

## **WATER ALLOCATION FOR NATURE AND THE 'END OF CONFLICT' ERA**

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### **ABSTRACT**

Human activities and development pressures increasingly threaten open spaces (or 'the countryside'), natural ecosystems and other natural resources in Israel. Among them, water sources are continuously degrading. Water is mainly managed for human use, and consequently, the ability of natural ecosystems to maintain themselves and to provide humans with ecosystem services decreases.

Despite the present status of the Israeli-Palestinian peace process, planners should address long-term water-related issues and consider the possible situation at the 'end of conflict' era.

We examined aspects regarding water resources in the peace agreements, in proposed regional cooperation development projects, and as reflected by social and economic trends and scenarios.

Our findings indicate that in peaceful times the pressures on the natural environment and water resources are likely to increase. Proposed development and improper management by all sides involved may lead to further degradation of water resources (particularly critical to the mountain aquifer), and to a situation of 'prolonged thirst' of terrestrial ecosystems.

A first attempt to address nature's right for water through legislation was recently made in Israel, along with discussions on desalination and on increased usage of treated effluents in agriculture. Nevertheless, these changes in water management may be inadequate to guarantee ecosystems with sufficient and sustainable water supply.

**KEYWORDS:** biodiversity, ecosystem services, peace agreement, regional cooperation development project, water allocation for nature

## INTRODUCTION

### General Background

The state of Israel has been going through major economical, social and environmental changes ever since its establishment. Israel has largely adopted western standards – regarding science and technology as well as standards of living and consumption, and standards for one's personal aims in life. These standards have been imported along with their associated processes and problems, posing a burden on the natural environment and thereby increasing the local environmental crisis. The environmental pressures are accelerated by the fast rate of population growth (including immigration) and a very high population density.

Israel has been blessed with a rich and unique variety of habitats and ecosystems. Apart from the intrinsic value of its rich biodiversity, it also supplies humans with invaluable **ecosystem services**, which include water accumulation, absorption, and filtration (see general discussion and relevant examples in Achiron-Frumkin and Frumkin, 2002). Today in Israel, human activities and growing development pressures increasingly threaten 'open spaces' (or 'the countryside'). The result of this state-of-affairs is that many of Israel's agricultural and natural ecosystems, many habitats with their associated biodiversity, are threatened (Shalmon, 1999; Frumkin, 2003a; Frumkin et al., 2004).

Among its other natural resources, Israel's water sources are continuously degrading for two reasons. The first is quantitative – the increase in water consumption leads to over-pumping, resulting in a lowered water table of above- and below-surface water sources. The second is qualitative – water quality is worsening due to salination (which is partly caused by over-pumping) and due to constant input of various contaminants. The loss of open space that functions as aquifer filtration area aggravates the situation. In particular, accelerated building on the coastal plain aquifer's filtration areas decreases the available filtration surface area of one of the major aquifers and increases the leakage of contaminants into the aquifer (Han, 2002; Israel Hydrological Service, 2000; Katz et al., 2001, Achiron-Frumkin et al., 2003).

Desalination is frequently suggested as the only viable remedy to the entire region's water problems, but apparently, this is not the case. Desalination is planned to be an additional supply, a partial substitute to natural sources and cannot wholly substitute them. It would not solve problems of desalination and contamination of the natural water sources. Alongside desalination, another suggested practice that can save a large amount of fresh water is the increased usage of treated effluents in agriculture. However, this practice involves problems related with salination of soils and a possible gradual degradation of both soils and aquifers, a process that is also likely to affect natural systems as well (Gvirtzman, 2002; Kliot, 2003).

### **Water allocation for nature**

Regarded a scarce resource, water is mainly managed for human use, while water allocation for nature is primarily perceived as a luxury. The degradation of water sources affects natural ecosystems in their ability to maintain themselves and to provide humans with ecosystem services. Water shortage joins with habitat loss and defragmentation to make ecosystems more fragile and less resistant to changes and catastrophes. The main loss of species and habitats in Israel in the last decades has occurred in wetlands (Frumkin, 2003a; Frumkin et al., 2004; Shaham, 2003)

A preliminary attempt to address 'Nature's Right for Water' was recently made through the patient and persistent work of the Nature Reserves and Parks Authority (NRPA) and the Ministry of the Environment, which led to legislation in the Knesset. The legislation is meant to ensure a regular water allocation for the maintenance of nature reserves, rivers and other wetlands (Shaham, 2003). The NRPA wishes to ensure that some 150 million cubic meters (MCM) of water would be available annually to nature and to conservation of open spaces, and that additional 50 MCM would be available for river restoration. With the Water Commission, the NRPA intends to prepare a national yearly master plan to define nature's need for water. This is a major step forward. It is not yet clear if the desired allocation is sufficient and if it can indeed guarantee a long-term commitment.

