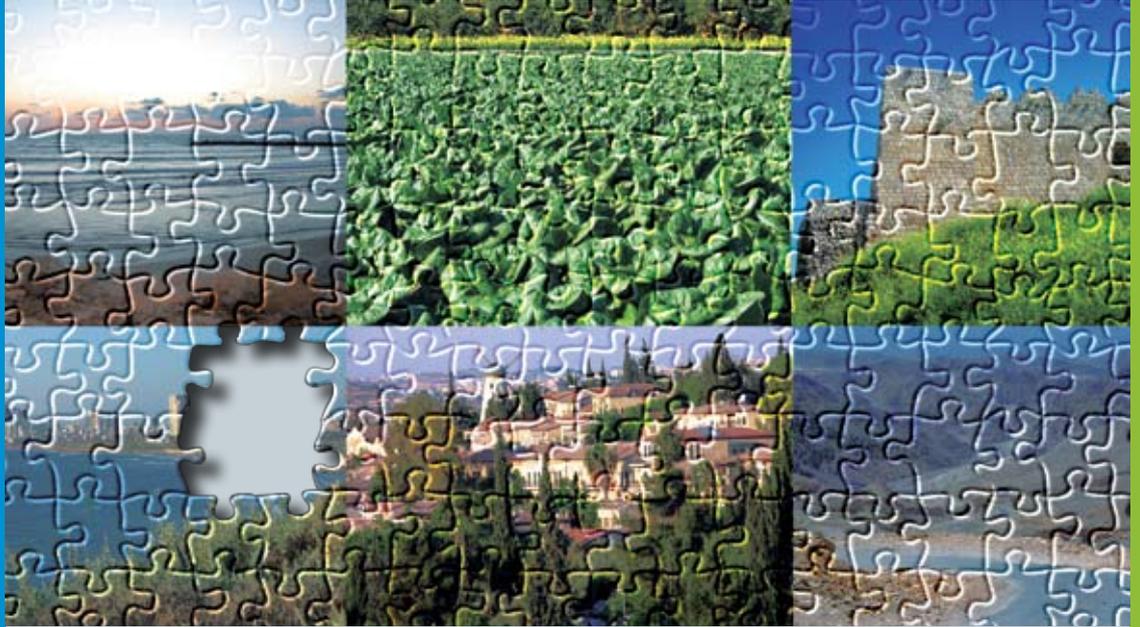




State of Israel
Ministry of Environmental Protection



THE PATH TOWARD SUSTAINABLE DEVELOPMENT IN ISRAEL

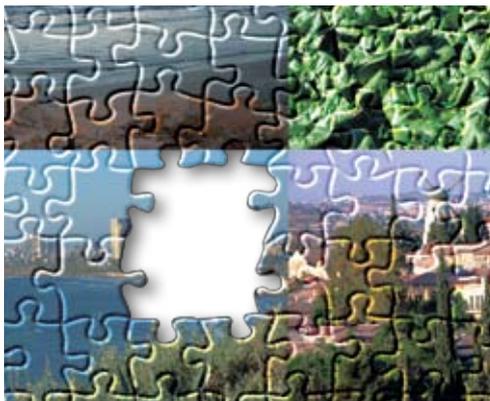
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המשרד להגנת הסביבה
وزارة حماية البيئة
Ministry of Environmental Protection



שלום עם הסביבה



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Overview – the Last 60 Years

From its inception some 60 years ago, the State of Israel has faced major environmental and developmental challenges in the fields of agriculture, rural development, desertification and water management. The success of the young, developing country in meeting these challenges was due to a mix of innovation, technology and national commitment.

Israeli agriculture, for example, invented and made popular drip irrigation technologies that resulted in prosperous local agricultural economies; its agricultural products are exported worldwide with a reputation for uniqueness and quality. Israel's ability to make agriculture in the desert bloom is largely the result of research and investment in salt and drought-resistant plant species, animal husbandry for extreme climates, as well as green/hot house technologies and aquaculture.

The country's long experience in managing limited water resources along with the development of novel water technologies have made Israel a leader in all aspects of the water sector. This expertise and these diverse solutions are now being exported to countries worldwide for the benefit of growing populations with scarce water and food resources. Israel's afforestation and land reclamation efforts in degraded drylands provide examples for countries with arid lands of how to recreate forests and parks that provide multiple environmental benefits, combat desertification and preserve open space.

Making Development More Sustainable

Despite outstanding successes in the fields of water management, agriculture and land reclamation, not all development in the previous century was based on sustainability principles, and some environmental and resource degradation did occur. Israel's challenge in the 21st century is to integrate the sustainability paradigm into all levels of the country's planning, policies and development to achieve a better of balance between environmental, social and economic development needs.

Furthermore, Israel's significant manpower, scientific institutions, and private enterprise can be applied to problems that affect countries around the world, such as climate change, feeding growing populations and the maximization of limited resources. For example, Israel offers sophisticated wastewater treatments that reduce the stress on scarce water resources and recycle the treated wastewater for reuse in agriculture. These include innovative tertiary and even quaternary Soil Aquifer Treatment methods, as well as new generation subsurface drip irrigation systems that are more suitable for treated wastewater, with more efficient water use and plant growth.

