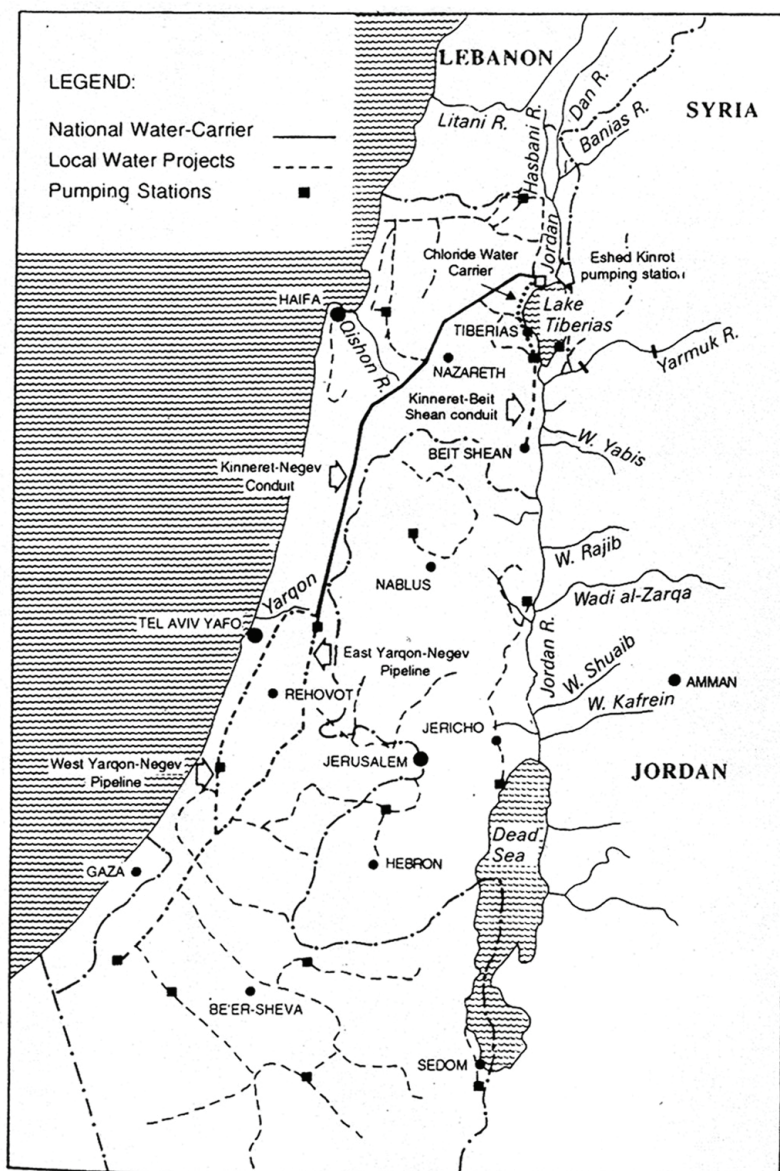
the Jordan Valley. In addition, Israel supplies, by agreements, water to the Palestinian Authority and the Kingdom of Jordan.

The National Carrier was first operated in 1964, and the main use of water at the time was in agriculture. Since then Israel's population has grown, and a great deal of water has been diverted to the urban sector, which today is the largest consumer of freshwater. Correspondingly, the use of freshwater in agriculture has decreased and was replaced by marginal water – brackish and recycled wastewater.

There is no life without water. Yet the main use of water in the urban sector is not drinking, but rather landscaping, bathing, mopping and other household chores, and the removal of contaminants. Thus the volume of wastewater in the urban sector now exceeds half the freshwater used, and it is collected in sewage systems and transferred to wastewater treatment facilities. After treatment, it is referred to as *effluent*, most of which is taken into recycling facilities, where it is stored and reused in agriculture and nature. Many of the wastewater treatment facilities are local; the two largest are the Shafdan, which treats wastewater from Israel's center and diverts it to the south and western Negev; and the Kishón, which treats Haifa and environs' wastewater and supplies the effluent to the Jezre'el Valley, the Harod Valley, and the Lower Galilee.

The natural reservoirs receive the water stored therein from precipitation which has decreased in recent years, especially in the North, the region that feeds the Sea of Galilee. Some believe that this phenomenon is a result of global warming and similar developments. If so, Israel is facing a long-term shortage of natural water. (The last rainy season, winter 2010-11, was rainy in the North and dry in the South.)

### A map of Israel and the national project



**Source:** Kliot, Nurit, *Water Resources and Conflicts in the Middle East*, Routledge, 1994.

According to the Water Law, all of Israel's water sources are public property and controlled by the state. The regulation of the water supply is under the purview of the Water Authority; it oversees withdrawal, provision to the agriculture and urban sectors, water quality, and development of the supply system, including recycling facilities and desalination plants.

Many economic entities are active in the water economy. Most of the withdrawal and provision of freshwater is done by the state-owned Mekorót water company, which also operates the Shafdan and Kishón treatment facilities. The other suppliers are the local governments, regional agriculture associations, a few private companies, and private well owners. The large desalination plants are owned by private companies, both Israeli and foreign, and one large plant is now being built by a subsidiary of Mekorót. The desalination plants deliver their output to Mekorót and it adds the water to the national system.

The economic activity of the water sector in 2006 (the last year for which data are available), including output and investment, totaled over NIS 10 billion (see Table 2). The product value was close to NIS 3.5 billion, or half a percent of Israel's Gross Domestic Product. The water economy has grown together with the country's population, and will grow further with increased seawater desalination.

Table 2. **The water economy, 2006**  
NIS millions, at 2010 prices

Output	8,238
Gross investment in fixed assets	2,186
Product (Gross value added)	3,462

**Notes:**

- a. The values in the table are adjusted to 2010 prices.
- b. Not counting administrative services such as the Water Authority.
- c. The product equals the value of output minus purchased inputs from other sectors of the national economy.



### Chapter 3: Water Sources

The total quantity of water supplied in Israel is roughly 2 billion CM per year. This quantity includes various types of water of different qualities and from several sources. The main source is natural resources, but as explained previously, these are endangered due to a decrease in precipitation, which may be related to global warming, and due to contamination and overdrafting.

Table 3 summarizes the potential of renewable water – the quantity that can be withdrawn annually from natural sources – as per the accepted estimate at the end of the 20<sup>th</sup> century. The table's purpose is to show the proportional contributions of the natural water sources. The region abundant in water is the Sea of Galilee basin, where half of the quantity is withdrawn from the Sea of Galilee itself, a portion is sent via the National Carrier to the center and south, and a portion is used for local provision: to the Kingdom of Jordan, the communities around the Sea of Galilee, and the Jordan Valley.

Table 3. **Water potential from natural sources; estimate for the end of the 20<sup>th</sup> century**  
millions of cubic meters per year

Coastal Aquifer	250
Mountain Aquifer	600
Sea of Galilee system	640
Western Galilee Aquifer	170
Carmel Aquifer	40
Negev and Arava Aquifer	55
<b>Total water potential</b>	<b>1,755</b>

**Note:** The supply in the Arava is 90 CM per year, but only 55 million CM are from renewable sources.

**Source:** Gvirtzman, 2002, Table 8.1.

Due to concern regarding decreasing precipitation, the quantity of renewable water in the Water Authority's planning directives has been reduced, and stands today at 1.4 billion CM (compared to 1.775 billion CM in Table 3). In 2010, 450 million CM of recycled and 280 million CM of desalinated seawater were added to the country's supply; these sources are expected to increase.

### ***3.A. Wastewater and Effluent***

As indicated, in the urban sector, in households, offices, and manufacturing, the main function of water is waste removal. In the past, this was to cesspools from which it often leaked into the reservoirs. In locales that had central sewage systems, the collected wastewater was sent to the sea or to nearby streams. Contamination of the beaches, particularly in Tel-Aviv, and two outbreaks of epidemics – cholera in 1970 and polio in 1988 – helped raised awareness of the dangers of neglecting wastewater, and the need to develop modern sewage systems and build wastewater treatment facilities. The treated wastewater, the effluent or recycled water, is used for irrigation in agriculture and in a few cases, diverted to rivers.

In contrast to the water system built around the National Carrier and linking the regions of the country, wastewater and effluent are handled locally. It appeared that the local governments were able to bear the responsibility and the cost of treatment. Cities would collect sewage and treat it, and neighboring farmers would build recycling facilities and use the treated water. These facilities are, however, costly and experience taught that tardiness in treatment or neglect cause environmental damage and health hazards. Because of this, significant public assistance is offered: as will be shown in Chapter 10, the lion's share of the State water budget in recent years has been dedicated to support of wastewater and recycling systems.

In the past, use of effluent was scant: in 1963, effluent diverted to agriculture constituted only 4 percent of the quantity of water in the urban sector. This rate reached 55 percent in recent years, and the area irrigated, which was 1500 hectares 50 years ago, today exceeds 100,000 hectares. The largest treatment and recycling facility is the Shafdan, which collects wastewater from 15 cities in Tel-Aviv and its vicinity and treats it centrally adjacent to Rishon LeZion Beach. Post treatment, the effluent is deposited in the surrounding sand dunes and, after a year's delay, is withdrawn and conveyed to the south and the western Negev. After having been filtered through the sand, the recycled water, although not potable, is approved for unlimited irrigation. Use of effluent from other treatment facilities is more restricted, both because of its high salinity that can damage reservoirs, and because of health risks to farmers and their products. Currently, a more stringent standard (of the Inbár Committee) is being adopted whose implementation will make wastewater treatment more costly, but will enable broader use of the treated effluent.

### 3.B. *Desalination*

The possibility of desalinating seawater arose in the professional discourse as early as the 1960s, and was even brought up between the Israeli and the US governments, yet was rejected due to technical and economic reasons. Desalination was first carried out in Eilat 30 years ago. The first master plan that recommended seawater desalination on a large scale was submitted in 1997, but was rejected.

In the wake of a drought in 1998-99, the government decided to begin practical preparations for seawater desalination. In 2000 a tender was issued for building a desalination plant in Ashkelon, south of Tel-Aviv. In 2001, the winning bid was chosen, and at the same time, the government decided to order Mekorót to build a plant in Ashdód. In April 2002, the government adopted the master plan

(transitional) for the construction, by 2004, of desalination facilities with a total capacity of 400 million CM. Construction proceeded, yet more slowly than anticipated. Today three desalination plants are in operation on the coast: in Ashkelon, Palmachim, and Hadera, with combined output of nearly 300 million CM per year.

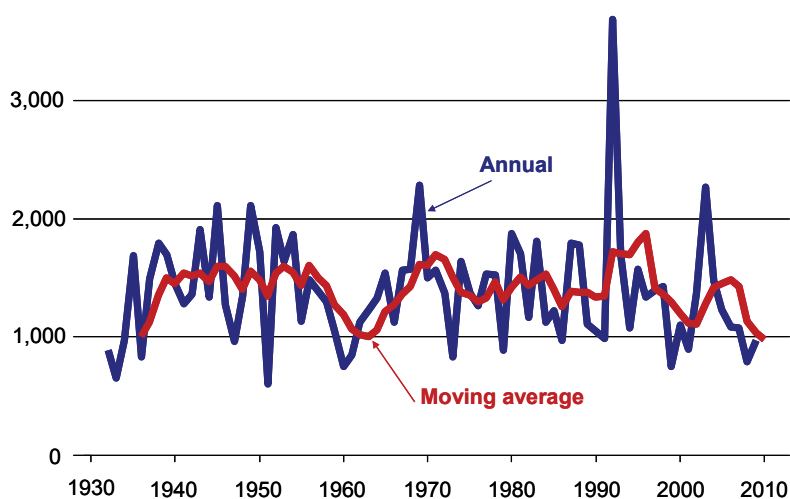
Not all of the planned desalination plants were built. The companies that were supposed to have built them in Shomrat and at the mouth of the Kishon (both north of Haifa) withdrew from the projects, and the state repossessed their deposits. A third company, which was supposed to build a plant in Ashdod (in addition to Mekorot's), went bankrupt. In the near future, two more plants are on the agenda: one at Sorek, with a capacity of 150 million cubic meters per year; and a Mekorot plant at Ashdod, with an output capacity of 100 million CM per year. Besides these, other plants for desalination of saline water are on the horizon, at capacities of 80 million CM per year; and Mekorot is planning wastewater desalination at a capacity of 13 million cubic meters per year. If all these plans are realized, it can be anticipated that by 2015 the quantity of desalinated seawater will reach 600 million CM; that is, an addition of 50 percent to natural water sources. Barring disappointing surprises, this addition will secure orderly provision and rehabilitation of the reservoirs that have suffered from overdrafting for a long period.

## Chapter 4: The Natural Sources

### *An Expanded Discussion*

The data in Table 3 reflect multi-year averages. Yet in fact, as we shall see, water extraction changed from period to period according to the quantities available in the reservoirs. Due to storability, this quantity is not determined by yearly enrichment (recharge, replenishment) – the quantity that is added every year to the reservoirs – but rather by cumulative enrichment of several years. Enrichment data – actually estimates – have been reported for a 78-year-series from 1932 to 2009, and they are presented in Figure 2.

Figure 2  
**Enrichment of the national system, 1932-2009**  
annual and five-year moving average, million CM



**Source:** Yoav Kislev.

**Data:** Master Plan (Water Commission, 2002) and additions from the Water Authority.

Figure 2 shows yearly enrichment data for the main reservoirs of the national water system: the Sea of Galilee, the Mountain Aquifer, the Coastal Aquifer, and the Western Galilee. The graph shows several dry years, sometimes groups of years, with particularly low enrichment, and one year – 1992 (rainy season 1991-2) – that peaked at a record high. Figure 2 also shows a graph of enrichment in clusters of years, in a moving average. Each point on the graph represents average enrichment for the five-year period it ends. For example, the point for 1960 shows the average enrichment for the years 1956-1960. The long term average for all 78 years is 1,384 million CM, but the averages for the five-year periods are lower and higher than that. Four dry periods are prominent: the beginning of the 1930s (the first point on the graph), the beginning of the 1960s, the end of the 1990s, and the past few years.

#### ***4.A. Reservoirs and Operational Lines***

Precipitation accumulates in the reservoirs, aquifers, and the Sea of Galilee. The overall volume of the stored water is much larger than the addition that comes from precipitation during any rainy season. The water economy operates as a large pool to which a small quantity of water is added annually, and a similar quantity ought to be available for use. With cautious withdrawal, reserves for dry years accumulate in the reservoirs. Intensive extraction, on the other hand, is liable to cause diminishment of water in the reservoirs and damage to the resources.

Such damage manifests itself in two ways: 1) Diminishment reduces water reserves, thereby exacerbating the crisis in drought years; 2) Water tables drop, and this reduction damages the reservoirs. In the aquifers, the damage is mainly in the "invasion" of seawater and other saline water into the reservoir. The entrance of salty water reduces the active volume of the reservoir and its supply capacity. The

further the drop of water tables, the more widespread the damage, and with time it even worsens. In the case of the Sea of Galilee, there is also the risk of biological damage as a result of large fluctuations in its water level.

Due to the large quantity of stored water, it is easy to slide into overdrafting, despite the threats to resources; after all, there always is water in the reservoirs. To prevent the damage, operational lines, or “red lines,” were set to indicate the limits of the reservoirs.

Red lines were first adopted for the Sea of Galilee in the 1920s, as part of the operating system of the power station at Naharáyim, and they had a dual purpose: to prevent flooding in the winter and receding of the water in the summer, so that the farmers, fishermen, and churches would not be harmed. To do so, the upper line was marked at 208.90 meters below sea level (the Mediterranean), and the lower line at minus 212 meters. In 1967, the lower line was codified into law by directive of the Water Commissioner. At that time, the prevailing hydrological view was that lowering the Sea of Galilee’s water level was liable to cause bursting of the saline springs on the lake’s bottom and to damage seriously water quality.

Since then, our understanding of the salinity process has changed, and the line was moved five times. The last amendment was made in 2001, when the red line was set at minus 215.50 meters. Shimon Tál, the Water Commissioner at the time, wanted to prevent continuous changes: “This level was set because the National Carrier’s pumps will stop functioning when we reach it. This constraint will protect the level of the Sea of Galilee from dropping any further.”

The other reservoir for which red lines have been drawn is the Yarkón-Tninim Aquifer, where lines were measured in two wells: one at Petach Tikva, the other at Hadéra. These lines were set according to the recommendations of hydrologists but they were not codified into law. The desired level of the water table in this aquifer was three meters above the lines, it has not been maintained stringently; there

have even been years in which the water table fell below the lines. Red lines were not drawn for the Coastal Aquifer, which is comprised of many cells, but hydrological recommendations call for maintaining average levels of 3-4 meters above sea level. This recommendation has not always been upheld either.

#### **4.B. *Withdrawal Policy***

Water provision to the urban sector has always been regular, demand was fully satisfied. As such, any changes in extraction were realized as changes in the supply to agriculture. In principle, one of two policies can be followed in extraction management and provision from the reservoirs: flexible extraction or sustainable extraction (the latter is also termed *safe yield*). In both options, the intention is to use the water in the *operational storage*, the body of water above the red line.

With flexible extraction, every year, any quantity in the operational storage is used. Extraction continues until the water table falls to the red line. In this case, the decision on the quantity to be withdrawn is made in the spring, when the situation of water in the reservoirs is already known. The advantage of this policy is that the entire available quantity is used. But flexible extraction has two drawbacks: the first is that no water is left in storage as a reserve, and if a drought occurs, the water economy slides into overdrafting and water tables fall below the red lines. The second is a double drawback for the farmers: they must prepare their equipment for both possibilities – dry and rainy – and notification of water allotment in the spring may come too late for some crops.

Under the second policy option, sustainable extraction, provision is stable, a fixed quantity every year, with the possible exception of emergency periods in which the quantity is reduced and allotments are cut. Determining the sustainable quantity is done by a simple statistical calculation wherein historical enrichment series, such as



shown in Figure 2, are entered repeatedly into the computer, and different fixed extraction possibilities are examined against them.

The advantage of sustainable extraction is in the assurance of a stable water supply, the farmers know ahead of time how much water will be at their disposal; at the same time, utilization of reservoirs is sustainable. A drawback is that average multi-year supply is lower than in flexible extraction. Another drawback is the dependence on historical enrichment series: if climatic changes occur, causing diminished precipitation, even for short periods of several years, adhering to the pre-determined quantity might lead to large deficits and crises. Therefore, as under a policy of flexible extraction, so also if the alternative policy of sustainable extraction is adopted; the reservoirs must be diligently monitored so as not to let water tables fall below the red lines. In the age of desalination, desalinated water can be used as a backup for natural extraction during droughts, thereby increasing the extracted quantity defined as sustainable. With appropriate contractual arrangements, water can also be imported to serve as a backup source. In reality, extraction was flexible, not sustainable; the effective policy was actually of overdrafting.

#### 4.C. *Overdrafting*

By law, water sources are public property and are to be controlled by the state – that is, the government. The Water Commissioner was the arm of the government for implementing water policy (beginning in 2007, the Water Authority has filled this function). The law gave the Commissioner power and authority to manage the water economy and particularly, to protect resources, but failures have been exposed in this operation. Due to easy access to water and the proximity to centers of population and agricultural activity, the Coastal aquifer was the first where extraction and supply systems were developed, and where failures were realized early and felt intensely. Many wells were

dug in this region even prior to Israel's establishment, mainly for irrigating citrus groves. In the 1950s, the utilization of the Coastal aquifer was enhanced and its management policy was of overdrafting. The plan was to restore the depleted aquifer once the National Carrier was completed; however, although water was artificially recharged in several places, the Coastal Aquifer was not rehabilitated. With further development of the water economy, overdrafting was practiced in other places as well.

Overdrafting was well-known in the water sector and it was pointed out to the authorities time and again. Here are a few quotations: "It is obvious that this process cannot continue unchecked" (1973). "An ever-widening gap between the renewable sources and consumption" (1980). "In three reservoirs, a total of 1.6 billion cubic meters is missing" (1990). "A cumulative deficit of 2.5 billion cubic meters" (2001). An estimate published in 2006 was that in the eight year period of 1993-2000 overdrafting reached the annual rate of 80 million CM. This is how the water economy arrived at the recent drought years without reserves for emergencies and how considerable damage was caused to the reservoirs.

Many explanations have been offered for overdrafting – developing the country, the agriculture lobby, low prices, and postponement of desalination – but the bottom line is cut and dried: the state, which controls the water sources and whose task it is to protect them, has not fulfilled its role – a typical case of government failure. The lesson to be learned is not that the law should not have delivered the water to the control of the government – it is reasonable to assume that without the state's intervention, the situation would have been worse – but rather that the government, the people who draft and implement policies, are limited in their abilities and are often biased in their decisions and their actions. There must be monitoring of the state, just as the state monitors those engaged in the water economy. These issues will be expanded upon in Part 3.

#### 4.D. *Water Quality in the Reservoirs*

In addition to overdrafting, contaminating anthropogenic activity (by human beings) also damages water sources. The contaminating materials, some of them poisonous, come from industrial sewage, leakage from gas stations, fertilizers and manure in agriculture, garbage dumps, and other sources. The quality of water is monitored in hundreds of control points and when contamination is found, wells are closed and supply curtailed. However, this is not enough, since the contaminating material stays in the reservoir and even spreads further in it. Therefore water from wells suspected of contamination is cleansed. In 2006, the quantity of cleansed water was 66 million CM. Part of the treated water is returned to the system in drinking quality and other parts are diverted for restricted utilization. In addition, great effort is spent on prevention of contamination in the water sources. The Ministry of Environmental Protection is also active in this area – for example, in industry and dairies – and the boundaries of responsibility between the Ministry and the Water Authority have often been cause for heated disputes between the two government agencies.

## Chapter 5: Provision and Consumption

Fifty years ago, agriculture used over 80 percent of the water supplied in Israel, and essentially all of that was of drinking quality. Today, as seen in Table 4, agriculture's share of consumption is smaller, and most water in this sector is marginal: recycled, saline, and floodwater. The quantity of freshwater used in the urban sector is larger than in agriculture.