### **What are nature's needs for water?**

Israel is located in a semi-arid region, where water is relatively scarce and therefore it is one of the limiting factors to biological mechanisms. In order to be able to maintain healthy life, for existence and proper functioning, water supply should be within certain quality limits. It is generally agreed that water for aquatic organisms should be better than drinking quality standards (Shaham, 2003). The current legislation is concerned with water allocation for aquatic nature reserves and wetlands, which are the main natural 'consumers' of water, and probably the most vulnerable habitats.

Nevertheless, other terrestrial ecosystems, in nearby smaller tributaries and generally, in non-wetland habitats, also require adequate water supply. Terrestrial ecosystems away from rivers throughout the country are supported by their available water supply – through direct rainfall, through underground water supply or aboveground runoff, filtration and streaming. If we take a closer look, we can further examine the need for water at a local level: plants in any ecosystem need water. The amount of plants, their composition and the presence of particular rare species may depend on very local circumstances; some animal species rely on plants for their water as well as for their food supply; many animal species need fresh drinking water, which they may find in small local sources; winter ephemeral ponds are a nearly-extinct habitat in Israel – they require a sufficient supply of fresh water for their formation and maintenance for a minimal duration that will allow their inhabitants to reproduce.

### **Aims of this work**

The Israeli-Palestinian peace process is currently on hold. Nevertheless, while it was still going many understandings and programs were made by official and private bodies for a time to come, a peaceful 'end of conflict' era in this region. Some of this planning can affect water allocation to nature. Whenever the peace process will resume, it is very likely that much of this dormant planning will again be relevant.

Planners as well as nature conservationists should be aware of these plans, prepare for times when they will be promoted and consider them on a regional basis. In this work we try to draw a possible scenario for the status of water resources in the 'end of conflict' era

and its possible ecological implications. Forecasting and drawing scenarios are many-a-time quite a risky business. Our aim here is to draw attention to possibilities and to actions or precautions that may need to be adopted.

## **METHODS**

We used three sources of information about possible events in the future 'end of conflict' era: (a) the peace treaties and agreements; (b) proposed development projects for regional cooperation; and (c) multi-disciplinary group discussions and interviews with professionals. The peace agreements, development projects and general trends will mainly be discussed with reference to their impact on the environment within Israel.

### **Peace treaties and agreements**

Israel signed peace agreements with Egypt (1979) and Jordan (1994) and an interim agreement with the Palestinians (1995). We examined the environmental aspects and clauses in these agreements (Israel Ministry of Foreign Affairs, 2004a-c), and their relevance to various development programs. We try to point at lacunae and possible environmental conflicts deriving from the agreements - mainly between development and conservation.

### **Proposed Development Projects**

Data on 280 proposed or on-going projects of regional cooperation and programs were received from the former Israeli Ministry for Regional Cooperation. Forty-seven projects directly involved water issues – agreements, planning, supply, desalination, treatment of effluents and reclamation of contaminated areas. Of these, we referred to development programs that are relevant to the Israeli environment, ending up with 26 projects (6 cooperation projects, 15 non-cooperation projects that may affect Israeli water supply, 5 general protocols and programs). We also checked for other possible indirect effects of major projects on water availability to the natural environment.

### **Discussions and Interviews**

Between 2000-2002, as a part of a multi-disciplinary work group (Achiron-Frumkin and Frumkin, 2002), we participated in an active discussion group on different aspects and scenarios for a peaceful era. We had personal interviews with various environmentalists – both

governmental and NGOs – and heard their perspective and scenario for environmental, social and economical prospects on a time of peace.

## **RESULTS AND DISCUSSION**

### **Peace treaties and agreements**

The peace treaties with Egypt (1979) and Jordan (1994), and the interim agreement with the Palestinians (1995) reflect the prevailing environmental attitude at the time they were prepared. Water issues that are mentioned include water usage, allocation and resource maintenance. A major lacuna is the absolute absence of any water allocation for nature where water allocations are discussed. The agreements do not pay attention and do not include sufficient guidelines to nature's needs for maintaining ecosystem functions, particularly in terms of water and land allocation. No attention is paid to the necessity to devise water quality standards and to solve possible conflicts between different water usages.

