

# ISRAEL WATER SECTOR



# STATE OF ISRAEL



**MINISTRY OF NATIONAL INFRASTRUCTURE ● THE WATER COMMISSION**

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**REDUCE CONSUMPTION**



# THE WATER SECTOR OF ISRAEL CONFRONTING THE CHALLENGES

## 1. Background

Israel has suffered from a chronic water shortage for years. In recent years however, the situation has developed into a crisis so severe that it is feared that by the next summer it may be difficult to adequately supply municipal and household water requirements. The current cumulative deficit in Israel's renewable water resources amounts to approximately 2 billion cubic meters, an amount equal to the annual consumption of the State. The deficit has also led to the qualitative deterioration of potable aquifer water resources that have, in part, become either of brackish quality or otherwise become polluted.

The causes of the crisis are both natural and man-made. Israel has suffered from four consecutive years of drought. The increase in demand for water for domestic uses, caused by population growth and the rising standard of living, together with the need to supply water pursuant to international undertakings have led to over-utilization of its renewable water sources.

The policy for the water sector, particularly in the past decade, combined with the absence of adequate action facing the impending water shortage situation, has contributed to the severity of the present crisis.

The agricultural sector has suffered most because of the crisis. Due to the shortage, water allocations to the sector had to be reduced drastically causing a reduction in the agricultural productivity.

The current crisis has led to the realization that a master plan for policy, institutional and operational changes is required to stabilize the situation and to improve Israel's water balance with a long-term perspective.

## 2. Actions taken

The Government of Israel has discussed a proposed master plan for the development of the water sector with the aim of solving the water crisis and has resolved to immediately implement a number of components thereof.

At this stage, the following has been authorized:

- i. The construction of desalination plants with an installed annual capacity of 400 MCM for seawater and with an annual 50 MCM capacity for brackish water.
- ii. The rehabilitation of polluted and depleted wells with an annual total yield of up to 50 MCM.
- iii. The importation from Turkey of an annual quantity of 50 MCM fresh water.
- iv. To increase the amounts of treated sewage effluents suitable for irrigation up to 500 MCM.

By the second half of the year 2004 the impact of these projects ought to be felt, and all projects will be gradually completed by the end of the decade.

The amount of additional water produced and imported in accordance with these decisions is needed to close the gap formed in Israel's water balance. The gap, caused by overexploitation and depletion of natural water sources on the one hand and the increased demand on the other.

## 3. The new water sector policy

All activities in the water sector will be based on a new water sector policy that incorporates a development plan and is founded upon three basic components:

- i. Ensuring water supply.
- ii. Social and economic requirements.

**iii. Environmental and ecological needs.**

Water is considered as a national resource of utmost importance. Water is vital to ensure the population's well-being and quality of life and to preserve the rural – agricultural sector.

Consequently it has been determined that

- a.** Water requirements of the domestic, industrial and tourism sectors will be completely filled with the utmost dependability and at the appropriate quality. The supply of water pursuant to international undertakings (Jordan and the Palestinian Authority) will continue as usual and will be taken into account in the water balance of the country.
- b.** Steps will be taken to effect substantial savings in water consumption.
- c.** Irrigated agricultural lands are targeted to remain at 2 million dunum. The agricultural consumption will be adjusted annually to the state of the reservoirs. The agricultural sector will receive an annual allocation of potable water of 530 MCM. The balance of the supply to agriculture will come from brackish, flood and treated wastewaters.
- d.** The environmental requirements will be considered as a consumer like any other water consuming sector. The requirements of this sector will be fulfilled by preserving the range of irrigated land and by an allotment of water necessary for the existence of bodies of waters in green areas and in rivers.
- e.** The natural water resources, surface and subsurface, will serve as the source for and as the main regulatory reservoir of the water sector. To achieve the above, the water sources will initially be rehabilitated and thereafter their quality will be preserved

as much as possible. The operational policy for the natural water resources will be based upon the multi-annual regulatory requirements on the one hand and the reservoirs limitations restrictions on the other.

- f.** The planning policy will strive to ensure to meet all water requirements even under extreme weather conditions.
- g.** The development plan will include the development of water supply to the peripheral areas of the State.
- h.** The development plan will serve as a realistic base for the development of water resources and the ability to supply the various sectors in the short and long term.