The last row of Table 4 shows Mekorót's share of the water supply: in 2009, Mekorót supplied, on average for all sectors and kinds, 70 percent of the water. With quantities of desalinated seawater also added to the national system, Mekorót's share, particularly of freshwater, will increase.

Table 4. **Water supply, 2009**  
in millions of cubic meters

	<b>Agriculture</b>	<b>Industry</b>	<b>Urban</b>	<b>External</b>	<b>Total</b>
Fresh	403	81	680	100	1,264
Recycled and Shafdan	395	1	1		397
Brackish	180	28	5		213
Floodwater	38				38
<b>Total</b>	<b>1,016</b>	<b>110</b>	<b>686</b>	<b>100</b>	<b>1,912</b>
<i>Of this:</i>					
<b>Mekorót</b>	597	71	567	100	1,335

**Notes:**

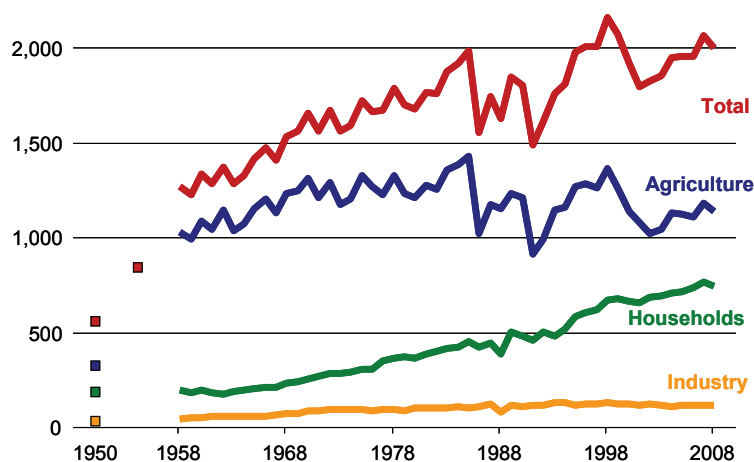
- The plants in Ashkelon, Palmachim, and Hadëra supplied 160 million CM of desalinated seawater. In addition, 25 million CM of desalinated saline water were supplied, particularly in Eilat and the Arava; all this is included in "fresh."
- The external users are the Kingdom of Jordan (46 million cubic meters) and the Palestinian Authority.

**Source:** Water Authority website.

Water consumption for the last 60 years is tracked in Figure 3. The data for the early years are irregular. This was the period of building the large projects – among them the National Carrier – and expansion of supply. The development of the water supply system continued even after the completion of the National Carrier. By the mid-1980s, all natural water sources were in fact utilized, and these sources have not increased since. In the early years, before full use of the water sources, a stable supply held out even in dry periods. Thus the drought at the beginning of the 1960s does not stand out in the graphs of Figure 3. However, in the past two decades, when full and intensive use was made of water sources, and the policy was of flexible supply, droughts, when they occurred, forced reduction in allotment. In rainy periods, supply expanded, usually along with overdrafting. Aside from small changes in urban (households) consumption, agriculture in fact absorbed all the variation in supply.

Figure 3

**Water consumption by sector, 1950-2008**  
by sector, all types of water, without external users, million CM



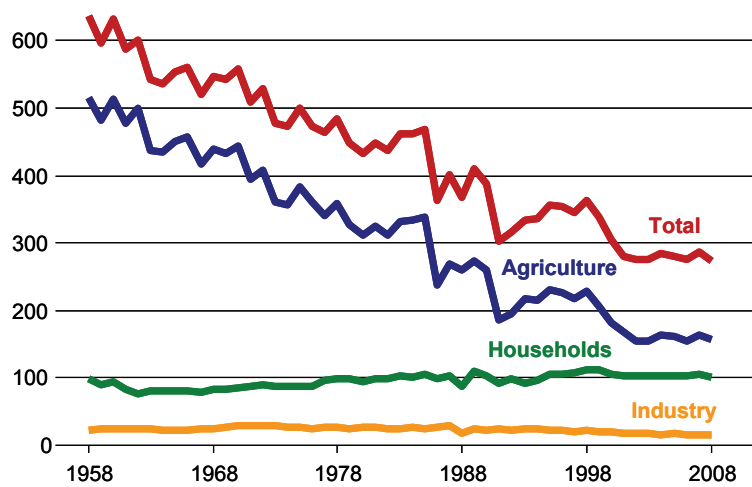
Note: "Households" are the urban sector.

Source: Yoav Kislev.

Data: Central Bureau of Statistics, *Statistical Abstract of Israel*, various years.

Figure 4 shows the same data as Figure 3, but this time by average per capita. Beginning at the end of the 1950s, the population rose markedly, surpassing the increase in supply, so that overall per capita supply decreased, with the supply to agriculture particularly declining. Agriculture produces fresh food for a growing population despite the relative reduction in available water (more on this in Chapter 6).

Figure 4  
Per capita consumption, 1958-2008\*  
by sector, million CM



\* The quantity for each sector is divided into Israel's total population.

**Note:** "Households" are the urban sector.

**Source:** Yoav Kislev.

**Data:** Central Bureau of Statistics, *Statistical Abstract of Israel*, various years.

Water use in the urban sector has followed the population increase: The growth in per capita consumption was less than 1 percent per year (we will return to this issue in Chapter 7). Neither did consumption by industry increase: the product mix changed, and industry learned to use water more efficiently.

#### **5.A. *Water to the Kingdom of Jordan and the Palestinian Territories***

Jewish communities in the Jordan Valley had used water from the River Yarmuk for many years. A tacit agreement was reached in 1952, with American assistance, on the division of the river's water between Jordan and Israel and it was followed for decades to the satisfaction of both sides. The Peace Treaty of 1994 stipulated three points regarding water: allocation of the Yarmuk water; Israel agreed to pump water from the Yarmuk in the winter, to be stored in the Sea of Galilee and transferred to Jordan in the summer; Jordan agreed that Israeli farmers in the Arava Valley continue to extract water from wells they had dug across the international border, in Jordanian territory. The quantity in Table 4 (46 million CM) was provided from the Sea of Galilee according to the Peace Treaty and agreements reached in its wake.

After the Six Day War in 1967 Israel augmented the provision of water in the West Bank and Gaza Strip. By the Interim Agreement of 1995 (Oslo II) Israel was to add annually 28.6 million CM to the Palestinian territories. Also agreed upon were the rights of the Palestinians to drill wells in the West Bank and the establishment of a Joint Water Committee to supervise the sources of water and their quality. The Interim Agreement was for five years but it has not yet been renewed or replaced. However, because of increasing needs, provision from Israel increased and in 2009 it was 54 million CM, almost twice the quantity agreed upon in 1995. Supply to Israeli

settlements in the West Bank is included in Table 4 with the quantities provided to the water sectors in Israel.

The Palestinians complain that Israel deprives them of water they should receive. The official government reply is that we supply more than the agreed upon quantity (Water Authority, 2009). There is, however, a different opinion; namely, Israel is the governing power in these areas and it has to treat all inhabitants equally. Ample supply to Israeli settlements and limited provision to Palestinian communities is, according to this view, a clear case of discrimination (Kislev, 2008).

### ***5.B. Cost of Supply – Two Dimensions***

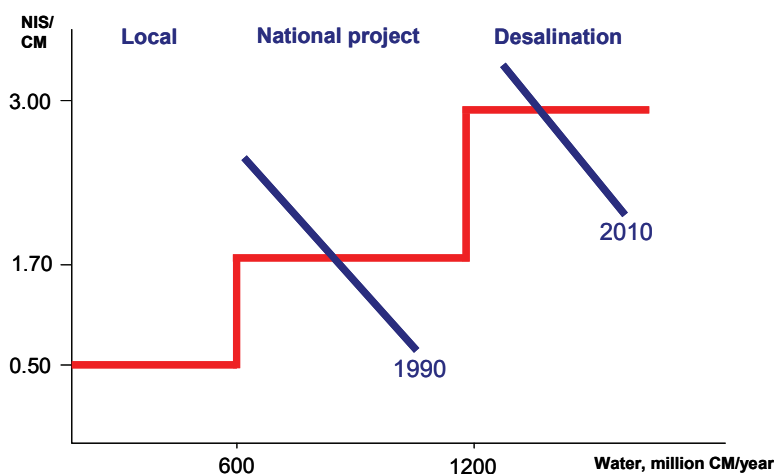
The cost of supply is presented in two dimensions; the first is an overview. Figure 5 encompasses the salient features of the cost of freshwater both historically and in terms of the source of supply. The first period of Israel's water economy was the Age of Local Production: supply was then from wells and other sources located close to users, largely in agriculture but also to residential communities. At today's prices, the cost of that water was NIS 0.50 per CM, which is also, in rough terms, today's price for supply from the Sea of Galilee and environs, from wells in the Upper Galilee, coastal wells, and others. After the inauguration of the National Carrier in 1964, Israel's water economy moved into the Age of the National Project, wherein the cost is NIS 1.70 per cubic meter. And beginning in 2005, we entered the Age of Desalination, with cost, in rough terms, of NIS 3.00 per CM.

In addition to a historical overview, the steps in the graph in Figure 5 can be taken as depicting a supply curve linking the price of freshwater to the available quantity. Demand curves are also marked in the figure: in 1990, we did not use all of the freshwater at our disposal (recall that estimates of the potential were larger than the



1,200 in the figure), and in 2010, the water economy was dependent upon desalination to meet demand.

Figure 5  
The three “water ages” and the cost of freshwater



Source: Yoav Kislev.

The supply curve step-function indicates the marginal cost of freshwater. Currently, by the figure's assumption, the marginal cost is the cost of desalination, NIS 3.00 per CM. The marginal cost is the cost to the water economy of the use of one additional cubic meter, and a price equal to the marginal cost conveys to every user the information that directs him or her – relying on their own private considerations – to allocate water in ways consistent with considerations of the economy at large. However, as we shall see below, water prices are not actually set based on the marginal cost.

The second dimension of cost relates to components and structure. In its most simplified form, the cost of water for all uses is made up of

the following components: cost of water in its source; fixed cost; variable cost. Post-use costs are also added to these components: for water in towns and manufacturing, sewage collection and treatment and for water in agriculture – drainage where needed. The total cost is the sum of all of these components.

The cost in the source will be explained in Chapter 12, in the discussion of the extraction levies. The fixed cost does not change with the quantity of water. Basically it is the cost of capital – of the assets. However, in water utilities the lion's share of the cost of labor is also fixed. In its origin, the cost of the assets is the investment outlay, but in many cases it is expressed in annual terms – X NIS per year for depreciation and interest – and, in water utilities, labor cost is added to these components. The variable cost is a function of the quantity of water supplied. A large part of it is the cost of energy to move water or to treat sewage.

Covering the variable cost in consumers' payment is simple: the price reflects the cost per CM and the revenue – price times quantity – covers all the variable costs (per month or per year). The problem of fixed cost is more difficult. Where consumers do not cover total cost, fixed cost can be covered from another source; for example, government budget covering investment. In the other possibility, when tariffs are to be cost-recovery, there are in principle three ways to cover fixed cost: a) an advance payment equal to investment outlays – such are the development levies in the urban sector (Chapter 7); b) a periodic fixed payment to cover the periodic fixed cost; c) integration of the fixed cost with the current, volumetric charge for water. In the last case – and this is the way Mekorót's tariffs are now set – rates for the coming year are based on forecasted consumption. If the forecast is not realized, financial surpluses or shortages are accumulated, and the rates are amended in the following year. These different components of costs and the ways they are covered will be further discussed below.

### 5.C. Cost in Numbers

Mekorót supplies 70 percent of the water in Israel (Table 4). The prices the company charges are set by the Council of the Water Authority and are intended to completely cover the costs of supply. We turn therefore to the costs of Mekorót. An agreement reached with the farmers in 2006, stipulated a gradual shift to cost-recovery prices and determined ways to study the cost of water supply at Mekorót – including purchasing desalinated water. Although the study was purportedly completed, its findings and conclusions have not been published as yet. Meanwhile, costs of several kinds of water can be calculated for Mekorót from the company's financial reports and they are shown here alongside the prices set in the agreements with the operators of seawater desalination plants. Private suppliers and regional water cooperatives do not publicly disclose information on their costs or charges, but the Central Bureau of Statistics gathers information on the cost of water to agriculture from all supply sources, and this is presented in the next chapter. The supply cost in the urban water and sewage corporations is discussed in Chapter 7.

**Table 5. Quantities and average cost: Mekorót, 2009**

	Quantity in millions of cubic meters	Cost in NIS per cubic meter
Freshwater	994	2.22
Shafdan	160	1.33
Brackish	124	1.13
Effluent	59	0.86

**Note:** The financial report did not distinguish between fixed and variable costs.

**Data:** Quantity, Water Authority website; costs, Mekorót, *Financial Report for 2009*, (Hebrew) explanation 24.8.

Cost of water in Mekorót includes purchasing desalinated seawater – 160 million CM in 2009 – and much smaller quantities from other suppliers. Extraction levy is not included in the costs of Table 5. Practically, Mekorót does not pay the levy. By the company's estimate, if Mekorót had to pay the levy, in 2009 it would have been NIS 967 million; the cost of freshwater with the tax would then have been NIS 3.20 per cubic meter.

The contracts signed with the operators of the desalination plants stipulated two price elements, fixed and variable (Table 6). When water is provided, the desalination plants will receive the "total" price. For periods when water is not purchased, the operators will receive the fixed element; for example, if the plant in Ashkelon – with a capacity of 100 million CM per year – ceases operating by order of the Water Authority, the government will pay its owners the sum of NIS 179.5 million per year. Consistent with the current policy, it is reasonable to expect that the payment will be covered by water users as part of the tariff. This question has not yet been clarified in the law or the rules,<sup>3</sup> though.

The prices for desalinated water quoted in Table 6 are lower than what had been expected in the past. The main reasons for this are advancements in desalination technology and the state having committed to covering the fixed costs when water is not purchased. Thus the state is taking upon itself (or upon the consumers) the main economic risk faced by the plants' owners, the risk that their "product" will not be taken.

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<sup>3</sup> I adopt a terminological distinction made by the law in Israel. Regulations and rules are by-laws of equal standing. Regulations are enacted by ministers; a few "statutory" agencies are empowered to enact rules, the Council of the Water Authority among them.

**Table 6. Prices of desalinated seawater**  
in NIS per cubic meter

	<b>Capacity of original plant million CM/year</b>	<b>Fixed</b>	<b>Variable</b>	<b>Total</b>
Ashkelon	100	1.795	1.198	2.993
Palmahim	30			
Hadëra	127	0.849	1.683	2.533
Sórek	150	1.047	1.119	2.166
Ashdód	100			2.390

**Notes:**

- a. The plants in Sórek and Ashdód are still under construction.
- b. The operator of the plant in Palmahim refused to disclose its price.
- c. The prices in the table are for the original capacity. The capacity was extended after the construction of the original plant, at slightly different prices.

**Data:** For capacity of original plant – Water Authority website; for prices in Ashkelon, Hadëra and Sórek – Ministry of Finance, correspondence, 29 August 2011 (prices to 30 June 2011); prices for Ashdod – from *Ha'aretz*, *TheMarker*, 2 November 2011.

## Chapter 6: **Water in Agriculture**

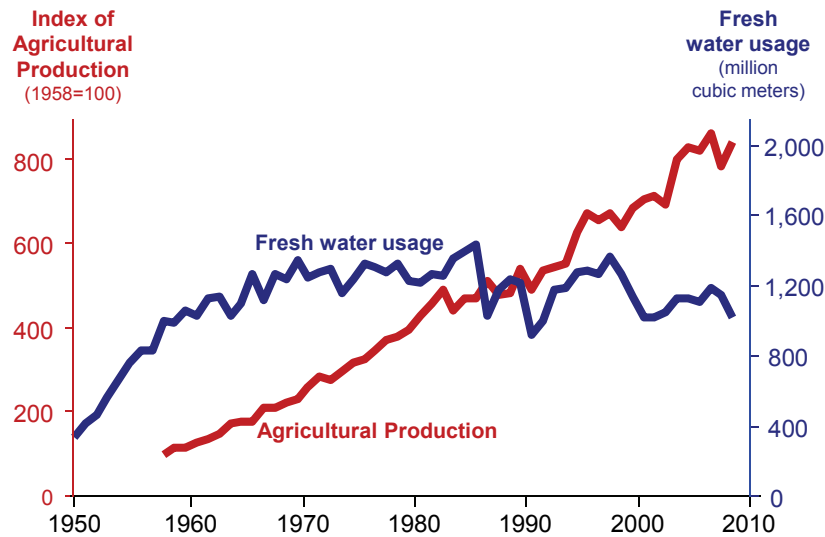
Agriculture uses over 50 percent of Israel's available water but its share of freshwater is less. Forty percent of the water used in agriculture is supplied from its own facilities, mainly owned by regional and local cooperatives; the rest is provided by Mekorót.

### *6.A. Consumption and Production*

In the early days of the State, the supply to agriculture was limited to water from local sources – from the Sea of Galilee, wells, and rivers – to irrigated fields close by. With the completion of the National Carrier – one of the largest projects of the young State – the supply to agriculture quadrupled and expanded to all parts of the country. Yet in the past 40 years, as was seen in Figure 3, the quantity supplied to this sector has not grown significantly.

The period beginning in the mid-1980s is characterized by a gradual shift from freshwater to recycled effluent and other marginal water, as well as by fluctuations in supply. Despite the fact that the water quantity did not increase, the output of crops – vegetables, field crops, and orchards, agriculture's water consumers – steadily grew. In the past four decades, output of crops per unit of water has grown sevenfold; and once again, as can be seen in Figure 6, the halting of the expansion of water supply has not slowed the expansion of agricultural production.

Figure 6  
**Water usage and agricultural production**  
 1950-2009



**Source:** Yoav Kislev.

**Data:** Central Bureau of Statistics, *Statistical Abstract of Israel*, various years.

Many view the increase in agricultural production per unit of water as a measure of the success of Israel's irrigation technology. An OECD report (2010a, Executive Summary) referred in this context to "an innovation culture spanning several decades." Truly, Israel's technology shows impressive achievements, but water is not the only factor responsible for the development of agricultural production. Among the other factors: since the 1960s, the quantity of fertilizer used in agriculture has increased 50 percent; the quantities of fuel and oil used for machinery have doubled; and herbicide and pesticide use has tripled. Moreover, in the past decade, the area covered by

greenhouses has doubled, and foreign labor has been added, mostly from Thailand and generally excellent workers. In contrast, the number of self-employed farmers has dropped, concentrating production into the hands of a relatively small number of professionals, those who can manage large farms. These factors and others were combined with the technological achievements that have brought about a marked increase in agricultural production. Improvement in water technology has not been its only cause.

#### **6.B. *The Food-Water Balance***

The quantity of water available in Israel does not suffice for the production of the entire food needs of the population of the country. A simple computation will demonstrate this, even if only with approximate figures. The computation is based on an approach developed by Tony Allan (2000) according to which food trade, or trade in other products, is actually trade in water used in the production process. While the products themselves are dry or contain only tiny quantities of water, their production requires water; consequently, export and import of food can be regarded as if they were trade in water. The term coined is *virtual water*.

In approximate terms, the quantity of water needed for producing one kilogram of grain seed (wheat, barley, and so forth) is one CM (precipitation or irrigation); and the quantity of food needed to feed one human is the equivalent of one ton of wheat per year, or 1,000 CM of water. Therefore, in the first part of Table 7, the quantity of water needed to feed Israel's population (including foreign laborers and tourists) is written as 7,800 million CM of water per year. Add to that water for the urban sector and industry, and the total quantity of water needed is 8,600 million CM a year. Israel's available water, again in rough terms, is 1,500 million CM a year in the soil (from precipitation that wets the ground of fields and gardens) and 2,000



million CM a year provided from natural and other sources. Subtract water for export crops – citrus, flowers, and others – estimated as 500 million CM a year and one reaches the total available quantity of 3,000 million CM a year; hence the yearly deficit is 5,600 million CM.

**Table 7. Water balance and food import in approximate figures**

<b>Needs</b> (water, million CM/year)		<b>Resources</b> (water, million CM/year)	
Food	7,800	In soil (from rain)	1,500
Home and urban	690	Extraction and recycled	2,000
Industry	110	Export	-500
		Total	3,000
		Import of virtual water	5,600
<b>Total</b>	<b>8,600</b>	<b>Total</b>	<b>8,600</b>
<b>Main food imports</b>	<b>Thousands of tons</b>	<b>Virtual water cubic meters per ton</b>	<b>Virtual water millions of cubic meters</b>
Grains	3,200	1.0	3,200
Oilseeds	394	1.3	512
Sugar	492	1.5	738
Beef	63	16.0	1,008
<b>Total</b>			<b>5,458</b>

**Sources:** Water – my estimates; food – 2009 Central Bureau of Statistics figures for foreign trade; virtual water – [www.waterFootprint.org](http://www.waterFootprint.org) and my adjustments.

The second part of the table shows virtual water imports. For example, we import 63,000 tons of beef a year. The quantity of water needed to raise one kilogram of beef is 16 CM, so that the imported beef contains a billion CM of virtual water. The aggregate quantity of the four main food groups in the table is 5,458 million CM of water a year.

Israel imports and exports many products containing virtual water. Although the balance in Table 7 is not complete, as even the food sector is not covered fully, it leads to a clear conclusion: we cannot be independent in our food supply, as Israel's water resources suffice to produce less than half of the quantity of food needed to feed its population; even large-scale desalination won't change this conclusion. The additional food that we consume is produced abroad, and we import it against exports of industrial products, services, and knowledge (virtual water can also be quantified in imported and exported industrial products).

The other countries in our region also need to import food, that is, virtual water. Tony Allan found that the Middle East is more dependent than any other region on virtual water imports. He remarked that this import added in the prevention of war: if we did not import food, the region's inhabitants would have fought desperately for every drop of water. Here is a contribution of globalization to peace.

