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Country profile

The total area of Israel is 22 072 sq km, of which 21 643 sq km is land area. About half of the land area in the south and east of the country is desert with less than 200 mm of rain per year (multi-year average). The northern and western parts of the country are characterised by a Mediterranean climate with precipitation ranging between 300 and 900 mm per year (multi-year average). The Sea of Galilee (Lake Kinneret) is the only freshwater lake in Israel. The length of Israel's Mediterranean Sea coast, which constitutes the country's western border, is 194 km. The salt-laden Dead Sea is the lowest point on Earth: 417 m below sea level. Israel is one of the most densely populated countries in the world, with the highest density in the centre of the country. Most of the country's population resides in urban areas, and a significant portion resides along the coastal plain, exerting major pressure on the environment in the coastal area.

Israel has a technologically advanced market economy, including rapidly developing hi-tech, agricultural, financial and service sectors. Israel was characterised by relatively high and stable economic growth in the previous decade and in 2010 joined the OECD (Organisation for Economic Co-operation and Development). Israel is a parliamentary democracy, with legislative, executive and judicial branches. Its major institutions are the presidency, the Knesset (parliament), the government (cabinet), the judiciary and the State Comptroller.

The global economic crisis, coupled with climate change and resource depletion, has influenced people and the environment worldwide, and Israel is no exception. In 2011, Israel's government decided to establish a national plan for green growth, focused on decoupling economic growth from environmental deterioration. This plan is based on the recognition that the environment can serve as an engine for increasing efficiency, resource savings and economic growth, for developing new clean-tech industries, for creating new jobs, for strengthening the social infrastructure and for increasing competitiveness on the global market.

Israel experienced a series of demonstrations in 2011, involving hundreds of thousands of protesters from a variety of socioeconomic backgrounds opposing the continuing rise in the cost of living. These protests have led to the adoption of a series of recommendations which may affect the population's wellbeing and the environment.

Some of the major driving forces of environmental pressures in Israel are the population density and growth rate. Israel has a very high population density, especially along the coast. Israel's population reached approximately 8 million in 2012, with a yearly population growth rate close to 2 %. This driving force poses high pressures on natural resources, such as land, water and energy.

Economic growth is another important driving force, which on the one hand contributes to the population's wellbeing but on the other hand causes an intensive use of natural resources. The Israeli economy exerts resilience and has grown by 20 % over the past ten years. Since the 1990s, the economy has grown by approximately 75 %. Israel relies on both imports and exports, and therefore depends on global markets and resources.

The manufacturing industry is responsible for about 12 % of net domestic product. Over the years, this sector has had a negative impact on air, streams and seawater quality. In recent years, environmental regulation has required the industry to improve its environmental performance and, as a result, reduce emission of pollutants to the environment.

Although the agriculture sector is responsible for less than 2 % of net domestic product, it has a major impact on land and water resources in Israel. Agriculture consumes close to 40 % of the freshwater resources. However, in recent years the use of recycled water in agriculture has increased. The cultivation methods are intensive and therefore involve heavy use of pesticides and fertilisers, which exert pressures on water and land quality.

Population increase and a rise in the standard of living in Israel have been accompanied by a rise in private car ownership and kilometres travelled. Consequently, transport is a main source of air pollution in city centres in Israel.

The population in Israel is expected to reach 11 million by 2030 as a result of natural growth, immigration and a rise in life expectancy. Economic growth, accompanied by a rise in the standard of living, is also foreseen. These trends are expected to accelerate pressures on natural resources, such as land, water and energy.

Assuming that the urbanisation trend continues, especially along the coastal plain, it will be necessary to take steps to protect open spaces and establish ecological corridors between remaining open spaces, such as river strips.

The economy in Israel is expected to keep growing, as is its dependency on global markets and resources. Environmental pressures will mirror economic activity and international connections.

Climate change is expected to exert increasing pressure on the natural and human environment throughout the world, and especially in the Mediterranean, which is defined as a climate change hotspot. Consequently, climate change is expected to have a huge impact on water resources, seawater quality, coastal areas and biodiversity. These changes, in turn, will impact on a variety of economic activities and branches, such as agriculture, infrastructure design and maintenance, health systems and the insurance industry. In addition, climate change will influence geopolitics, as immigration and water conflicts are expected to rise.