# WATER RESOURCES LEGISLATION

## WATER LAW, 5719-1959

Water is a scarce commodity in Israel. The country is situated in an arid zone and the natural resources are insufficient to meet the ever-rising demand. The necessity to use water in a rationing regime has led to the enactment, in the 1950s, of the Water Law. The Water Law did away with private ownership of water resources and established an administrative water allocation mechanism that has earned the respect of many nations around the world for Israel's ability to allocate its limited water resources for a long period of time in a manner that is beneficial to resources and users alike.

Israeli water legislation is based upon:

That water resources are the property of the public and that there is no private ownership of water resources;

that every person has the right to a water allocation for recognized purposes;

that the overall quantity of available water is scarce and that a prioritization process has to take place in order to provide sufficient water, in quantity as well as in quality, to all users;

that only a centralized allocation of water resources can ensure an optimal use of the limited water resources;

that the consumers, through their representatives, need to have a major input in the formation of the rules relating to the allocation of water quotas;

that attempts must be made to increase the water quantities available for utilization by the consumers;

that the government has the right to take appropriate action to prevent the pollution of water resources;

The Water Law creates a balance between the

inherent water scarcity and the need to provide water for those needs which are recognized as the most important ones. The Law provides that all water resources belong to the public and are to be allocated for specific and recognized purposes only. National water planning is, consequently, based on maximum water conservation, optimum management of water resources and careful water allocation.

Section 1 of the Water Law lays down the underlying philosophy of Israel's approach to its water resources by providing that:

**"The water resources of the State are public property; they are subject to the control of the State and are destined for the requirements of its inhabitants and for the development of the country."**

There is no private or governmental ownership of water. All water resources (with the exception of sea water) belong to the public and are controlled by the State of Israel as the custodian for its residents. The latter serves as the administrator for all of the country's water resources through the workings of the Water Commissioner and his staff at the Water Commission.

The absence of private ownership of water is further provided for in Section 4 of the Law which states that:

"A person's right in any land does not confer upon him a right in a water resource situated therein or crossing it or abutting thereon;..."

Contrary to legal concepts prevailing in some other jurisdictions, land ownership in Israel does not include the right to the water flowing through the land, beneath it or drawn from wells situated thereon. Water may be drawn from a well situated on a person's property only in accordance with a water production

license, even if the water is intended solely for the landowner's own consumption.

Whilst the Water Law de facto expropriated any private ownership of water and water resources, the right to receive and use water has been recognized in Section 3 of the Law which states that:

"Every person is entitled to receive and use water, subject to the provisions of this Law".

The relationship between the public ownership of the water and the private right of use is thus established. The right to water is not an absolute one but is always for one of the purposes recognized by the Water Law. The purposes recognized by the Water Law for private right of water uses are domestic uses, agriculture, industry, handicraft, commerce, services and public services (Section 6).

While the water source itself cannot be the subject to private ownership, water production, pumping and supply equipment may, and is in many cases, privately owned. Thus, once water is allocated the water is brought to the end user through the private sector.

Each and every water use requires a license. This includes well drilling, extraction (production), supplying, consumption, subsurface recharging and water treatment. All licenses are annually issued and, at least de jure the license granted for one year does not confer upon the recipient the right for a license in the following year although in fact, absent compelling reasons to the contrary most likely he will receive a license for the next year as well. The license lists conditions that relate to quantities, qualities, procedures and arrangements of production and supply of water, increasing the efficiency of water use, preventing pollution, etc.. The license may be revoked by the Water Commissioner

if the conditions are not fulfilled or if the water use endangers the water source.

The Law does not prescribe priorities in water allocations though such can be found in the Water Regulations (Water use in a Rationing Area), 5736-1976 which prescribe that in Rationing Areas, i.e. geographic area in which the demand exceeds the supply, water allocations will be granted in the following order of priorities:

- (a) Domestic Uses;
- (b) Industrial Uses;
- (c) Agricultural Uses;
- (d) Other Uses.

Since most of the country has been declared as a Rationing Area the above order of priority is in fact the general order of priority for all water allocations in Israel.

The water allocations for each calendar year are fixed by the Water Commissioner for each of the aforementioned categories. The allocations are annually adjusted to reflect the changes in water availability and water needs.

