Reviving Streams and Wetlands in Israel

The SPNI's Vision and Major Guidelines for Eco-Hydrological Restoration

March 2012

Nature Conservation Division, Society for Protection of Nature in Israel
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Few may remember today the abundantly flowing waters of the coastal and inland rivers, and the wetland ecosystems that were an integral part of Israel's landscapes. Despite the central role of rivers and wetlands in the nation's image, due to the ecological services they provide as well as their importance for recreation and leisure, Israel's riparian ecosystems have been in a constant state of deterioration during the last few decades, in every aspect assessed in this report.

Every major report that examined this issue during recent years arrived at the same conclusion, that this situation is not a Heavenly decree. Destruction of rivers is anthropological – the result of continual management failure and negligence over time.

Three national development projects that were promoted during the second half of the 20th century, lead to desiccation of springs and rivers and damage to aquatic habitats: river drainage, divergence of spring water for agriculture, and establishment of a drilling network for groundwater extraction. The time has come for a fourth national project – which will restore the rivers to their former health and glory. Rehabilitation of the rivers is in our hands – just as we spoiled, we can also make amends.

This report does not stop at presenting the destruction of river ecosystems – it also presents an achievable vision. The sea-water desalination network being established along the coastal strip provides an opportunity to reverse the trend of destroying Israel's rivers. Today, river rehabilitation needs to be a national mission. The challenge is not easy, it requires significant budgets and a long-term commitment, however is it definitely possible, if we put the issue high of our list of priorities and allocate the necessary resources. There is no doubt in my mind that the return on the investment, both for the public and for nature, will be worth the price.

This report presents an update on the state of the springs and wetlands in Israel, and describes the vision of the Society for Protection of Nature in Israel (SPNI) concerning the rehabilitation of wetland ecosystems, and sustainable management of natural water resources. The report consists of four chapters: The first chapter describes the importance of aquatic habitats and the ecosystem services they provide, and answers the question: what is a “healthy” river? The second chapter presents the threats to biodiversity in aquatic habitats in Israel, relating to the managerial hurdles that hinder river rehabilitation processes. The third chapter surveys the ongoing diminishing flow from Israel's springs. The survey raises pertinent questions concerning the way the in which Israel's natural water resources are mismanaged; demonstrates the disastrous consequences of over-extraction of groundwater on wetland ecosystems and focuses on the management of rivers as public assets. The fourth chapter presents an update on the state of the rivers in 20121, with respect to issues such as the state of the springs, water quality, and sewage removal from the rivers. Moreover, the chapter presents data on the historical amounts of water in the different streams and rivers, detailing the vision of SPNI for rehabilitation of water flow in each river. In the report summary we have concentrated the principles and the vision of SPNI for ecological and hydrological rehabilitation of rivers in Israel.

May this vision take shape, and the day will come when we will enjoy clean flowing rivers, and our children will play and swim in our country's coastal rivers.

This report, as well as the multitude of activities that SPNI conducts to promote rehabilitation of Israel's streams and wetlands, are made possible due to the generous contribution of The Beracha Foundation.

Nir Papay

1 Data updates from the 2008 Rivers Report (Perelmuter, 2008)
Healthy and functioning rivers and aquatic habitats provide essential ecosystem services for the wellbeing of humans. Aquatic habitats provide flood control and runoff management services in the upper reaches; sedimentation of eroded soil and increased soil fertility in valleys; purification of water from sediments and organic pollutants. Rivers function both as corridors that contribute to the maintenance of ecological continuity in natural systems, and as high quality leisure and recreation areas, between urban areas and within cities.

Despite the enormous importance of rivers and aquatic habitats for the wellbeing of humans, freshwater ecosystems around the world have suffered, and continue to suffer critically, from urban development. Many factors damage biodiversity and ecological functioning of freshwater ecosystems: drainage and destruction of aquatic habitats by turning them into residential or agricultural areas; alteration of water flow in springs and rivers; over-exploitation, pumping and pollution of water resources; introduction of alien (invasive) species to aquatic ecosystems.