#### 6.C. *Costs, Prices, and Levies*

About 60 percent of water for agriculture is supplied by Mekorót. The prices that Mekorót charges are set in rules and will be reviewed in the next chapter. The prices charged by other suppliers – mostly regional associations – are neither monitored nor published, but the Central Bureau of Statistics publishes aggregate data on the cost of water for all users, both Mekorót customers and others. These cost figures will be presented below.

The Water Law distinguishes between the cost of water and water fees. *Cost* refers to the cost of extraction and supply, on the "production" side (as distinct from the cost to users referred to at the end of the previous paragraph), and it was set in the past in regulations issued by the Minister of Agriculture. Today this is the responsibility

of the Water Authority. The cost of water in Mekorót for supply to all its customers – not only farmers – is shown in Table 5. *Fees* are prices paid by the users of water, which the law allows setting based on various considerations, among them the users' ability to pay (the government has recently adopted a policy of cost-recovering prices, Chapter 15). The law also sets extraction levies that are to reflect water scarcity, and may differ from place to place.

In the past, water prices were determined with the approval of Knesset committees with no explicit connection to the cost of provision. When the Water Authority was established, it was tasked with setting prices. Yet just before its establishment in fall 2006, the government signed an agreement with farmers' representatives according to which water prices for agriculture would be set based on the average Mekorót cost of water supply to the sector, including agriculture's share of desalinated water. (The agreement also stipulated support for investment in agriculture, but this aspect will not be reviewed here.) According to the agreement, Mekorót's costs were to be agreed upon by a joint committee following a comprehensive study. The committee apparently completed its work, but its findings have not been published yet. Nevertheless, water prices for agriculture have risen, and will continue to rise in the coming years.

Mekorót's tariffs for freshwater to agriculture, are block rate prices. Each agricultural consumer, whether mosháv, kibbutz, or individual farmer, has a basic water quota (also called 1989 quota), and the prices paid are set according to demand relative to the quota in the following manner:

Block I,	Quantity A,	50 percent of quota	NIS 1.650 per CM
Block II,	Quantity B,	30 percent of quota	NIS 1.902 per CM
Block III,	Quantity C,	20 percent of quota	NIS 2.411 per CM.

These prices do not include value added tax.

The rules also set forth increments to the tariff for the coming years:

- By 2016, the prices for all blocks will rise by 60 agorót per CM. In special cases, for example the Beit Sh'eán Valley, prices are different. The charge for brackish water is lower, a decreasing function of salinity level. An extra charge is set for consumption above the quota, termed *irregular quantity*.
- The following prices were set for recycled water and effluent supplied by Mekorót: Shafdan water – NIS 0.934 per CM as part of allotment and incremental payment for extra consumption; other effluents for unrestricted irrigation – NIS 0.803 per CM. These prices are higher by some 10 percent than the prices up until now and will rise gradually over the coming years.
- By 2015, the price of Shafdan water will be NIS 1.052 per CM, and effluent will cost NIS 0.892 per CM. Again, the rules do not set the price for effluent that is not supplied by Mekorót.

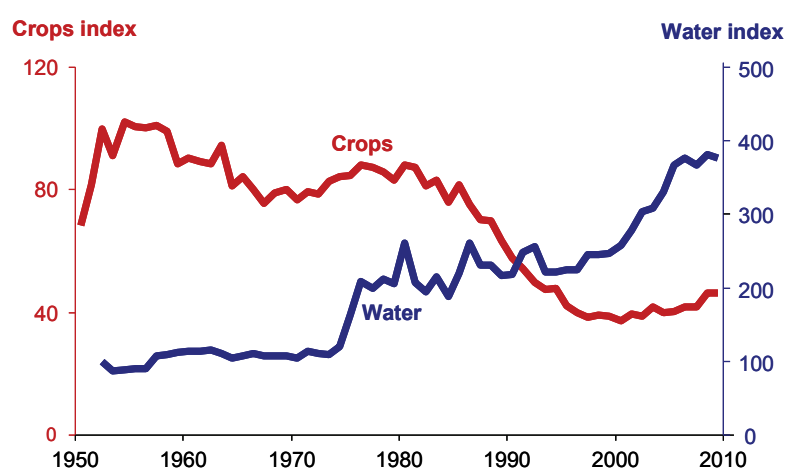
By law, since 1999, water suppliers are required to pay extraction levies, and they are allowed to pass them on to their customers. The levies differ depending on the water's end use, its locale, the season – winter or summer – and whether the year was rainy or dry. In fact, the levy does not apply to Mekorót and its customers. The levies on agricultural water will be presented in the discussion on policy, and those that apply to the urban sector will be explained in Chapter 7. All of the prices and the levies are linked to indexes reflecting changes in the cost of water provision.

According to the letter of the law, water supply for agriculture is done by administrative allotment, in quotas: each consumer has a quota that was historically set by the planning authorities (1989 quota). The quota is supposed to be the maximum quantity that the consumer will receive. In fact, in recent years – until the present crisis – the farmers have not used their full quotas, and the quotas served

only to determine the price blocks (the quotas are reduced in periods of shortages and crises).

A few factors may affect agriculture water consumption. Figure 7 shows two of these: the index of the cost of water and the index of the price of crops (field crops, vegetables, and orchards). The indexes are real, discounted by the consumer price index. The cost of water is the average cost per unit (cubic meter) of all types of water from all sources – not only payments to Mekorót – and it is the cost to the farmers. For those purchasing water, the cost is the buying price; and for those supplying water themselves, the cost is of self-supply.

Figure 7  
**Water cost index for agriculture and crops price index,  
 1950-2009**  
 prices adjusted by consumer price index, 1952=100



**Source:** Yoav Kislev

**Data:** Central Bureau of Statistics, *Statistical Abstract of Israel*, various years.

The average cost in Figure 7 was stable for Israel's first two decades, then rose sharply in the 1970s together with energy prices (in the wake of rising energy prices, the cost of self-extraction rose, as did prices paid by farmers to Mekorót), and then rose again gradually from the 1990s until today. Over a 50-year period, the real cost of water quadrupled. In contrast, the trend in crop output prices has been a downward one, despite a temporary increase in the 1970s.

Today, product prices are approximately 40 percent of the real price that applied at the beginning of the 1950s. That is, in the period following the establishment of the State, prices were two-and-a-half times higher than what they are today. The reduction in price of Israeli agriculture products reflects a rise in productivity and a reduction in world market prices, both of Israeli agricultural exports and imports that compete with local products.

Water constitutes only a fraction – and frequently not a large one – of the total cost of producing agricultural products, therefore a reduction in produce prices likely had a stronger effect on the demand for water than the rise in the cost of the water itself. Indeed, when agricultural product prices were relatively high, in the 1970s, farmers used their water quotas fully and even surpassed them, while later, when prices decreased, agriculture did not utilize all its allocations.

#### 6.D. *Policy*

Examining agricultural water policy raises four issues: allocation to the sector and diversion of freshwater for urban uses, allocation among agricultural sub-sectors, tariffs and levies in the country's regions, and cross subsidization.

- **Allocation to agriculture**

In Israel's early years, particularly following the wave of immigration and mass settling of the land, agriculture was the main consumer of

water, and the large water projects – the National Carrier and the mains to the mountains, Negev and Arava – were laid to provide for the needs of agriculture. As the water sector developed, allocation to agriculture increased: in the mid-1980s, the quantity of water used in agriculture reached 1,400 million CM a year. Yet over the years, Israel's population grew, urban water consumption increased, and freshwater was diverted from agriculture to the urban sector. At the same time, the amount of sewage increased, and large quantities of treated wastewater were recycled and transferred to agricultural use – up until then in smaller quantities than those of freshwater diverted from agriculture. In recent years, the total quantity of water of all types used in agriculture has been markedly less than the record supply: in 2009, it stood at only 1,016 million CM (Table 4).

The reduction of water allocation to agriculture came under criticism that was not always justified. The gradual diversion of freshwater from agriculture to urban consumption is one aspect of Israel's general and economic development, as well as that of world markets. For comparison, one can look at parallel changes that have taken place in the numbers of workers in agriculture. These changes were accepted uncritically: more than 120,000 people were employed in agriculture at the beginning of the 1960s; today fewer than 70,000 are employed in the sector, many of them are foreign workers. The number of Israelis employed today in agriculture is less than a third of what it was 40 years ago, although over that period, the population of the country tripled. The main cause of the reduction in the number of workers in agriculture – both self-employed and laborers – is the rise in income and salaries in other industries. Farmers and their children have shifted to occupations and income sources outside agriculture. At the same time, increased productivity – including improvements in water utilization – has enabled maintaining and even expanding the supply of fresh food to the growing population with a small and diminishing number of workers.

The gradual shift of freshwater from agriculture to other sectors is therefore part of the growth process and the change in the structure of Israel's economy. The freshwater goes over to the urban sector and is replaced, though only partially, by marginal water. It is likely that this shift would have been accepted uncritically if it had been accompanied by a sharper rise in the price of water than that which actually occurred. The farmers would then have voluntarily reduced the quantities of water that they took. Yet the policy was one of price supports for agricultural water – because of appreciation of the difficulties of the sector, for the sake of maintaining a green environment, and due to agriculture's political power. Since the directing of water is in the hands of the state, and the decisions of government agencies have been to reduce agricultural supply, the changes in water use have been perceived as coercive and arbitrary, thus generating sharp criticism on the parts of the farmers.

The gradual diminishment in the quantity of water supplied to agriculture was accompanied by another phenomenon, which generated even sharper criticism: that of repeated reductions in the water allocated to agriculture in dry periods (Figure 3). Agriculture has borne the burden of the crises in the water sector, and according to its spokespeople, it has become “the fourth aquifer” to which the authorities came running every time there was a shortage. This phenomenon stemmed from the inability to reduce significantly and instantly water supply to urban consumption, from the fact that when all sources were tapped the water sector became tight, all development possibilities were practically exploited, and, above all, due to intense overdrafting that depleted the quantities of water in the reservoirs, leaving no reserves for hard times.



- **Allocations to sub-sectors within agriculture**

Households, institutions, offices, and others in the urban sector are not restricted in their water consumption; they are free to take as they please in exchange for paying the tariffs the Water Authority sets. As explained previously, a combined method prevails in agriculture: initial water allotment is administrative – each consumer has a basic quota – and the payment for the water is a function of quota utilization.

Water allotment, the quota, affects the farm economy in four main ways:

- Initial allotment determines the structure of the farm and the farmer's ability to develop water-intensive crops or others.
- Tariff setting: With block rate prices, a farmer who has a large quota can receive a greater quantity of water at the lower price of Quantity A.
- Conversion to effluent: A farmer converting freshwater quota receives a quota of effluent of 1.2 CM for every CM of freshwater given up (for Shafdan the ratio is 1:1).
- Mainly felt today, the quota is the basis for the reduced quantity of water to be used in times of emergency.

There are considerable differences in allocations to the agriculture sub-sectors. The most recent detailed numbers that I found are for 1998-99. The quantity of water used then in agriculture was more than 25 percent larger of today's provision, yet there have been no significant changes since then in the proportional allocation to the sub-sectors.

The data are presented in Table 8. Looking at the quotas (column 2), for 270 kibbutzim, the quota was 678 million cubic meters a year, whereas 411 moshavim were awarded only 519 million cubic meters a year. Neither the kibbutzim nor the moshavim used all of their quotas in 1999 (column 3). Only the non-Jewish sector used all its allocated water.

Table 8. Water in the agricultural sub-sectors, 1999

	No. of communities	1998 quota in millions of cubic meters	Use in millions of cubic meters	Quota in cubic meters per dunam	No. of workdays per 1000 cubic meters used
	(1)	(2)	(3)	(4)	(5)
Kibbutzim	270	678	601	532	6
Communal moshavim	42	61	50	478	11
Moshavim	411	519	414	493	23
Non-Jewish	131	36	36	63	50
Urban / rural	55	216	140	763	16
Education / research	45	21	13	470	8
<b>Total</b>	<b>954</b>	<b>1,531</b>	<b>1,254</b>	<b>456</b>	<b>14</b>

**Notes:**

- a. Urban / rural = non-cooperative villages
- b. In column (4), dunam (one tenth of an hectare), physical area, field crops, vegetables, and orchards
- c. Workdays, in crop production.

**Source:** Ministry of Agriculture, 2001.

Looking at the allotment per land unit (column 4), the kibbutzim had more water than the moshavim; and the two sectors had a much larger quantity than did the non-Jewish sector. The land area of a farm community is practically a set size, whereas in contrast, labor input varies, and as such, it makes sense to associate it not with the quota, but rather to the actual water use (column 5).

Here the differences between the sectors are large: six workdays per 1,000 CM in the kibbutzim; in the moshavim 23 workdays per 1,000 CM; and in the non-Jewish sector 50 workdays per 1,000 CM. Farmers who had at their disposal smaller quantities of water used them for labor-intensive crops, they “squeezed” the water more.

One explanation for the differential allocation to the sub-sectors is that it reflects a basic planning approach: kibbutz agriculture was built for large areas and mechanization. In the figures in Table 8, the average land area of a kibbutz in 1999 was 4,700 dunams, with water allotted commensurately. The average land area of a moshav was 2,600 dunams, and water allocation was accordingly smaller, on the assumption that the moshavim would engage in labor-intensive agriculture (the communal moshavim fell in between). Although this explanation is historically correct, these planned assignments led to differing allocations, with the kibbutzim still being able, if they so desired, to go over to labor-intensive crops; but the moshavim do not have the corresponding option of growing land- and water-intensive crops. A moshav farmer who wishes to expand has to collect means of production from others in the community or the region. The planning-based explanation for land and water distribution to Jewish communities does not apply to the non-Jewish sector; here the explanation appears to be clear-cut discrimination.

Recently, the Ministry of Agriculture has permitted quota trading. Although this option does relieve certain difficulties, the relief is only partial because trading is restricted, and – perhaps needless to say – only a farmer who was awarded a quota in the past can now transfer it in exchange for payment, or for free.

- **Regional tariffs and levies**

The data on water allocation point to differences between sub-sectors. The main differences in tariffs and levies are between regions. They reflect, however, not only regional conditions but also differences in organization and internal politics within agriculture. To focus, we consider only freshwater. As has been explained previously, in setting the tariffs that Mekorót's agricultural customers pay, the Council of the Water Authority follows the 2006 agreement. Farmers who are not Mekorót customers pay extraction levies set forth in the Water Law

upon recommendation of the Water Authority Council. Thus the farmers are divided (in paying for freshwater) into two groups: those who pay Mekorót tariffs, and those who pay extraction levies. The tariffs of Mekorót are identical, uniform tariffs (though block rate prices) almost everywhere; the levies differ from place to place and season to season.

The schedule of levies in use today was first set as the second addendum to the Water Law in the fall of 2006, at the same time that the agreement with the farmers was formulated. Thus the price agreement and the second amendment are, in fact, a single package. Regarding extraction levies, Israel is divided into three regions: *disconnected* (the Harod Valley, the Beit Sh'eán Valley, the Lower Jordan Valley, the Dead Sea, and the Arava); *the Sea of Galilee area* (Migdal, Tiberias, the Jordan Valley, Yavniel Valley, the Golan, and the Upper Galilee); *the country system* (all other places).

The levies are defined in different values for extraction from aquifers and from surface water. Regarding the latter, a distinction is made between upper, mid-level, and downstream, as well as three hydrological conditions. (I did not manage to obtain from the Water Authority the geographical definition of the surface water regions.)

Table 9 shows the tariff and the levies for the country system in round numbers. The Mekorót tariff is repeated here for comparison. The extraction levies in the table are my calculations, using values from the tables in the second addendum to the Water Law, for mid-level surface water, for an average hydrological condition; extraction of downstream water is not levied.

Table 10 shows selected extraction levy values for the disconnected and the Sea of Galilee region. Extraction to reservoirs in the Golan during the winter is exempt from levies; a levy does apply to pumping freshwater from these reservoirs, at a rate of 40 percent of that applying to surface water in the Sea of Galilee region.

Table 9. **Mekorót tariff and extraction levies in the country system**, agorot per cubic meter

	<b>Mekorót freshwater</b>	<b>Extraction levy</b>	
		<b>Aquifer</b>	<b>Surface water</b>
Quantity A	165	5	21
Quantity B	190	102	118
Quantity C	241	150	150
<b>Average</b>	<b>188</b>	<b>63</b>	<b>76</b>

\* Mekorót's tariff applies to all regions, with the exception of a few unique cases.

**Source:** Water Authority web site.

Table 10. **Extraction levies in disconnected and Sea of Galilee regions**, agorot per cubic meter

	<b>Disconnected</b>	<b>Sea of Galilee</b>
<b>Aquifer</b>		
Quantity A	1	5
Quantity B	3	13
Quantity C	4	21
<b>Average</b>	<b>2</b>	<b>11</b>
<b>Mid-level surface water</b>		
Quantity A	0	4
Quantity B	1	11
Quantity C	2	17
<b>Average</b>	<b>1</b>	<b>9</b>

**Source:** The second addendum to the Water Law. The law itself (with addendums) is available on the Water Authority website (in Hebrew).

As the values in the tables show, the highest price is the tariff for Mekorót freshwater, the next highest are the extraction levies in the country system; far behind are the extraction levies in the disconnected and Sea of Galilee regions. The differences are large by any measure.

Examination of the tables leads to several observations. The first is that there are two aspects to the regional extraction levy: the allocation aspect, and the equality aspect. To begin with the former, the levies affect the national water system only in cases in which they are imposed in places that are connected – directly or indirectly – to the national water economy. This is the case in the Sea of Galilee region. Water taken in the Golan or the Upper Galilee does not reach the Sea of Galilee, thereby subtracting from the water balance of other parts of the country. With exceptionally low extraction levies, farmers in the Sea of Galilee region receive economic signals that differ markedly from those sent to others who also share water resources in the national system. The situation is different regarding water in the disconnected region. There allocation is internal and the decision on extraction is regional, without affecting the national system.

Considering intra-sector equality, it may be argued that all farmers should bear similarly structured levies, for example, in each region a levy reflecting local water scarcity. This view leads to another point that arises when examining the tables, which is agriculture's internal political organization. The lion's share of water supply in the north, the disconnected, and the Sea of Galilee regions, is the responsibility of water associations that are regional cooperatives whose members are kibbutzim and moshavim. Naturally, these associations are also platforms for political activity, not in the partisan sense, but in the sense of negotiations with the public officials. The representatives of the associations bring the requests and needs of their member to the table. In contrast, Mekorót customers and farmers in the national system usually stand alone, each one and his connection to the

national supplier or local provider; they have no collective voice. The organized farmers have more power than the others and this may be the root of the great differences in users' water cost seen in Tables 9 and 10.

Another issue relates not to Tables 9 and 10, but to the underlying law. As already indicated, the Water Authority Council sets tariffs in rules, whereas extraction levies are considered a tax, and therefore they are set forth in the Water Law itself (not in rules that are by-laws). Amendments to the law are made only after a decision by the Water Authority Council is presented for discussion and approval in the Knesset Finance Committee.

The levies themselves are not quoted in the law; in their stead, the law specifies a series of tables whose figures are multiplied by each other in order to get the actual values of the levies. In fact all the levies could have been printed out on a single sheet, but this was not done and the information was not presented in this simple way to the Water Authority Council or to the Knesset Finance Committee. It is hard not to reach the conclusion that the Water Authority has an interest in hiding the levies and the differences between them. Indeed, it has succeeded in doing so: the members of its Council and of the Knesset Finance Committee approved a clearly inequitable tax without bothering to learn what it actually was.

- **Subsidies and cross subsidization**

The term subsidy applies generally to support by the public at large, by the State budget, to a sector or commodity. Cross subsidization is support of one group of the public by another.

For a long time the State budget supported Mekorót and water prices for consumers, particularly for agriculture, that were lower than the cost of supply. Beginning in 2008, water prices have been set such that consumers' entire payment cover Mekorót's cost in full. Household and other consumers in the urban sector cross subsidize

water prices in agriculture. The Water Authority estimated this support to be at 90 agorót per CM of urban consumption (for 2011). As explained earlier, the price of freshwater in agriculture will rise, and cross subsidization will decrease; some subsidy will however remain to cover the cost of the recycled Shafdan water and the effluents.

Another cross-subsidy will be applied within the farm sector: by the 2006 agreement, future freshwater prices of Mekorót will be set to cover the cost of provision to agriculture. This means that farmers in low cost areas will cross-subsidize supply to high cost regions; that is, some farmers, Mekorót's consumers, not all farmers and not the country's public at large, will carry the burden of supporting irrigation in the mountains and in the Southern Arava valley.

At this point, it should also be mentioned that the State budget supports various activities in the water economy; among them, sewage treatment and effluent recycling. This aspect is discussed in Chapter 10.



## Chapter 7: The Urban Water Sector

Israel's water economy is actually comprised of two interdependent yet separately administered economies. One is the nationwide system containing the water sources and their reservoirs, the National Carrier and supply system, the desalination plants, and the effluent recycling systems. The second economy is the urban water sector containing the intra-urban water supply, sewage removal, and the treatment facilities. The two economies are interdependent due to the fact that the local governments provide some of their own water: 15 percent of the urban water is withdrawn by municipalities from reservoirs that are actually part of the nationwide economy; water "purchased at the city gate," usually from Mekorót, makes up the difference. The agriculture sector gets its water directly from the nationwide economy.

The two economies are separate entities, as the issues and problems they deal with differ. The nationwide economy deals with questions of sustainable resource management, development of water supply utilities, desalination, distribution, conveyance, and recycling; whereas the urban economy deals with water distribution and sewage collection and treatment in each urban center or cluster. In terms of administration, the economies are fundamentally separate: one is nationally or regionally administered; the other locally or municipally.

### 7.A. *Provision and Consumption*

Table 11 shows per capita consumption in the urban sector. The column labeled "Residential consumption" shows household consumption; the column labeled "Urban consumption" also includes, in addition to households, public landscaping, schools, light industry, commerce, and other institutions. Within their jurisdictions local governments also supply water to agriculture and manufacturing, but these quantities are recorded separately. In the agriculture sector,

household and farming water supplies are not fully separate.<sup>4</sup> As the data recorded for this sector are estimates, water consumption in the regional councils<sup>5</sup> is not shown in Table 11.