Water allocations to domestic users are channelled to the users via the Municipalities. The Municipality serves a dual function, both as a consumer of water vis-a-vis the bulk producer/supplier and as a water supplier vis-a-vis all of the consumers within the municipal boundaries. Until 1995 also domestic uses were subject to quota allocations. Since that year the quota allocation for domestic water use were abolished and now solely regulated through a strict differential pricing mechanism.

The rules concerning municipal supplies require that each consumer have an individual water meter, and that water is charged separately and not as part of the municipal taxes.

Industrial uses are subject to quotas that are based on water use tables for the various industrial uses and annexed to the Regulations. There are specific provisions relating to small consumers (i.e. up to 5000-10000 CM per annum). The water is supplied through the municipalities.

The water allocations system distinguishes between water allocations for planned communities (A planned community is normally a cooperative community for which an annual, combined water allocation is being made based on the community's needs), and for non-planned communities. Water allocations for planned communities are based on the water needs as defined in the agricultural plan for the community. Water allocations to non-planned communities are based on the type of agricultural growth, the growth stage of the tree and the geographical location of the plants/trees. The allocations are based on the water needs in the various regions of the country and normally water will not be allotted to regions where a particular growth is not considered economical.

Water resources management is entrusted to the Water Commissioner appointed by the Government. Ministerial responsibility rests with the Minister of National Infrastructure in most matters with responsibilities vested in the Ministers of Agriculture, Health, Finance, Environment and the Interior for certain matters.

In order to give effect to the custodial function of the Government a number of advisory bodies were established, the most prominent amongst which is the Water Council. The Water Council is headed by the Minister of National Infrastructure and includes representatives of all interested parties in the

water sector, government, consumers, suppliers and producers. The Water Council convenes on a regular basis and the Water Law prescribes a lengthy list of matters that require prior consultation with the Water Council, mainly in matters of tariffs and legislation.

Disputes between the Government and individuals pertaining to the Water Law are adjudicated before a special judicial forum, the Water Tribunal. The Tribunal is composed of one professional judge and two public representatives, chosen from time to time from a list compiled by the Minister of National Infrastructure, following consultation with the Water Board. The professional judge serves as president of the court.

In 1991 the Water Law was amended to supplement it with a chapter on the environmental protection of the water resources. The new rules reflect the growing importance that the environmental protection takes in the use of water resources.

#### **WATER MEASUREMENT LAW, 1955**

A fundamental provision in the law is the obligation to provide water solely by measurement, and to each consumer separately. Payment in respect of the water is based on reading the water meters.

The law grants the Water Commissioner the authority to prohibit the supply and consumption of water so long as a water meter is not installed, and also the authority to install a water meter on the account of whosoever was obliged to install one.

#### **WATER DRILLING (CONTROL) LAW, 1955**

The law is intended to protect the subsurface water sources and to prevent their pollution,

depletion or salination due to irresponsible utilization. The essence of the law is the obligation to obtain a license from the Water Commissioner for every drilling of a well or every change within a well, designed to increase its water yield. In every case of well-drilling or a change within a well without a license, or not in conformity to its conditions, the Water Commissioner may order cessation of the installation and restoration of the situation to its previous state.

A drilling license is required even if the well is designed to supply the personal consumption needs of the well owner only.

#### **A Look Towards the Future**

The Water Law, enacted in the 1950s was based on the administrative control of water allocation. It allowed the country to direct economic development of the agricultural sector by allocating, subsidized, water quotas to the sector. The notion was correct for the time and was an integral part of an administratively controlled economy. The Israeli economy has since been privatized to a significant extent and water allocations should not remain administratively controlled.

Furthermore, a gradual abolition of subsidies for water prices to the agricultural sector on the one hand and the development of large-scale, affordable, desalination plants will ensure that within a few years there will be no shortage of water at their marginal cost. Under the guidance of the Minister of National Infrastructure, the Water Commission is developing a proposal whereby the administrative control over water allocations will be substituted by a market-oriented approach.