Priority thematic areas

Solid waste

Waste management policies must be based on the availability of resources and management of materials, as well as on the principle of turning waste from a nuisance into a resource. Hazards and nuisances that are associated with improper waste treatment include soil and groundwater contamination, air pollution and greenhouse gas emissions, proliferation of pests and spread of disease, safety problems, visual nuisances and odours. In addition, landfill can reduce land values and availability of land.

State and impact

Israel produces approximately 4.8 million tonnes of municipal solid waste each year, a quantity that is growing at an annual rate of 3–5 %. Each resident produces an average of 1.9 kg of waste per day. The major treatment method of solid waste in Israel is landfill, followed by recycling.

The ministry's policies and regulations evolved from the 1980s, when they mainly addressed unregulated waste dumping, to the 1990s, when they were focused on the closure of unregulated dumps and the opening of state-of-the-art landfill sites. Today, ministry policies and regulations are largely focused on integrated waste management. Fourteen controlled landfill sites are currently operational. An integrated waste management policy calls for a reduction of waste generated at source and of the amount buried in landfill, especially by means of recovering, reusing and recycling the waste that is generated. The main objective of this policy is to turn Israel's waste from a nuisance that has an adverse impact on the environment into a resource that can benefit the country and its citizens. In line with this policy, recycling rates for paper, plastic, glass and metals have grown in recent years.

In the past, illegal dumping of waste was responsible for air pollution, odour nuisances, greenhouse gas emissions, soil and groundwater contamination, as well as vast consumption of scarce land resources. In the last two decades, the closure of the country's illegal dumps and their replacement with controlled landfill sites has reduced these environmental ills. Nevertheless, greenhouse gas emissions and land consumption for landfill remain a difficulty and carry significant external costs.

Key drivers and pressures

Increases in population and standard of living are the key drivers in this theme. They are responsible for the generation of growing amounts of waste, which puts pressure on the environment, as described above.

Responses

Israel has gone a long way towards fulfilling its vision of Sustainable Materials Management in accordance with the motto 'From Nuisance to Resource'. The goal is to reduce the quantity of waste generated, in general, and the quantity reaching landfills, in particular, while increasing the percentage of waste that is recovered and recycled.

Accordingly, the current policy tools include promotion of separation of waste at source, increased landfill levies, extended legislation about producer responsibility, mandatory recycling and the establishment or upgrading of recycling and recovery facilities.

The Ministry of Environmental Protection (MoEP) launched a major financial programme to help local authorities establish infrastructure to separate waste at source into at least three streams: clean biodegradable, packaging waste ('recyclables') and all the rest. A prerequisite for the success of this programme is education and information. Therefore, the MoEP offered additional funds to the local authorities that were chosen to pioneer the programme, for educational activities aimed at changing behavioural patterns to encourage

waste reduction, reuse and separation at source for recycling.

So that the programme of separating waste could help Israel along the recycling path, significant funds were allocated to expand the capacity of material recovery facilities and recycling plants. This money was obtained from a landfill levy fund, aimed at reducing the amount of waste buried in landfill.

The extended responsibility of producers for treating dedicated waste streams is an important component of the recycling policy in Israel. Therefore, this principle was incorporated into the following laws: the Deposit on Beverage Containers Law, the Tyre Disposal and Recycling Law and the Packaging Law.

The 2020 outlook and possible impacts on the natural environment and human health

The current decade is expected to herald a major change in consumption and behavioural patterns that will lead to decreased waste generation and increased recovery and recycling. Plans are already ripe for further improvements, such as the addition of tens of thousands of households and dozens of local authorities to the separation at source programme and the launch of a multimillion-shekel programme for comprehensive waste treatment by local authorities of disadvantaged and minority communities, including infrastructure development, training, education and enforcement. The target is to reach at least a 50 % recovery and recycling rate by 2020.

Industrial emissions

Industrial activities are accompanied by the emission of pollutants, causing serious environmental and public health problems. Industrial emissions in Israel are a major source of pollution and are focused on a number of hotspots where major industrial activity is concentrated: Ramat Hovav industrial park in Israel's south, Haifa Bay in the north and the Ashdod industrial zone in the centre of the country. In all these areas, ecosystems and the local population are exposed to an increased environmental and health risk.

State and impact

In the last decade there has been a reduction in some industrial air pollutants, according to data from air monitoring stations, emissions tests in selected facilities and calculations. In particular, there has been a decrease in emissions of major pollutants from fuel combustion, owing to a change in the fuel mix and the introduction of enhanced abatement technologies.

