

# Chapter 17

## The Water Authority: The Impetus for Its Establishment, Its Objectives, Accomplishments, and the Challenges Facing It

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Water scarcity is a “fact of life” in Israel, where demand for water routinely exceeds its supply. The commonly agreed-upon policy to bring demand and supply into balance failed mainly due to population increase. In addition, the years 2001–2005 saw the most severe drought to hit Israel in a century.

The long-term annual average availability of natural water for the period 1932–2008, 1.35 billion cubic meters (bcm), masks a downward trend: in the last 18 years, the average has been only 1.175 bcm. The above-mentioned droughts made the situation progressively worse, turning it into an acute water shortage. At the end of winter 2003/2004, the water stocks in the operable reservoirs stood at only 1.3 bcm above what is defined as “red lines.”<sup>1</sup> Precipitation in the following 3 years was poor and forced intensified harvesting of existing water stocks. Consequently, all the winter water accumulated in the reservoirs was consumed in the next summer.

Winter 2007/2008 was especially dry (precipitation averaged only 62% of the long-term average). As a result, water in the reservoirs dropped by another 0.5 bcm. Winters 2008/2009 and 2009/2010 saw only a slight rehabilitation of the reservoirs, caused mainly by reduced water consumption and additional seawater desalination. Precipitation in winter 2010/2011 was also short of the long-run average.

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<sup>1</sup>Red lines signify the level of water in the reservoir below which the reservoir may sustain damage.

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A review of the updated quantities and quality of water in major water resources can be found in Rejwan (2011).<sup>2</sup> Additional factors contributing to the accumulating overdrafts are population growth and economic development, resulting in increased domestic and industrial consumption of freshwater, and, until a few years ago, inefficient institutional and administrative mechanisms for water allocation and control, including both hydro-politics and effective pressure by the “agricultural lobby.” An excellent recent review of the water economy of Israel can be found in Kislev (2011).<sup>3</sup>

The long history of inefficient management of Israel’s water economy constituted the main reason for establishing the Governmental Authority for Water and Sewage (AWS). The decision to establish it was, “luckily,” taken before the latest water crisis, and the regulatory powers with which AWS was endowed were crucial in its successful coping with this crisis. AWS was instituted on January 1, 2007, and replaced the Office of Water Commission that had existed before, which constituted the organizational basis on which AWS was founded. The former had been a government department in the Ministry of National Infrastructure (today’s Ministry of Energy and Water). The immediate challenge was to struggle with the severe water crisis. This task was multifaceted because of primary missions of reforming the water economy economically and institutionally. Such reforms were intellectually challenging and politically loaded.

The remaining of the chapter is organized as follows. Section 17.1 reviews the background and circumstances for the establishment of the AWS. Section 17.2 describes the structure and the main functions and tasks of the AWS. The coping of the AWS with the current water crisis is detailed in Sect. 17.3, and the reforms of the water and sewage corporations and of the water and sewage tariffs in the urban sector are discussed in Sects. 17.4 and 17.5, respectively. Finally, Sect. 17.6 discusses the vision, targets, and challenges concerning the future of the Israeli water economy.

## 17.1 The Background and Circumstances of the Creation of the AWS

The implications of the changes in the water economy are detailed in the June 2002 report of the Parliamentary Commission on the Water Economy, headed by M.K. David Magen.<sup>4</sup> The commission was appointed in the wake of the dire water situation during the decade preceding its work. The upshot of the report was the realization that repeated water crises are not a force majeure but are a consequence of the absence of a central, professional management of the water system. The main

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<sup>2</sup>Rejwan (2011).

<sup>3</sup>Kislev (2011).

<sup>4</sup>[http://www.knesset.gov.il/committees/heb/docs/vaadat\\_chakira\\_mayim.html](http://www.knesset.gov.il/committees/heb/docs/vaadat_chakira_mayim.html)

failure consisted of overutilization of water reservoirs and scant development of alternative sources. This led to a continuous depletion of supply sources and a severe imbalance between the availability of water from natural resources and the demand for water usage. The solution lay in a concept of management that would allow for long-run considerations and sustainable planning, protected from political constraints.

As mentioned above, the AWS was founded on January 1, 2007. The forming of the AWS involved organizational changes to the old Water Commission, a governmental department in the Ministry of National Infrastructure (today's Ministry of Energy and Water), comprising considerable expansion to its functions and responsibilities. The main idea driving the establishment of the AWS was the concentration of all authority concerning water and sewage in one governmental-professional agency. This would engender an all-encompassing and coherent approach to the needs of the water economy and possess the proficiency needed to oversee and regulate it, including the setting of tariffs for water and sewage.

The law which facilitated the formation of the AWS also promulgated the formation of the Governmental Authority Council for Water and Sewage (henceforth Council). It comprises eight members: the chief executive of the AWS who also serves as the Council's chair, five representatives of government ministries (Finance, Energy and Water, Agriculture and Rural Development, Environmental Protection and Interior), and two representatives of the public, appointed by the government.

Prior to the formation of the AWS, the water economy had been overseen by a clutch of government units, belonging to six different ministries. The Knesset had also been involved. In addition to the Water Commission's responsibility for development and husbandry of the water resources, and the allocation of water based on licenses for the production and provision of water, the Ministry for Environmental Protection was charged with the responsibility of water treatment and contamination prevention; the Ministry of Health was responsible for the quality of potable water, the Ministry of Agriculture and Rural Development had been in charge of water allocation in the farm sector, the Ministry of the Interior had been responsible for water and sewer services in the municipalities, and the Ministry for National Infrastructure had been responsible for developing sewer infrastructure. To this, one has to add the role of various ministers, who together with the Minister of Finance and the Knesset's Finance Committee, had been granted the authority to set tariffs: the minister of the interior fixed those paid by consumers to the municipal authorities, the Minister of National Infrastructure set those paid to Mekorot Corporation (the Israeli water company which is the main producer and supplier of water in Israel) by its customers, and the Minister of Agriculture and Rural Development set rates in the agricultural sector.