# WATER COMMISSION - STRUCTURE AND FUNCTIONS

The Water Commissioner is responsible for the overall management of the nation's water resources with the aim of ensuring a steady water supply to all Israel's residents over time for diverse consumption uses – domestic, industrial and agricultural. The Water Commissioner is responsible for formulating the water policy, the planning and development of the water economy, preventing the pollution of water sources, the regulation of streams and flood prevention, utilization of overflow water, development of new water sources, utilization of waste water, development and promotion of efficient water use.

The Water Law is the basis defines and dictates to the Minister of National Infrastructures and the Water Commissioner the basis for their actions with regard to the nation's water sources. The water, as public property, is subject to the control of the State and is designated for the needs of its residents and the development of the country. According to the law's definition, "water sources" denotes springs, rivers, lakes and other flows and collections of water, whether surface or subsurface, whether natural, regulated or installed, whether the water wells up, flows or stagnates at all times or occasionally, including drainage water or sewage effluents. The Water Commissioner, who is a cabinet appointed civil servant, implements the policy of the Minister of National Infrastructure, is responsible in effect and by law for all that occurs and is being conducted in the water economy, and represents the supreme government statutory authority, which is vested with the responsibility and powers of decision concerning the nation's water economy policy.

## **THE HYDROLOGICAL SERVICE**

The Hydrological Service is a department of

the Water Commission that deals with establishing hydrological background data for the operation of water sources and planning. The data serve as a basis for production, licensing, including the water quality, supervision of operations required for maintaining the quality and quantity of water, and the preparation of water recharging and pumping operations. The service deals, among other things, with the initiation of hydrological research works, regular measurements of the water table, the level of the Kinneret and surface water bodies, in order to determine the water potential. The service reports to the Water Commissioner.

## **DEMAND MANAGEMENT DIVISION**

The Demand Management Division is charged with the implementation of the Water Law with respect to water production, supply and recharging rights. The division exercises the Water Commission's powers as regards licensing, drilling and production of water, registration of water rights, allocation of water, and reporting of production, supply and consumption. The division works together with the Planning Authority of the Agriculture Ministry and the districts concerning the verification of demands. The Division focuses on demand management. This means that the supply-oriented policy, devoid of any involvement in the manner of usage in terms of quantity and quality, is replaced by a demand- and consumption-oriented policy – i.e. water resources management, based on handling of consumption and involvement in the aspect of demands, uses and the various qualities.

## **THE DEVELOPMENT DIVISION**

The Development Division is a new division in the Water Commission that is currently being set up. The Development Division will

manage all the staff work related to the implementation of the water economy development programs according to the water works development programs, as derived from the nation's water needs. The division will coordinate the development program with the various government offices: the Defense Ministry, the Housing Ministry, municipalities, settlements and the Jewish Agency. The division will operate an engineering and economic control mechanism as well as supervision of water works execution by Mekorot, in the framework of the cost arrangement, and by other water suppliers.

#### **THE PLANNING DIVISION**

The Planning Division is in charge of the long term strategic planning of the water economy on all its levels: a national and regional master plan, planning principal subjects, regional and local (restoring receptors, desalination, utilization and development of water sources), is in charge of the general plan of the water plants and streams. The division is responsible for the consolidation of the water economy's long-term development plans, and drawing up five-year plans in accordance with the Water Commissioner's order of preferences and policy. In addition, the division concentrates the handling of the water economy's special programs in cooperation with other bodies, such as the National Contour Plan for Water, plans for the rehabilitation of rivers, and others.

#### **DRAINAGE DIVISION**

The drainage and protection against floods division concentrates the work of the headquarters in all things connected to the execution of drainage operations in regional and national rivers and the development of the country's national drainage infrastructure plan. The department, which acts through

regional authorities, is responsible for planning drainage projects, ordering the execution of a master plan for drainage, supervising and controlling the implementation of projects and authorization of annual work programs of the drainage authorities.

#### **THE DIVISION FOR THE PROMOTION OF WATER SAVING**

The division's main tasks are in the policy field concerning water saving in the private and public sectors, initiating and promoting activities in the sphere of standardization and enforcement, promotion of local and national projects on the subject of efficient water usage, water shortage and expanding the up-to-date technological solutions in the aforementioned sphere.

Likewise, the division deals in the concentration and distribution of up-to-date information in the sphere of water saving for the relevant public, both in the municipal sphere (including private and public gardening) and in the agricultural and industrial sphere.