The deep crisis in which Israel’s water system currently finds itself is mainly expressed in the dangerous deterioration in the state of natural water resources and severe damage to aquatic habitats: springs, rivers, swamp habitats and winter ponds. One of the main changes that rivers and aquatic habitats in Israel have undergone is the disastrous disappearance of water from perennial rivers, and the desiccation of aquatic habitats. Most rivers in the country’s north and central regions – those that in the past had water flowing in them throughout the entire year - are today intermittent rivers in which only rainwater flows; even worse, in Israel today only 3% remains of the total area of aquatic habitats that were part of Israel’s landscapes in the early 20th century (Glazman, 2010). Moreover, all of the coastal rivers and most of the rivers in the valleys are polluted by sewage and industrial wastewater, and their unique characteristic plant and animal species are fast disappearing.

Promoted during the second half of the 20th Century, three large-scale developmental projects are at the bottom of both the desiccation of springs and rivers in the north and central regions of the country, and the disappearance of aquatic habitats from the country’s landscapes. The first project was a wide-spread river drainage, in order to create agricultural fields in drainage basins; the drainage projects straightened the rivers’ meanders, and created agricultural fields in close proximity to river banks – at the expense of the river corridors and floodplains.

The second project consisted of the diversion of spring water for use by local agricultural settlements. Until today, water flowing in most springs is captured at the flow points in concrete pools, and pumped directly from the springs for irrigation. The diversion of spring water minimized the water in most rivers, thus transforming many perennial rivers into intermittent rivers.
The third project that is desiccating rivers in Israel is the drilling network used for the extraction of groundwater. Over-pumping from the groundwater store and reduction of water levels is leading to salinization and pollution of groundwater in some of the basins, moreover, resulting in waning spring flow. Findings from a survey conducted by the SPNI (presented in Chapter 3) show that out of the 90 springs assessed in the survey, 60 are in a waning inclination. Some of these springs have lost 30-50% of their flow during the last 30 years. Processes of salinization and the waning of spring water flow raise two pertinent questions, relating: a) to the damage caused to rivers as a result of over-extraction of groundwater; b) to the “treading on the edge” policy of exploitation of natural water resources in the State of Israel.

The vision of SPNI: principles for river rehabilitation

In the next few years the State of Israel will enter an era during which large amounts of water will be desalinated, and it will be possible to supply a significant portion of urban water consumption with desalinized water. Already today (2012), about 300 million cubic meters of water are desalinized annually. In 2014 the desalination rate is expected to increase to 565 million cubic meters per year. In 2020, the amount of desalinized water is expected to exceed 650 million cubic meters per year, expected to supply the entire water demand of the urban sector (from the Master Plan for the Water System – Water Authority, 2011). Releasing the dependence of the urban sector on natural water resources, in addition to increased usage of treated wastewater for agriculture, will allow the rehabilitation and stabilization of the groundwater store and of the water level in the Sea of Galilee, and furthermore, the restoration of natural spring flow in Israel.

In light of the revolutionary change in the national water system, SPNI is promoting a vision of restoring the water flow in nature, and urges governmental ministries to bring about and to lead a major change in the policy for the management of natural water resources in the State of Israel.

Restoring water flow to rivers

⇒ Sustainable management of natural water resources: One of the keys to restoring water flow in nature is the rehabilitation of water levels in aquifers, accompanied by sustainable management of natural water resources. High groundwater levels, expressed as natural spring flow, indicate normal drainage of natural below-ground water reservoirs. Sustainable management of natural water resources means using only the natural rainwater recharge (the “interest”), avoiding over-extraction from the baseline water store (the “capital”), and defining red lines and restrictions on the usage of natural water reserves.