The main problem with the setup of multiple regulators was the existence of parallel authorities, sometimes overlapping, where each agency is responsible for a different aspect of the water economy. This generated conflicts between different interests, caused preferences for sectorial over national considerations, and obviated long-run decision-making.

A good example of what was happening concerns water treatment and prevention of contamination. Responsibility for these tasks was given to both the Ministry of Environmental Protection and to the Water Commission. This generated constant friction and turf wars. The ministry was intent on prioritizing the environmental aspect of water contamination, while the commission was interested in contamination as part of its management of the water resources component of the provision of water. An additional, and particularly egregious, example of the clash between different interests concerned the economic aspect of the water system. Since the authority for setting tariffs was held by ministers and the Knesset, the set tariffs did not reflect adequate cost considerations and were set mostly on the basis of political and social considerations. Consequently, the water and sewer system did not constitute a financially self-sustaining economy, requiring support from government budgets. The Water Commission, nominally authorized to plan and execute the development and allocation of water resources, did indeed formulate plans, but did not possess the means to see them through. Consequently, the Water Commission traded its demand for expanding seawater desalination for additional financial assistance from the government budget. Likewise, during the last years preceding the establishment of the AWS, it had been impossible to get the consent of the minister of agriculture and the Knesset's Finance Committee for increases in water tariffs. This led the Finance Ministry to insert circumventing clauses in omnibus bills dealing with Israel's economy.

Given this litany, it became clear that a radical change was called for and see to it that all aspects of the water economy management be concentrated in a single agency.

### ***17.1.1 Agreement with the Farm Organizations***

One big obstacle to the formation of the AWS had been the problem of water tariffs for agriculture. This had been a particularly hard nut to crack, both because the agricultural sector still possessed considerable political clout and because it had been feared that the farm sector would not be able to survive water rates that are based on realistic, marginal costing. It was thus clear that considerations of the quality of the environment and the well-being of inhabitants of peripheral zones, in addition to security and social concerns, would have to be taken into account when formulating the new water regime for agriculture. And this needed doing before the creation of the AWS.

On November 16, 2006, a historic agreement (henceforth Agreement) between the government and the agricultural organizations was concluded. The Agreement postulated that the target price of freshwater for agriculture would be based on the farm sector's share of the average cost of freshwater production and supply, including desalinated water. One of the principles of the Agreement stipulated that

cost calculations will be carried out as far as possible for each of the pumping units of Mekorot and for each of the water types (freshwater, saline water, recycled wastewater), separately.

The Agreement also stipulated that whenever the cost of provision of water for farm uses fell short of the cost of provision of water for urban usage, the farmers will pay the full actual cost of the water provided to them, and whenever the cost of providing water to agriculture exceeds the cost of urban provision, the farmers will pay the overall average cost of water. This implies that whenever the second of these contingencies applies, the urban sector will shoulder part of the cost of providing water for agriculture (known as “inter-sectorial cross-subsidization”). For the purpose of calculating the cost of water provided to farmers and urbanites, a normative model is utilized. It takes into considerations the capital requirements for conveying the water to each type of user; it then assumes that all water users are alike and apportions to each sector the actual capital costs of each sub-plant, based on the relative amounts used by the two sectors.

The Agreement also fixed the tariff for brackish water supplied to farmers, as a derivative of the freshwater tariff (60% before the inclusion of desalination costs, i.e., cross-subsidization between the prices of freshwater and brackish water provided to farming). The Agreement also set the price for recycled effluent from the Dan Region (the plant known as the Shafdan, which recycles the effluent from the Greater Tel-Aviv megalopolis and supplies the recycled effluent to farmers in the Negev) at NIS 1/cm (November 2006 prices).

In order to alleviate the burden on farmers, the process of attaining the target tariff was spread in the Agreement over a period of 7 years. During this process, the farmers were to receive financial support from the government budget, equal to the total increase in tariffs, for the purpose of increasing the efficiency of irrigation systems. The Agreement also provided for special treatment of areas that are not hooked up to the country’s water network (e.g., the Arava – the Jordan Valley south of the Dead Sea).

The Agreement was clearing the way for the creation of the AWS. Concurrent with this, the Agreement was also ratified by the newly established Council and became an obligatory principle for setting tariffs by the Council. We shall return later to the implications of the Agreement for water tariffs in general.

## 17.2 The Water Authority: Structure, Status, and Functions

When the Minister of National Infrastructures, Dr. Uzi Landau, charged by law with the responsibility for the water economy, was asked during his testimony before the Commission of Inquiry on the Water Economy of Israel<sup>5</sup> (The Bein Commission)

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<sup>5</sup>Bein Committee (2010).

what his role and what his authority are vis-a-vis the AWS, he replied that aside from having tea with the AWS's chief executive, he does not have much of an influence. His colorful answer reflects the unique nature of the AWS within the government system. One would be hard-pressed to find another government agency that, at least as far as the law is concerned, resembles the AWS in the scope of its authority and the degree of its independence of ministers and the legislature.