The peace treaty between Israel and Egypt does not directly refer to any environmental issues, including water. Though no major water sources are shared between Israel and Egypt, agreed development projects may have a local impact (see below).

The peace treaty between Israel and Jordan includes article 6, which is dedicated to water. It designates “...*rightful allocations of both of them [Israel and Jordan] in Jordan River and Yarmouk River waters and Arava/Arava ground water...*” Article 6 addresses the need to define water quantities and quality regarding usage, and the need to develop present and new water sources. It refers to required measures and monitoring in order to protect water resources from contamination. It includes provisions for water allocation and distribution between the two sides, of the Jordan River and its tributaries and in the Arava valley, which do not consider ecosystem needs. The flow of fresh water in the lower Jordan River is considered 'waste'. Hence, it was agreed that the lower Jordan would change from a river of high-quality water flow into a canal used for the disposal of treated sewage and brackish water to the Dead Sea.

Apart from considering directly this scarce resource, other articles that discuss transportation, energy and development may involve

indirect effects to natural ecosystems (see discussion below). Water quality standards have not been defined. The environmental article (article 18) and its associated annex IV are quite detailed and cover a wide array of topics, including suggested cooperation between both parties according to sustainable development principles. They emphasize the need to protect biodiversity by various means, though the maintenance of water sources and their quality is mentioned solely with respect to human usage.

The Israeli-Palestinian Interim Agreement has no environmental clauses. References to environmental issues appear in annex III and annex VI. Annex III, clause 12B, deals with cooperation and understandings, and outlines the general attitude: *“Both sides will strive to utilize and exploit the natural resources, pursuant to their own environmental and developmental policies, in a manner which shall prevent damage to the environment, and shall take all necessary measures to ensure that activities in their respective areas do not cause damage to the environment of the other side”*. Most measures are intended to mitigate different kinds of pollution. Other agreed principles are: developing measures to fight desertification, the need to conduct an Environmental Impact Statement (EIS) for major development programs, and the protection of forests, nature reserves and natural assets. Clause 40 outlines principles concerning water and sewage, and acknowledges the Palestinian need for additional water supply.

### **Proposed Development Projects**

Generally, the proposed development projects are based on understandings that were outlined in the peace agreements. With one exception, none of the 26 projects related to water deals with nature's rights and needs for water, though several projects may help to reduce water pollution. Here we shall give but a few examples. Several water-supply projects in Jordan draw water from the Jordan River and its tributaries. A proposed desalination project will use brackish water on the Jordanian side of the Dead Sea. The Jordanian Water Conduit will allocate additional tens of MCM/year to Israeli and Jordanian salt plants. Quite a few Palestinian wastewater conduction systems and treatment facilities are planned. Treating pollution of the Jordan River includes several wastewater treatment facilities in the Jordanian and Israeli sides. Another plan to restore the lower Jordan River also

designates an area for a bi-national nature reserve on both sides of the river. The Red Sea-Dead Sea Canal is the only project that mentions water allocation to the Dead Sea.

Of the other cooperation projects we examined – those not directly related to water – some may affect the natural environment either by protecting areas (several proposed transboundary nature reserves and a biosphere reserve) or by using land and emitting pollutants (e.g. several industrial areas, energy, transportation and tourism), as will be discussed later in this chapter.

### **Socio-economic and environmental scenarios**

People rightly expect that the 'end of the conflict' will bring about economic prosperity and improve the standard of living (particularly of the Palestinians). There will be great need for building and reconstruction on both the Palestinian and the Israeli sides, in particular an urgent need to answer the Palestinian lack of infrastructures.

The experience so far has shown that in quite a few environmental cases that required urgent cooperation, political considerations made such cooperation impossible even before the current surge of violence (e.g. Israeli-Palestinian problems to resolve issues of wastewater management, see Frumkin and Achiron-Frumkin, 2003; Kliot, 2003). When the 'end of conflict' will finally be with us, it is likely that initially it would not be a 'warm peace' but rather avoidance of violence that would allow each side to slowly recover. In such circumstances, cooperation and joint management of a crucial resource is made more complicated.

### **Possible ecological implications**

Human activity can affect the availability of water to ecosystems directly, through above- and underground water resources, by pumping and by direct discharge of pollutants. It can also affect it indirectly, through development and through the way humans act in open spaces. In what ways can development affect water supply to nature? It can:

- Change the amount of water that is being accumulated locally – through a change or damage to a drainage basin's original

waterways, or through a decrease in the area of open space available to this basin (e.g. by construction of roads or buildings).