**Table 11. Water consumption and loss in the urban sector, 2009**

	<b>Households, cubic meters per capita</b>	<b>Urban, cubic meters per capita</b>	<b>Water Loss in percent</b>
<b>Mixed and Jewish communities</b>			
Cities	52.7	74.3	9.5
Local councils	60.0	80.6	10.8
<b>Minority communities</b>			
Cities	49.6	63.3	21.3
Local councils	46.1	67.3	24.4

**Source:** Water Authority website.

As can be seen in Table 11, per capita water consumption in Jewish and mixed communities (among them Jerusalem, Tel-Aviv-Jaffa, and Haifa) is higher than in minority communities, probably reflecting differences between population groups in income, lifestyle, and number of public institutions. In the past, these differences were larger. Recall that per capita consumption in the urban sector (Figure 4) overall rose at a low rate, yet there were differences between the population groups. In the last quarter of the 20<sup>th</sup> century – the period for which the computation was done – the growth in per capita consumption of water in Jewish and mixed communities was less than half a percent per year, whereas in the minority communities, it was

<sup>4</sup> The Water Authority is now moving forward with separate grids in farm communities.

<sup>5</sup> Regional councils are jurisdictions covering mostly villages.

close to 3 percent per year. The cause of the difference was the improvements in the standard of living and in infrastructure in the minority communities. In locales where water flows regularly, consumption is higher than in households where provision is often disrupted.

Recently, urban water consumption has decreased, apparently due to the increased awareness of the water crisis and the unrelenting public education campaign. In 2007, average per capita household consumption was 61.2 CM; whereas in 2009, it was 52.4 CM (average for all communities in Table 11). Surprisingly enough, for decades there were only slight changes in per capita water consumption in the urban sector. Total per capita consumption of all commodities and services is currently three times greater than what it was 50 years ago, apartments also increased significantly. Water consumption, however, with the exception of that in minority communities, has remained nearly unchanged. It is not clear what factors are responsible for this stability: perhaps improved infrastructure, paving over yards to create parking spaces, raised consciousness regarding waste, or price increases (although estimates suggest that the influence of prices is small). In any event, the statement heard occasionally that urban water consumption has risen due to increased income of the households is baseless: income has had negligible impact; the increase in consumption has been mainly due to population increase.

The heading of the last column in Table 11 is water loss. The "loss" is actually non-revenue water: the difference between the quantity purchased from Mekorót or withdrawn locally, and that recorded as supply to the end users. It includes metering errors, public landscaping in places where watering is not metered, fire hydrants, thefts, and estimates of leakage and burst pipes. In 2009, overall loss in the urban sector was recorded at 67 million CM. It is estimated that less than half of this quantity was actual leakage. By the regulations, municipalities that record high loss are fined, but fines were not

imposed in recent years. In the past there was also suspicion of skewing the figures in some municipalities that sought to show low loss numbers. It is likely that the cessation of fining caused the appearance of high loss rates in several communities in recent years.

### ***7.B. Corporatization of the Urban Sector***

As indicated, for years the municipalities have been responsible for water and sewage services in their jurisdictions. They purchased water from Mekorót or pumped it from wells they owned, supplied it to households and businesses; collected sewage, and transferred it to treatment facilities. The residents paid for these services. Since water is an essential commodity, payments were regular in most places, and the fact that the water bill was attached to the municipal tax charge evidently helped to expedite collection of this tax, thereby constituting a stable cash flow into the coffers of the municipalities.

Yet this structure did present difficulties. Water services were provided as part of the overall activity of the municipality; there was no separate, full accounting of the water and sewage services on their own. It was therefore impossible to know what their share was in the total local government budget; neither was it possible to evaluate their efficiency. Political and other considerations made it easy for heads of some municipalities to postpone costly work needed on their water and sewage systems, and instead divert the accumulated funds to other, more pressing and visible needs. Where municipalities failed to run a proper payment system, water loss was high and sewage was not collected and properly treated.

Although full information on the urban water economy was not available, assessments have always been that it was not efficient and was eating its own capital. Water and sewage systems were not upgraded to standards, and money collected for these services was transferred to other uses. Consequently, as early as 1962, the Ministers

of Agriculture and the Interior ordered the municipalities to establish “closed economies” in the water and sewage sectors. Other directives in this spirit were issued over the years, but to no avail. In 1993, the government decided to transfer the administration of the urban water economy to independent companies (corporations in the popular terminology) and a committee was appointed to examine the issue and draft a bill, which was enacted into law in the Knesset (the Parliament) in July 2001. By the original law, the municipalities were authorized to form corporations to supply water and sewage services, and they would be, at least initially, owned by the local governments.

The water system’s assets would be transferred to these corporations, which would then take over provision of services. To oversee them, two regulatory agencies were formed: the Public Utilities Authority (PUA) – Water and Sewage, which would be responsible for the quality of the services and the tariffs; and the Superintendent of the Corporations, whose job it was to license these companies, to monitor the agreements between them and the local governments they served, and to approve their development plans. These two agencies were later assimilated into the Governmental Water and Sewage Authority. In a 2004 amendment to the law, the formation of corporations was made obligatory. To expedite this process, the government penalized local authorities that failed to form corporations, and at the same time, promised hefty monetary assistance to those that were formed (Chapter 10). As of this writing, 52 corporations have been formed in 132 localities, serving a combined population of over five million. The Superintendent of the Corporations is trying to reduce the number of corporations.

The water and sewage corporations replace and will replace urban water departments, and will operate proper economic business models under the professional supervision of a central regulator. Significant improvements in efficiency and quality of services are anticipated: monetary reporting will be complete and the information on and

conditions of activity will be orderly; maintenance of the system will not be conditional on the local government's financial situation; the corporations will be able to approach the capital market for financing their activities; they will free up local governments that have difficulties in collecting payments from the burden of having to maintain their water and sewage systems; and they can recruit workers from outside the rigid constraints of the municipal service.

Yet the formation of the corporations also raises certain problems which more than a few municipalities had misgivings about and so have avoided or postponed joining the process. The orderly payments for water and sewage services helps the budgetary management of the municipality, even those in which these monies remain within the domain of water services; this cash source will now dry up; removal of the responsibility for water and sewage services from the local government compromised local democracy; the outsourcing and resultant distancing of accountability for services raises difficulties for residents, who up until now had direct contact with the local officials; the corporations – particularly regional corporations – are liable to become “foreign bodies” in the community, and run into problems in gaining the cooperation of residents and their representatives; and, the corporations operate on local infrastructure – roads, paths, parks – raising the likelihood of disputes arising between them and the municipality over areas of responsibility and rising costs. Moreover, the question of tariffs, as long as it went undecided, made it difficult for municipalities to join the corporatization process.

### *7.C. Tariffs: Historical Overview*

The urban water economy is now undergoing far-reaching changes. As indicated previously, the municipal water departments are being transferred to corporations. New tariffs for water and sewage services were introduced at the beginning of 2010, and they aroused intensive

public debate – at times vociferous (this issue will be reviewed below). Not to get bogged down in details, we shall discuss only household tariffs, and we will begin with those that were in effect before 2010. This “before and after” presentation will assist in understanding the changes that occurred upon implementation of the new tariffs.

Although the urban water economy is local in nature, its tariffs are set in rules issued by the Council of the Water Authority, and prior to that were determined by the Ministry of Finance and the Ministry of the Interior. (In addition to setting tariffs for the corporations, the Water Authority sets tariffs for municipalities whose water systems have still not undergone corporatization; these are not discussed here.) Recall, we are dealing now in historic tariffs: they were identical in all municipalities, and the fee schedules set prices for two supply locales. The first of these was the “city gates.” The price municipalities paid Mekorót, in December 2009, for water aimed for household provision was NIS 2.90 per CM. Prices for other users differ slightly. The second supply locale is at the “front door” of households, offices, manufacturing, or agricultural land within city limits. The municipalities collected payment for household water (again, as of December 2009) according to a block rate schedule (in round figures) as follows:

First block	8 CM per month,	NIS 3.90 per CM
Second block	8 additional CM per month	NIS 5.50 per CM
Third block	additional quantities	NIS 7.60 per CM

For large families the first block was extended by 3 CM for every person above four family members.

Previously there was a special first block price for water used in private gardens. It was abolished in 2009.

In 2007, 46.4 percent of household water was consumed at Block I, 16 percent at Block II, 19.1 percent at Block III, and 18.4 percent at Gardening Level. The average price was NIS 4.90 per cubic meter.

Urban residents also contributed to a Rehabilitation Fund, the most recent charge for which was 21 agorót per CM. The fund assisted municipalities in upgrading their water systems. The corporations do not operate it, and the fund will eventually be abolished.

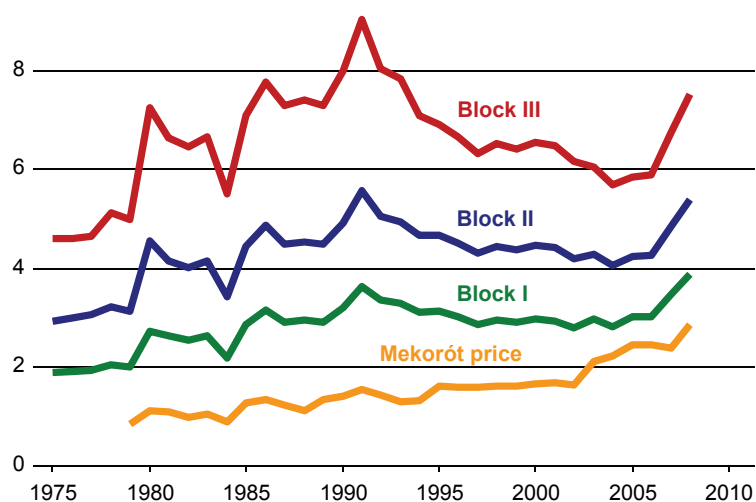
In July 2009, a temporary order was issued that was to be effective until the end of 2010, levying a tax “intended to reduce household water consumption.” The levy, of NIS 20 per CM, in addition to the regular rate, was supposed to have been charged to households where water consumption exceeded a monthly quantity set by the order. As a result of public pressure, the levy was “frozen” – in fact, rescinded.

The municipalities collected and are still collecting (recall that there are those that still have not gone over to corporations) sewage fees and development levies. The former are charged per the quantity of water consumed, minus garden water. The latter are charged for connecting to the municipal water and sewage systems. These fees and levies are set by each city and local council separately, following approval by the Ministry of the Interior, and are regarded as auxiliary laws and published officially. In contrast to uniform water pricing, wide differences between municipalities could be observed in these fees. For example, in 2005, the sewage fee in Kiryat Gat was NIS 0.72 per CM, whereas in Netanya it was NIS 2.57. Large differences in development levies can be seen as well: a typical apartment in Nahariya was charged NIS 4,685, while an equivalent apartment in Tel-Aviv was charged NIS 18,334. The local authorities hired consultants, who represented them before the Ministry of the Interior; those with good representation managed to gain approval of high fees and levies.



Water tariffs changed markedly over the years. Figure 8 shows four price schedules and their evolutions over the past three decades: the Mekorót “city gate” price, and three household block rates. The increase in both Mekorót and the prices household paid up to the 1990s apparently reflects rising costs of provision, particularly electricity, that also affected agricultural water prices shown in Fig. 6. Thereafter, while Mekorót’s prices continued to rise, the rates households were charged dipped significantly; then rose again after 2005.

Figure 8  
**Water prices in the municipalities, 1975-2008**  
 “city gate” price and block rates, 2008 prices, NIS per CM



**Source:** Bar-Sira, Cohen and Kislev, 2007, additions by Plessner, 2009.

**Data:** Central Bureau of Statistics, *Statistical Abstract of Israel*, various years.

Assuming that the percentage shares of the blocks presented above applied in the past as well, the average household water price in 1991 was NIS 5.00 per CM (adjusted to 2008 prices level), and in 2004 it was NIS 3.50 per CM. During that same period, Mekorót prices rose from NIS 1.50 per CM to NIS 2.20 per CM. For the municipalities, the important factor is not the household price, but rather the difference between that price and the price they pay to Mekorót. The difference was NIS 3.40 per CM in 1991 and NIS 1.40 per CM in 2004. Thereafter, this difference rose: in 2008, it was NIS 2.00 per CM. The scissors effect of a drop in consumer prices on the one hand, and a rise in Mekorót prices on the other, eliminated hundreds of millions of shekels a year from the water income of the municipalities.

The explanation for the fluctuations of the prices is apparently related to the corporatization process and to the Ministry of Finance policy, which prior to the formation of the Water Authority was the dominant factor in setting urban water prices. As indicated previously, although the Corporation Law was passed in 2001, long before that, the prevailing view, particularly at the Ministry of Finance, was that the municipalities used their water income for purposes other than that for which it was intended. Price decreases and reduction in proceeds between 1991 and 2004 made it difficult for the municipalities to maintain their water economies, thus pressuring them to agree to transfer their water departments to the new corporations once they are established.

In 2005, an expert committee submitted its report in which the prices recommended for the corporations were higher than those in effect at the time in the urban sector.<sup>6</sup> Because of the lower municipal tariffs, the anticipated transition to the (higher) cost-covering rates to

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<sup>6</sup> In other words, the tariffs set in the past for the municipalities had been too low, as the Water Authority stated of the 2009 prices, "It can be unequivocally stated that in the present situation, these water tariffs encompass within them built-in losses to the corporations."

be charged by the corporations was viewed by many as a sharp, even exaggerated rise.<sup>7</sup> The consumer price increases, in the last several years in Figure 8, were set in anticipation of future developments and were aimed at mitigating criticism. In fact, when the new prices were announced to go into effect in 2010, they were received by the public and the members of the Knesset with criticism. It is reasonable to believe that if the previous four years had not seen the price increases shown in Figure 8, this criticism would have been even more stinging.

#### *7.D. Tariffs in the Corporations*

The PUA – Water and Sewage (The Corporations Authority) drafted a service charter that was supposed to be binding on the corporations, and appointed the expert committee referred to above. As indicated, the committee submitted its recommendations in mid-2005 and the Authority immediately initiated a process of hearings. Its work was halted, though, as its role was assimilated into the new Governmental Water and Sewage Authority, which was to be established in 2007. The newly formed Authority and its Council deliberated for three years before they came up with tariffs for the corporations towards 2010.

The task was arduous, both due to technical difficulties and because, as required by law, the Council of the Water Authority, held hearings. The proposed tariffs were published, stakeholders were invited to express their opinions, and many did. The tariffs were finalized in December 2009, went into effect in 2010, and immediately came under attack, in the wake of which the Water Authority Council decided on certain adjustments that went into effect in July 2011; yet the basic structure did not change, and it still reflects

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<sup>7</sup> I was a member of the expert committee, and witness to the reaction to its report.

some of the committee's recommendations. The main features of the new tariffs are:

- a) By law, the tariffs are cost-recovery rates, and consumer payments will cover the cost of the corporations' services.
- b) The tariffs are uniform (though block rates), the same in every locality.
- c) The tariffs are aggregate – without a distinction between payments for water and sewage services.
- d) There are two price levels: a low rate for an approved quantity, and a higher rate for additional water.
- e) Development levies (one-time connection fees) were abolished, and cost of assets (pipes, pools, pumps, and so forth) are part of the proceeds of on-going water and sewage payments (temporarily, until the end of 2012, the corporations can continue to charge development levies).
- f) The rules underlying the fees distinguish between buildings that were hooked up to water and sewage systems in the past, and for which development levies were paid (“veteran assets” in legal parlance), and assets for which levies have still not been paid. To prevent overlap of payments, for a period of 14 years, the veteran assets tariffs will be lower than those charged new consumers.<sup>8</sup>

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<sup>8</sup> The abolition of the development levies is a shift from a payment in advance, at the time of the investment, for the assets used in the water and sewage services, to payment of on-going rates (Chapter 5). There were several reasons for this shift: municipalities could not raise investment capital and therefore relied on money provided by developers and new owners; the corporations will have more convenient access to the capital market, the residents can now be freed of this obligation. By law development levies were charged only once and there was no way to finance renewal of the assets when their day came; on-going payment will cover both amortization of credit used for initial investment and asset renewal. As we saw above, the development levies varied a great deal between the municipalities. Point 6 regulates the shift from the levies regime to on-going payments.

For brevity and to simplify, only household tariffs are reviewed here; other users in the urban sector are disregarded. The approved quantity of water for a household is 3.5 CM per capita per month (it was 2.5 CM before the most recent changes). For example, a four-member household will be recognized as needing 14 CM per month, for which the low rate will be charged. Single-member households' approved quantity will be 7 CM per month. Estimates show that a typical increment in consumption for a family is 2 CM per month for every additional member. This means that large families will receive an approved monthly quantity larger than the used amount. Usually, only small families whose consumption is relatively high will reach a quantity that requires the higher fee. In addition, billing is bi-monthly, and therefore there will be households that consume a larger-than-approved quantity only during the summer months, when relatively large quantities are used.

The rate for veteran properties, including VAT, is NIS 8.63 per CM for the approved quantity, and NIS 13.89 per CM for additional quantities. The new household rates are 80 agorót higher than those for veteran properties. The Water Authority estimated that the bi-monthly payment for a typical family rose with the transition to the new rates by approximately 30 percent; the increment is however smaller for families that reduced consumption in the wake of the campaign to save water.

As explained, the tariffs are cost-recovery rates. They have two components: the cost of purchasing water from Mekorót (or operating own wells), and the internal cost; that is, water distribution, sewage collection, and wastewater treatment. The average payment to Mekorót (in 2011) will be NIS 4.20 per CM. This sum includes: NIS 0.93 for desalinated water, NIS 0.92 subsidizing agriculture (Chapter 6), and 20 agorót for past deficits, at least some of which were caused by reduction of water consumption during the crisis. This is the

average payment; payments of individual corporations vary due to the differences in approved internal costs.

A regulator in every sphere sets prices, based on approved cost per unit of a product or service. The approved internal cost for the corporations contains several components, such as labor, interest, and return on equity; and these vary markedly from one place to another. Three items form most of the differences in the approved costs. One is the capital invested in the local water system (assessed in a property survey conducted when the corporation was established). Capital-rich corporations have a higher approved cost per CM in this item. The other two items are “normative:” the first is loss rates – water loss, and a collection loss – where due to both types of loss the cost per CM **sold** is on average higher by 25 percent than if there were no losses. This is the average, although “weak” corporations – operating in low socioeconomic localities (according to the Central Bureau of Statistics' ratings) – are allowed water loss and collection loss at higher rates than others. This means that the approved cost per cubic meter **sold** is higher in the weak corporations than in the stronger ones.

Another cost factor with a normative component is wastewater treatment, for which the cost per CM is calculated by a formula dictated by the rules and based on the size of the facility and the quality of the effluent. These differ between the corporations.

In order to combine the two principles – cost-recovering and uniform consumers' rates – the prices paid by the corporations for Mekorót water are not identical: corporations whose approved internal cost is high pay Mekorót a low price, and vice versa. In this way, low cost corporations support the others and a uniform end-user tariff structure is maintained.

To illustrate, Table 12 presents the prices two corporations pay for water delivered to the residential sector: Modi'in and Shikmá (serving the city of Holon and the local council of Azur). Mekorót's prices (determined by the Water Authority) reflect the block rate price

structure of households' charges. Accordingly, the corporation pays Mekorot a low rate for the water it sold its residential customers as approved quantity. For any additional quantity, the corporation pays the high rate. The data in the table indicate that the Water Authority believed that the internal cost of Modi'in's water and sewage services was higher than that of the Shikmá corporation and, therefore, Modi'in paid Mekorót lower prices than Shikmá did.

**Table 12. Mekorót rate, residential sector**

NIS per cubic meter without VAT

	<b>Modi'in</b>	<b>Shikmá</b>
For approved quantity	1.27	2.38
For additional quantity	4.32	6.52
Average	3.47	5.36

Notes:

a. Rates as of January 1, 2011.

b. The average was calculated on the assumption that the share of the approved quantity is 28 percent, the ratio used in the calculations of the Water Authority.

**Source:** Water Authority website.

The Water Authority expects that the corporations will become efficient and they will all converge in a few years to same normative loss values. Consequently the approved cost values in the corporations should reach similar levels, and the support of weak corporations by the strong ones will be eliminated. This expectation is however only a hope, not to say an illusion. The differences between the corporations are large; some will succeed in streamlining operations, whereas others will not. The result will be that some corporations will be profitable, and others will suffer growing financial losses. Tariff setting in the future cannot be based on norms as the basis for

approved costs. On top of that, a structural difficulty is added: under the adopted tariffs structure, it doesn't make much sense for a corporation to increase its efficiency. Those that show low costs and profits will see their payments to Mekorót increase. The management of every corporation will attempt to convince the Water Authority that its costs are especially high. They can re-hire the same consultants who helped the municipalities in the past to achieve approvals of high rates and levies. The government, for its part, will not be able to allow the corporations to accumulate profits, and even less so let them accumulate losses and go under. However, the Water Authority has not yet explained what its policy will be in the face of such eventualities. The components of the average cost in the corporations and the support of agriculture are presented in detail on the Authority's web site; but a discussion of cross corporation subsidy or how the approved costs will be set in the future is not presented.



## Chapter 8: Mekorót

Mekorót occupies a special status in the water sector as its largest supplier (Table 4) and the operator of the state-owned National Carrier. Mekorót operates a seawater desalination plant in Eilat and smaller plants in other places; however, for a long time it did not succeed in its present major assignment: building a desalination plant in Ashdód. Some of the difficulties were connected to the company's structure and the attempts to change it. This chapter is devoted to Mekorót and its development.

Mekorót was formed in 1937 to supply water to Haifa Bay and the Yizre'el Valley. After the establishment of the State, the company expanded its activity to the rest of the country and built the other large water supply systems, including the National Carrier from the Sea of Galilee to the Negev. The total monetary value of Mekorót's activity – water supply, investments, and other works – is close to NIS 5 billion a year. Mekorót has 2,300 employees, operates 10,000 kilometers of water lines, and owns 3,000 installations. Today the company supplies 70 percent of the total quantity of water in Israel, and 80 percent of the water to urban areas. At present, its seawater and saline water desalination plants supply 24 million CM a year.