Rural Development

The challenge of rural development is due to its multiple overlapping environmental and human layers of agriculture, water management, soil preservation, land use, rural economics, etc. Nature protection, for example, was valued during Israel's early years, but it was a one dimensional view that focused on specific localized nature reserves and the protection of individual rare species. Today it is increasingly recognized that rural agricultural areas play a key role in maintaining healthy ecosystems, as well as attractive open landscapes, particularly for Israel's highly urbanized population. The Ministry of Agriculture and Rural Development and the Ministry of Environmental Protection are currently planning and implementing programs to minimize pollution and environmental damage from agricultural activities on the one hand and to increase the role of rural communities in protecting biological diversity and ecological corridors on the other.

Ecotourism can play an important role in encouraging this transformation by recognizing the value of the rural landscape and rural communities for sustainable tourism that promotes both the environmental and socio-economic vitality of rural areas. Rural local authorities are reorienting their strategic development plans to recognize the changing role of open space management and are becoming the leaders of sustainable initiatives, such as biosphere reserves.

Sustainable Policy

As sustainability becomes a well accepted goal on the international agenda and is increasingly integrated in the strategic aims of the business sector, the public sector is seeking economic instruments for effective and efficient implementation of environmental and social goals. The current process of Israel's accession to the OECD will no doubt add extra weight to moves towards environmental and social responsibility whilst enabling fair competition in a global market.

Valerie Brachya

Deputy Director General for Policy and Planning
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Sustainable Agriculture

Agriculture has played a key role in the development of Israel, and as Israel enters its 60th year, agriculture will continue to be a key player in the drive toward sustainable development. At the local level of sustainability, continuous efforts are being made to make agriculture even more efficient and productive, while simultaneously reducing waste and pollution. Agriculture also intersects with a wider range of sustainable issues at the regional and national scale, for example providing an environmentally sound solution for the recycling of treated wastewater and sludge. In addition, vibrant agricultural communities are important socio-economic goals that help to maintain landscape values buffer zones between urban areas and sustain open space in the periphery.

Increased Productivity with Less Water

Israeli agriculture has maintained its productivity while dealing with limited water resources. During Israel's first 60 years, while agricultural production expanded sixteen-fold, water usage did not increase. Agriculture historically utilized around 70% of the water supply but that percentage has been decreasing since the mid-1980's and has dropped to 58% today (1,129 million cubic meters). At the same time the overall value of agricultural output has continued to increase.

Israel's agriculture is characterized by high level of technology, pressure irrigation systems, automation and mechanization and high quality seeds and plants. The invention and introduction of drip irrigation in Israel during the 1960s was the single most important innovation in agricultural development and responsible for its increasing crop yields. National management of water resources was also a key to Israel's success in arid and semi-arid zones while the increasing use of marginal water sources is becoming a key component of water management policy.

MARKET FORCES INFLUENCING AGRICULTURAL SUSTAINABILITY

The drought of the early 1990's suggests how market forces may decrease agricultural demand for water without affecting production. Due to extended drought in 1990-91, the real price of water supplied to agriculture was increased by 47% while supply quotas were reduced by more than 50% to deal with the shortage. Although farmers were adversely affected in the short-run, they were able to adapt through substantial investment in highly efficient computerized and drip irrigation technologies that reduced their demand in the long run.

Agriculture also reduced potable water consumption substantially over the years with no impact on production. For example, between the years 2000-2005, the fruit sector experienced an average to 35% cut in water quotas, but increased its production by 42%. Israeli agriculture is steadily adapting to marginal water sources and increasing its use of treated wastewater and saline water.

Treated wastewater from sewage treatment that can be utilized by certain types of crops is increasingly directed to agriculture, while restructured pricing in the water sector provides incentive to farmers to utilize this source. In addition new technologies are continually striving to improve the agro-technical, environmental and health concerns involved with the reuse of wastewater effluents. One such example is Subsurface Drip Irrigation, which is more suitable for use with treated wastewater, and results in even more efficient water use and crop growth than above surface drip irrigation methods. Additional efforts to save water have focused on the replacement of marginal plantations with drought-resistant trees, the introduction of water-conserving technologies and improved storm runoff collection.

At the heart of the agricultural sector is the ability to wisely balance financial incentives, government regulation and free-market forces to improve the agricultural sector and make it more sustainable. In addition, the unique "climate" of Israel has necessitated close collaboration between government institutions, scientists, farmers, and localized agricultural concerns in order to maximize the growth and sustainability of agricultural output in a region with limited natural resources.

MINISTRY OF AGRICULTURE PLANNING FOR SUSTAINABLE AGRICULTURE

Sustainable development for agriculture refers to the wise use of limited resources (land, water, energy) while minimizing the adverse environmental impact of manmade materials used in agricultural production (fertilizers, pesticides, non-degradable materials). It includes the more efficient, reduced or alternative use of resources while improving the treatment of agricultural by-products such as plant and animal organic waste.