In addition, a dramatic reduction in direct discharges of pollution to the marine environment was registered during this decade. Land-based source pollution has been a prime subject and the results are that there is no more sewage running to the sea. Of all sewage produced, 78 % is being reused in agriculture through the implementation of advanced technologies, whereas the rest undergoes secondary and tertiary treatments before being discharged into the environment. Industrial sources of pollution to the sea have been reduced to the extent that certain contaminant loads, such as heavy metals, organic matter, oils and nutrients, were reduced by 75–95 %, and efforts to reduce this further still go on.

The number-one hotspot, and the only one left in Israel, is the Shafdan sewage plant, sludge from which contributes at least 75 % and up to 98 % of the total load to the Israeli marine environment. It is planned that this source will be terminated by the end of 2015. By the year 2030, all of Israel's water for domestic use will come from desalination. The potential benefits for the region are great. However, it also means that great care should be taken to monitor the impacts of desalination plants, particularly on the marine environment.

Within the framework of environmental legislation, the Ministry of Environmental Protection (MoEP) has formulated a programme for the reduction of industrial pollution which sets specific requirements for large facilities, which are subject to the implementation of best available techniques (BAT) and integrated pollution prevention and control (IPPC) guidelines, and establishes framework conditions for small and medium-sized entities.

In parallel, a set of programmes was formulated for the rehabilitation of heavily polluted streams and soils. One example would be the Kishon River, Israel's second-largest coastal river, in which 10 years ago the pollution load from industrial plants was drastically reduced, by as much as 90 %, with continuing improvements later on. In addition, an action plan for sediment drainage and remediation is in place. This project will enable the rehabilitation of the river and its habitats, restoring its flow, conserving its unique natural assets and allowing it to function as an open area for the benefit of the public.

Key drivers and pressures

Economic growth and the rise in the standard of living in Israel are among the major forces for industrial development in Israel. As a result of these factors, pollution from industrial sources has grown with the increase in industrial production. Environmental awareness, legislation and enforcement measures have led to the recognition that industrial development can be decoupled from environmental damage. In 2011, Israel's government decided to establish a national plan for green growth, focusing on decoupling economic growth from environmental deterioration

Industry, for its part, has recognised that there is no contradiction between industrial development and environmental performance, and it is, therefore, working towards improving its environmental performance through pollution prevention at source, the implementation of advanced environmental technologies and the efficient use of resources.

Other pressures include a scarcity of natural resources, which in turn affects input prices and the competitiveness of the economy. Currently, industry relies heavily on fossil fuels and is susceptible to fluctuations in the fossil fuel markets.

Responses

In recent years, the MoEP has been making steps towards integrated pollution control in the light of the European Commission's Industrial Emissions Directive, which is based on principles such as integrated approach, BAT, flexibility, inspection and public participation. Based on accumulated experience and international developments, an integrated environmental permit law is currently being drafted for large-scale and medium-scale plants and businesses with a significant environmental impact. The law is intended to apply the IPPC approach and to streamline existing permits into one integrated permit, to be obtained through one unified and simplified approval procedure. The integrated permit will replace the current permits which deal separately with different environmental issues. Each plant will receive tailor-made conditions according to its specific characteristics, based on BAT. The licensed facilities will then be required to undertake such measures as pollution prevention, BAT implementation, minimisation and recycling of waste, accident prevention, energy efficiency and prevention of environmental risk throughout their operations. Sectors with similar characteristics whose environmental impact is local in nature will be subject to regulation at the local level via their business licences.

Israeli Pollutant Release and Transfer Register (PRTR) law requires facilities to report on the emission and transfer of 114 pollutants — 89 pollutants which are emitted into the air and 92 pollutants which are released into freshwater, marine water and soil — as well as on waste transfers in accordance with the European Waste Catalogue and Hazardous Waste List. The law defines a list of 74 activities that must be reported to the registry by approximately 500 facilities in Israel, within the framework of several sectors: energy industries; metal industries; mineral industries; chemical industries; waste and wastewater; agriculture, food and beverages; and others.

In the framework of the PRTR law, free access to facilities' reports is available to the public through a website which is searchable using various parameters, including facility, pollutant, location and sector. In addition, a knowledge centre to be jointly set up by government and industry in cooperation with Israel's non-governmental organisations is now at the planning stage. Such a centre would provide a place for the collection and distribution of knowledge about clean technology and green production and for networking among stakeholders.