- Change the quality of available water – through local contamination of soil or runoff that can lead to local or regional contamination of water sources, both above and below ground. This can be due to oils, pesticides or other toxic substances.

Once a drainage basin is changed, its ability to supply water to living organisms also changes. It may well be that overall, the same amount of water may still be available to an area, but it will be distributed in a different manner locally, creating local environmental changes. Such changes may render a mountainside, a mountain spring, a winter ephemeral pond or the residence site of a rare plant with less water than before or nearly waterless, if not enough water is accumulated to sustain them. This is also true where local pumping lowers the aquifer water level, thus drying local springs. The desert environment is particularly sensitive to changes in water regime, and the opening of new roads and railways may change water runoff routes and drastically affect local habitats. These changes at the local level seem minor and negligible, but they do accumulate and can be particularly felt in dry years. The good news is that today we know ways to develop while conserving water sources, via adoption of careful, water-sensitive and sustainable-oriented planning (e.g. see Katz et al., 2001). It needs more awareness, it needs courage to explore new methods and a willingness to use them.

To better understand some of the environmental implications of the agreements and development projects, we need to look closely at some examples of the current environmental situation:

The annual water flow input to the **Dead Sea** today is ca 1,000 MCM of water less than it was at the beginning of the 20th century. This gradual decline has led over the years to a decrease of over 26 meters in the Dead Sea level, and has severe implications for both man and the natural environment. It involves changes in the aboveground and underground flowing regimes of the Dead Sea coastal oases ecosystem and salination of springs. These changes lead to a rapid change of this unique ecosystem, while threatening its endemic biodiversity. The solution to the situation is far from clear. In addition, the decline of the water table has induced the formation of

hundreds of large sinkholes, mainly along the western coast, making any human activity in the area a perilous task (Frumkin, 2003b; Bromberg, 2004; Eidelman and Cohen, 2004).

Some of the development projects designated along its coast will probably somewhat worsen the water balance of the Dead Sea. Additional water uptake and further use of floodwater up the Jordan River will probably also be bad for the Dead Sea. Plans for tourism and other enterprises along its coast may become obsolete due to the risks involved. The plans for a biosphere reserve there may conflict with other projects designated for the same area. The Red Sea-Dead Sea Canal is the only project that mentions water allocation to the Dead Sea, but it may involve major changes to regional ecology, whose character is not clear.

The water of the upper **Jordan River** basin is being continuously used by all adjacent countries: Lebanon, Syria, Jordan and Israel, as well as by the Palestinians. Some of its tributaries currently conduct treated effluents. Israel and Jordan exhaustively divided the Jordan River water resources, including excess unutilized floodwater that can be pumped for storage off the course of the river. The treaty between them allocated no water for nature and its application has probably already contributed to the deterioration of the lower part into a canal conducting effluents (Kliot, 2003). The stated need for “*ecological rehabilitation of the Jordan River*” is not backed by any of the water clauses of the treaty.

The proposed project entitled 'treating pollution of the Jordan River' includes several wastewater treatment facilities in the Jordanian and Israeli sides. It has no defined bi-national framework to coordinate the management of the drainage basin and the river itself, and does not allocate any water to the river itself, a supply that could help clean the riverbed and restore its ecosystem. This project probably adopts the approach that if pollutants are removed – the river ecosystem will eventually restore itself. It is not clear how this project corresponds with another plan to restore the lower Jordan River, which also designates an area for a bi-national nature reserve on both sides of the river, where currently effluents have been allowed. Further south, excess pumping of groundwater in the Arava valley has already caused deterioration of some oases and drying of several unique salt

marshes (e.g. Yotvata and Evrona). There as well, the parties agreed on quotas for pumped water to be divided between them, with no restrictions deriving from ecological needs.

**Agricultural development** (e.g. fighting desertification) should be carefully examined to verify that irreversible damage is not caused to the area's biodiversity, and to long-term quality of soil and water.

**Development of transportation** along and across the Rift Valley would probably lead to further conflicts with environmental well being, including water balance for local ecosystems.

A major problem with the proposed or on-going regional cooperation projects and programs is that many of them are located on a limited geographical area. On one hand, this saves open space. On the other hand, little attention was paid to their cumulative effect on the region, on its open spaces and its natural habitats. Many of the projects reflect a conservative, non-sustainable approach. The only plans that may consider ecosystem needs and may eventually include water allocation for nature – those for nature reserves – seem to partly conflict with other development plans designated for the same areas.