The AWS constitutes an amalgam of three separate agencies: the first is the Water Commission on whose foundation the AWS was created, the second is the unit in the Ministry of National Infrastructure that used to be responsible for developing the sewer system, and the third is the unit in the Interior Ministry that used to oversee the urban water and sewer systems as well as the water corporations that had already existed in some cities. Thus, the AWS has become the chief overseer and regulator of all involved in the water and sewer economy: producers, suppliers, and consumers, in the urban, rural, agricultural, and industrial sectors. As a consequence, the roles played by the various bodies that had previously been involved in the water and sewer economy have shrunk very considerably.

- The Knesset's sole remaining function is to ratify, or reject, the surcharge on water extraction, as the proceeds from this surcharge constitute fiscal revenue (the purpose of these surcharges is to equalize the cost of extraction in private wells with the cost incurred by Mekorot).
- The Ministry of Agriculture, which in the more distant past ran Israel's water economy (the Water Commission has been under its jurisdiction into the 1990s), is left with the sole task of allocating the amount of water allotted to the farm sector by the Council, among the various farms. In order to facilitate a smooth transition on the basis of the Agreement, the minister of agriculture was granted the power to ratify water tariffs for farm usage for a period of 5 years following the creation of the AWS (those 5 years ended at the end of 2011).

The AWS is a professional government agency, subject to governmental rules and procedures. Its employees are government employees. It has allocated its own budget from the government budget. Even though the representative of the Finance Ministry is only one of eight Council members, his clout in the council exceeds that of the other members because of the dependence of the AWS on the government budget. The lack of independent financial resources for the operation of the AWS hurts its ability to function independently and manage the water economy consistently. This is why the executives of the AWS have endeavored, ever since its establishment, to base its operation on a self-sustained financial foundation, by turning the extraction surcharges from a revenue item in the government budget into a source of revenue for the AWS.

At the same time, criticism of the exaggerated independence of the AWS, and the lack of its subjection to governmental and parliamentary oversight mechanisms, has been voiced. The criticism became especially vociferous following the drastic steps that the AWS took to deal with the water crisis and the reforms that it initiated.

The sharp rise of water tariffs begat continuous efforts by members of the Knesset to return the supervision of tariffs to the Knesset, under the pretext that water constituted an essential good that everyone has the right to receive equitably. As a consequence, and based on the recommendations of the Bein Committee, the government instituted some changes in the AWS. These included the addition of a representative of the minister of health to the Council, splitting the positions of the AWS's chief executive and the chair of the Council and turning the former into a regular member of the Council. The chair would be a public representative. The master plans for the water economy, put together by the AWS, were to be henceforth subject to ratification by the water and energy minister and by the government.

### 17.3 The Coping of the AWS with the Water Crisis

As mentioned earlier, in recent years, Israel has experienced the most severe water crisis in its history. This, because of the unlikely event of seven consecutive years of severe droughts (2005–2011), of which 1 year, 2008, saw an extreme drought. For example, the rate of flow in the Dan springs, which constitute the largest single water source in the Middle East, stood at the beginning of January 2009 at the lowest rate since measurements had begun in 1949. Likewise, the total volume of water availability in the Kinneret (Sea of Galilee) stood in January 2009 at 935 million cm (mcm). This was a far cry from the 1.9 bcm that had been expected to be added to the Kinneret during the said period, implying a deficit of about 1 bcm.

The AWS was formed during the height of the crisis and had virtually no time to get organized in order to face the situation. It had been clear that in the absence of a drastic reduction in the demand for, and increased supply of, water, usage would reduce reservoirs to below the “black lines,”<sup>6</sup> having already been reduced to under the “red lines.” As detailed in the sequel, the AWS undertook rigorous steps designed to facilitate continued orderly and steady water provision while attempting to minimize the risk of irreversible damage to water reservoirs. Some of the steps sought to increase water supply, and some to curtail water demand, both in the short and long run. The AWS puts together two emergency programs and asked the government to adopt them. The government did and allocated the funds required for their implementations. The 2009 and 2010 budgets allocated NIS three billion to the water economy.

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<sup>6</sup>Black lines are below the red lines, such that damage sustained by the reservoir may be irreversible.

### 17.3.1 *Supply-Side Management*

The steps taken to increase water supply were as follows:

- Full utilization of the existing potential (and not fully utilized) in the short run, without crossing red or black lines, including:
  - Accelerated drilling in order to maximize extraction from natural sources
  - Reduction of extraction surcharges, so as to render pumping more profitable in areas with the potential to add to water availability
  - Reclamation of water contaminated by salination or by percolation of contaminants into ground water
- For the long run, two significant steps were taken concerning desalination and effluent recycling:
  - *Desalination*: On May 2008, the Council resolved to increase the annual scope of sea water desalination to 750 mcm not later than 2020.<sup>7</sup> The resolution was adopted by the government on the following June. It also concluded to have a desalination capacity of 600 mcm operative by 2013. This massive desalination plan puts an end to past practices and opens a new era of reliable water provision, which is capable of coping with the shock of droughts. It also means less emphasis on conducting water from north to south and more on shipping it from the Mediterranean Sea in the west to the east.
  - *Effluent recycling*: In many countries, effluent is considered a nuisance to be disposed of. In contrast, in Israel, due to the severe scarcity of water, effluent is recycled and reused. The AWS adopted various resolutions designed to further recycling, so that more freshwater formerly allocated to irrigation may be replaced by recycled stuff. Recycling is carried out in special plants, normally adjacent to a city or a cluster of cities, using advanced technologies. The rate of effluent recycling stands at 75%,<sup>8</sup> and most of it is used for irrigation. There are 140 recycling plants, supplying close to 400 mcm annually. This amount constitutes 30% of all the water supplied to agriculture and 20% of the total water supply. Recycled effluent destined for farm irrigation incorporates all the required quality standards. The same goes for the part used for watering gardens and for industrial use. The AWS helps private entrepreneurs to construct recycling plants by granting them significant investment subsidies. It intends to expand the construction of such plants so that by 2020, their capacity will have reached about 600 mcm (comprising 95% of all effluent). The supply of reclaimed water is expected to grow, as the supply of water to the expanding domestic and industrial sectors will grow, while irrigation will use the increasing amounts of recycled effluent.