In addition, the division deals with the initiation of surveys and researches in the spheres within its professional responsibility.

The ongoing activities of the division's staff also include advice to planners, engineers and manufacturers on all the division's spheres of activity and professional training (courses, workshops and seminars, etc.).

#### **THE DIVISION FOR SUPPORT AND LEVY COLLECTION**

Within the framework of the Regulations Law 1999 a decision was made to encourage projects for the restoration of streams and improvement of wells, canceling the balance fund for water fees, transferring the money

that accumulated in the fund to the country's revenue and imposing an extraction levy. In addition, the apparatus was fixed for continuing support for private water extractors and transition provisions concerning the period up until the full regularization of the rights and obligations of the fund.

The unit deals with the fund's obligations and rights, the height of the extraction levies, accompanies the continuing support for private water extractors, accompanies and follows up on the granting of allowances for the encouragement of projects for the restoration of streams and the improvement of wells.

#### **THE WATER QUALITY DIVISION**

This division deals with safeguarding the water sources' quality and operating a monitoring and data collection system for the promotion of programs for the treatment and reuse of waste water through the coordination of disposal methods and preservation of the environment. The monitoring system is coordinated with the Environment Ministry and Health Ministry. Additionally, it is the responsibility of the section to initiate programs for the restoration and utilization of waste water in agriculture.

#### **THE SCIENTIFIC DIVISION**

The Scientific Division adjacent to the water commission serves as a forum for professional deliberations by all branches of research of the academic and research institutes in the country. Those convene from time to time for discussions, where an opportunity is afforded scientists to participate and express their views on the activities and policy of the water economy on the national level (such as: sewage policy, desalination policy, filtering policy, etc.)

#### **THE ECONOMIC DEPARTMENT**

This department is responsible for the preparation of proposals for changes in the water prices through levies, grants and duties, control of Mekorot's water supply accounts, and an economic examination of the water economy development programs.

#### **THE LEGAL BUREAU**

The bureau is in charge of initiating and handling primary and subsidiary legislation, counseling with regard to the implementation of the water laws, drawing up of contracts and agreements, coordinating the activities of the Water Council and the Objections Committee and representing the Water Commission before the various Knesset committees.

#### **ADMINISTRATION AND ORGANIZATION**

This unit is in charge of operating the Water Commission in the domain of administration and organization, within the framework of the existing policy and directives.

#### **THE KINNERET ADMINISTRATION**

The Kinneret Administration operates in the framework of the Kinneret Drainage Authority. The administration is in charge of operations in the Kinneret drainage basin in the spheres of pollution prevention, caring for the shores of the Kinneret, and supervision, control and monitoring within the basin's area. In addition, the administration provides regional service in the disposal of sewage and garbage, which is run as a "closed economy."



# WATER ALLOCATIONS

Water, as a resource in short supply, necessitated a legal framework and the prescribing of engineering, economic and administrative actions in order to attain its efficient utilization, in accordance with the goals set by the State.

The method of water allocations commenced, in effect, with the enactment of the Water Law in 1959 and the rationing regulations instituted according thereto. Most regions in the country were declared “rationing regions”, meaning regions where water consumption was to be limited to fixed rations. Therefore, norms were established for agricultural consumption and crops for per capita domestic consumption and for industrial consumption.

Since the promulgation of the Water Law, an annual water production and supply license is issued to each and every producer and supplier. The production license is a fundamental document reflecting the Water Commissioner’s provisions regarding the amounts of water allowed for production, supply or consumption, conditions of production, and the restrictions to which it is subject. The first priority is given however to municipal and domestic supply.

The development of the economy as well as the drought years besetting the country have dictated changes and updates in the allocations for all the sectors.

## **AGRICULTURE**

The water allocation for agriculture makes a distinction between private agriculture and planned agriculture (kibbutzim and moshavim).

Water allocation for private agriculture began with the enactment of the Water Law. The initial stage was the recognition of water

usage rights (not water rights) already existing at the time of the law’s promulgation, which was done by photographing the farmers’ areas, their designation and the quantity of water consumed in those days. Subsequently, usage norms were established for the different crops, and the multiplication of the norms by the scale of crop cultivation determined the water quota for the farmer.