The 2020 outlook and possible impacts on the natural environment and human health

It is predicted that decoupling between industrial development and environmental deterioration will evolve. In addition, the manufacturing industry is expected to shift to cleaner fuels, such as natural gas, use renewable energy and improve energy efficiency. Today, Nimby (not in my back yard) syndrome is prevalent. The expectation is to see a future in which the public knows that the construction of an industrial facility will not endanger its health.

Key considerations for industry will be the entire life cycle of a product, the optimisation of resources and the minimisation of industrial emissions and waste production. It is expected that there will be a shift from a product-based economy to a services-based economy, changing consumption patterns and turning waste into a resource.

Israel is characterised by technological innovativeness and entrepreneurship and will lead clean-tech pilot projects and technology transfer in local and global markets.

Wastewater and sanitation

Water is an essential resource for both human wellbeing and environmental systems. Israel regards water issues as a high-priority area. It is possible to identify three unique broad considerations that make water a priority subject for Israel: its high dependency on water treatment technologies for drinking water and irrigation, its relatively high number of pressure sources per area and its geographical and climatic character.

The country's economy, livelihood and even basic existence rely heavily on using technology for water provision for human consumption and for irrigation. Specifically, Israel supplies a vast quantity of the drinking water it consumes using desalinated seawater produced by reverse osmosis technology. It is estimated that desalinated water provides as much as 80 % of the country's drinking water. Furthermore, for the past decade the agricultural sector has been using treated waste water instead of fresh water for irrigation. This now accounts for 60 % of all water used for irrigation.

This policy has enabled Israel to continue farming, with all its attached direct and indirect benefits. However, relying on technology creates a national responsibility to monitor the health and environmental impacts of the various technologies in use.

With regard to the country's relatively high number of pressure sources per area, it is important to indicate the rapid population growth since the country's establishment, a high population density along the coastline and multiple pollution sources relating to transport, industry, farming, wastewater and other anthropogenic sources. These all create significant pressure on aquifers, streams, lakes and other water bodies.

Finally, the geographical and climatic character of Israel is a major challenge that makes water an important priority issue. Israel is a semi-arid to arid country with an uneven distribution of water sources (natural and artificial) and fluctuating availability of natural water resources. In addition, the effects of climate change are expected to further contribute to the country's water issues.

State and impacts

Water scarcity has always been a major concern in Israel, which is characterised by limited precipitation on the one hand and high rates of population and economic growth on the other.

Israel's main freshwater sources include the Sea of Galilee and two major aquifers, which in recent years have suffered some depletion and deterioration due to low precipitation and overuse.

In the past, coastal rivers and marine waters suffered greatly from pollution originating from domestic and industrial sources. Over the last two decades, the number of permanent sources of pollution to rivers has decreased from 250 to fewer than 100. As a result, pollution loads to the rivers and into the Mediterranean Sea have significantly decreased.

With regard to domestic wastewater, in spite of high population growth, almost all the population of Israel (more than 98 %) is connected to the sewage network and treatment systems (including wastewater treatment plants, septic tanks, pour-flush latrines and simple pit or ventilated improved pit latrines).

The levels of nutrients in Israel's Mediterranean coastal waters are relatively low in relation to international environmental quality guidelines and criteria, except at a few specific sites, coastal rivers and marine outfalls, which show nutrient enrichment.

Key drivers and pressures

Population growth and density and polluting sources relating to industrial, agricultural and urban activities exert pressure on water sources. Israel is one of the most densely populated countries in the world. Most of its population resides in urban areas and a significant portion resides on the coastal plain, placing major pressure on the environment in the coastal area.

Responses

Israel copes with the abovementioned pressures on water resources through three main measures:

- establishment of large facilities for water desalination;
- encouraging people to save water;
- investment in connecting the population to wastewater treatment plants and improving the level of treatment of wastewater.

With regard to desalination, 300 million cubic metres (mcm) of desalinated water is currently produced from seawater at three different facilities and other desalination facilities.

In addition to the increase in water supply, the Israeli Water Authority is acting to increase the efficiency of water use and to reduce demand for water. In 2012, a national campaign for water savings was launched with great success.

As for wastewater treatment, Israel has emerged as a world leader in wastewater recycling, reclaiming some 80 % of its wastewater for agricultural irrigation. More than 87 % of wastewater undergoes secondary or tertiary treatment.

More stringent effluent quality standards came into effect in 2010. These were designed to minimise damage to water sources, the natural environment and soil. The regulations set maximum levels for dissolved and suspended elements and compounds and for 36 other parameters regarding effluents. They call for much higher treatment levels in existing and future wastewater treatment plants.