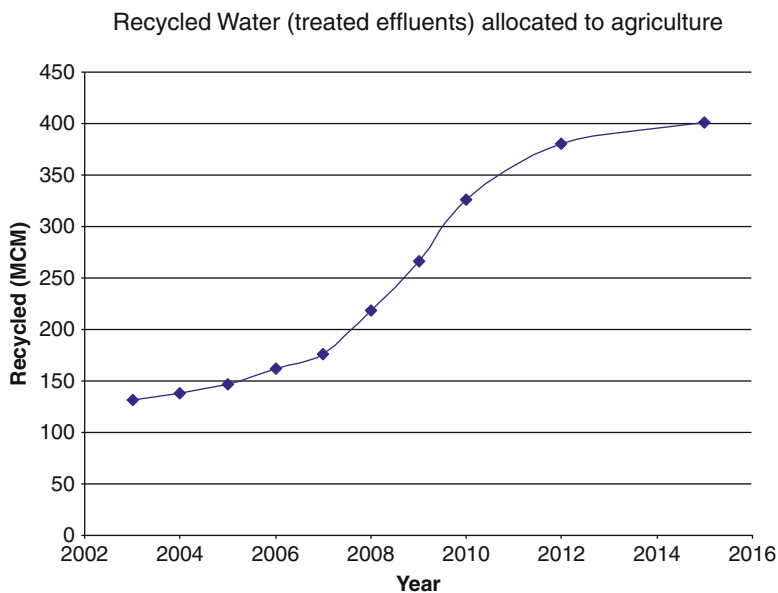
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<sup>7</sup>Up to 2005, only the desalination plant in the city of Eilat supplied consumers regularly. In 2005, the government began constructing new plants, using B.O.T. tenders. As a result, at this point, desalination capacity stands at 330 mcm.

<sup>8</sup>This constitutes the highest rate in the world.



The dramatic historic increase and the planned further increase of recycling can be surmised from the following diagram.



### 17.3.2 Demand-Side Management

Despite all the efforts made to increase water supply, it was still expected that water levels will fall below the “black lines,” so that it became paramount to reduce water usage by all users. Freshwater consumption in 2007, the year the AWS was founded, totaled 1,408 mcm (not counting water supplied to Jordan and to the Palestinian Authority). This consisted of 551 mcm destined for agriculture, 90 mcm allocated to industry, and 767 mcm provided to households.

Following is a description of the main steps taken by the AWS in its effort to reduce water demand:

*A drastic administrative reduction of the water quota allotted to agriculture:* The allocation of freshwater to agriculture has been declining over the years. A decade ago, the farm sector was allocated 920 mcm. From this point on, it had been gradually reduced in accordance with water availability. Reduction had been facilitated both by increased irrigation efficiency and the move to increased use of recycled effluent. The amount of freshwater allotted to agriculture in 2008 was 530 mcm. In 2009, the Council resolved that annual water allocation to farming will be reduced by 100 mcm compared to the 2008 allocation. This is the lowest allocation to agriculture ever (it should be noted that because of these reductions, the government resolved on February 2009 to provide farmers with financial support.

Freshwater in agriculture is used nowadays mainly for orchards and greenhouses, and the tightening water supplies in these uses exert a considerable impact on farmers' incomes).

*A reduction of (administrative) water allocation to industry:* Water consumption by the industrial sector constitutes about 6% of total water consumption. Freshwater consumption by industry stood in 2008 at 88 mcm. The reduction is implemented at the industrial plant's level. The plant does not get the quota it asks for: prior to the allotment of water to the plant, a detailed inspection of its production processes takes place, from which a water usage model emerges, and the plant is required to adhere to the more efficient water utilization implied by the model. In addition, freshwater use by industry is reduced by using water of inferior quality in power plants and saline water in quarries.

*Reduction of household consumption:* Freshwater consumption by households exceeds that of any other sector. Over the years, per-capita consumption has been growing, reaching a peak of 106 cm per person per year in 2007. Israel's population at that point numbered 7.2 million persons. It should be noted that the term "household consumption" consists of actual household consumption of about 60 cm annually per person and of water loss and public water consumption.

The main AWS decisions that led to a significant decline of per-person consumption were as follows:

- The setting of higher tariffs charged by the municipal water corporations,<sup>9</sup> which meant *a very considerable increase of tariffs for urban water consumers*. The new tariffs were to be implemented gradually: 40% of the increase on January 1, 2010, a further 25% on the following July 1, and the rest in 2011. In addition, a special "social rate" was conceived – a lower rate for the basic water needs of poorer families. The demand for urban water is not totally inelastic (Bar-Shira et al. 2007<sup>10</sup>). Thus, increased tariffs were bound to cause reduced water consumption.
- *The surcharge on excessive water consumption:* In the wake of winter 2008/2009, it seemed that steps taken up to that point would not be adequate and an additional reduction of water consumption, of at least 50 mcm, is called for. The assessment was that such a goal could not be attained without the immediate implementation of serious measures. One alternative considered by the AWS was a total cessation of lawn watering throughout the country. This was criticized by some as too harsh and impossible to enforce (it is worth noting that during a water crisis in Spain and in France, a total ban on irrigating gardens had been imposed,

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<sup>9</sup>These were established on the basis of a law, adopted in 2001, according to which the urban provision of water services was transferred from municipal governments to these corporations, each of which is a viable financial entity, regulated by the AWS.