Water allocation for planned settlements was determined according to the types of soil and water production means as well as the number of units establishing the maximum size of the settlement. The maximum water allocation for the settlement was obtained by multiplying the number of planned farm units by the water quota per unit.

Since 1986 the Water Commission has been following a policy of water quota cutbacks. A cutback was made in most parts of the country, stressing the reduction in pumping from the coastal aquifer (Pleistocene aquifer), which is undergoing a rehabilitation process.

The prominent change initiated in 1993 is the flexibility in the annual allocation date. In January, 70% of the overall allocation is determined for each agriculture sector consumer, with the remainder of the allocation determined during the winter according to the hydrological situation, but no later than April 1st of the same year

In the year 1999, after the depletion of the State of Israel’s water sources, the Water Commissioner decided on a reduction in the water quotas for agriculture (1998 was set as the basic year for the cut) by a 40% average and in the years 2000 - 2002 an average reduction of 50% was decided on.



## **INDUSTRY**

Establishing quotas for industrial plants whose production processes use more than 5,000 cubic meters of water a year is done based on the quantities (“norms”) of water consumption, according to the type of product and scope of production.

The multiplication of the aforesaid norms by production scope constitutes the basis for water allocations in the plant. A plant whose waste water disposal system does not meet the required criteria, does not receive a water consumption license.

## **DOMESTIC CONSUMPTION**

The amount of water allocated to the local authority for domestic consumption includes the use of water for domestic needs, gardening, auxiliary farms, services and public utilities, trades, commerce, etc. within the domain of the local authority. In other words, the overall shared consumption of the local authority, excluding separate allocations for industrial and agricultural needs within its domain.

The Water Commission will do its utmost to reduce the depreciation rates of the local authorities, whether it is a matter of administrative depreciation or results from leakages in the municipal systems.

In recent years the amount of water allocated to local authorities, for various uses, has not been fixed. Every local authority is entitled to usage as per its requirements for various purposes, subject to the consumption difference between the quantities of water that it sells to consumers within its boundaries was not more than 12%. If the consumption difference is higher, the local authority is given a monetary fine (“special payment”).

## **EXTRACTION LEVIES**

In 1999 all those extracting water from water sources were charged with an extraction levy payment.

The extraction levies reflect the regional and countrywide shortage and are intended to internalize the water shortage considerations.

The rates of the levy are fixed in regulations and updated from time to time, in accordance with the updating apparatus of the water tariffs.

The obligation for payment of the extraction levy falls on the extractor, but he is entitled to collect it from his consumers their share of the extraction levy as well, together with the cost of the water, according to the quantity of water supplied to them.

If the water extractor does not pay the extraction levy, the Water Commissioner has the right to cancel, to suspend or to change the extraction license of that extractor from that water source.

In parallel, in order to advance various goals for the benefit of the water economy, the law sets a framework for granting allowances from the State budget, for the production and development of inferior water sources, which will serve for the conversion of good water, for the support of private water extractors, the cost of whose water extraction is high, in order to permit the continuation of the existence of these private water extractors, who are a positive competitive factor in the water economy, for operations for the betterment and improvement of water, which were disqualified from use as drinking water, with the aim of returning them to use as drinking water.



# WATER PRICES

The water price is the price charged for water consumption as established between the production supplier and the consumer. Where a “water tariff” has been promulgated, the “water tariff” is the water price.

Mekorot supplies two thirds of the water supply. The prices the company is entitled to charge are the rates set by the Ministers of National Infrastructures and Finance, approved by the Knesset’s Finance Committee, and updated from time to time according to the changes in the Consumer Price Index, electricity rates and the average wage index.

The rates are categorized by the different uses: domestic, consumption and services, industry and agriculture, each differing from each other.

## **INDUSTRY AND AGRICULTURE**

The rates for industrial and agriculture uses are lower than those for domestic consumption and services for two major reasons:

- \* Water for agriculture and industry is designated for production.
- \* Water for agriculture is supplied on a less reliable basis and is of poorer quality.

## **THE LOCAL AUTHORITY /MUNICIPALITY**

Rates within the local authority are set by the Ministers of Interior and Finance, based on the rate the local authority pays when buying water from Mekorot.

The rates for agriculture and industrial uses within the local authority are identical, in principle, to Mekorot’s sale price. However, the local authority collects distribution expenses to cover the costs of distributing and supplying this water within the authority’s domain.