In the first decades of Israel's existence, Mekorót operated much like a government agency in that the government financed its investments, the prices that it charged were set by Knesset committees, and when it ran into difficulties, it approached the Ministry of Finance to cover its needs. With this mode of operation, investment in the water system was dependent on the ever-changing situation of the State budget, and Mekorót's administration was engaged more in convincing the Ministry of Finance of its needs than in improving efficiency and productivity. Mekorót tried to accumulate

“cash for a rainy day” and its financial statements did not always reflect all of its activities.

In an effort to prevent the deficiencies and failures of such a milieu, a new regime of collaboration of the government and Mekorót was formulated and drafted into an agreement. The preparation of the agreement was completed in 1993, but due to legal and other difficulties, it was signed only in 2002. The agreement had two parts: a formula for computing the costs of water supply and their coverage, hence the term “cost agreement;” and the details of the restructuring steps the company agreed to undertake. Recently the costs part of the agreement was replaced by rules set by the Council of the Water Authority.

#### ***8.A. Costs and Their Coverage***

The main principles of the cost agreement between the government and Mekorót are: in supplying water, Mekorót has certain approved annual costs – among them, capital costs calculated according to the structure of its assets, fixed costs of labor, and variable costs calculated as a function of the quantity of water provided. Against these costs the company earns income from selling water to its customers. By the agreement, the government promises to cover the difference between Mekorót’s income and the approved costs. (Mekorót was also required to reduce its costs gradually.) This coverage of the difference is not mentioned in the new rules recently published and the meaning of its absence is that all of Mekorót’s costs will be covered by payments made by its customers (recall that this was done in practice since 2008, before the setting of the new rules). The approved costs are “normative,” and are set forth in the agreement. If Mekorót succeeds in reducing costs it may keep the profits for investments. The significance of this design is threefold:

Mekorót acts as a business entity. Economic incentives are in play for its administrators, and its negotiation space at the Ministry of Finance was narrowed markedly. Indeed, efficiency gains could be recognized in the company's operation in the wake of the agreement.

The price of the water sold by Mekorót (the average proceeds, including subsidy, if there should be such) is equal to the average cost, and although Mekorót is the lone supplier in its areas, it does not acquire monopoly profits.

Assurance of coverage of costs improved Mekorót's ability to meet its obligations. Its bonds received a high rating and the company has a solid standing in the capital market. It can and does raise credit of large sums and on good terms. Mekorót's dependence on the State budget has lessened greatly in the wake of the agreement.

The agreement augmented Mekorót's status as an independent entity. As a state-owned company, it is subject to the provisions of the State-Owned Companies Law, and its operations are regulated by the Water Authority, but within these limits, it is free to adhere to its business considerations like any other company.

#### **8.B. *Extraction Levies and Subsidies***

Water suppliers have to pay extraction levies as stipulated in the law. However, imposing the levy on Mekorót creates a contradiction. On the one hand, the purpose of the levy is to direct extraction, at least partially, but Mekorót extracts as instructed by the Water Authority; it is not free in this decision. On the other hand, ever since the cost agreement was signed, economic considerations are supposed to guide Mekorót's actions. To rectify this contradiction, the agreement stipulated "Mekorót commits itself to pay extraction levies at times and rates to be determined by law. This payment shall be considered an approved expenditure for calculating the standard cost package." In this way Mekorót is actually exempt from the levy, the payment is

recognized as approved cost and can be covered two ways: consumer payments or state subsidies. In fact, the policy is to set water tariffs that cover the cost of supply without the extraction levy, and the state subsidy is written as if it reimburses Mekorót the sum of the levy that it was charged (Chapter 10).

### **8.C. *Investments and Assets***

By the cost agreement, Mekorót's cost of capital is one of the items covered by tariffs. This means that every (approved) asset added to the company's inventory – for example, the new fifth main line to Jerusalem – increases Mekorót's income. Consequently it is worthwhile for Mekorót to invest and strengthen its asset position. The incentive to invest is further augmented because quite often, new assets lead to energy savings. Investment, if approved, is covered by the tariffs, while energy savings are recorded to Mekorót's credit and added to its profits. Therefore it makes sense, for example, for Mekorót to opt for a larger pump over a small one, even if in terms of the consumers – who pay for water and cover the cost of the capital – a small pump would suffice.

### **8.D. *Employees***

The salaries of Mekorót's employees are higher than average, but they don't break the record: the salaries in Israel Electric Corporation and the Aerospace Industry are higher. In any case, salaries are not a large component of Mekorót's costs – about 15 percent.

Generally, workers see themselves as partners to their company's goals, and try to contribute to its success. At the same time, they are concerned with their status and their livelihoods and are occasionally at odds with the management. For employees of public utilities such as Mekorót, which are subject to regulation and cannot close down,

and particularly if they are state-owned, that status actually bolsters employees' power and their identification with the company.

Mekorót does not acquire monopoly profits: customers' payments and state subsidies cover costs, and no more. Yet the costs also include the cost of labor, and the larger this cost is, the better the employees' conditions. Moreover, a profitable company can more easily share its income with its employees than can a company in difficulty. Therefore, Mekorót employees are the ones who guard its standing, and try to ensure that agreements made with it will be to its advantage. This situation is expressed in a few areas. For example, the cost agreement was appended to a collective agreement between Mekorót and its employees; in October 2007, Mekorót's employees declared a labor dispute over government proposals that "contravened parts of the understanding that the workers' committee had with the administration;" Mekorót would, at least in the past, hire relatives and acquaintances of employees; in the wake of a demand by the director-general of the country's largest labor union the clause relating to Mekorót's regulation was removed from the proposed budget law that was to be passed in the fall of 2009; at the beginning of 2010, Mekorót employees announced that they intended to declare a labor dispute if the Ashdód desalination plant was not built by Mekorót subsidiary, Yizum. These types of employee pressures indicate the possibility that the overall cost of labor to Mekorót (and to other government companies) is greater than the measured salaries and wages – it also includes the costs of establishing projects that Mekorót wouldn't necessarily have established. Perhaps it is unnecessary to add that this is just a conjecture that cannot be proven or disproven; but it is still true that for Mekorót and its employees it is worthwhile to expand the company's operations as much as possible – costs will be covered.

### 8.E. *Structural Changes*

The second part of the agreement between the government and Mekorót relates to changes in Mekorót's structure. The government first agreed with Mekorót on these changes in 1993, but the agreement has been implemented only recently. By the new structure, Mekorót is split into four companies, two of which will be state-owned: Mekorót Water Company and the National Carrier and Assets Company. Mekorót Water Company will own two daughter companies: Mekorót Development (Yizum) and the Engineering Company (Bitzua).

Mekorót Water Company will be engaged in the main tasks that Mekorót has handled up to now: extraction and water supply. Other tasks will be split among the other companies. This split has two purposes. The first is to clarify that assets that Mekorót built with state financing and for the state are state assets and not Mekorót's. Therefore, the National Carrier and all assets that Mekorót built in the occupied territories were transferred to the ownership of the National Carrier Company. These state-owned assets will be operated and maintained as they were in the past by Mekorót Water, and the company will pay rent to the state. In this way the cost of these assets will be covered by water users' payments.

The second purpose of the split is to reduce Mekorót's power as a monopoly and to facilitate better regulation. The Engineering Company was earlier a division in Mekorót engaging in construction and maintenance. Mekorót could then charge itself high costs to be covered by the agreement. Now that the Engineering Company is separate, Mekorót Water is obligated to contract out work to others, and the Engineering Company can also accept work from outside Mekorót. This competition will prevent, or at least reduce, the possibility that Mekorót will inflate its costs. Similarly, Yizum will handle wastewater treatment plants and will build the Ashdód desalination plant and development projects abroad. Mekorót Water will be a customer of the desalination plant, and not its owner.

### 8.F. *Ownership*

At its establishment, Mekorót was owned by several Zionist organizations. The government joined the founders and later acted to reach full ownership so that it would be able to execute changes in Mekorót's structure. To reach full ownership the state bought the company's shares of the public entities. Others who claim to own shares are water consumers in agriculture, in cities, and in industry, who were required to buy "water rights" when they were initially hooked up to Mekorót. The state denies their claims, and the issue is now in the courts.

### 8.G. *The Ashdód Desalination Plant*

Mekorót operates various types of desalination plants – mostly small scale – in a few places around the country. About 30 years ago, it began building a relatively large plant with an output capacity of 15 million CM a year on the grounds of the electrical power plant in Ashdód. That attempt failed. Later, the government policy was to prefer private entrepreneurs over Mekorót, but in 2001, when the water situation worsened, the government again assigned Mekorót the task. Progress on the plant ran into obstacles that arose and were not solved over the years, among them that the grounds of the Israel Electric Corporation were unsuitable and agreements with contractors were disqualified by the courts. But the main difficulty was the opposition of the Ministry of Finance and particularly the Accountant-General, whose opinion was that handing the project over to a national water monopoly should not have been done. This opposition was expressed in sharply, even crudely worded communiqués to Mekorót and to the Minister of Finance, who tried to halt the government's decision to build. Even so, in 2007, the government again decided to have Mekorót build the plant, which is to have a capacity of 100 million cubic meters a year and will be built by Yizum. It seems that

construction has gotten underway now after long negotiations on payment for the water that the plant will supply (they have not been fully disclosed, see Table 6). If there are no more obstacles, the plant will begin operating in 2014, 13 years after the original decision to build it.

## Chapter 9: Tahal

Tahal, an abbreviation for *Water Planning for Israel*, was established in 1952 as a state-owned company, with the purpose of planning and constructing the National Carrier to convey water from the north to the south and the Negev. In its early years, Tahal was engaged in both planning and building the carrier, but in 1956, its functions were divided: building was transferred to Mekorót, and Tahal remained just a planning office. Upon completion of the large projects in the carrier system, Tahal began working abroad and became a large international firm. At its height, in the 1970s, it employed 1,000 persons. In the first three decades of its existence, Tahal occupied a unique position: all planning for the Water Commission and Mekorót was done by it. Over the years, the number of independent hydro-engineers increased, placing the Water Commission under pressure to give work to experts outside Tahal. Tahal lost its unique position and at the end of the 1980s the Water Commission opened its own (small) planning division, which has since leaned heavily on outsourcing. Thus was cut the enduring and binding tie between Tahal and the Water Commission. Tahal remained the largest and more experienced company, yet not the sole one. In 1996, the state sold Tahal's shares and it was privatized. It now employs 500 professionals and is engaged in dozens of projects in Israel and abroad, many of them as a partner.



An important factor in the shift of the center of gravity of planning from Tahal to the Water Commission was the 1992 legislation of the Mandatory Tenders Law. Tahal, that previously had suggested planning projects on its own initiative, was now prohibited from doing so, because if it did so, it was at risk of losing the bid. Tahal's employees also maintain a low profile, and their opinions are not heard in public discussions. After all, who would level criticism at their source of livelihood? Historically speaking, the processes that Tahal underwent and the simultaneous changes that occurred in the water sector and its administration were an outcome of the development of the country, its economy, and its governmental modes of operation. Yet the water economy lost an independent voice.

## **Part 2: Public Finance**

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The government is involved in the water sector in many ways. One of the more important expressions of its involvement is water's share of the State budget; this is the subject of the next chapter.

### **Chapter 10: The State Budget in the Water Economy**

The State budget is the foundation for many projects in the water sector, and it is activated in several channels. This chapter reviews government expenditures in the 11 year period 2000-2010.

The State budget funds two main channels in the water sector. The first is the administration which includes the Water Authority and the departments of ministries that deal with water: the environment, interior, health, and other ministries. The administrative budget covers not just overseeing, but also other activities such as, monitoring of water resources at the Hydrological Service, research, public education, and promotion of water savings.

The second channel is subsidies and financial support. These are divided into four sub-channels: Direct aid to Mekorót and other suppliers aimed at keeping prices down (not practiced anymore); Compensation and aid to farmers – where their allotment was reduced or the prices they paid increased; Aid to investments, particularly in sewage systems or recycling facilities; In recent years, aid in the form of large sums to urban water corporations and municipalities that agreed or were compelled to part from their water departments.

The state does not finance desalination plants from its budget. Until recently, it invested small sums in water facilities directly owned by it; this is no longer done either. Officially, the State budget is comprised

of two budgets: the regular budget of on-going activity; and the development budget, which is intended for investment and advancing the economy. Every sum in the budget is defined as part of a built-in hierarchy, from the ministry (or extra-ministerial item) down to the regulation. For example:

**Ministry:** Infrastructures

**Budget item:** Water Commission

**Sub-item:** Water sector activity

**Regulation:** Pollution prevention

The material for this chapter was compiled following the definitions of items and regulations in the annual reports of the Ministry of Finance and the guidelines of the European Union, COFOG (Eurostat, 2007). The sums for each year have been aggregated under areas of activity described below. The sums presented are of actual expenditures, such that the mandates of future commitment are included only in years in which the commitments were actually realized and the monies expended. In addition, sums granted as credit are recorded as expenditures at the time they were transferred from the State budget to the recipient.

The total of the sums allotted to the water sector in the 2010 State budget was over NIS 2 billion, the water economy managed to spend only 65 percent of this allotment. It is reasonable to assume that some of the plans that did not come to fruition in 2010 will be financed in later years, but this has not been documented yet.

The discussion on the budget in this chapter relates to three aspects: A) Regular and development budgets; B) Remarks on the administrative structure; C) Functional division.

The discussion on the first two relates to budget items as they are recorded in the official reports; not so on functional division, which constitutes the core of this chapter, there the sums are assigned by subject, regardless of type of budget or its administrative definition. A

brief discussion of state income in the water economy, particularly the extraction levies, is presented toward the end of the chapter.

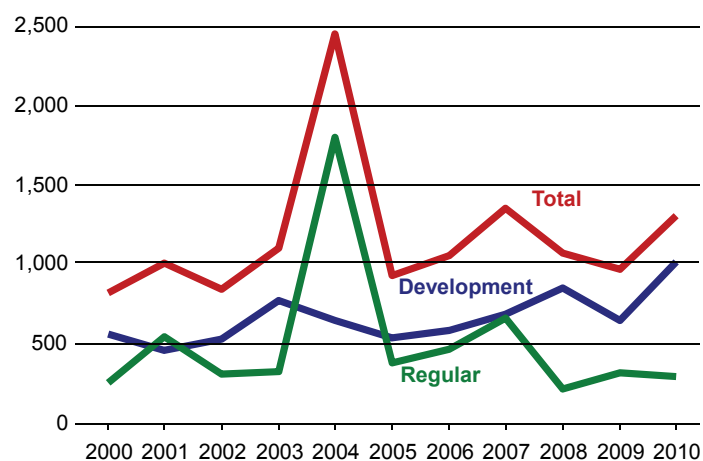
#### 10.A. *Regular and Development Budgets*<sup>9</sup>

The annual average, for the reviewed period, of the budget expenditure for the water sector was NIS 1,173 million, of which 56 percent was development budget and 44 percent was regular budget. In principle, the development budget is intended for financing state assets and aiding investment in the various sectors of the economy. The regular budget is intended for covering administrative expenditures and on-going subsidies. This division is not strictly adhered to, though. In addition, consistency was not maintained in expenditures throughout the years of the period, as can be seen in Figure 9, where two points stand out: in 2004, there was a large expenditure in the regular budget, most of which was paying off past debts to Mekorót. An increase in expenditure can also be seen, particularly in the development budget, in 2010. We shall return to these points in detail later on.

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<sup>9</sup> All numerical values in this chapter are quoted in 2010 prices.

Figure 9  
**Government expenditures on the water economy  
 2000-2010**  
 By type of budget, 2010 prices, NIS million



**Source:** Taub Center for Social Policy Studies in Israel.

**Data:** Ministry of Finance, *Annual Report*, various years.

### 10.B. *The Administrative Structure*

Consistency has not been maintained in the State budget structure, not in the division into government agencies nor over time. In principle, the state arms of activity are the ministries; the State budget is passed by the Knesset into law and enables the ministries to execute their tasks. The ministries that operate in the water sector in the period under review were Infrastructures, Environment, Agriculture, Interior, and Health, each of which was allotted sums from the budget. Yet in addition to the ministry budgets and separately from them, the law also sets monetary allotments for special areas. The separation of the

budget into government entities is manifested in the budget books presented to the Knesset. The budget of each ministry is presented in its own book and in addition, there are separate books for special areas; among them is the water sector, recording the budget sums allocated to fund the Water Authority's functions, as well as funds to support new projects in the sector.

The Water Authority is a statutory entity – the law grants it autonomy – and, therefore, it is perhaps natural that it has a separate budget in its own book. Yet autonomy is not the only reason for separate budgeting. For example, another book is “Various Subsidies” where budget allotments for water are also recorded (in addition to those of the water sector). Some of these allotments are transferred through the Water Authority and others through the Ministry of Agriculture. In these cases, Knesset members who vote on the budget do not know what the total allotment is to a given area, and which government agencies will be responsible for the execution of the budgeted tasks.

The division into books with separate titles does not reflect only the nature of the recording. For example, the Minister of National Infrastructures is responsible for the Water Law, and in the days of the Water Commission, the ministry was budgeted accordingly. Since the establishment of the Authority, though, the Ministry has not been allotted budgetary means to realize that responsibility. In contrast, the law states that the director of the Water Authority is responsible for its budget. This can be interpreted as responsibility for the regular budget, yet in fact the Water Authority director is also responsible for the development budget, which is also recorded separately in the water sector book. These sums are large; the 2010 proposed regular budget of the Water Authority was NIS 123 million (including expenditures for the administration outlays of the Superintendent of the Corporations and the Sewage Authority; both were recently appended to the Water Authority). In contrast, the proposed development budget

(water plants) for the same year was NIS 1,270 million. It would appear that the Director of Water Authority is responsible for a budget ten times the size of that intended in the wording of the law. This responsibility is not merely for “signing checks,” but rather is about setting criteria for aid and managing professional, engineering, economic, and financial teams.

Thus the Director has a special status. In a few other areas – among them tariffs and water allocations – the law grants the authority to make decisions not to the director of the Water Authority himself, but rather to the Water Authority Council (Chapter 12). The Council sets rules and the Water Authority only implements them, but the Council does not have responsibility or authority over the budget of the Water Authority or of water projects, nor does it discuss these at all. The government awarded the Director of the Water Authority, personally, the authority to effect policy the likes of which is ordinarily granted only to ministers and their offices.

#### 10.C. *Functional Division*

From this point on, the expenditures will be surveyed by function and the administrative structure of the budget will not be maintained. For example, while the main subsidy of recycling plants is recorded in the water economy budget, another part – though not large – is recorded in the Ministry of Agriculture budget. The sums presented are for the entire support of recycling, regardless of the agency to which it was assigned. The expenditures will be presented by two main areas: support for investments and on-going support.

- **Investments**

The lion’s share of the State budget for the sector is dedicated to development; that is, to investment in water projects. Table 13 displays main investment areas where expenditures were made.

Development of the expenditures over the years is depicted in Figures 10-12.

These sums pass through several agencies. Sewage treatment plants are funded by a dedicated directorate that was part of the Ministry of National Infrastructures (and previous to that, the Ministry of the Interior), and was added to the Water Authority upon its formation in 2007; aid to recycling plants was the responsibility of the Water Commission and now the Water Authority; support to the urban corporations go through the Superintendent of the Corporations, which was assigned to the Ministry of the Interior and has since gone over to the Water Authority (in September 2009). All these sums represent aid to projects constructed by extra-governmental entities: the local authorities, the water corporations, agricultural associations, and others. The exceptions to this are the plants in the West Bank and Gaza Strip, which although built and operated by Mekorót, are officially state assets. Expenditures on them are government direct investments, not aid; although recently this has changed, and the new plants in these areas will be owned by Mekorót.

Table 13. **Support for investments in main areas, 2000-2010**  
annual average in millions of NIS, 2010 prices

<b>Sewage treatment plants, total</b>	<b>367</b>
Of sewage treatment plants, locality-specific treatment and front line communities	54
Of sewage treatment plants, minority communities	88
Recycling facilities	128
West Bank and Gaza	16
Water and sewage corporations	93
<b>Total</b>	<b>604</b>

**Source:** Taub Center for Social Policy Studies in Israel.

**Data:** Ministry of Finance, *Annual Report*, various years.

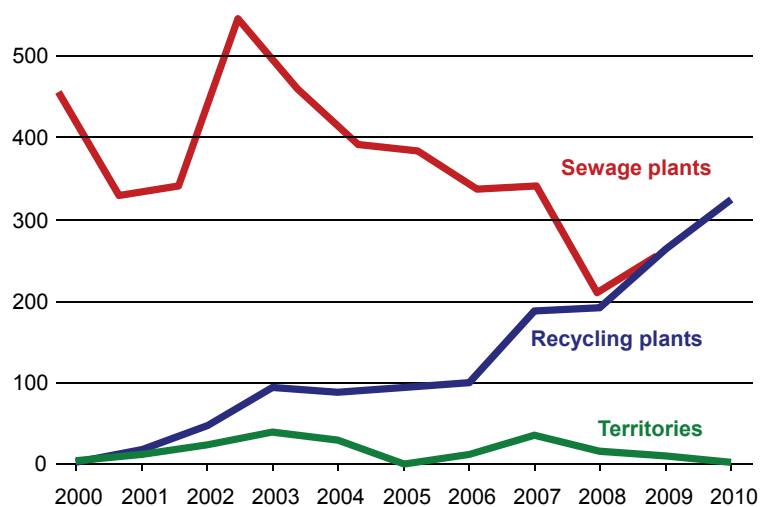


In the wake of investment in the sewage system, the quantity of wastewater in treatment centers has grown from 381 million CM in 2000 to 465 million CM in 2009. The share of collected sewage as part of the total quantity of urban and industrial water grew between those years from 48 percent to 59 percent. The large expenditure in the investment in the sewage system in 2003 and its decrease thereafter (Figure 10) reflect several factors: there was heavy investment in costly treatment plants at the beginning of the period; later, the Ministry of Finance penalized local councils that did not transfer their water assets to corporations by preventing them from receiving aid for rehabilitation of their sewage infrastructure; closing the gap in communities that had not had proper systems previously; and lastly, the new water corporations were just starting to get off the ground in recent years, and many were not yet ready to accept aid.