<sup>10</sup>Bar-Shira et al. (2007).

and in other countries, notably the US and Australia, limitations on garden watering had, as well, been instituted). In view of the criticism, economic rather than administrative measures were considered. Based on an initiative of the AWS, the Knesset adopted a law authorizing a special levy on excessive water consumption, with the objective of curtailing household usage. The levy was set at NIS20/cm for monthly amounts exceeding 4 cm/person. The law came into effect on July 15, 2009. Because of harsh public criticism, and in view of the tariffs' reform (see next paragraph), which was to hike tariffs on January 1, 2010, the surcharge was abolished on December 31, 2009.

- *A media campaign and measures to bring about water conservation*: This included various forms of propaganda using the media, educational means, and the provision of incentives for water conservation.
- *Abolishment of reduced tariffs for gardening*: A significant part of household consumption, estimated at 140–180 mcm annually, is used for gardening. Already at the beginning of the efforts to deal with the water crisis, it was thought that water for gardening constituted the largest potential source for saving water. This is because irrigation for gardening was relatively inefficient and also because use for gardening was less essential than other components of household consumption. In order to reduce the use of gardening water, the AWS abolished the discount that had existed for both private and public gardens. In addition, the AWS instituted, for the first time ever, water quotas for public gardening.

Analysis of water use data for the period under consideration reveals that the steps taken by the AWS, and particularly the aggressive media campaign and the surcharge on excessive use (even though the latter was rescinded after a short while), caused a significant drop in consumption. In fact, the mere introduction of the water problem into the public square caused a decline in usage (in August 2009, water usage already declined by 15% compared to a year earlier). The analysis further indicates a lasting effect of all the measures taken by the AWS on the per-capita consumption of water during 2010. First indications are that this persisted in 2011.

It is very doubtful that the measures used in order to cope with the water crisis could have been implemented under the system governing the water economy prior to the establishment of the AWS. One can therefore conclude that the advent of the AWS was a timely reform that yielded considerable benefits.

It also behooves one to note, in the present context, the long-term master program for the water economy (covering the period to 2050)<sup>11</sup> that the AWS advanced and which deals with objectives, priorities, and budgeting for the amount of billions of shekels.

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<sup>11</sup>The Water Authority (2010).

## 17.4 The Reform of the Water and Sewer Corporations

Water provision and sewer disposal in the urban sector used to be under the auspices of local governments (city councils). Consequently, there had been many actors involved in this area (many of them quite small): there are 263 municipalities in Israel, of which 64 are cities, 146 local councils, and 53 regional councils. Local governments supplied about 70% of the water in the urban sector. Maintenance of the water and sewer piping network and its operation had been concentrated in the water and sewer department of the local government, which also extracted the water in those cases where the locality possessed its own water sources. Other units of the municipality provided billing and management services. Tariffs reflected in no way the costs. Rather, they reflected bureaucratic jumble and conflicting economic and social objectives. In view of this blatant inefficiency, the government resolved to transfer the water and sewer infrastructures to the oversight of professional and regulated bodies. The Law of Water and Sewer Corporations, adopted by the Knesset in July 2001, was designed to achieve this purpose. A central objective of the law was the running of these new bodies along business lines, so as to instill efficiency and proficiency in the management of urban water and sewer systems. Revenues accruing to these bodies were to be earmarked for investment in the infrastructure. They were also empowered to raise funds for investment, so as to render them independent of the national or local governments. The new corporations were to be owned by the respective local governments, but their sole function would be to run the water and sewer system. The law also stipulated that water and sewer tariffs in each locality reflect that locality's costs, so that revenues would cover costs, including a reasonable rate of return on capital.

The reform did not really take off at first. The formation of corporations, which had at first been voluntary, but later made obligatory, faced stiff resistance by most local governments. The objection was driven by the desire to avoid the forfeiting of revenues generated by water and sewer to the corporations and also the fear of losing control over an area that they viewed as part of the services that they were to provide their citizens. The revenues that resulted from the sale of water and from levies on infrastructure development had been used by local governments to finance spending that had nothing to do with the water economy. Moreover, the Authority for Public Services Water and Sewer in the Interior Ministry, which had been charged with setting cost-based tariffs, and criteria for the proper running of local corporations, had been politically hamstrung.

In view of this state of affairs, when the government decided to establish the AWS in 2007, it also resolved to move the aforementioned unit from the Interior Ministry to the newly created AWS. The Ministry of Finance then stepped in and provided local governments with financial incentives in order to hasten the process of forming corporation. It is estimated that to date, NIS1.7 billion was devoted to that end.

Due to political constraints, it proved impossible to goad local governments into forming associations that would jointly form corporations, which would thus serve

larger constituencies. The rationale for such a move is economic: it would make the provision of water and sewer services more efficient because of economies of scale. It would also economize on the AWS oversight functions. The number of water and sewer corporations formed to date is 52, some of them quite small. Out of these, 24 operate in jurisdictions of more than one municipality, while 28 are single-municipality entities.