A nationwide multi-year plan for sustainable agricultural development has been adopted that balances environmental concerns and rural development with continued agricultural activity and land management. The following principles guide sustainable agriculture policy:

- Efficient use of resources and materials in agricultural activity
- Reduction of both degradable and non-degradable waste
- Reduction of agriculture related hazards and environmental damage
- Preservation of agricultural land and open space, and maintaining the culture and landscape values of agriculture
- Preservation of the nature/agriculture balance
- Efficient use of land and resources for rural development
- Preservation of the rural character of agricultural communities
- Maintaining rural open space as "green lungs" for urban populace
- Promotion of recognized sustainable development principles in Ministry activities

Integrated Pest Management

Israeli agronomists, researchers and NGO's are leading a transition from traditional chemical pest control to integrated methods of pest management and plant protection. By integrating a wide variety of methods – physical, biological, and chemical – pesticide use can be minimized, thereby minimizing adverse health effects, environmental damage and pest resistance.

BIOLOGICAL PEST CONTROL

Biological control techniques were pioneered by Kibbutz Sde Eliyahu in the Beit She'an Valley, in part due to their focus on organic agriculture. These include the development and commercialization of beneficial natural enemies, such as predatory insects, larvicides and fungal products that offer an alternative to chemical pesticides in terms of long-term effectiveness, cost and safety.

An additional biological pest control program implemented at the kibbutz pioneered the managed use of barn owls and kestrels for pest control of rodents in fields and plantations. This environmentally friendly and economically profitable project is so successful that top class organic agricultural products can be grown using little or no rodent pesticides. A nation-wide raptor project has been initiated to promote, construct and monitor nesting boxes for these species in the agricultural sector.

Organic Agricultural Waste

While agricultural wastes are known sources of water, air and land pollution, much of the organic waste can be converted into environmentally and economically profitable products. New technologies and regional cooperation are being promoted for the centralized collection, transport and processing of organic, agricultural and animal waste in regional treatment facilities. This not only resolves waste disposal problems, it creates compost as a byproduct that can be applied to agricultural fields and integrated in the fertilization programs of various crops. The reuse of treated sludge from sewage treatment facilities is also being promoted as part of soil improvement and fertilization policies.

Utilizing Treated Wastewater for Agriculture

The utilization of wastewater is a major component of Israel's agricultural infrastructure, particularly in the drylands. Indeed, in the semi-arid region, recycled wastewater constitutes the largest single source of irrigation water. As of June, 2006, 92% of Israeli sewage is treated and 75% is reused, primarily by the agricultural sector. Although this strengthens agriculture in the drylands, in order to maximize safety and minimize environmental risk from wastewater reuse new safety standards for use of recycled wastewater have been imposed. The new improved standards promise to reduce environmental pollution and health risks, as well as eliminate the restrictive list of crops which may be irrigated with wastewater. In this manner fresh water supplies can be conserved for the growing domestic sector while preserving the extent of crop range currently in cultivation in Israel's drylands.

TOPSOIL SALINIZATION

Some 200 reservoirs that store recycled urban wastewater were created by the Jewish National Fund (JNF) over the past twenty years for use in agriculture in drylands. However, farmers found that land adjoining the reservoirs became saline and unusable. Researchers from the Blaustein Institute for Desert Research (BIDR) at Ben-Gurion University showed that the reservoirs partially blocked the normal outflow of the low-lying salt-rich groundwater. This resulted in the low-salt irrigation water mixing with the saline ground water building up close to the soil surface. Evapotranspiration of this water by solar heat left the salts behind, producing saline topsoil unfit for farming and degrading the lands.

The discovery of the mechanism causing the salinization enabled the development of a solution for reversing the soil degradation. Horizontal drains combined with deep vertical shafts were introduced into the partially confined, shallow saline aquifers, releasing the groundwater pressure buildup. This allowed washing, drying and aeration of the topsoil for the reintroduction of intensive, sustainable agriculture in the abandoned fields.

Arid Land Water Management & Planning

The Water Crisis, Response and Strategy

Water scarcity has been of concern to Israel since its establishment in 1948, with its chronic water shortage stemming from both natural and man-made causes. A tenfold increase in population coupled with extensive economic development has placed a continuous and growing demand on Israel's limited water resources. Climatic fluctuations accentuated by multi-year cycles of drought and over-pumping of natural water reservoirs have led to cumulative deficits in Israel's renewable water resources.

Existing aquifer groundwater resources are being degraded by seawater intrusion, as over-extraction lowers the water table, while man-made pollution from industry and agricultural runoff is a continuous threat. Urban development also impedes natural recharge of the coastal aquifers from rainfall. Additional constraints to sustainable development in the water sector include trans-boundary sewage, pollution and water allocation issues, fragmented water management responsibility, intensive use among competing users, and the inability to supply water to future generations at present prices.

Water Demand and Pressure on Resources

The three main economic sectors: agriculture (58%), domestic (36%) and industry (6%) consume most of Israel's renewable water supply.