⇒ De-capturing the springs and flow rehabilitation: Conservation and rehabilitation of rivers and wetlands will be based on natural water sources and natural
flow. The aim is to restore the historical quantities of water that nourished the rivers and wetlands, thus trying to restore the seasonal and spatial flow patterns that characterized them in the past. It is imperative to release all diverted spring water to flow freely in nature, at the same time providing alternative solutions for human consumers. **Usage of treated wastewater for river rehabilitation will not be allowed.**

In recent decades, the governmental authority responsible for management of water resources in Israel ("The Water Authority") is promoting a policy of over-exploitation of groundwater in most of the basins in Israel, at the same time avoiding clear definition of red lines for groundwater pumping and maintenance of water levels in the different basins. Reduction of groundwater levels is drying the flow of dozens of springs in the Galilee, the Golan, the Valley Regions and the Coastal Plains. **We categorically demand that, in all areas where there is a threat to spring flow, no new drillings will be added, and groundwater extraction will be strictly minimized, until rehabilitation of natural spring flow is achieved. Criteria and restrictions (red lines) will be defined and imposed on the exploitation of natural water resources, also on the reduction of groundwater levels in all basins. Furthermore, guidelines for the rehabilitation of groundwater store and for the stabilization of the water level of the Sea of Galilee, should also be determined and imposed, together with progress in the formation of a seawater desalination systems.**

The prognosis is that the rehabilitation of the water resource store and the raising of the groundwater levels will lead to strengthening and renewal of flow in some of the dry springs. The program for returning the water to the rivers will determine the necessary conditions for the different rivers, thus providing the infrastructure for the rehabilitation of the ecological function of all aquatic habitats. Fulfillment of the vision for restoring water flow to rivers needs to become a inherent part of the program for sustainable management of the water sources in the State of Israel.

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Currently, fresh water flows along no more than 218 km of Israel's rivers, and most of the rivers are badly polluted. After river rehabilitation, fresh water will flow along no less than 600 km of Israel's rivers, and the river ecosystems will be vital and healthy.

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**Integrated management of rivers as a basis for rehabilitating the provision of ecosystem services**

- **Adopting an eco-hydrological approach to river management**
  Instead of the drainage approach currently accepted for river exploitation, SPNI is promoting an eco-hydrological approach to river management. The eco-hydrological approach is an integrated management concept, whose motto is the restoration and broadening of the riparian corridors along rivers, at times even at the expense of agricultural fields which today are being cultivated right up to the river’s banks (within the floodplain). The broadening of natural river corridors will allow the rehabilitation of
the meanders and floodplains in the upper reaches of the rivers, in order to moderate flash flooding in the lower reaches and to rehabilitate aquatic habitats. Rehabilitation of the hydrological and ecological systems within the rivers’ corridors will contribute to provision of ecosystem services in the river basin, thus increasing the public value of the rivers – both as ecological corridors for nature conservation, and as open spaces for leisure and recreation.

**Changing the managerial structure and merging authorities for river management**

The hurdles facing river rehabilitation in Israel are related, among other things, to the fact that the responsibility for issues concerning river management, is currently divided both among different laws, and among several government authorities. Those authorities are driven by different, sometimes conflicting, interests. The division of responsibility and the numerous laws make it very difficult to rehabilitate public river values, hindering progress towards integrated management of rivers and natural resources in drainage basins.

SPNI has adopted the conclusions of a policy study conducted by the Open Landscape Institute (OLI) of SPNI, in collaboration with representatives of various authorities dealing with river management (OLI, 2011). The study proposes a model for integrated river management within the framework of a single management entity; this entity will be responsible for most of the issues concerning above-ground water management, reduction of soil erosion, and conservation of natural resources in drainage basins of rivers. The study’s authors propose three main changes: 1) converting from the one-dimensional accepted approach for river drainage, to a multi-dimensional approach, based upon the rehabilitation of river function from different viewpoints: environment, ecology, drainage, landscape and leisure. 2) the establishment of a national authority for the management of drainage basins. This establishment will act under the authority of a national council for drainage basins (namely, a balanced public body whose role will include public control and balancing of interests in decisions related to river management). 3) a broad change in the legislation concerning the division of responsibilities by government ministries on the issues of river rehabilitation and management.