It has been more than 10 years since the Water and Sewer Corporations Law passed, and most of the municipal water and sewer economies are indeed operated by such corporations. Out of a total of 184 municipalities that had been obliged to form corporations (excluding rural municipalities, who did not have to form corporations), 136 municipalities, serving 5.6 million inhabitants, formed corporations, and 48 municipalities, serving 908 thousand inhabitants, have not yet done so. The data indicate that the advent of corporations, and their subjection to the AWS's oversight, has led to increased investment in the municipal water systems, enhanced water conservation, and reduced water loss and bill-paying delinquency.

Still, the reform has not been completed. The AWS is striving to bring about the formation of as yet unformed corporations. It is also trying to bring about mergers between existing corporations.

## **17.5 The Reform in Water and Sewage Tariffs**

As already mentioned, the reform that bases water tariffs on costs came into effect on January 1, 2010. At that date, new tariffs were imposed on Mekorot, on the local water and sewage corporations, and partially also on municipalities that had not formed such corporations at that time.

Prior to the reform's implementation, tariffs had not reflected costs. The tariffs in municipalities had a two-tier structure: a one-time charge was levied when a new structure was hooked to the water and sewer system, and there was a current charge for consumption. The latter consisted of two components: one was a charge for water determined by decrees under the Water Law, and one was a charge for sewer based on municipal bylaws. This structure lacked a clear connection to the costs of providing water and sewer services, resulting in an inefficient allocation of funds to the water system. The most obvious symptom of this has been the continuous lack of funds for essential investment.

As has already been pointed out, implementation of the reform required a steep increase of water and sewer tariffs. To the reasons already mentioned, one needs to add the following:

1. The newly coming desalination plants and the expansion of existing plants in Ashkelon and in Palmachim, as well as of investment, required to adapt the water transportation system to the uptake of desalinated water. The production and provision of desalinated water costs considerably more than the cost associated with natural freshwater.

2. The sharp decline in water consumption, brought about by the emergency measures taken by the AWS, itself caused a rise in per-unit tariffs. This is because the supplier's fixed costs are of course unaffected by output, and so when output declines, the fixed costs have to be borne by a smaller amount of water, implying a higher price per unit.

The average cost per cm climbed by about 40%. This translated to an increase of NIS50 per month (excluding VAT) for an average family of four, consuming 4 cm per person. Declined consumption, however, reduced outlays for water, so that the above figure is a gross one. It is worthwhile to note that water cost for the average family constitutes only 1–1.4% of the consumer cost of living.

Prior to describing the details of the water-tariffs reform, we shall illuminate the objective difficulty with which an administrative setting of tariffs has to contend and the tortuous process of AWS resolutions in this context, brought about by political pressure exerted by members of the Finance and Economics Committees of the Knesset and by a hostile press egged on by some members of the Knesset as well as by some mayors.

### *17.5.1 Efficiency Prices and Administrative Prices*

Economists define “efficiency prices” as those prices which will bring about an efficient allocation of the limited water resources among the various users, implying maximization of the water economy's contribution to the national welfare.

- Efficiency prices must reflect water quality, the geographic distribution of water sources as well as water users (plains vs. valleys and mountains), the time of extraction and usage (summer vs. winter), and the availability of water from a specific source. They must also reflect differences between water from sources that are part of the national grid and those that are not connected to this grid and between water whose provision is reliable and water whose provision is not. When water prices are determined administratively rather than by the free market, those who set the prices must be aware of the advantages engendered by efficiency prices (even if it is impossible to figure out what these actually are).
- Administratively set prices have to satisfy certain conditions. They have to balance demand and the supply that can be generated without causing long-run damage. They have to generate enough revenue to cover all costs, fixed, variable, and the shadow price, reflecting scarcity. They have to minimize cross-subsidization among water users. And they have to strive to fulfill the signaling function that free-market prices fulfill. Namely, signal to consumers the marginal cost of a cm supplied and signal to producers how much consumers are willing to pay for the marginal cm extracted.
- Administrative prices also have to take into account fairness in the allocation of burdens among social classes, even if that obviates coming closer to efficiency prices.

*In Israel, the two principles that are applied in practice, and which affect tariff the most, are:*

- (a) *The principle of fairness or uniformity:* As a rule, all users of water in a given sector pay the same price, or the same tiered prices<sup>12</sup> countrywide, regardless of their location of abode.
- (b) *The principle of covering all costs:* The Water and Sewer Corporations Law stipulated that tariffs paid by corporations will be set so as to cover all costs. This is as distinct from the less stringent system set by the Water Law (which applied to Mekorot). The present principle applies to Mekorot as well, based on the cost structure model of this government company.

The Water and Sewer Corporations Law set forth methods for calculating the costs of the services provided by the corporation and instructed that tariffs be set on the basis of costs: “the price of each service will reflect, as far as possible, the cost of that service.” This implies that tariffs need not be uniform. The tariffs for each corporation will fit that corporation’s costs and will be set separately for water and for sewer services. The implication of this system of particular tariffs for each corporation is that every corporation will have to balance its books, so that there will be no cross-subsidization between corporations. But the reality is that water tariffs for households served by the corporations have been set uniformly everywhere. They are staggered, consisting of two tranches: the first is set as an “official basic quantity,” at 2.5 cm per person per month (upgraded on July 1, 2011, to 3.5 cm), and a second tranche, more expensive for any amount used beyond the first tranche. This replaced the uniform price that each local government had paid to Mekorot prior to the reform.