Table 2.2: Water demand by sectors (MCM/year, Source: Water Authority, 2005)

Sector	Total (MCM/year)	Fresh (MCM/year)	Saline (MCM/year)	Marginal (MCM/year)
Irrigation	1,129	565	185	379
Industrial	113	82	30	2
Urban	712	705	3	3
Domestic Total	1,954	1,352	218	384
International treaties	100	100		
Total (MCM/year)	2,054	1,452	218	384

The Response

The water crisis led to the overhaul of Israel's water management policy with the creation of the Water Authority in 2007 to implement the policy, institutional and technological changes required to stabilize the situation and to manage its water sector more efficiently with a long-term perspective.

The main points of this plan are:

- Establishment of a sustainable policy
- Reclamation of large amounts of effluents
- Water conservation projects
- Seawater and brackish water desalination plants
- Institutional and organizational change

The new Water Authority concentrates all water management issues under one roof, assuming responsibility for the entire water chain from pumping, to sewage treatment and reclamation, including tariffs. The Authority provides a new opportunity for effective cooperation among the various government bodies, NGO's, the private sector and citizens and a vastly improved chance for sustainable development of the water ecosystem.

Water Conservation

In addition to the reorganization of national water management, significant efforts are being made – according to sustainable development guidelines and legislation – to maximize the utilization of existing water resources. Increased water conservation and water use efficiency remain the most cost effective priority for supplying water. This entails improved domestic water conservation and the restructuring of water rates that reflect water supply costs, including scarcity on the one hand, and upgrading sewage treatment on the other. To maximize safety and minimize environmental risk from wastewater reuse, water quality standards are being upgraded for both agricultural use of treated wastewater and its discharge into aquifers, streams and rivers.

The Role of Technology

The fact that water spans multiple economic, societal, governmental, and environmental issues dictates the need for advanced multi-disciplinary tools and innovative approaches and technologies that characterize Israel. The advanced public and private research and development sector, coupled with a lively business and investment community, helps Israel to pioneer new technological and economical solutions in the fields of water production and water treatment (e.g., recycling, treatment and desalination facilities).

However, it became clear that the available water sources could not meet demand and large-scale seawater desalination plants are required for the country's water supply system coupled with improved demand management tools. Due to the fact that Israel has a relatively long coastline and a well-developed economy, seawater desalination is a cost effective option compared to other water supply options.

Strategic Planning – Restructuring the Water Sector

In recent years, the rationale motivating the water sector in Israel has undergone changes integrating economic incentives and environmental and health considerations to become more efficient and responsible for future generations. The changes reflect significant gaps in water supply but also indicate a dynamic approach to deal with the climatic uncertainty and the threat of drought with new water production technologies, water treatment and advanced management tools. The program to develop additional water supplies is aimed to address extreme decreases in the replenishment of natural sources. (A 10% drop in average multi-year replenishment with the need to address consecutive years of drought.)

Israel's notable achievements in the last few years include: desalination, increased treatment and recycling of wastewater, improved standards for drinking water, updated water rates for all sectors, water saving campaigns, new demand management tools (for example, production levies) and new water infrastructure and technology projects. In addition, for the first time, nature and river ecosystems were accorded standing as a "consumer" in the national master plan, with a targeted allocation for main water ecosystems.

KEY WATER CONSERVATION STRATEGIES

Domestic water-conservation campaigns – lower consumption through improved pipe maintenance, water saving devices, and landscape design and irrigation practices in the residential and municipal sectors.

Water Sensitive Planning (WaSP) to harvest urban runoff – a new mandatory planning paradigm shift that views runoff not as a nuisance to be disposed of, but rather a valuable resource to be harvested by efficient channeling to surface or underground storage.

Environmental objectives in water policies – river and stream ecosystems were formally incorporated in national planning and water policy, along with the establishment of regional riverbed authorities with the statutory tools to prevent pollution and implement rehabilitation.

Align tariffs with scarcity – adjust and manage water prices in all sectors to reflect water scarcity and true value of water.

Desalination plants – for seawater or brackish groundwater are a key technological component of Israel's water management strategy to expand its natural water sources.

Wastewater treatment – upgrade the treatment of sewage water to increase its use in agriculture and other non-drinking purposes.

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: ensuring water supply, social and economic requirements, environmental and ecological needs, and based on the Israeli government's decision on a sustainable development program in the areas of water and sewage.

Improving the Quantity and Quality of Treated Wastewater

Israel is a world leader in wastewater treatment and reuse, applying innovative secondary, tertiary and even quaternary purification methods that recycle effluent to meet a variety of demands. As of June, 2006, 92% of Israeli sewage is treated and 75% is reused, primarily by the agricultural sector. The Dan Reclamation facility is an excellent example of utilizing reclamation technologies to sustain multiple layers of the water sector.

The potential of wastewater involves safeguarding the appropriate sanitation and health standards while preventing damage to agricultural land, nature, streams and underground aquifers. The Water Authority will be investing ¼ billion dollars to upgrade sewage treatment facilities by the year 2015. Part of this investment includes upgrading to more stringent quality standards for irrigation with treated wastewater, thereby making the disposal of and irrigation with reclaimed wastewater a sustainable process.