## **DOMESTIC CONSUMPTION**

Domestic consumption and service rates are set based on the buying rate paid to Mekorot and the amount needed to cover the expenditures entailed in supplying this water with the required quality and reliability.

Domestic consumption rates are progressive and rise with an increase in the amount of water consumed.

The first price is for the initial 8 cubic meters per month for each housing unit.

The second price is for the next 7 cubic meters. For each additional cubic meter, the price increases gradually.

Large families are accorded water price benefits – each additional family member over 4 persons is entitled to 3 additional cubic meters a month charged according to the first rate.

## **GARDENING AND LANDSCAPING**

For gardening and landscaping a relatively low water rate has been set, identical to the first rate for domestic consumption. But this is only for a limited amount of water – 0.6 cubic meter per sq.m. of garden, and for no more than 300 cubic meters a year per garden, for the period between April-November.

In condominiums, the limitation is up to 500 sq.m. of garden for each house. This is not a question of allocating water, but of providing water for gardening at a relatively low rate, such that the consumer can use a greater amount of water for the garden, but in such case the amount exceeding the 300 cubic meters or 500 cubic meters, as the case may be, is added onto the domestic consumption.

Shared consumption in condominiums is defined as the difference between the amount

of water recorded by the general water meter for the condominium and the amounts of water recorded by the tenants' individual water meters. The shared consumption is divided equally among the housing units.

#### **CONCEALED LEAKAGE**

Concealed leakage – if the shared consumption is higher than usual or has increased suddenly, this is usually a sign of a hidden leak in the property's internal system. In such a case, the local authority obliges the immediate repair of the hidden leakage and payment for the water lost.

If the local authority is convinced that repair of the hidden leakage has been carried out quickly and efficiently, it is entitled to charge for the water lost due to the leak according to the first rate of domestic consumption.

A consumer, who uses a small amount of water, pays only a fixed usage fee, intended to cover the local authority's expenses for reading the meters and dispatching the bill, which must be done even if water consumption is very low.

Payment is based on the reading of water meters. Local authorities are required to supply water only under a measurement framework, using properly functioning water meters, and must notify consumers of a water meter reading at least once every two months, charging them accordingly. The bill sent to the consumer must be based solely on the water meter reading. If there is any change in the water rates during the consumption period covered by the bill, the assumption is that consumption was evenly divided over that same period. Therefore, the consumers will be charged according to the previous rate up to the day of change, and according to the

new rate from that day onward

Where a water meter has not been installed, the charge for domestic consumption is for 15 cubic meters a month, or 8 cubic meters a month for small apartments, where no more than two persons reside, or 5 cubic meters a month if only one person lives in such an apartment.

If found that the water meter has been malfunctioning during a certain period, and it is impossible to determine the water consumption of the consumer, the local authority is entitled to charge the consumer for an amount of water determined according to the average water consumption during the two months preceding the malfunction and the two months following it, or based on the consumption during the corresponding period of the previous year.

# WATER COMMISSION DESALINATION ACTIVITIES

Desalination processes enables producing water of any desired quality from saline and/or contaminated raw water sources.

In the past few years, the Israel Water Commission initiated and supported, on a large scale, three types of desalination projects, to generate new water supply sources and/or to upgrade the quality of existing water sources and supply systems:

## **1. CONTAMINATED WELL WATER DESALINATION**

Urban and industrial activities and decades of fertilization and irrigation of arable land above aquifers have continuously increased the salinity and contamination levels of Israel's main groundwater sources. As a result, levels of health hazardous contaminants (mostly nitrates, but also heavy metals and organics) in an increasing number of wells, mostly in high population density areas, have exceeded Israel Ministry of Health drinking water standard limits. Some of these wells were shut down and others operated only for water supply to non-potable uses, such as irrigation and industrial applications.

To date the Israel Water Commission has supported and supervised the rehabilitation of 3 such wells, producing in total 1.55 MCM per year of potable water, by installation of 2 desalination plants. Another 27 wells have been already approved, for execution within the next 1-2 years, and 19 additional projects are in the process of technical and economic evaluation. All in all the goal is to rehabilitate and reintroduce into the local and national water supply systems, by the year 2010, 50 MCM per year of non-potable water.