### ***17.5.2 The Decision-Making Process at the AWS***

In the first stage of the deliberations concerning the new tariffs, the AWS assigned too much importance to costs and too little to fairness. *The first proposal* of the AWS, published in October 2008, proposed unequal tariffs for the various water and sewer corporations. These reflected cost differentials, with the higher tariffs applying to the weaker, higher-cost corporations and the lower tariffs to the stronger, more efficient ones. *The proposal invited public hearings* and elicited responses from the media as well as from members of the Knesset’s Finance and Economics Committees. Although the law allowed for differential tariffs, even members of the Council felt that the proposal could not be implemented, as it hurts especially weaker parts of the population, living mainly in the periphery. Therefore, in May 2009, the AWS floated a *second proposal*, according to which

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<sup>12</sup>Tiered prices are structured as follows: one pays a certain price per cm for the first tranche of water used; for the next tranche, a higher price is paid and so on.

rates were to be somewhat lower relative to the first proposal where costs were high and as a counterbalance will be raised a bit where costs are low. However, due to public pressure, this proposal, too, was rejected, and the AWS came up with a *third proposal*, this time setting uniform tariffs throughout. That is, fairness considerations trumped economic ones.

The proposal was adopted by the Council and made official. Although consumers pay a uniform price, the corporations do not. The more efficient ones pay Mekorot a higher price than do the less efficient ones. Consequently, a cross-subsidization among corporations has come into existence. This weakens the incentive to increase efficiency. It has resulted in a somewhat comic situation. An inefficient corporation will receive a letter from the overseer of corporations: in the first paragraph, it will be chided for the inefficiency; the second will award it a prize: a reduction in tariffs paid by the corporation to Mekorot. Since the costs of Mekorot have to be covered, this implies that the more efficient corporations will be charged higher tariffs than they otherwise would have been. Question is can this system be upheld in the long run?

### ***17.5.3 The Calculation of Tariffs***

The purpose of setting tariffs based on costs, including fair return on capital, was to ensure the corporations and Mekorot that their revenues will cover their costs, thus rendering them financially independent of either the state or the municipalities. This approach was also called for in view of the drawn out water crisis, partially caused by the inefficient allocation of water brought about, among other factors, by the artificially low tariffs paid by users. The setting of cost-based tariffs enhances the users' awareness of the real cost of providing water and disposing of sewer. As mentioned, increased water desalination also played an important role in raising tariffs.

The calculations were based on the two enunciated principles, setting a uniform tariff for all urban users, while at the same time covering all costs.

The conceptual framework for the calculations was as follows:

The uniform rate for consumers was calculated based on the average approved costs of the local corporations and Mekorot. That is, costs per cm are calculated as the average cost for providing water. Concerning corporations, for each of them, an approved total cost was set, based on the costs of the various operational inputs, capital, and maintenance. This includes the price paid by the corporation to Mekorot.

To demonstrate, assume two corporations, each providing half of the total services. One is efficient, having an approved cost of NIS4/cm, and the other inefficient, at NIS6/cm. Neither cost includes the payment per cm to Mekorot. Assuming that the average cost of Mekorot is NIS3/cm, it follows that total cost for the efficient corporation is NIS7/cm, while for the inefficient one, it is NIS9/cm. Averaging yields NIS8/cm. Therefore, the efficient corporation will purchase



Mekorot water at NIS4/cm, while the inefficient one will do it for NIS2/cm. That way, both corporations will bear the overall average cost of water. Mekorot, at the same time, receives a total of NIS6 for the two cubic meters, that is, NIS3/cm, corresponding to its average costs. The cross-subsidization consists of transferring NIS1/cm from the efficient to the inefficient corporation.

The reform was implemented in stages, as the following description explains.

1. *A two-rung tariff system for households*: For a basic amount of 2.5 cm per person per month, and not less than 5 cm per household, a lower tariff was set (these amounts were updated in July 2011 to 3.5 cm and 7 cm, respectively). Any consumption above that is charged a higher tariff. This was implemented in two stages: an average increase of 25% on January 1, 2010, and an additional average of 8% 6 months later. On January 1, 2012, the tariffs for water and sewer to households were NIS8.63/cm for the lower rung and NIS13.889 for the higher one.

It behooves one to ask whether the distinction between a basic amount of water and quantities above it is worth the considerable expense involved in implementing such a system. It is reasonable to answer the question in the affirmative. The institution of the lower rung expedited the shepherding of the reform through the political establishment, because it puts a social face on a reform that made water and sewer more expensive.

2. *Industry, agriculture, and hospitals* were also allowed a period of adjustment to the new tariffs. For hospitals, the final new tariff will take effect by the end of 2013 (the tariff on January 1, 2012, was NIS6.993/cm); for industry, it will take until the end of 2014 to face the final tariff (on January 1, 2012, it paid the same as hospitals); agriculture will have until 2016 to adjust, at which time, it will pay the average cost of water (tariffs for freshwater for farming are set along a 3-rung system: on January 1, 2012, they were NIS2.079, 2.375, and 2.972/cm).

Even before the reform came into effect, it had faced heavy public criticism. The thrust of the criticism were the high tariffs and the cross-subsidization embedded in them, particularly the subsidization of the industrial and agricultural sectors. The cross-subsidization generated by the uniformity of tariffs for households also came under fire. Local governments, water corporations, and consumers submitted petitions to the High Court of Justice against the reform. Recently, the Court handed down a decision affirming the legality and reasonableness of the norms and the tariffs based on them. The Court has still to decide whether or not cross-subsidization constitutes a fiscal act requiring Knesset ratification. The state's position is that even though cross-subsidization does exist, there is no taxation involved, and the government enjoys no revenue. The state also emphasizes that the system is based on the principle of costs covering.