SOIL AQUIFER TREATMENT (SAT)

To ensure a high level of purification of reclaimed water for irrigation of food crops a unique technology was developed locally – Soil Aquifer Treatment (SAT) – and applied at the Dan Reclamation facility. After treatment the high quality effluent is applied to sand infiltration fields, where they are recharged into the aquifer by alternate regimes of flooding and drying. As the water seeps into the ground, it undergoes physical, biological and chemical processes that significantly improve its quality.

The long retention time in the aquifer produces a very high quality treated effluent. This treated wastewater is suitable for all agricultural crops with no restrictions or risk to public health (pathogen free). During 2004, the facility treated 122 MCM of wastewater annually, and with the backup of the coastal aquifer, returned 140 MCM of reclaimed water to the Negev. This sustainable system treats marginal water from the central coastal region and supplies the treated wastewater for unrestricted agricultural irrigation in the southern arid areas.

Desertification and Sustainable Development

Israel has taken a number of countermeasures during the past several years to strengthen its efforts to address the desertification processes. Most of these activities were part of planning, environmental, and development strategies or policies for the sustainable use of natural resources. They make a significant contribution to Israel's ongoing efforts to reduce erosion, increase the productivity of lands in the semi-arid drylands, ensure agricultural yields in general, and promote afforestation efforts throughout the country.

Strategic Planning and Policies to Combat Desertification

- **Upgraded sustainable water management** – for drylands, based on treated wastewater, desalinization, water harvesting techniques and the establishment of watershed management projects.
- **Afforestation** – adoption of National Master Plan 22 for Forests and Afforestation that promotes sustainable forestry through zoning a range of forest types defined by ecological carrying capacity, precipitation levels and landscape values.
- **Policies to promote sustainable agriculture** – in vulnerable regions based on active erosion control programs, regulation of nomadic grazing, and the promotion of water-saving, salt-tolerant crops with advanced agricultural techniques.

Major Programs Implemented

- **Arid and hyper-arid drylands** – flood control, water harvesting, effluent treatment and reuse of treated wastewater for crop irrigation and landscaping; management of natural vegetation and applied agricultural crops including techniques such as drought and saline-resistant crops and greenhouse agriculture.
- **Semi-arid drylands** – control of free-ranging livestock herds and afforestation to prevent soil erosion, restoration of aquifer recharge, and development of fish farming with saline groundwater as well as establishment of orchards irrigated by treated wastewater transported from densely populated parts of the country.
- **Dry sub-humid drylands** – remediation of salinized agricultural lands and management of water resources to prevent pollution and promote conservation.

Preventing and Reversing Desertification

In light of the fact that less than half of the rainwater in the Negev permeates into the underground water table and most flows down gullies into the sea, new methods for flood prevention as well as water harvesting and conservation continue to be developed. Small dams and reservoirs have proven to effectively capture runoff water, arrest the velocity and quantities of floodwater, replenish underground aquifers and create tourism and recreation sites.

To overcome the effect of minimal rainfall and extreme temperature variation in the desert, a wide variety of innovative agro-technology systems have been developed. Runoff and rainfall catchment basins have enabled the development of agroforestry in areas with insufficient rainfall. By reducing evaporation, new subsurface drip irrigation technologies improve the efficiencies and productivity of conventional drip irrigation. Savannization techniques utilize runoff harvest, contour furrows and afforestation to increase productivity and reverse desertification.

Recycled wastewater, which is unusable for irrigating vegetable crops, is utilized to irrigate groves and parks in semi-arid areas, while brackish water is used for salt-tolerant crops and trees in recreation areas. Additional research efforts have led to the identification of crops and technologies that allow agricultural production with water containing up to 4000 ppm salts, thus opening up new horizons for saline water-based agriculture in the desert.

From its inception, Israel's strong commitment to science and technology has been manifested in activities relevant to desertification. For example, the flourishing of agriculture in the country's semi-arid and hyper-arid regions is largely the result of a concentrated investment in research related to salt and drought-resistant plant species, animal husbandry for extreme climates as well as green/hot house technologies and aquaculture.

SAVANNIZATION TECHNIQUE FOR DRYLANDS

A new afforestation practice developed by Israel is called savannization. Surface runoff is harvested by planting rows of trees along earthen ridges to capture the runoff and encourage the growth of savanna-style steppes. The technique has proven to prevent desertification and increase productivity and biodiversity without external resource enrichment.

Contour furrows are dug on slopes of watersheds at vertical distances of tens of meters, while trees are planted at a density of 100/hectare. Surface runoff in the area between furrows is collected, infiltrates the soil and is stored in the furrows. During a typical rainy season four to six rainstorms produce enough surface runoff on the plots to provide the trees with 6-37% of their total annual precipitation, at a storage depth protected from evaporation.

By 2006, some 52 square kilometers have been successfully "savannized" by the JNF. The result is reduced flash floods with less soil erosion, increased overall productivity of semi-arid soils and improved growth and survival of trees in drought years.