The process used most commonly for removal of nitrates is electro-dialysis. To remove other

contaminants, ion-exchangers and activated carbon filters are used.

Most projects are executed through BOOT (Build, Own, Operate and Transfer) agreements between the well owners, water suppliers and private entrepreneurs with the State providing projects that meet threshold preconditions and requirements grants of up to 40% of their normalized investments.

Typical well outputs are in the range of 80 to 200 m<sup>3</sup>/hour, and treated water costs are in the range of 1.2-1.4 IS/ m<sup>3</sup>.

## **2. BRACKISH WATER DESALINATION**

Brackish waters are defined as saline waters with a total dissolved solids (TDS) levels of 1,000 to 10,000 parts per million (ppm).

About 166 MCM per year of brackish water are pumped today from various boreholes throughout the State and used directly as a source of supply. About 35 MCM per year are used by industry (mostly as cooling water) and the rest for agriculture (fish ponds and irrigation). In Eilat and the Arava settlements, another 10 MCM per year of brackish water are desalinated, generating, at an average recovery or conversion ratio (product to feed ratio) of 70%, 7 MCM per year of potable water.

It is the intention of the Water Commission to increase the production of potable water through brackish water desalination: **1)** by replacing the brackish water currently used by industry and agriculture with suitably treated municipal effluents, and using the brackish water made available as raw feed for additional desalination plants, and **2)** by desalinating additional, unutilized brackish water sources. A total potential of about 200 MCM per year has been identified so far (some of this potential must

be verified by further hydrological surveys), and these could be used to generate about 50 MCM per year of potable water.

To improve the quality of the water in the supply system into which the desalinated water will be introduced and blended, the Water Commission will require that the quality of all desalinated brackish water exceed required drinking water standards by a wide margin.

Desalinated brackish water in Israel, at this high quality, using the most economical process, reverse osmosis, will cost between 1.4 and 1.8 IS/m<sup>3</sup>, depending on plant size (and economies of scale) and raw feed water and brine discharge costs.

### **3. SEAWATER DESALINATION**

In early 2002, the Government of Israel approved the installation of seawater desalination plants with a total output of 400 MCM per year of potable water. All projects were to be executed by the private sector, through international tenders.

By mid-2002 four tenders, with a total capacity of 305 MCM per year of potable water, were published. Three tenders, supervised by a committee consisting of representatives of the Ministries of Finance, National Infrastructures and the Environment, were on a BOOT and BOO basis, with minimal water purchase quantities guaranteed by the Government. The fourth tender, managed by the national water utility company, Mekorot, was on a turnkey basis. The Water Commission is represented on all four tender evaluation committees and their professional subcommittees.

The contractor for the first tendered project, a 100 MCM per year plant in Ashkelon, has already been selected and water production is scheduled to commence by the end of 2004.

The contractors for the second tendered project, a 60 (2\*30) MCM per year in two plants, has already been selected. The first one will build in the Pal-machim site and the second plant in the Haifa Bay. The plants are to begin supplying desalinated water in early 2005.

The selection of winning bidder for tender, the 45 MCM per year turnkey project in Ashdod, will be made during the second half of 2002. Water production should commence 2-2.5 years after contract signing.

The fourth tender, for a plant capable of producing at least 100 MCM per year near Caesarea, is at the bidders pre-qualification stage.

The preferred process for all these projects has proven to be seawater reverse osmosis, utilizing self-generated power. When completed, these will be some of the largest SWRO plants in the world.

Here too, as with the BWRO projects, the Water Commission has specified and demanded a product water quality widely exceeding drinking water standards and requirements. This superior quality will result, after the desalinated water has been blended with water from natural sources, to softer municipal water supplies, with low chloride, sodium and boron concentrations. Household and industrial consumers will benefit, as well as farmers, who will receive lower salinity treated municipal effluent, in lieu of potable water, for irrigation.

The cost of desalinated water from the Ashkelon plant will be about 50 US cents/m<sup>3</sup>, lower than from any other seawater desalination plant in the world. Desalinated water costs for the other, smaller projects are expected to be within 50 to 60 US cents/m<sup>3</sup>.

**MINISTRY OF NATIONAL INFRASTRUCTURE ● THE WATER COMMISSION**



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