Figure 10

**Government investment and support, 2000-2010**

NIS million, 2010 prices

**Source:** Taub Center for Social Policy Studies in Israel.**Data:** Ministry of Finance, *Annual Report*, various years.

The wastewater treatment plants return treated effluent to agriculture and small quantities to nature. Over the years, the state has supported a few such plants, among them the large Shafdan project whose output was for the Negev; it was constructed with the aid of the World Bank. The Jewish National Fund also contributed to the recycling economy, particularly to building reservoirs. Yet until 1999, there was no proper state plan for budgetary aid. That year, the Ministry of Finance and the Water Commissioner agreed that the monies that had accumulated in the Equalization Fund, whose activity had ceased with the introduction of the extraction levies, would be dedicated to supporting the construction of recycling facilities. Indeed, the need for orderly expansion of this water source was clear and known, both for the sake of agriculture, from which freshwater was taken for the urban sector, and in order to prevent contamination of beaches, washes, streams, and other water bodies.

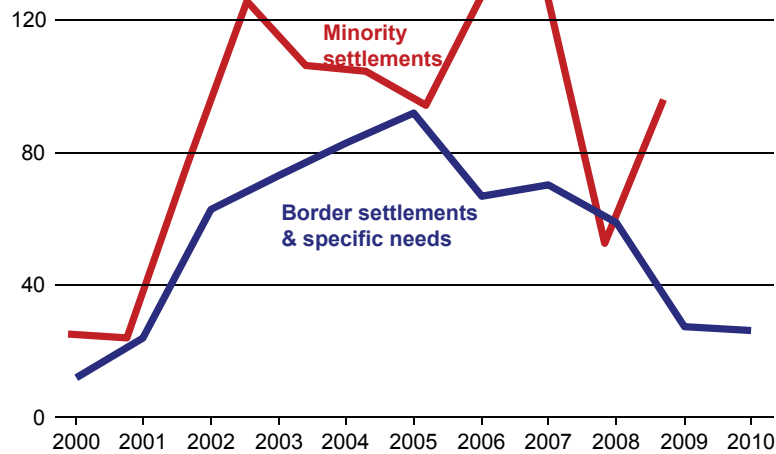
Therefore, and in the wake of the agreement, the state determined that it would aid with its budget the building of recycling facilities in grants that could reach up to 60 percent of the value of the investment (100 percent in inter-regional systems). The level of aid for each plant was set such that the cost per CM to the users would not exceed the price of effluent supplied by Mekorót. The project's startup did not happen immediately. Even though the plans had been drafted and many decisions made, the carry-through took years and went slowly. As can be seen in Figure 10, the budgetary expenditure at the beginning of the period was actually negligible, and the results were minimal. In the six-year period 2000-2005, the building of only 12 plants was completed with state aid, and of those, the quantity of effluent added was only 7.53 million CM a year. An increase in budget sums expended to this purpose can be seen only toward the end of the period.

The small expenditures for encouraging recycling and the use of effluent at the beginning of the period and the increase thereafter

reflect two budgetary aspects: the first is that the sums budgeted at the beginning were small and grew later. The second is that utilization of the budget was only partial (just 2 percent in 2000) and it grew overtime. Underlying this development were a few factors: government policy, which was formulated and carried out by the Ministry of Finance, was to prevent Mekorót from building more recycling plants, so that the pace of development was set by the ability of the “private” entities – mostly agriculture associations – which, even with JNF aid, was limited. The Water Commission and the Water Authority acted slowly in the areas under their purview; the Israel Lands Authority made it difficult for the farmers to build reservoirs on land zoned for agriculture; the Ministry of Finance took its time granting investment planning permits, even when monies had been approved in the budget. Therefore, even though the plans called for reaching an output of 509 million CM of effluent by 2010, in fact that year only 395 million CM were supplied to agriculture (to be exact, the data is for 2009), and of that, 30 million cubic meters were freshwater that was added as “reinforcement” to Shafdan, and there may have been other similar cases. The sums increased toward the end of the decade, perhaps due to recognition of the crisis in the water economy and consequently the willingness to budget finance to increase the supply from every possible source.

Two special groups won relatively large support for sewage facilities: minority communities, and border communities (to which were added the communities that obtained locality-specific treatment). The increase in budgetary allotments at the beginning of the decade in Figure 11 reflects recognition of the need for aid to these population groups. Reduced budgetary outlay toward the end of the decade probably reflects structural transformation: shifting aid from local authorities to corporations.

Figure 11  
**Special supports to sewage plants, 2000-2010**  
 NIS million, 2010 prices

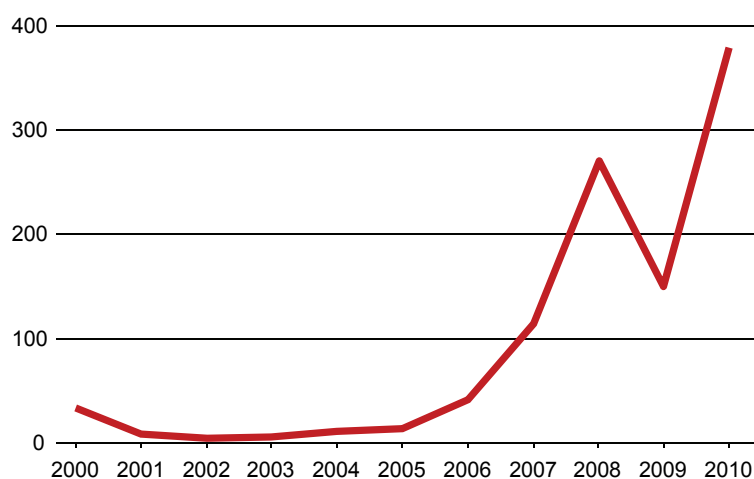


**Source:** Taub Center for Social Policy Studies in Israel.  
**Data:** Ministry of Finance, *Annual Report*, various years.

Figure 12 shows the support of the water and sewage corporations. This support in part covers the cost of the establishment of the corporations, and in part the state's contribution to upgrading and renewal of water and sewage systems that the corporations inherited from the local authorities. Weak corporations receive more help than stronger ones. Increased expenditures in Figure 12 toward the end of the period are a reflection of growth in the number of corporations and their commencing of service and investment activities (52 corporations are operating today).

Yet not all of the assistance remains in the corporations: a large portion of the grants received upon establishment is passed on to the municipalities where they operate. In addition, at the time of their establishment, 30-40 percent of the assets that they received were recorded as “owner (local authority) loans.” The cost of these “loans” does not show up in the State budget; the corporations will repay them with water fees to be collected from their customers.

Figure 12  
**Water and sewage corporations, 2000-2010**  
NIS million, 2010 prices



**Source:** Taub Center for Social Policy Studies in Israel.

**Data:** Ministry of Finance, *Annual Report*, various years.

- **Other expenditures**

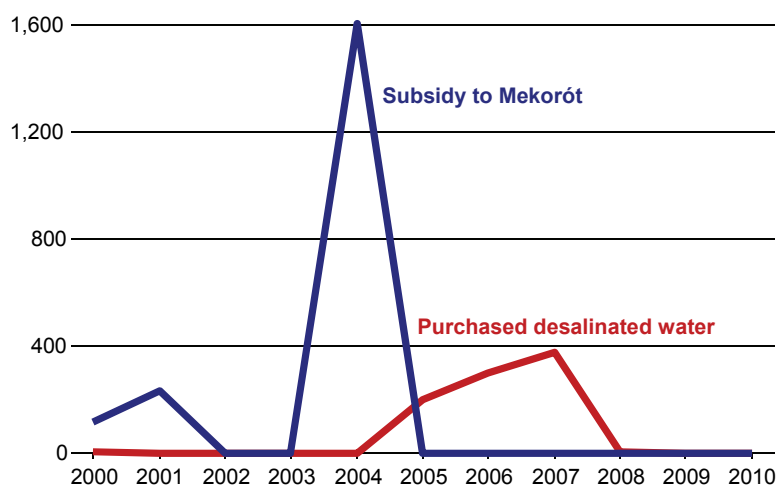
The yearly averages for the expenditures not included in Table 13 are shown in Table 14. In most of these cases, the expenditures are on-going support, but, for the sake of clarity, investments in the areas shown in the table were also added. The monies for treating the drainage basins were transferred to governing agencies, and monitoring and pollution prevention activity were carried out by the Water Commission and Water Authority, as well as various ministries. These areas are included here due to their special interest and because they involve overlap of their functions and projects.

Table 14. **Other expenditures**  
NIS millions, annual average, 2010 prices

<b>Item</b>	<b>Sum</b>
Mekorót	178
Purchase of desalinated water	81
Agriculture	124
Drainage basins	53
Monitoring and pollution prevention	21
Miscellaneous	90
Research	9
Water savings	12
<b>Total</b>	<b>569</b>

Subsidies to Mekorót are price supports as stipulated in the cost agreement. Because of drawn-out auditing, the transfer of budget monies was irregular. In some years, no transfers were made. In 2004, Mekorót received NIS 1,607 million at 2010 prices (Figure 13), part of which was a one-time remittance, but most were sums owed since 1993. This episode is still on-going. As of 2009, there were still unresolved issues between Mekorót and the government, among them “completion of accounts auditing from 1994 onward.”

Figure 13  
**Subsidy of Mekorót, 2000-2010**  
 NIS million, 2010 prices



**Source:** Taub Center for Social Policy Studies in Israel.  
**Data:** Ministry of Finance, *Annual Report*, various years.

Another channel of subsidy of Mekorót's costs was purchase of desalinated water. Until 2008, the government purchased the water desalinated in plants not owned by Mekorót with monies from the State budget.<sup>10</sup> This water was given to Mekorót free of charge, and its value can therefore be viewed as a subsidy. Beginning in 2008, Mekorót has paid for desalinated seawater, whose cost is approved for the purpose of calculating tariffs. Therefore, the subsidy to Mekorót

<sup>10</sup> Mekorót itself has 31 desalination plants, mainly in the Negev and Arava. Their cost was covered in the past as part of the agreement, and is now covered by water tariffs.

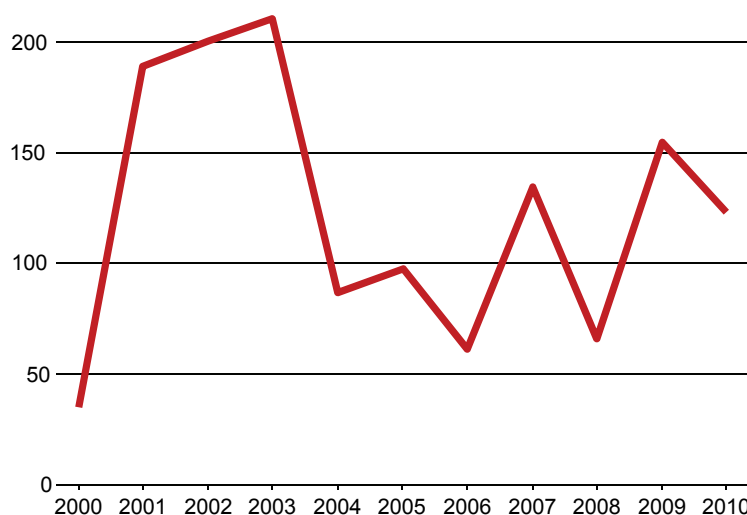
was actually at NIS 259 million a year on average – the sum of the first two rows of Table 14; and similarly, the summation of the two graphs in Figure 13.

Agriculture was the main beneficiary of subsidies of Mekorót water prices. In addition to lower Mekorót prices, agriculture can be seen as the beneficiary of the support to investment in recycling facilities. Further budgetary aid to agriculture (Figure 14 and Table 14) is mostly in the form of compensations, although it is not recorded in these terms. The compensations are for reduction in water supply during droughts, and to cover periods of price hikes. Some of the expenditures in recent years are apparently related to closure of accumulated accounts of previous years. The compensation sums are usually remitted indirectly as aid to investments in improvement of infrastructure, they also go to other purposes, among them replanting of orchards, advancement of summer fruit export, or support to regional wheat. In this way the government, at least outwardly, upholds the principle of not compensating sectors harmed by policy change. This principle is also upheld in the 2006 agreement, and the increase in subsidy expenditures for agriculture in the past two years has been mainly in the form of subsidies to investments and they were not recorded formally as compensation for prices that have been rising and are expected to rise.

A special form of subsidy to agriculture was “grants;” these were payments transferred to farmers whose water was self-supplied, and whose cost per cubic meter, including the extraction levy, was higher than the price that they would have paid had they purchased their water from Mekorót. These grants were halted in 2006 along with lowering the levy in many places. The accounts for the grants for previous years were apparently closed in 2010, the expenditure was budgeted at NIS 35 million and the sum was added to the agricultural subsidy for that year (the grants are not shown separately in the figure).

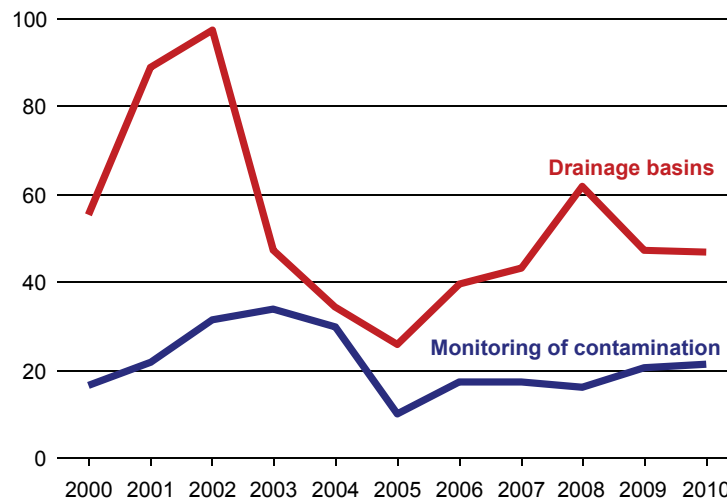


Figure 14  
**Support to agriculture in the water economy, 2000-2010**  
NIS million, 2010 prices



The discussion turns now to Figure 15. A drainage basin is a geographical area from whence the water drains, whether rainwater or water from other sources, into channels and streams that join into a single river. The water that flows in the basin could damage agriculture land or buildings and it also irrigates fields and gardens and creates natural recreational areas. Herein stems the origin of the comprehensive approach according to which drainage basin treatment was assigned to 11 drainage authorities; the Sea of Galilee Administration, coordinating treatment of the lake, operates within one of these drainage authorities. In addition two River Authorities were established, for the Kishón and the Yarkón respectively; they are responsible for these two rivers, our main streams. These authorities are engaged in land conservation, regulating the streams, cleanup, building and maintaining tourism sites, and similar activities.

Figure 15  
**Expenditure on quality and the environment, 2000-2010**  
 NIS million, 2010 prices



**Source:** Taub Center for Social Policy Studies in Israel.  
**Data:** Ministry of Finance, *Annual Report*, various years.

The drainage and river authorities are regional statutory corporations; they levy taxes on the communities in their jurisdiction and receive occasional state aid. By a government decision of May 2010, the Agriculture and Rural Development Ministry will establish a National Drainage Authority, which is to be responsible for regulation and oversight of drainage and treatment of rivers. In addition, the State budget transfers certain sums to the Nature and Parks Authority to purchase water to add to the streams (recently 15 million CM a year) as well as aid in investments for rehabilitating natural water bodies.

The second graph in Figure 15 shows expenditures for monitoring water quality; the expenditures also include pollution prevention. In

fact, a considerable portion of the treatment of the drainage basin also lies in the domain of monitoring and pollution prevention of water sources. A prominent example is the irrigation regime of the peat soils of the Hula Valley, which is aimed at preventing erosion of nutrients that, should they reach the Sea of Galilee, would cause an algae population explosion, thereby damaging water quality. Other activities under the aegis of monitoring and pollution prevention are local in nature, such as testing wells or desalinated water and law enforcement; this area is therefore shown separately in Table 14 and Figure 15.

- **Other expenditures**

The expenditures surveyed up until now were state support to the water economy. The administrative costs to carry out this activity have not been presented. At the beginning of the period under review, this cost was NIS 100 million (at 2010 prices), and it increased somewhat following the establishment of the Water Authority. In 2010, this expenditure was especially high – NIS 270 million – and of that, the public education campaign on the need to save water and install water saver devices is prominent. During the period under review, the cost of this administration stood at 10 percent of the total expenditure on the water economy; but it should be noted that in addition to encouraging conservation of water, this administration also includes the activities of the Hydrological Service, its professional work and research, even if not conducted in the Water Authority or in any other state entity.

In addition to budget expenditures explicitly identified with water, there is also state activity in tangential domains that are not reviewed in this chapter. An example is the dairy reform, aimed at improving productivity and also the proper handling of the dairy industry's large quantities of run-off that harms the environment and contaminates

reservoirs. In the past decade, support of this reform reached nearly NIS 1 billion.

#### 10.D. *Extraction Levies*

Up to now the survey has covered expenditures from the State budget, but the government also receives income from the water sector – albeit not in large sums – such as fees for bidding documents or fines for overconsumption. Large sums, at least apparently, come from extraction levies.<sup>11</sup>

As was explained in Chapter 8, Mekorót and its customers do not pay extraction levies. But the law is binding. Therefore, the levies are calculated for Mekorót every year. In the surveyed period, the extraction levy appeared in the budget books twice: in 2004, and in 2005, at a sum in excess of NIS 1 billion each time, and in two lines cancelling each other – with a plus and a minus sign. For its part, Mekorót continues to record the levy in its financial reports as an on-going cost; for example, NIS 543 million for 2007 and larger sums for the two subsequent years. Against this “cost,” Mekorót records income of similar magnitudes.

As indicated, there still are open accounts between the state and Mekorót. For example, until the end of 2009, it was not determined whether VAT payments apply to the extraction levy. If they are, the sum would be NIS 700 million over and above the levy itself. Mekorót operates under the assumption that closure of the accounts, when it occurs, will not affect its situation because sums that it does not receive from the State budget will be covered by payments of its customers.

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<sup>11</sup> The state also derives revenues from other taxes, among them value added tax, but these are imposed on all sectors of the economy, and are not specific to water.

The lack of clarity and dragged-out accounting process also characterize the extraction levies binding other suppliers. Unlike Mekorót, these suppliers are supposed to pay the levy. The Water Authority ordinarily charges in advance for the volume of water in the pumping permits, and settles up later according to actual extraction. The total sum recorded in advance is close to NIS 250 million a year (without Mekorót). At the end of 2009, the sum recorded in the Water Authority ledgers as levy debt was NIS 943 million, yet NIS 497 was recorded against it as “deduction for debts in doubt.”

#### 10.E. *Summary Remarks*

The ledgers – items, regulations, and notes – give a detailed description of government activity, but there also are cases where the information is not clear or straightforward. Despite the difficulties, it seems that this chapter transmitted the salient points of the budget dedicated to water. Yet it is important to stress that the picture is only partial: the available data present only the state expenditure, not what was done with those sums and what was achieved. The tables and figures show the support of recycling facilities, but not their overall cost and the resulting benefits. There is still a lot of work to be done.

The main message of the chapter is that the state is involved in the water economy to a broad degree. Although not expressed explicitly, it is reasonable to assume that the State budget will continue to support heavily the water sector; for example, when the time comes to reconstruct the sewage and recycling plants built in recent years. The overview also raises the question of long-term planning. The division of functions and financial responsibilities between the budget and other economic entities is not discussed explicitly in the material published up to now in the Master Plan (Chapter 14). Neither does the plan specify integration of budget considerations with future

development needs. Past experience shows that ignoring such issues leads to unpleasant surprises and disappointments.

An example of an unexpected budget cost can be seen in the scope of support delivered in recent years to urban corporations. The magnitude of this aid and the accompanying payments of public monies to cities were neither foreseen nor planned for, and apparently are not a passing phenomenon; more than a few corporations face grave difficulties and will continue to face them in the future.

The overview in this chapter also points to other difficulties; among them, the lags in building recycling facilities. Yet it appears that the main difficulty encountered is in regulation. Up until now, the economic regulation in the water sector was of just one company – Mekorót – and it was done by Ministry of Finance personnel. With the establishment of the Water Authority, regulation officially passed to it. The information in the chapter shows that the government faced difficulties in regulating Mekorót: accounting was dragged out and basic decisions were not made. From now on, the Water Authority will be responsible for regulation of dozens of corporations; the difficulties will only increase.

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## Part 3: Legislation and Governance

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The Knesset passes laws that regulate the water economy, usually at the initiative of the Cabinet. The Knesset also acts beyond the purview of legislation; for example, in influencing tariffs or forming investigative committees. The government is involved in the water economy – by law – in management, regulation, and as we have seen, budget. This part of the survey will focus on legislation and regulation, and it ends in a discussion of difficulties and even failures revealed in the government's activity and their implications.

### Chapter 11: Regulation and Legislation

Regulation is a general term comprising direction and control by government agencies of activities in the country. Regulation is implemented at two levels: in legislation of the legislating body, and in secondary legislation and implementation by the government agencies whose job it is to regulate and oversee. In principle, in Israel and other countries with similar economic regimes, the state intervenes and regulates only in spheres susceptible to “market failure;” that is, far-reaching damage to efficiency, or where important national objectives will not be achieved without intervention. In fact, though, the state is involved in many spheres.

Israel's water supply is characterized by three main properties that have the potential to cause market failure and thereby justify state intervention: water resources are common; water, wastewater, and recycled water have both positive and negative environmental impact; and the water suppliers are monopolies in their locales. Added to these are objectives of encouraging agriculture, creating a green

environment, equitable resource allocation, and others. The state's role is therefore to set sustainable policy for resource utilization; to preserve the quality of water sources and the environment; to oversee the water suppliers so that they engage in their activities efficaciously and sustainably at a high level of service and commensurate prices; and to allot water for worthy objectives. The state's intervention is regulated by the law.