Afforestation and Drylands Management

Israel's Jewish National Fund (JNF), which is responsible for land development, afforestation and water projects on public lands, recently adopted a broad ecological and environmental program to combat desertification and to upgrade degraded lands by:

- Promoting **agroforestry** and grazing by savannization techniques for tree planting and run-off containment.
- Promoting **afforestation** – planting tree clusters (usually eucalyptus) in banked-up water catchment depressions for shade and greenery.
- Fostering **desert agriculture** by supporting R&D programs to identify and develop new strains of crops suited to semi-arid and arid areas.
- Building **floodwater control dams** in dry river beds to protect fields from soil erosion and to facilitate the percolation of surface runoff water from surrounding watersheds to enrich underground aquifers.
- Utilizing **treated wastewater** and collected **surface runoff** to create recreational green belts near towns and rural communities.
- Building **water storage reservoirs** to hold treated urban wastewater for the irrigation of dryland farms in the South.
- Sponsoring **ecological R&D programs** in collaboration with universities and research institutes to foster desert management programs, which, enhance productivity and biodiversity, repair damaged arid lands and restore indigenous flora and fauna.
- Collaborating with the **International Arid Lands Consortium** comprised of US Forest Service and six American universities in advancing strategies for sustainable development of desert regions.

Rural Sustainable Development

Changes in Israeli society and the economy necessitate a review of the management and development of the rural landscape. Open space and agricultural land management, and the development of farming settlements, agriculture, entrepreneurs, tourism, services, and traffic – all depend on development policy and the definition of the means to implement it.

The Ministry of Agriculture and Rural Development is in the process of defining a strategic plan and comprehensive framework for agricultural and rural sustainable development, with the following aims:

- Strengthening the rural community.
- Diversifying the rural economic basis while stabilizing and developing agriculture as a unique economic sector.
- Protecting open spaces and landscapes, both natural and man-made, and integrating them with the rural landscape.
- Planning and developing the farm and countryside in Israel, in its various contexts, as a unique form of rural life with a distinct character.
- Updating the statutory and physical structure of these settlements to keep pace with current organizational and structural trends.

Ministry programs continue to support sustainable rural development – including farming and animal husbandry – and help to solve environmental hazards stemming from agriculture, while on the other hand, position agriculture as an environmental friendly solution for nation-wide problems such as sewage and open space preservation.

An unplanned benefit accrues to the public as a result of the rural agronomic activity, in which a byproduct of farming is the creation of rural landscapes and open space. Although these possess a very high economic value for public enjoyment, they are not normally included in economic calculations as a public good. As many European nations have stressed, agricultural lands serve as real estate reserves, preserving options for future generations, and in this context, government subsidies for rural preservation make sense economically.

RELOCATING AND UPGRADING DAIRY AND POULTRY FACILITIES

A successful program initiated by the Ministry of Agriculture and Rural Development to make farming communities more sustainable is the reform of dairy and poultry farms. Grants were offered to relocate chicken coops, dairy cowsheds and traditional animal breeding from within the rural agricultural cooperatives and villages to designated regional areas outside their communities in new modern facilities.

In addition to removing environmental nuisances from residential areas, the new farm production facilities adhere to more stringent environmental, sanitary and veterinary codes. The result of the first stage of relocating dairy farms for example, was a decrease in the total number of cowsheds, while waste treatment compliance improved and the national milk quota increased significantly. Positive influences on the rural settlements, include an increase in their quality of life, and enhanced development opportunities for rural tourism and employment.

Policies/Programs for Rural Development

The Ministry of Agriculture and Rural Development is planning for sustainable rural development so that the characteristics, heritage and qualities of the rural settlement may be preserved. This effort will emphasize agriculture's importance and its integration into the open space that characterize the rural landscape.

Maintaining the Character of the Rural Settlement and Its Legacy

- Retain cooperative agricultural frameworks and councils.
- Encourage non-agriculture architectural design that preserves the rural character.
- Develop compatible rural and agro-tourism.
- Support organic growth of existing settlements and strengthening of veteran communities.
- Foster quality of life in the rural landscape.
- Renewal of the rural community that preserves its heritage and history.

Preservation of Open Spaces, Agrarian Culture and Landscape Values

- Incorporate sustainable development principles into decision making.
- Develop land cultivation that preserves agriculture and open space.
- Undertake soil preservation and drainage programs to maintain the value of soil for agriculture.
- Develop the agricultural landscape and agronomic complexes.

Preservation of the Nature-Agriculture Relationship

- Minimize damage caused by native wildlife via environment friendly means.
- Restrict import of foreign and exotic plants and animals to prevent intrusive species.
- Strict prevention of agricultural contamination and spillage into nature reserves and landscapes.
- Set population limits for predatory species (jackals, foxes, wolves, cattle egret, etc.).
- Active involvement in the preservation of biodiversity in Israel.
- Preserve Israeli nature's genetic resources, especially agronomic plants.