The mountain aquifer is currently polluted by both Israelis and Palestinians. Effluents, including also industrial effluents, are running down westwards into Israel's coastal rivers, jeopardizing efforts to restore them. Among the proposed projects were some Palestinian wastewater treatment facilities which could have reduced pollution (including transboundary pollution) and groundwater contamination. Several projects and solutions that were suggested to handle the Palestinian effluents were not promoted due to the political situation, and part of the foreign funding to Palestinian infrastructure project may be lost by now (Kliot, 2003).

Generally, both the peace treaty with Jordan and the interim-agreement with the Palestinians contain clauses that show positive environmental intentions. For example, annex VI of the Israeli-Palestinian interim-agreement declares that *“In implementing the various economic cooperation programs, the two sides will ensure that aspects of environmental protection including air, water, marine and land resources, and prevention of environmental risks, hazards*

*and nuisances will be taken into consideration*". The mutual desire to cooperate in protection of biodiversity and nature reserves is shown in the following statement: *"economic cooperation will take into consideration environmental protection aspects"*.

It is reasonably feared that the important guidelines and principles that do appear in the agreements with Jordan and with the Palestinians may not be fulfilled. This may be due to lack of awareness among decision-makers, lack of criteria for sustainability or lack of administrative and fiscal tools to apply them (see Frumkin and Achiron-Frumkin, 2003). It is not clear, how well Israel and Jordan can implement their good will, as many of the topics are not implemented yet within each country. Most current development in Israel is not sustainable, and we do not expect that the Palestinian side, which faces highly critical issues, will place nature's right for water first on its priority list. Important statements and declarations are not enough to guarantee their appropriate application, to guarantee that environmental interests will be considered alongside economic (or other) interests, particularly as examination of alternative plans was not required.

A higher level of economic activity usually leads to higher consumption and contamination levels, and to increased demands for water, energy, open space (for both development and recreation purposes) and other natural resources. Development of the kind that will cover open space with asphalt, stone and concrete may affect water drainage basins and decrease water penetration into aquifers. This problem may be particularly felt in the mountain and coastal aquifers. Yet, official guidelines for development at the 'end of conflict' era may not necessarily incorporate high environmental standards, particularly if development is done under time pressure, with a limited budget and with many other issues to be dealt with.

## **CONCLUSIONS**

### **Would Israel's biodiversity be better off in peaceful times?**

The case of water allocation to nature is a clear example of the conflict between the needs of this generation and the needs of future generations, the needs of those who have more and those who have less, and between human needs and the needs of other co-patriot organisms. The sustainable development approach – as manifested in

Agenda 21 and the biodiversity convention on which Israel has signed – tries to address these conflicts and resolve them. Most of the future problems are already here with us. The fragile current acknowledgment of nature's right for water – if adequate at all – may not hold if water shortage would worsen. It may be implied within Israel, but will probably not be considered in the surrounding areas. The trends of change in water management (including desalination and effluent irrigation) may not be adequate to guarantee sufficient and sustainable water supply for natural ecosystems.

Our findings suggest that in terms of water allocation for nature, the scenarios for the 'end of conflict' are not likely to produce a more comforting picture than our present situation. Rather, they actually indicate that the immense pressures on the natural environment and water resources are likely to increase. Unless a dramatic change in the way we manage our water resources will take place, we are likely to encounter further damage to water resources. This will be added to the already deteriorating quality of the mountain aquifer, and to the continued denial of the ecosystem justified needs for water by all sides involved. In times of water shortage, water allocation to nature and its relation to the vitality and stability of natural ecosystems may come last on the priority list. One should also bear in mind that water stress or shortage would be only one of several environmental stresses that are quite certainly likely to increase. Such are the decrease in open spaces (available physical space and habitat) and connectivity within and between natural populations, increased human activity in residing area, increased levels of air pollution, etc., whose effects on ecosystems may not be incremental but rather synergistic.

Such circumstances necessitate careful planning and management of natural resources, with a long-term view and policy which will incorporate water professionals and ecologists in a wider regional planning and management framework, applying the 'precautionary principle'. Nature's right for water should be incorporated, as another aspects that needs addressing, into master plans and cooperation projects. New ways to include this aspect in cooperation work between environmental officials, educators and NGO work should be devised and can already be put to action now. Unfortunately, in the process of planning and decision-making, political and security considerations often rule out professional considerations, sometimes

yielding a devastating outcome. As shared resources, there should be some form of shared responsibility for the deterioration of the Dead Sea and the mountain aquifer. It is vital that the shareholders involved would join forces and efforts to avoid any further deterioration and cooperate in order to solve the described problems, including water allocation to the ambient ecosystems.

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