State intervention in the water economy – as well as in other spheres – reinforces, directs and regulates overall national and social considerations and goals. At the same time, the presence and authority of the government – the central state body – also renders it an address for pressure; this is the nature of democracy. The discussion of this issue will be expanded in the last chapter of the survey.

The water sector is subject to a long list of laws, dealing with planning and building, health, and environmental protection. The Water Law of 1959 deals only with water and its regulation. Over nearly five decades, this law has undergone only a few changes, yet in the past decade, legislation created two far-reaching structural reforms. One was the transfer, in a law passed in 2001, of the urban water supply from the municipal water departments to independent companies (corporations). The second reform was an amendment to the Water Law, passed in 2006, when the Water Authority was established, centralizing most regulation activity in one hand.

#### 11.A. *The Main Points of the Water Law*<sup>12</sup>

The first clause in the law states that all water sources are the property of the people and are to be managed by the state for the needs of the people and the development of the country. And for further clarification, a person's right to land does not provide a right to a water

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<sup>12</sup> A more detailed source is Laster and Livney (2008).



source; that is, the law does not recognize private ownership of water or its use; and the state controls and manages the water sources.

These statements are the funding blocks of the law; their implications are far-reaching because of the special characteristics of the resources. Water is a common resource, enrichment is random, the quantity and quality of water in the sources is not known with certainty, salts and other contaminants accumulate in the reservoirs and their quality and their potential utilization change with time. Because of these and similar factors, property rights in water, wherever they are defined, tend to be elusive; for example, “the owner of land on the bank of a river, may use its water (a riparian right), provided no harm is done to downstream flow,” or “the user of water for irrigation may sell his rights but only of water actually consumed, not of any quantity drained to the subsurface.” Consequently, where water quantity is limited, the right and the ownership are forever in dispute, often in courts of law. For example, the State of Arizona has recently reformed its surface water law (there is a separate law for groundwater). The reform was followed by close to 90,000 law suits; court proceedings will now last for many years. This litigation regime has enormous cost; not only the cost of the courts, the lawyers, and time spent by the parties to the disputes – but also the distortions in the allocation of water until the cases are decided and distortions resulting from attempts to avoid costly legal procedures.

In Israel, thanks to the public ownership of water, the Water Law is comparatively simple and in its framework allocation is efficient. Cases are brought to courts, but in relatively small numbers. One of the first was a lawsuit brought, in the early 1960s, by orchard owners in Pardes Hanna against the Water Commissioner who ordered them to cease withdrawing water from their own private wells and connect instead to the newly built National Carrier. The farmers claimed that the water in the Carrier was salty. The Supreme Court rejected their case and decided that the Commissioner acted within his rights as

defined by the law. It may well be that if Israel had followed the American legal tradition, the farmers' case would have been upheld. It may also have been that the allocation to the sub-sectors in agriculture (Table 8) would have been different. But the economic and social cost of the water economy and its development would have then been very high. This cost was saved thanks to the first clause in the Water Law of the country.

In addition to public ownership of water, the law states that every individual is entitled to receive water subject to the restrictions of the law, and that such receipt shall not cause the source to become saline or to dilute it. The law lists six objectives of water use: households; agriculture; manufacturing; light industry; commerce and services; public utilities; and preservation and rehabilitation of nature and scenic landscape. These principles – public domain, state control, and preservation of resources and water's objectives – constitute a foundation for regulations that derive from the law's force. The regulations cover three main areas: regulation of natural sources and water withdrawal; allocation of water to end users; and economic regulation of the supplier and their activity.

In the area of regulation of resources, among others, rules were enacted for water quality preservation, regulation of artificial recharge, and protecting wells from contamination. In addition, the obligation to meter water was imposed; the restriction that extraction (abstraction) is by permit only was set; and rationing districts were drawn where allotments may be reduced in drought periods. By law, agriculture and manufacturing receive water quotas determined administratively. The law, however, does not place any quantity restrictions on the urban sector; urban residents can use as much water as they demand, as long as they pay for it, of course.

In the area of economic regulation of the water supply, the law and regulations state rules for calculation of the cost of water supply and the determination of tariffs. The calculation of cost shall be based on

real costs of the water supplier; tariffs can vary according to the water's objective, uses, the consumers' ability to pay, and other factors. In 1999, in the wake of the work of a public committee (Arlosoroff), the law was amended to include the option of setting extraction levies on water withdrawn from natural sources. At the same time, the previously required payments to the Equalization Fund were abolished. The distinction between the levy and the fund will be explained below.

Water tariffs at the national level are set only for Mekorót, as other suppliers are mostly private or regional cooperatives, and the state does not intervene in setting the prices that they charge. For the urban sector, the regulations set the prices that Mekorót customers – the local authorities or water and sewage corporations – pay the company; and the tariffs paid to local suppliers by households, institutions, and other urban consumers.

Far-reaching changes in how tariffs were set took place over the years. Previously, there were periods in which the tariffs were decided by the Knesset Finance Committee or one of its sub-committees; in other periods, the Finance, Agriculture, and Interior Ministers took part in setting prices. Currently, the responsibility and authority for tariff setting are in the hands of the Water Authority Council.

## Chapter 12: The Governmental Water and Wastewater Authority

To understand the significance of the reform in the law and the roles of the Water Authority, it will be convenient to begin by examining the two sub-divisions of the water economy shown in Table 15.<sup>13</sup>

Table 15. The water economy and its sub-divisions

	Countrywide economy	Urban economy
Resources	+	
Economics	+	+

The vertical division is to the countrywide and the urban economy. The former includes the water resources, Mekorót, the regional associations, and the recycling facilities. The desalination plants can also be viewed as part of this system, but it is more convenient to view them as external entities selling water to the economy. The urban sector includes the water corporations and departments in the municipalities. The urban sector does not have its own resources; suppliers that withdraw water independently do so from resources belonging to the countrywide economy. The horizontal division is into resources and economics. The economic sphere includes Mekorót and the cooperatives in the countrywide economy, as well as the urban corporations.

<sup>13</sup> The divisions of the water sector, both geographic and administrative divisions, are not consistent or well defined. This chapter employs the term “countrywide” to define all water systems that are not within urban jurisdictions or other residential areas. The term differs from the “country system” that referred to natural water sources as defined in the discussion leading to Table 9.

In the original Water Law, the Water Commissioner – an individual with regulatory powers – was the regulator of the countrywide economy. His authority to draft regulations was subject to the approval of a minister – initially the Minister of Agriculture, and from 1996, the Minister of National Infrastructure. Yet the responsibility for the sustainability of reservoirs and the efficient use of resources was imposed upon the Commissioner. The professional and administrative experts, assisting the commissioner, were handled by the office of the Water Commission.

Although the responsibility for the resources was borne by the Commissioner, authority over various issues related to the countrywide supply was dispersed throughout many other agencies. For example, formally the Commissioner was also responsible for the economic side of the countrywide supply, but in fact he did not set prices, and his decisions on investments were subject to the approval of the Ministry of Finance. Regulation of the urban sector was not under his purview. Before the establishment of the urban corporations, the urban sector was part of the municipal administration, which was in turn under the aegis of the Ministry of the Interior; and when the corporations were formed, they were subject to regulation by a special authority, the PUA (Public Utilities Authority) – Water and Sewage.

With the reform at the beginning of 2007 the position of Water Commissioner was abolished and the Water Authority was established and it was given responsibilities that had up until then been dispersed amongst various ministries. In addition, the Water Authority Council was formed, comprising eight members: the Director of the Water Authority, who heads the council; representatives from each of five ministries: Agriculture and Rural Development, Environmental Protection, Interior, Infrastructure, and Finance; and two representatives of the public who are appointed by the government: one on recommendation of the Infrastructures Minister, and the other on recommendation of the Agriculture and Interior Ministers.

The formation of the Council constitutes the main organizational change of the reform. Since its formation, the Council is the body that decides on tariffs and levies (the latter, with the approval of the Knesset Finance Committee) and before whom many issues under the administration of the Water Authority are brought for consideration. So, for example, the Council recommended to the Cabinet the expansion of seawater desalination plants; the addition of Jerusalem's fifth water system, and its building by Mekorót; it recommended to the Cabinet compensating farmers for cutting their water quotas; appointed a steering committee for the Water Economy Master Plan, and more. Yet most of the time of the Council and its members has been devoted to handling the urban water economy and tariffs charged by the corporations and local authorities.

The Council is obligated to give a fair opportunity to the public to air its concerns before it sets rules on tariffs and other matters. And in fact, since its formation, the Council has held public hearings on various issues, among them Mekorót prices, water corporations' fees, extraction levies, restrictions on watering gardens, and more. In a few cases, repeat hearings have been held on proposals that were amended in the wake of public criticism.

#### 12.A. *Structural Changes*

The legal reform that established the Water Authority included the regulation of the urban water and sewage corporations. The significance of this is that the regulation of the urban water sector was put under the jurisdiction of the same agency that is responsible for the regulation of the countrywide water economy. The areas of responsibility of the Water Authority cover now all the cells in Table 15. Making the Authority responsible for tariffs, both Mekorót's and those of the urban sector, means it is responsible for the economic dimension of the water economy, including the responsibility for the

regulation of investments in Mekorót and the urban corporations. The discussion of this aspect will be extended but before doing that, we shall comment on the general problem of the division of labor between public authorities.

### 12.B. *The Independence of Regulation*

The Knesset writes the laws that dictate the behavior of the citizens and the government, but it cannot go into all the technical details of the law and it therefore delegates power to others; for example, in the original Water Law, “the Minister of Agriculture is allowed ... to set norms for the quantity of water, its quality....” Today that is a responsibility of the Water Authority Council.

Regulations, and rules, in any area, are part of the secondary legislation done under the empowerment of the laws of the Knesset. In addition to enabling the writing of rules, the law gives the Water Authority considerable independence – although the term does not appear explicitly in the wording of the law. This independence is at two levels: one is the distancing of the executive political echelon from involvement in the water economy. Thus the Minister of National Infrastructures, who is responsible for the implementation of the Water Law, may set regulations on any issue concerning the execution of the Law “except issues that reside under the responsibility of the Council of the Water Authority.” And there are many such issues.

The second level of independence is in the division of labor between the Knesset and the Water Authority. In the past, the Knesset was involved heavily in setting the tariffs; this function is now the responsibility of the Water Authority (except for the approval of the extraction levies).

Giving independence to regulating agencies is done also in other places. Parliaments in many countries gave their regulation authorities

wide independence. An example is the central banks, like our Bank of Israel, whose performance improved markedly as they were made independent; although we have also seen failure, this is the nature of reality. Recently (July, 2011) a proposal was submitted to amend the Water Law with the aim of turning the wheel back and tariff setting would revert to the Knesset. This would be a mistake. The printed regulations specifying the new tariffs cover 22 packed pages, not including the extraction levies. The Knesset and its committees cannot master all the details of the tariffs; they should set basic laws, and sometimes even details, for the Water Authority and its Council to follow. And indeed, this was the practice. For example: in the urban sector “the tariffs for water and sewage services will be set in accordance with the cost of provision of the services.” Or in the Water Law “the tariffs for water supplied to public utilities that are public baths, ritual baths, and hospitals will not be higher than NIS 1.61 per CM.” The Water Authority Council must adhere to these instructions. In a similar manner the Knesset may enact other obligatory articles. Should, however, the responsibility for tariffs return to the Knesset, long delays can be expected (the extraction levies for 2011 were approved in the Finance Committee of the Knesset 11 months after the decision of the Council of the Water Authority), and the members of the Knesset, who cannot master all the details of costs and tariffs, will often deal in minor issues and miss the essence.

The papers reported that when the proposal to the amendment was submitted, the chairman of the Finance Committee added some sharp comments on “bureaucrats who increased prices out of proportion ... we shall erase this shame.” More than such words dishonor the public officials, who operate within the law and cannot enter into disputes, they dishonor the Knesset, our house of representatives.



## Chapter 13: The Areas of Regulation

As explained previously, regulation of the water economy comprises three areas: regulation of the resources and the environment; water allocation; and economic regulation. As will be explained, there are both parallels and overlaps between these areas, and by the law, the Water Authority is responsible both for regulating resources and for economic regulation. Integrating these two areas under the aegis of a single regulatory entity is unique to Israel; in other countries on which we have information, economic regulation and the regulation of the resources are the responsibility of separate agencies.

### 13.A. *Regulating Resources and Environment*

The function of regulation of resources is to set the quantities of water withdrawn from natural sources, the use of fresh and recycled water and the provision of water to nature, and at the same time the preservation of water quality both in the reservoirs and to the end user. As indicated, the main share of responsibility in this area is taken on by the Water Authority, although a few powers also lie elsewhere: the Ministry of Environmental Protection is responsible for protecting water sources from contamination; the Ministry of Health is responsible for drinking water quality and well protective zones; the Ministry of Agriculture is responsible for soil preservation and drainage.

The tangency and overlap in the economic and physical areas of regulation is recognizable everywhere in the water sector. To give a few examples: the quantities withdrawn determine the likelihood of shortages, and in turn the economic damage liable to be sustained, particularly to agriculture; withdrawal and use, particularly of effluent, affect the accumulation of salts in reservoir-held water, and in certain cases, the need to treat water at high cost; stringent standards of water

quality, either for irrigation or drinking, reduce the sources of provision and raise its cost. Therefore, there are clear advantages to concentrating regulatory responsibilities and considerations in a single agency. Yet, as explained above, in other countries, regulation of resources and economic regulation are separate, and therefore the effects of economic factors on decisions concerning resources (for example, decisions on overdrafting) pass through the “filter” of the inter-ministerial boundary and are discussed among officials responsible for different areas. It can be expected that under such a system there will be cases in which shared decisions will be more carefully considered than those made by a single agency where all powers are centralized (and which can more easily submit to pressure).

Recognizing the advantages of separation of powers, some observers are proposing transferring the responsibility for natural water resources to the Ministry of Environmental Protection, which is also responsible for preventing contamination of soil, gas stations, streams, and other places. In this way it would have authority over all aspects of natural water resources, quantities, and quality. The Ministry of Environmental Protection would then set limits on withdrawal from natural sources, whereas the Water Authority would handle the economic aspects of provision, investment, oversight of desalination facilities, and the urban sector.<sup>14</sup>

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<sup>14</sup> This separation has another advantage: it will facilitate the creation of a comprehensive economic regulatory agency that will be responsible for regulation in water, electricity, oil, gas, telecommunication, and other areas where public utilities operate. The economic foundation is common to all these areas; the integration will augment the uniformity of regulation in the country and strengthen it professionally. The integrated body will employ both economists with expertise in regulation at large and individuals specializing in particular areas of interest.

### 13.B. *Regulation of Allocation and Prices*

There are two dimensions to water allocation: the first is allocation of the resources; determining the source – natural, recycled, or desalinated – and the quantity provided. The second is allocation to end users. The Water Authority is responsible for both these dimensions. We will begin with the latter, where prices play a central, yet not an exclusive role. Water price setting raises questions of both principle and practice; neither is simple. Our review will begin with first principles and will be expanded later.

To focus, we will discuss mainly prices set for Mekorót. The first issue is the question of marginal cost, which today is the cost of desalination (Figure 5). A price equal to the marginal cost of provision informs the consumers and directs them to use water efficiently. Yet because there are reservoirs from which the pumping cost is lower than desalination (the Sea of Galilee, wells), if the consumers pay for all water at a price equal to the marginal cost, their total payment for water will be higher than the total cost of provision. On the other hand, if the price of water equals the average cost of its supply (the average of cost of provision from wells, the Sea of Galilee, and desalination), total consumer payments will equal the total cost of supply. This raises a question: is it fair to set prices higher than the average cost? In other words, is it fair to charge more than total cost? This question will be examined in the discussion of the extraction levies.

Another matter is the question of equality in sharing the burden of cost: the cost of water supply in the north, the Hula Valley, or near the Sea of Galilee is lower than that in the center and south; and the cost of supply to Tel-Aviv is lower than to Jerusalem. Yet the prices of water supplied by Mekorót for agriculture are uniform nationwide; the tariffs do not differ by geographic regions (but for a few exceptions). Similarly, equality is also maintained in tariffs paid by urban consumers (Chapter 7). In setting identical prices despite varying

costs, the Water Authority sacrifices economic efficacy in favor of equality in sharing the burden of supply. In other words, equality has become one of the objectives that justify state intervention in regulating the water economy (this discussion will be further expanded in Chapter 16).

Many believe that agriculture contributes to the environment and the dispersion of population over and above the production of food, fiber, and flowers for which the farmers receive payment in the marketplace. Agriculture is supported in various ways in order to encourage this added "external" contribution. One form of this support is low water prices: by setting lower prices for agriculture than for the urban sector, the Water Authority is upholding the law calling for acting "as per government policy." Yet as explained previously, in the wake of the agreement with the farmers, water prices for agriculture will increase, at least for freshwater, and in the future, support will have to be offered in other forms.

An accepted form of support for water prices is setting block rate tariffs; this is done both in agriculture and in households. Block rate tariff has two roles: it enables purchase of a basic quantity of water at a low price; and it discourages users from using large quantities. Yet this price policy does have its drawbacks. For example, in the moshav sector, the entire community is defined as a single consumer responsible for internal allocation between farms. As such, moshav farmers can transfer water quotas from one farm to another. Individual private farmers, in contrast, are bound each to their own quota and are denied the flexibility that the moshavim can take for granted.

In summary, it should also be mentioned that prices are not always an efficient instrument for allocation. The knowledge that we possess, even if derived from statistical and scientific research, is not sufficient for setting prices in periods of shortage, prices that will direct farmers and urban dwellers to take exactly the available quantities of water; not too much and not too little. As such, during hard times, there is no

choice but to turn to quantitative allocation. In agriculture this would be lowering quotas; in the urban sector, banning watering gardens and similar emergency steps, often augmented with public campaigns.

### *13.C. Regulating Withdrawal and Levies*

As indicated, the first question of water allocation is allocation of withdrawal; that is, setting the quantities to be provided from the various sources. Concerning desalination, the power of the Water Authority has several dimensions: it recommends construction to the government and it oversees the quality of the water delivered. It is also reasonable to assume that it will have the authority to decide on shutdown of plants during especially rainy periods. The Water Authority's intervention in withdrawal from the natural sources is broader: decisions concerning pumping at natural sources rest on engineering and hydraulic considerations and these may differ from place to place and from year to year. Accordingly, the Water Authority issues annual permits at the beginning of each year. The law prohibits pumping from any source without a permit. This means that decisions on pumping are time and place specific administrative decisions involving professional expertise. Pumping cannot be directed solely by prices. Yet there is a monetary instrument that aids in regulating pumping: extraction levies.

The economic justification of the levies is the need to charge for the value of water at the source. The explanation is that water – or for that matter any natural resource – that is quantitatively restricted, has a scarcity value.<sup>15</sup> Seawater has no scarcity value; it is not scarce. In the Israeli water system, setting the scarcity value is simple: if the cost of desalination is NIS 3.00 per CM (as assumed in Figure 5), then the scarcity value of water in a coastal aquifer, adjacent to a desalination plant, is NIS 3.00 minus the cost of local pumping (let's say NIS

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<sup>15</sup> Scarcity value is explained in detail in Fisher et al., 2005.

0.50). In other words, the scarcity value is NIS 2.50, which should also be the extraction levy for water withdrawn from the coastal aquifer. The conveyance cost from the Sea of Galilee to the coast can be reasonably assumed to be NIS 1.70 per CM, thus the scarcity value of water in the Sea of Galilee is NIS 1.30 per cubic meter.

The extraction levy is paid to the State Treasury (the Ministry of Finance); that is, to all citizens of the state – they are the owners of water resources. In this way, the levy is a tax that goes to fund the State budget. Accordingly, the levies are quoted in the articles of the Water Law and changes suggested by the Water Authority are subject to approval by the Knesset Finance Committee.

The objective of the Water Law was to set extraction levies that reflect the scarcity values of water at its sources. Such levies will signal to users the value of water to the economy, and they will take this value into consideration when making their own private decisions on its usage in production or consumption. With the levies, the Water Authority will be able to create standardization such that the cost of water to private pumpers will be comparable to that of those who purchase their water from Mekorót (yet the Water Authority does not always do so, see Tables 9 and 10). As explained above, decisions on pumping, and pumping permits, are subject to change from year to year and place to place. Consequently, the extraction levies cannot be the sole instrument for regulating allocation at source, although they do serve as an assistive instrument. Without levies, the private pumper would earn large profits pumping large quantities, and would vehemently oppose the directive to reduce pumping, if issued. Under levies, profits are smaller, the opposition to central directives less intense, and the chances that regulation will succeed in its purpose improves.

Before the extraction levies were codified into law, an “Equalization Fund” operated. As its name indicates its purpose was to equalize, at least partially, the cost of water to users from different

sources. Consumers, whether Mekorót's customers or of independent providers, for whom the cost of water was low, paid to the fund; and the fund supported costly water projects. The fund's big drawback, aside from the fact that the payments did not reflect scarcity values, was that it encouraged over-investment. Investing – even if its contribution to the economy was small – was worthwhile for water providers, both individuals and cooperatives, as it increased cost and reduced or eliminated altogether payments to the fund. This possibility no longer exists because the extraction levies are calculated by water source, geographic area, and season, and are not dependent upon the specific cost of individual water projects.

As indicated, if the prices charged by Mekorót were identical to the marginal cost of provision (roughly speaking, the cost of desalination), Mekorót would have accumulated surpluses, and consumer payments would be higher than the company's cost. In theory, the payments of extraction levies, if calculated properly, will equal these surpluses; they will be transferred to the Treasury and will not accumulate at Mekorót. In fact, however, the prices paid by Mekorót customers are equal (on average) to the average – not the marginal – cost, and Mekorót and its consumers are exempt from extraction levies.

### 13.D. *Economic Regulation*

The role of economic regulation is to bring about optimal activity of the regulated economic entities, in this case the water suppliers. State intervention in the economic side of the water sector is necessary and its role is threefold: to maintain the stability and economic viability of the suppliers, providers of public utilities; to ensure high quality and reliable service; to watch that the suppliers do not exploit their monopoly positions to charge high prices and make undue profits.