Development Goals of the Rural Landscape

- Develop statutory basis for the sustainable development of the rural landscape
- Create sustainable rural communities with a reasonable level of public services, a multi-generation society and a diverse and stable economy.
- Stabilize and develop peripheral regions with special aid to settlements lacking socio-economic independence.
- Develop projects, initiatives and ideas that reinforce the rural landscape and raise awareness.
- Provide government support to promoting diverse economic rural activity.
- Conserve agricultural areas as a main element in open space planning.
- Provide assistance to promote alternative infrastructure, occupations, research, professional training, environmental protection and open space conservation.
- Increase accessibility to general populace and information centers by improving transportation and communication.
- Strengthen settlements in the country center and ensure their continued functioning as rural and agricultural entities within the broader urbanized region.

Sustainable Tourism

Ministry of Tourism Sustainable Policy

While tourism in Israel today is concentrated in and around the country's urban centers, a strategic decision was made by the Ministry of Tourism to emphasize sustainable rural tourism. In light of that decision, the Ministry has recently prepared and adopted strategies to align its operations and activities with sustainable principles and to promote sustainable tourism. The guidelines call for the planning, development, administration and marketing of tourism in Israel to be undertaken according to sustainable principles and to make the Ministry a leading factor in transforming tourism in Israel. Priorities and resource allocations are to be directed to making the tourist infrastructure, training and sites sustainable, as well as to official communications, publicity and marketing campaigns. Furthermore the Ministry has decided to position Israel as a country that has adopted sustainable tourism principles for environmental friendly tourism that protects the integrity of the local communities.

Rural Tourism and Land Resource Conservation

Israel has adopted two main strategies for rural tourism development that aim to conserve rural and environmental resources. The first calls for conservation and protection similar to nature and landscape reserves. Sensitive or critical open space areas will be identified in terms of their importance to the surrounding population and their suitability for conservation. These areas will be designated for passive recreation and leisure activities.

The second strategy will add active content into tourism development plans. These frameworks will be land intensive and will cover large areas, and will integrate preservation along with recreation. These may include open recreation areas, forests and woods, natural and artificial water bodies and any extensive use that suits recreational needs while maintaining the values of open space intact.

ECOTOURISM IN ISRAEL

Ecotourism Israel is an example of a private initiative that promotes sustainable tourism and ecotourism by supporting eco-tour operators in Israel – through advertising, guidance training, and investment. The organization operates according to international standards: "that meets the needs of the present tourists and host regions while protecting and enhancing the opportunity for the future... and responsible travel to natural areas that conserves the environment and improves the well-being of local people". The organization's goals are to: strengthen the local tourism industry, improve conservation capabilities, improve communities' well being, and enrich the tourist experience.

The development of public infrastructure in the rural sector, also known as “tourism villages” or “tourism complexes”, is supported by government incentives, subsidies and grants. The intention is to promote the economic welfare of settlements and regions that develop rural tourism including agro-tourism, rural landscape development and the preservation of the agricultural environment and its rural heritage and values.

HULA VALLEY RESTORATION PROJECT

In the 1950's the Hula Valley wetlands were drained to facilitate agricultural and rural development for the new, developing State. Intensive agriculture on these peat soils was productive at first but became problematic over the years. Accelerated decomposition of exposed peat soils polluted groundwater that flows into the Kinneret, and caused eutrophication and algal blooms.

In the 1990's a massive integrative restoration project was undertaken to restore drained wetlands, which also supported massive bird migration across the continents. It is a prime example of sustainable rural development incorporating sustainable agriculture, nature-based ecotourism and a restored wetland/migratory bird-based habitat into a unique mutual interdependent system. The aims of the project were to:

- Prevent pollution via the creation of an artificial wetland to reflood the exposed peat soils and prevent further decomposition.
- Construct an intensive network of drainage canals and reservoirs to control subsurface water levels of the peat soils and separate polluted from unpolluted groundwater.
- Restore a section of the original Jordan River course as a riparian corridor.
- Ecological restoration of the newly created wetland complex.
- Encourage ecologically-oriented and sustainable agricultural practices.
- Develop an ecotourism-based economy for the valley's inhabitants.
- Manage the wetlands and adjacent fields as critical support habitats for over 500 million birds that migrate bi-yearly between Europe and Africa.

Management, planning and research are coordinated through the widest range of local, public, research, government and NGO stakeholders. It is acknowledged that the economic and social benefits are directly dependant upon the ecological systems' integrity and long term ability to flourish.

Regulating the Nature and Capacity of Rural Tourism

Rural tourism has been the tourism success story of the last decade, but its growing popularity threatens its very underpinnings – quiet and serenity amidst natural surroundings. Limits must be imposed on the scope of this type of tourism to ensure that its special ambiance is sustainable. This may, for example, call for determining a ratio between tourist accommodation and the size of the local population to maintain an atmosphere of “hospitality” where the guests assimilate with the hosts and do not outnumber them. Weight should be given to the location of new tourist areas and projects – it is preferable that they should be established near existing built-up areas and not in open space areas. This is particularly pertinent in view of the demand to preserve the attraction of these areas: open beaches, forests, nature reserves, and wide open spaces.