In Israel, the use and disposal of treated sewage sludge (biosolids) are regulated under the Sludge Land Application Regulations (March 2004). These regulations require that sewage sludge undergo stabilisation and pathogen treatment to 'class A' standard before it is spread on the land.

Israeli sludge management policy enables the agricultural application of biosolids. In 2012, the quantity of sludge produced from wastewater treatment plants was 118 350 tons DM (dry matter), of which 38 % was discharged into the sea, 3 % went to landfill and 59 % was spread on the land.

Over the past two decades, river rehabilitation and recovery of the environmental and social functions of rivers have taken an increasingly important place on the public agenda.

The 2020 outlook and possible impacts on the natural environment and human health

As the driving forces behind water demand and pressures on water sources in Israel are expected to continue, Israel is planning to increase its water supply by expanding its desalination capacity and improving the level of treatment of wastewater in order to make much greater use of reclaimed water.

By 2020, the desalination capacity is expected to have grown from 300 to 750 mcm. This increase will reduce the pressures on natural water sources, but, since it will require additional dependency on energy sources, it may also result in an increase in air pollution and greenhouse gas emissions.

The targets and objectives for wastewater management are:

- to upgrade all large wastewater treatment plants to tertiary-level facilities, and to treat most of the country's wastewater to a level enabling unrestricted irrigation, in accordance with soil sensitivity and without risk to soil and water;

- to treat all sludge to 'class A' standard and use it for land application.

Major efforts have been and are being invested in removing pollutants from rivers and transforming rivers from the neglected backyards of municipalities to the front yards. The idea is to return the public to the rivers and the rivers to the public, and to rehabilitate the aquatic ecosystems of Israeli rivers.

The plans for desalination and improvement of water treatment are dependent on great investment, which are subject to economic conditions and geopolitical circumstances.

Specific thematic area

Integrated water management

An integrated water resource management approach is needed to close the gap between water supply and demand, and to allow for a reliable and safe water supply at an affordable price. In Israel, where water is scarce, a significant effort is made to ensure that this limited resource meets present and future needs.

An increase in demand for water and periods of inefficient water management throughout the nation's history have depleted and worsened Israel's water resources. Fluctuating water precipitation and forecast changes in climate have had a further negative impact on the availability of natural water. Israel has heavily invested in, and relied on, innovative water treatment technologies for drinking water and for treated municipal waste water for irrigation. Efficient water practices have achieved 95 % water efficiency in agriculture, which is the highest ratio in the world of crop yield per water unit.

State and impact

The integration of demand management with supply management lies at the heart of Israel's water policy. Faced with a forecast of continuing declines in freshwater availability, Israel will need to further decrease water losses and leaks in its municipal water and wastewater systems, reduce freshwater consumption in all sectors, increase its use of unconventional water sources and, at the same time, increase its environmental water allocations so as to conserve biodiversity and support vital ecosystem services. Israel recognises that unconventional water sources, such as desalinated water, have their own implicit costs, whether in terms of the impact of seawater intake and brine discharge from desalination plants on the marine environment, increased air pollution and greenhouse gas emissions because of increased electricity consumption and exploitation of Israel's densely populated coastal strip, or the effect of limited amounts of minerals such as magnesium on human health. Israel is aware of both the challenges and the opportunities that lie ahead, but is determined to use its most valuable assets, i.e. research, technology and a creative and entrepreneurial spirit, to find ways to overcome the challenges and seize opportunities.

The Israeli government has launched a pioneering national programme, entitled 'NewTech', aimed at promoting Israel's water and sewage technologies. The programme is spearheaded by the Ministry of the Economy, together with other ministries and government agencies. Israel's water expertise extends from efficient water management to wastewater treatment and reclamation, from desalination to water security and risk management. One of the most rapidly advancing fields is the creative use of advanced information technology (IT) in water systems to better monitor and control water resources. NewTech is designed to bring together water technology and hi-tech communications to ensure water savings on a large scale and to improve water efficiency across a number of industries. In parallel with its efforts to promote research and development and to further the export of cuttingedge water technologies, Israel has spared no effort in sharing its unique experience in overcoming obstacles with developing countries worldwide. MASHAV, Israel's Agency for International Development Cooperation, has been carrying out training and capacity building programmes in Israel and abroad since 1958. MASHAV's approach combines the transfer of technology, research and development and hands-on experience with hi-tech technologies originating from leading Israeli experts and institutions.

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