The Water Authority is the state arm, and as stipulated by law, it “...shall act as per government policy.” It therefore acts to advance objectives of public policy, some of which lie outside the definition of narrow economic justifiability for state intervention. Among these objectives is dispersion of the population, agricultural development, and equity – even if not full – in sharing the burden of the cost of water supply.

The economically regulated suppliers are Mekorót and the urban corporations. These are publicly owned companies: the state owns Mekorót, and the local authorities own the corporations. While the form of ownership – private shareholders or public entities – may affect the functioning of economic enterprises (Chapter 8), from a regulatory perspective, the question of ownership is marginal. The main tasks of regulation and its challenges are not affected by the structure of ownership.

Economic regulation places before the Water Authority – indeed, before any regulatory agency – contradictory tasks. On the one hand, ensuring viability, stability, and service quality, which come at high cost and are covered by end user payments; and on the other, keeping prices low so that the consumer is not exploited, and suppliers are not awarded monopolistic profits. To remedy this contradiction, the Water Authority acknowledges only “approved” costs in Mekorót and the corporations, and the tariffs are set to cover only these costs. Accordingly, the Water Authority also oversees the investments of the suppliers: the costs of investments agreed upon in advance are approved and covered by tariffs; other investments, if undertaken, are not covered.



### 13.E. *Private Suppliers and Desalination Plants*

Owners of private wells, municipalities that have not yet transferred their water services to corporations, regional water cooperatives, and others are considered private (non-Mekorót) suppliers. They are subject to regulation of resources and may withdraw water only under permit. Yet the involvement of the centralized regulation in their economic considerations is minimal: the Water Authority supports the construction of recycling facilities; the Sewage Authority supports wastewater treatment plants; and there is also occasional support of investment in water projects (Chapter 10); but there is no deep, on-going intervention in economic aspects of the activities of the private suppliers.

The desalination plants can be seen as operating outside the water economy – supplying it with raw material. The regulation of their activity takes the form of contractual agreements stipulating the quantities, prices, and quality of the water they are to provide. Contracts are also instruments of regulation, but the Water Authority does not intervene in on-going activities of the desalination plants.

### 13.F. *Service Charters*

A service charter is a document setting forth the quality indices of a service. It creates two obligations: on the one hand, it explicitly defines the services that the supplier is to provide; for instance, public health codes pertaining to drinking water are to be maintained. On the other hand, the service charter is a commitment to the public on the part of the regulator – in this case the Water Authority – to ensure that the service providers adhere to the required standards.

To be effective, the service charter does not make do with final indices such as clean water or speedy service, but rather specifies basic requirements such as rehabilitation, maintenance, and upgrading of water and wastewater installations. The history of the service

charters in the water sector is testimony to the Water Authority's priorities (and the Water Commission before it), and perhaps also to the burden of tasks it has taken on.

The Corporations Authority, formed in 2001, drafted and published a service charter in 2005. The Water Authority, in which the Corporations Authority was absorbed, began only this year (2011) to draft a service charter for the corporations, and in the meantime it announced that corporations must follow the existing service charter. As for Mekorót, the costs agreement signed in 2001 contained a clause calling for the drafting of a service charter by a team comprised of Mekorót personnel and state representatives. However, in a subsequent agreement, signed in 2007, this obligation was rescinded "... in light of the government's intent to implement an oversight model in the upcoming months." By the new regulations affecting Mekorót (2011) the company is required to set aside funds for maintenance and upgrading, but no service indices were defined for the company to keep, nor was it required to maintain and upgrade water infrastructure and equipment. Today Mekorót operates without a service charter.

## Chapter 14: Master Plans

Hundreds of plans for water projects, small and large, have been drafted over the years. A master plan is a plan that covers the entire water sector, drafted with a view to the long term, and having two main objectives: the first is to consider development and future objectives and to outline modes of action for all actors in the water sector. The second is to inform the government and the public what the plans of the water economy are, how the projects were chosen, and their costs – both as budget items funded by the taxpayers and the cost to be covered by payments for water. Three master plans were prepared in the past 25 years and a fourth is now being drafted. The plans that were prepared and the effort invested in them have enriched the knowledge and understanding of the professionals; they have faced a disappointing reception from their intended audience.

A particularly detailed plan was submitted in 1988. Three hundred working months were invested in that plan and it yielded 60 professional reports and 15 volumes of documents, both regional and national. In light of the expected increase in urban consumption and the need to protect the reservoirs, it recommended reducing the water supply to agriculture. Following the plan's signing and submission, the Director of Planning at the Ministry of Agriculture – the ministry under whose auspices the Water Commission was then functioning – wrote that “After repeated checking ... we have reached the conclusion that water supply to agriculture can be ensured ... at a scope of 1.3 billion million cubic meters per year,” or 220 million more than that recommended in the plan. The plan was shelved. The Ministry of Agriculture handed down a professional opinion in a field in which it did not have any experts of its own and rejected a plan in which it had been an active partner.

Another master plan was drafted in 1997 and it included for the first time desalination of seawater. Between the directive calling for the plan to be drafted and its submission, the Water Commissioner was replaced, and the new commissioner rejected the draft of the plan that his predecessor had ordered. He also decided to cease working on it. He instead opted for a policy of “brinkmanship” in exploiting all natural water sources.

A short-term master plan aptly titled “Transition” was drafted in 2002, in the wake of a severe water shortage. The government adopted only one of its recommendations: to build immediately desalination plants at a combined capacity of 400 million CM a year. Later on, this decision too was rescinded. Other governmental decisions on water – and there have been many – were made without any acknowledgement of this master plan or others.

The Water Authority has been engaged for several years in drafting a new master plan; however, despite the many changes that have taken place in the years since its establishment, it has yet to submit a plan, even a temporary, short-term one. And indeed, Mekorót's administration explained that it drafted a plan for itself because the Water Authority has yet to do so.

The plan now being drafted at the Water Authority covers a 40-year period, until 2050, and will be a “work in progress that is intended to evolve over the course of years.” The plan will be built in two tiers: a policy document, and an implementation document. The draft of the policy document was published at the end of 2010; the implementation document has not yet been published.

The policy document is comprised of three parts: the first is a summary of water balances and desalination needs for the period covered by the plan. The figures are submitted in the published version and also in the background material on the Water Authority web site, but the information disclosed is not sufficient for examination of numeric parameters and the conclusions of the plan.

Particularly lacking are data on the management of the natural reservoirs and supply reliability.

The second part of the Water Authority policy document is an outgrowth of the first: a development plan according to which investments in the water sector during the period covered by the plan will be made yearly at a sum of NIS 5.2 billion, more than double the 2006 investment outlays. This section of the draft is submitted in an incomplete and non-professional form; for example, the investment sums are summarized for the term of the plan in nominal values and are not discounted; no distinction is drawn between gross and net investment; the reported estimate was that the State budget will cover 15 percent of the investment, there is no explanation of how this rate will be maintained if today the budget is required to cover 60 percent or more of the investment in wastewater and recycling facilities; an “initial estimate” is shown of the development of tariffs, there is no explanation of how, accordingly, household water prices are supposed to decrease despite the anticipated investments.

The third part of the document covers policy. This section is made up of a large number of platitudes and truisms, many of them have nothing to do with water. For example, “including the Med-Dead Canal in the overall plan for the water sector is stipulated on proving the project’s feasibility;” and “Establishing an inter-ministerial headquarters ... that guides the national planning needs of the various ministries....” Considerations and analyses of various options are absent. This document contains everything for everyone, but as long as the implementation document is not submitted, the plan for execution cannot be known.

## Chapter 15: The Bein Committee

Due to public interest and the complexity of management, various committees have been formed over the years to study the water sector or aspects of its activity. The last two committees were formed at the initiative of the Knesset: the Magen Committee in 2002, a Knesset committee; and the Bein Committee in 2009, which was formed through a decision of the State Control Committee of the Knesset. The Cabinet adopted a series of decisions in light of the committee's recommendations; among them:

1. The Water Authority and the Ministry of Environmental Protection will act to guard the water sources against contamination; to affect improvement of wells, and to stop the flow of sewage into cesspools and streams.
2. The Water Authority will prepare a model for economic, social, and environmental analysis of projects in the water sector.
3. A master plan shall be prepared and submitted for approval to the Cabinet.
4. All water sector-related costs shall be embodied in tariffs.
5. Water prices shall be graduated and uniform nationwide.
6. A public representative shall head the Water Authority Council (and not the Water Authority director).
7. A Public Water and Sewage Council shall be formed, to be headed by the Minister of National Infrastructures. The Council will be authorized to direct queries to the Water Authority and to the various ministries, yet will not have power over them.

In tandem, it was decided to task the Water Authority with preparing the staff papers for implementing these decisions. However, as of this writing (November, 2011), no information on preparation or implementation has been made public.

## Chapter 16: Government Failures and their Moderation

Regulation has been placed in the hands of the state due to “market failures” in the water sector but occasionally the government has also failed at its task. Thus the water sector has been dragged into overdrafting and depletion of reservoirs; Mekorót’s first desalination plant has yet to be built; master plans that the top experts have prepared have been thwarted and either tabled or ignored; and the number of urban water and sewage corporations is far larger than desirable. Each of these failures is open to interpretation and for each, someone can be found to blame: the water commissioner who believed that his task was to save irrigated land even at the expense of water sources; the accountant-general who saw his task as that of thwarting Mekorót and not as advancing government policy on water supply; the water commissioner who opted not to take professional advice to reduce extraction because “it won’t be accepted;” the infrastructures minister who, prior to his party’s convention, compelled the Water Commissioner to allot an extra water increment to the moshavim in the Negev without asking where this water would come from; the agriculture minister and his deputy, who became overnight experts on water potential and rejected a plan to which they themselves were partners; the Water Commissioner who decided that he didn’t need experts and plans; the director-general of the Ministry of Finance, who, with the help of economic sanctions, hastily pushed through the forming of too many urban corporations.

To this historical list one may add the Water Authority director who, in his four years in office, has not formulated a service charter for utilities for which he was responsible, and has managed only to issue a watery draft of a partial master plan. One can also point to the present Minister of National Infrastructures, who has complained time and again that the law does not grant him authority over water issues,

but when the possibility arose – as well as the obligation – was too paralyzed to act. Professor Uri Shani, the first Water Authority Director, left his position at the end of February – and this was known two or three months in advance – but the minister appointed a successor only six months after Shani's departure. Similarly, the Cabinet decided to revive the Public Council on Water and Sewage, and it must be formed by force of law (even though the law will probably be amended), but it has yet to be formed.

Officeholders have to take responsibility – for both acts and failures to act – but here is a pattern that goes beyond personal responsibility. Despite significant successes – and the water sector can count many – the government fails again and again. It is in the nature of things: the government is made up of people, human beings who are necessarily limited in their abilities, who err, who are influenced by side issues, and who are occasionally biased. Government failures are impossible to prevent completely, but attempts can (and should) be made to mitigate them.

#### 16.A. *Structures and Modi Operandi*

Moderation of government failure can be done in two ways. One way is by putting into place suitable organizational and economic structures, or at least recognizing the difficulties that existing structures create. Examples:

- **The Water Authority**

The Water Authority attempts to perform the combined tasks of administration and regulation of both the urban water sector and the countrywide system. In fact, the bulk of its efforts – especially the bulk of its Council's time and attention – are devoted to matters of the urban sector. The problems of this sector won't go away; they will



only grow (Chapter 7). With this situation, the neglect of the natural resources may be continued.

- **A captive regulator**

The Water Authority is also in danger of becoming “a captive regulator,” a regulator biased in favor of the economic agents it oversees – supposedly on the public’s behalf. The roots of this potential bias begin in proximity to the overseen entities, in information that will never be complete, in the natural desire to achieve failure-free service, and in willingness to fulfill the demands of currently organized labor and labor that will organize in the future.

The probability of the Water Authority becoming a captive regulator has increased with the transition to cost recovery tariffs for Mekorót. Up until this transition, the State budget supported Mekorót; and the Ministry of Finance – the keeper of the budget – oversaw Mekorót’s investments (some claim that it overdid this task). With the new tariffs, the Ministry of Finance is freed of this burden; the consumers will cover all costs.

- **Tariffs in the corporations**

The tariffs charged by the corporations create difficulties of two types. One is that in the current price structure the payment to Mekorót increases as the internal cost of the corporation decreases. This negative relation undermines management’s incentive to reduce costs or improve service. In fact the opposite incentive is created: every manager will do the utmost to show that internal costs are especially high in his or her corporation. In this way, the corporations are liable to drift toward an inefficient mode of operation of the kind typical to over-planned economies characterized by service entities whose ownership is not clear and explicit and where management is

evaluated by inputs (pipes and sewers) rather than by outputs or by profits.

Up until now, reports have been mainly of successes (although loud criticism has also been heard): reduction of water loss, streamlined payment collection, investments in rehabilitating mains and sewers. Yet these were early successes. The corporations are young, the tasks challenging, and the state is pouring in huge sums (Chapter 10). In the upcoming years, activity will settle into a routine, the workers will exercise their right to organize and will keep demanding improvements in pay and conditions, and the monetary framework will be pressing. The test of the corporations still lies ahead.

Block rate tariffs add another difficulty; the corporations will have to keep monitoring the number of family members in each and every household. The task will be costly and the cost will be covered by the consumers. The consumers on their part will also be burdened with paperwork and the requirement to report any demographic change. This burden will be particularly heavy on low income families, among them many of the new immigrants.

- **Decentralized responsibility**

The original Corporation Law (2001) established two regulating bodies: the Corporation Council and the Superintendent of the Corporations. The functions and tasks of the Council were absorbed in the Governmental Water Authority (by the 2006 amendments to the law) and the Superintendent joined the Authority staff. As explained, the task of economic regulation is to ensure orderly functioning of the regulated public utilities and to maintain appropriate consumer prices. To fulfill this task, the regulator has to weigh demands from the utilities, the corporations in this case, against the cost the end users will have to cover. Consequently, the control of the corporations and the setting of tariffs should be in one hand and under a single

responsibility (this is true also for Mekorót). Today, there allegedly is one such hand, the Water Authority; but only allegedly. The separation of responsibilities has remained within the Water Authority itself: an independent Superintendent who decides on investments and requires expensive actions and a Council that is shown calculated tariffs and approves them, essentially automatically – a recipe for a captive regulator.

- **Moderation**

It is impossible to prevent all structural and administrative difficulties in the running of the water system, but they may be moderated. One way is by separating regulation of the urban and national sectors according to the divisions shown in Table 15, or separating regulation of resources from that of economics. Such proposals will be rejected with the claim that separation compromises the uniformity of centralized administration. This is the heart of the matter: there is more than one way to manage the water economy, and separation will encourage coping within the different agencies and bring responsibilities into focus.

Similarly, diversity can be introduced into the administration of the urban sector; for example, instead of the entire country being covered by corporations of a uniform structure, individual cities, those meeting specified administrative and economic provisions would be allowed to keep local water and sewage services as part of their municipal structure and responsibilities. Another possibility is to permit privatization of some of the corporations and in others to let the local governments own the service companies. Such diversification would encourage competition and enable examination of different organizational frameworks for service provision. It is thanks to diversity that this survey was typed on the keyboard of a PC, not penciled on lined paper; and it is competition that created nearly infinite models of mobile phones catering to the whims of every user,

young and old. Full economic competition cannot be realized in the water sector, but diversity will enable "yardstick competition;" that is, the Water Authority will be able to compare the functioning of some corporations with others, reward the successful ones and demand improvements in those that lag behind.

- **The political aspect**

As explained above, the intervention of the state renders it an address for public and political pressure, and it – in our case the Water Authority and its Council – takes this pressure into consideration when formulating decisions. Consideration does not mean bowing like a reed in the wind, but it also does not mean ignoring the public. The history of tariff setting in the urban corporation serves as an example. The law (water and sewage corporations) states that “Every price shall reflect, as far as possible, the cost of the service for which it was set.” In simple language, the tariffs are locality specific; each corporation will have a unique tariff to cover its specific costs.

This provision proved difficult for many, and the director of the Water Authority was called before the Knesset committees several times. He claimed that he was only implementing the law. Yet he was pressed and was even told that the law can be amended. After debates and deliberations, a way was found to square the circle integrating uniform tariffs (though block rate) with full cost recovery as required by the law (Chapter 7). However, even this did not suffice and the tariffs were changed again, this time the lowest-paying block was expanded. And it's likely that the story won't end there.

The uniform tariffs were set as the prevailing opinion (the media, the Knesset) was that the state should not discriminate between communities; all find shelter under its wings and it is expected to rule equitably. This philosophy gained support particularly in light of the fact that it was precisely in the poor locales where tariffs were likely to be high, as there, the Water Authority approved (for the first years

at least) norms of higher water losses and higher collection costs than in other locales. In the ensuing systems, the observable consumer tariffs – the subjects of public debate – are uniform, the corporations pay Mekorót differing prices; consequently, some corporations support others' water costs. Probably the poor communities are among those supported, but it is also probable that this cross subsidization did not raise vehement public criticism since it remained behind the scenes and was not obvious to the public eye.

Although identical tariffs were set in the wake of public pressure, a political aspect may also justify them. If different tariffs were to be set, the leadership of the communities harmed thereby would mobilize their forces to oppose "discrimination." Just consider higher tariffs for Jerusalem than for Tel-Aviv; the state would not be able to implement its desired policy. Whereas with uniform tariffs, the political struggle is aimed at lowering tariffs for all, and it is relatively weak, not focused and concentrated. Any given mayor can free ride on the struggle carried on by others. And thus, up until now, the Water Authority has succeeded in upholding its mandate of full cost recovery, even if only on a national scale, not in every locale separately.

The situation is similar with Mekorót prices for agricultural water. With the exception of the Beit She'an Valley, which operates under a special arrangement, prices for water differ by kind but all farmers pay identical rates; the tariffs do not reflect local cost of supply. If the prices were set high in the costly areas for – example, in the hilly regions – concentrated opposition would arise; whereas now, under uniform pricing, the state has succeeded in reaching an agreement with the farmers on full coverage of the cost of supply to agriculture (Chapter 6).

In two cases, the fees to Mekorót are calculated according to local cost of supply. The first is supply to Palestinian communities, for which the fee is set based on the cost of the specific facility delivering

the water. The second is “infrastructure service,” conveyance of water on other's behalf; an example is Mekorót transferring water from a treatment plant that does not belong to the company to an agricultural region. The payment for this service will be set to cover local cost. Both these cases lie below the political radar (extraction levies, as we saw in the discussions on Tables 9 and 10, were hidden behind complicated computation formulae). The exceptions prove the rule.

These political aspects reinforce the logic behind letting the water services in a few locales stay under the administration of the municipal governments. This option may be conditioned on complete financial separation of the water and sewage services from other departments in the local government, and payments to Mekorót could be set equal to the national average. Unlike corporations under strict regulation, independent water services, should they be allowed to function, will be free to set their own tariffs. Indeed, this was the situation prior to the formation of the corporations, when in the local governments three out of four rates were unique and differed from place to place (water development levy, sewage levy, and sewage fee). In such locales, the water and sewage supply administration would be judged by its success in supplying services and by their costs. They would form the test –for success or failure – for both the corporations and the Water Authority to observe.

#### ***16.B. Transparency and Public Participation***

The second way for moderating government failure is to adopt policies of transparency and public participation. The Water Law recognizes this need and states that the Water Registry, wherein all pumping permits are recorded, is open to the public for anyone to see. The law also requires the Water Authority's Council to publish on its web site for “public hearings” upcoming rules before they are finally codified. Other documents to be made public are the annual reports of

the Director of the Water Authority and data on the conditions of all water resources.

The required material is published and information on many other aspects of the operation of the water economy are also made available, but this is still not sufficient for effective public monitoring of the Water Authority's functioning as a regulatory agency. For example, the Water Authority does not notify the public of decisions regarding development of facilities and investments, which are likely to affect heavily the cost of water supply and future prices; nor does it publish the full minutes of its Council meetings. It publishes only decisions, and even those only after a lengthy delay. As of September 2011, the most recent decisions that can be viewed on the Water Authority site date from the beginning of September 2010 – a full year's delay.

The only way to ensure transparency is to codify in the law, explicitly, what the Water Authority and other agencies responsible for water must publish. For example, full minutes of council meetings, decisions on investments, cost-benefit analyses; full explanation of price setting, including analysis of Mekorót's and other supplier's costs (desalination plants and urban corporations); routine (quarterly) publication of all complaints and inquiries submitted to the Water Authority and other agencies; the measures taken and the replies sent to the inquirers. A great deal of power lies in the hands of the Water Authority executives, the management of Mekorót, and of the corporations; and they reinforce it by withholding information. Only fear of the law and of the Supreme Court will create full transparency.

Transparency is a moderating factor ("sunshine disinfects") but it is not enough. It is also important that the public actually be involved in the water economy. Such involvement is supposedly ensured in the form of two public representatives on the Water Authority Council, yet these representatives apparently see their role as bringing professional assistance to the Water Authority (one is an economist and the other a hydrologist). While this is nice, it is not what is

needed. The Water Authority has excellent professional teams and, when needed, it recruits outside consultants. The public representatives on the Council probably contribute to its deliberations, but they do not fulfill their role as true public representatives: they have not concerned themselves with transparency, they have not once reported publicly their activity on the Council nor their own positions. Their sitting in the Council cannot be taken as a realization of public involvement.

The Bein State Inquiry Committee proposed forming an independent public watchdog body with its own budget that would direct inquiries to every entity active in the water sector, fund consultation, and publish opinions. The government purportedly adopted this proposal, and decided to form such a council but without promising it a budget. The government also decided that the council will be headed by the Minister of National Infrastructures – a sure recipe for its being an organ of that ministry and a public relations department for its minister. Yet he, as indicated, did not even bother forming this puppet council.

The chairman of the Knesset's State Control Committee announced the establishment of a water affairs lobby and which he will head. Here is a challenge to the members of the Knesset, legislation that will lay the foundation for transparency and true public participation in the water economy.



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