ISRAEL BIKE TRAIL

As the popularity of biking and cycling in Israel is on the rise, local, city and national resources are being allocated to developing bike trails. The Israeli cross-country bike trail currently under construction will provide a contiguous corridor through open spaces and agricultural areas, cities and rural settlements, and heritage, historical and archeological sites. The collaborative effort includes a large number of stakeholders in planning the route running the length of the country and takes into account nature preservation, agricultural activity and the cyclists’ needs. Besides the obvious recreational and health benefits, cycling benefits rural tourism, acting as a doorway to the rural expanse, opening up eco-tourism options, and enlisting their support of open spaces, river corridors and natural and rural landscapes.

Sustainability at the Local Level

Global environmental and sustainability challenges have been focusing around the world on the local level. The basic premise is that locally designed initiatives provide an effective and cost-efficient way to achieve local, national, and global sustainability objectives for environmental protection, economic vitality and community well-being.

The Ministry of Environmental Protection together with the Heschel Center for Environmental Learning and Leadership established a Local Sustainability Center to promote sustainability programs in the day-to-day management of local authorities. A mandatory requirement for each local authority to establish a committee responsible for environment and sustainability did not of itself generate significant progress. However, providing the tools and initiating the preparation and adoption of sustainability master plans in each council has proved to be highly effective, particularly among the rural local councils.

The incorporation of environmental quality and sustainable development in the master plans for half of the 54 rural councils in Israel, which cover over 80% of Israel's land area, is a clear public statement of policy and reflects the importance of sustainable development as a leading concept in the councils' planning, development and operations. The national association of rural councils strongly supports the program and efforts to increase sustainable policies.

Master Plans for Sustainable Development

The procedure for preparing the master plan for local sustainability is based on several assumptions:

- **Public and professional policy statement** – an internal and external declaration that the sustainability paradigm is to become a matter of policy at the highest level of decision making.
- **Public participation** – all stages of the process are based on transparency and cooperation with all interested citizens, interest groups and stakeholders.
- **Comprehensive vision** – the preparation of the plans obligates all activities and planning within the council and rural settlements.

The procedure is divided into a multi-year planning process, with transparency and professional and public participation in each stage. After defining the goals and strategies in the first stage of the process, the second stage details the organized planning and management of the process including the implementation mechanisms, the selection of external professional consultants and the establishment of steering committees. The third stage of the procedure is integrating the sustainability master plan into the council's ongoing activities and work programs.

RAMAT MENASHE BIOSPHERE RESERVE

Ramat Menashe is an area with a recognized high landscape value and a wide diversity of natural assets interspersed with agricultural settlements. However the area also lies in the planned routes of a number of national infrastructure projects, and is under pressure from residential, industrial and commercial encroachment.

The Megiddo Rural Council decided to develop a plan to balance the human needs with that of the environment. The council developed a master strategic plan to designate the 18,000 acres within its jurisdiction as a biosphere region, serving as a central park or green lung between Haifa and Tel Aviv that demonstrates a sustainable balance between human and environmental needs.

The core of the plan is public participation and partnerships with all stakeholders, including government ministries, the Jewish National Fund, and other NGO's. Broad public support to preserve the rural flavor of the region influenced planning decisions regarding tourism, culture, development and the environment, as well the designation of about half the area as a regional park. The aim of the park, which is populated by 11,000 residents in 13 agricultural cooperatives and rural villages, is to assure optimal coexistence of humans, flora, fauna and agriculture along with the preservation of the rural character and open space.

The process for developing the plans and its statutory framework paralleled the UNESCO concept of biosphere reserves, such as its characterization of different zones (core, buffer, transition) and the emphasis on democratic process and public participation. The Megiddo council is attempting to build a broader consensus and comprehensive vision and have the entire region under its jurisdiction as well as contiguous regions (including the Carmel biosphere reserve) to be included in UNESCO's world network of biosphere reserves.

The biosphere reserve program includes the following projects:

- Development of human core – interfaces with environmental, socio-economic, cultural and human resources
- Public engagement – active participation by all shareholders
- Core zone agreements with stakeholders – army base (training) and sheep growers (grazing)
- Water resource improvements
- Educational – Lotem association for special needs outdoor education
- Sustainable agriculture and rural tourism

LOCAL SUSTAINABILITY CENTER

The Local Sustainability Center was established as a joint initiative of the Ministry of the Environmental Protection, the Heschel Center and Tel Aviv University to advance the capacity for sustainability in local government. It was supported by the European Commission Life Programme and has benefited from cooperation with ICLEI, the International Centre for Local Environmental Initiatives.

The center's activities include developing state-of-the-art tools for local sustainability in municipal planning, management and legislation on the one hand, and for recruiting, training and networking advocates, municipal professionals and mayors, to engage a critical mass of local governments in sustainable development on the other.

The center has succeeded in creating awareness, initiating change and gaining acceptance of new planning paradigms in urban, regional and local authorities. The center offers resources such as a local sustainability tool kit containing assessment tools, training plans, pedagogic materials, and guidelines for topics such as clean energy, green building and eco-procurement.



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