A further argument voiced against the reform was that a cost-based system of tariffs ignores the less fortunate, by depriving them of reduced tariffs. This objection originated mainly in the Knesset and served as a pretext for the demand to reinstate the Knesset as the arbiter of water tariffs. The AWS contends that the provision

of a basic amount of 3.5 cm per person per month at a charge considerably below the average cost constitutes a reasonable alleviation of the burden on the weaker consumers. Further reductions of tariffs for poorer households will intensify the distortion of the tariff structure and will impose further burdens on other segments of the population.

It seems that the Finance Ministry and the Knesset have come around to accept this stance, and so recently, the Finance Ministry and the Knesset's Finance Committee have concluded an agreement according to which the ministry will earmark some NIS40 million for subsidizing water for the disabled. The arrangement is going to take effect in the second half of 2012.

## 17.6 Vision, Targets, and Challenges Concerning the Water Economy

The long-run master plan for the water economy, which awaits government approval, facilitates the delineation of long-run targets, but the constantly changing technological, environmental, and geopolitical conditions requires constant reevaluation of these targets. It is to be assumed that the degree of success of the AWS in creating and operating the regulatory mechanisms will affect the future structure and stability of the water economy.

The vision for the water economy has been defined in the master plan thusly: "Water is an existential necessity for humans and for the environment. The water economy constitutes a strategic infrastructure for the State of Israel and an essential factor in its development and realization of its national objectives. The management and sustainable development of the water economy will be carried out professionally, efficiently, fairly and transparently on the basis of modern criteria, so as to maximize the public's welfare and to maintain its health. The natural water sources will be rehabilitated and conserved."

The practical upshot of this vision is the paramount objective of "securing in an efficient manner adequate, high quality and reliable water and sewer services provision to the various consumers, and to treat sewage and use recycled effluent so as to increase the sustainable welfare of all water users."

Following are some of the various challenges facing the water economy:

- *Stabilizing the various water sources*, rehabilitating the natural reservoirs, realizing the planned desalination and brackish and recycled effluent quantities, and guaranteeing reliable provision both on the national and local levels. This, by managing demand and supply, while taking into account stretched out extreme conditions, such as consecutive droughts, spurts of demand and curtailed supply.
- *Improving the regulatory rules* and the economic/administrative mechanisms of their implementation, in a manner that will enhance economic efficiency, fairness, transparency, and supply reliability: Tariff setting, looking after the financial stability of suppliers on the one hand, and monitoring criteria for

acceptable service to customers on the other. The water economy will be run so as to include the bulk of costs in water tariffs, while financing special national projects from the state budget.

- Detailed planning and execution of *development projects* throughout the water system based on the master plan recommendations: The water economy requires vast investment, but this is hampered due to structural, organizational, lack of professional labor, differences of opinion concerning sources of finance (government budget or increased tariffs), etc.
- *Concerning the water and sewage corporations*: It is necessary to render the oversight mechanisms more efficient and improve service to the customers. It is also desirable to strive for the merging of currently separate water and sewer corporations, based on engineering, geographic, economic, and social considerations. In addition, steps should be taken to enhance the creation of water and sewer corporations in rural regions.
- *In agriculture*: The sophistication of the administrative allocation methods should be enhanced so as to render water usage more flexible and to increase supply reliability in the long run. This, by using financial incentives (such as allowing regional trade in water quotas, without forfeiting the right to these quotas) and on the basis of the Agreement. In the future, farming will use mainly marginal water, restricting itself to relatively small amounts of freshwater. The geographic incidence of farming, land conservation, improved soil fertility, flexibility in crop selection, food security, and support for peripheral communities are to be achieved by providing farms with appropriate quantities and quality of water.
- *Effluent recycling*: A concerted endeavor must be made to hook up all the generators of sewer to central systems. Similarly, it is important to strive to increase immediately the quality of recycled effluent to the tertiary level and in the more distant future to higher levels. This will enhance public health and minimize damage to the environment and to natural water sources.
- *Water provision for environmental and landscape purposes*: Nature is an equal-rights consumer of water with all other users. The ecological systems whose viability depends on water will be rehabilitated and conserved. Water allocation to nature will increase mainly by rehabilitating natural water sources.
- *Governance*: it is necessary to organize the bodies that are active in the water economy so as to enable them to work in maximum harmony while shrinking the areas where delineation of domains of authority and responsibility are blurred. The various bodies should be allowed to carry out their responsibilities by providing them with the appropriate financial and organizational means.

In addition to the above (partial) list, it should be borne in mind that the water economy is a central participant in the development of the State of Israel and has to serve as a means to the realization of national targets such as peace agreements with neighboring countries, development of agriculture and the periphery and enhancing the settlement of the country, conservation of the environment and the landscape, enhancing water-related industries in Israel, and helping other countries to develop their own water economies.

## References

- Bar-Shira, Z., Cohen, N., & Kislev, Y. (2007). The demand for water in the municipalities. *Economic Quarterly*, 54, 179–203 (in Hebrew).
- Bein Committee (2010). *Report to the Knesset of the state commission of inquiry on water management in Israel*. Haifa: Bein Committee (in Hebrew).
- Kislev, Y. (2011). *The water economy of Israel*. Jerusalem: The Taub Center.
- Rejwan, A. (2011). *The state of Israel: National water efficiency report* (Working Paper). Tel-Aviv: The Planning Department, Israel Water Authority.
- The Water Authority (2010). *Long-term master plan for the water economy, Draft 2*. Tel Aviv: The Water Authority (in Hebrew).