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The Rivers of Israel

Policy and Planning Principles

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Rehabilitation of Israel's Rivers

Rehabilitation Israel's rivers is one of the central issues dealt with by the Israel Ministry of the Environment. It encompasses multiple fields such as the preservation of open spaces, water resource pollution prevention, treatment of solid waste hazards, municipal and industrial sewage treatment, education, and development of natural leisure places for public enjoyment.

The Israel River Restoration Administration, which was established by the Ministry of the Environment in 1993, has accrued a number of achievements with regard to protection of river corridors. This has been achieved through the preparation of outline plans, enforcement of pollution reduction, enhancement of public awareness to the importance of river restoration, and development of river-side parks open to the public.

Nevertheless, the lack of a clearly written policy paper, outlining the principles of river restoration, was clearly felt. Such a document is necessary to guide the various authorities which deal with this issue, including government ministries, drainage authorities, local authorities and non-governmental organizations.

The policy paper presented here outlines a compilation of the knowledge that has been gained in other countries as well as the experience accumulated in Israel in the last decade. It should be useful to decision-makers and operators alike.

I am confident that the policy paper before us is a crucial step in the development of ideas and in planning the restoration of Israel's rivers, as we embark upon another decade of blessed work.

Dr. Miriam Haran

Director General, Ministry of the Environment

PROLOGUE

From time immemorial, the riparian environment attracted human habitation. The first settlement of the world originated in the four rivers emanating from Eden, which enveloped and defined the countries of antiquity (Genesis 2). The major civilizations of ancient times developed along riverbanks: the Egyptian civilization - on the banks of the Nile; the Mesopotamian civilization - on the banks of the Tigris and Euphrates. Many of the rivers, both in Israel and in the world, are associated with the chronicles of human history and bear important chapters of historic memory, Jewish and general alike. The river, constantly flowing and changing, is inherently different from its surroundings - creating and marking a place, replete with values, memories and traditions.

The proximity of human dwellings and rivers has led to mutual dependence and reciprocity. Man has exploited the river for his own needs - pumping water, fishing, draining land, navigating and engaging in commerce. The threats posed by the river to human residence, whether in the form of floods or marshes, have led to comprehensive, and at time aggressive treatment - marshes at the edges of rivers were drained, flow paths regulated and deepened, meanders shortened and straightened, riverbanks stabilized - all in order to prevent floods, increase drainage efficiency, and enlarge the land area available for human settlement.

Such activity has necessarily taken a toll on the river. Sewage discharge and water pumping disrupted its ecological balance and its self-renewal and rehabilitation capacity. Biodiversity dwindled beyond recognition, and the river's expression in the landscape became blurred and distorted.

In the second half of the twentieth century, and especially over the past twenty years, recognition of the scope of the damage caused to rivers and of the need to restore them began to infiltrate into public consciousness and planning frameworks. Instead of exploiting the river in order to fill specific needs in the short term, a comprehensive approach was formulated, with an environmental orientation, in which the river was viewed as a system with unique features, which is worthy of conservation, restoration and sustainable development.

River pollution was the first subject to be raised on the public agenda in this regard. In the developed world, pollution prevention is regarded as self-evident. Sewage discharge into a river is deemed

illegitimate, and restoration plans are based on the assumption that pollution has been or will soon be stopped.

At a later stage, additional principles for river restoration were established, including landscape preservation, ecological restoration and cultivation of recreation and leisure areas. These objectives are central elements in today's river conservation and development programs.

Accumulated experience shows that river restoration is a lengthy process, lasting many years. It involves multi-purpose activities, including cessation of sewage discharge, clean up of riverbeds, re-creation of flow paths, and facilitation of natural processes of habitat renewal. Restoration of water to rivers is an absolute necessity, with prime ecological and landscape impact, and with high value in terms of its contribution to leisure, quality of life and tourism services.

At the same time, the fact remains that the wheel cannot be turned back, that the continuing impact of humankind on rivers cannot be totally nullified. Restoration objectives are therefore formulated in more moderate terms, which focus on minimizing damages and conserving the dynamic ecosystem in the river, whereby human intervention is considered an inseparable part of this system.

The possibility of improving the condition of Israel's rivers is more real today than ever before. The Israel River Restoration Administration, founded by the Ministry of the Environment and the Jewish National Fund (KKL) has initiated wide-scale activity, throughout the past decade, in relation to water treatment, ecological restoration and development of leisure and rest areas on riverbanks. Its activities, alongside growing public awareness, open a window of hope for a better future for Israel's rivers and their environment.

Dr. Yeshayahu Bar-Or
Head of Department of
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OVERVIEW

This document summarizes and presents ten years of river planning and restoration in Israel. These years have been characterized by wide-ranging activities and high hopes. Today, with river restoration at its height, it is only fitting to stop in order to examine past activities, survey the guiding principles of river plans, and establish them as planning guidelines for the future.

Within the framework of this document, the principles, outlooks and perceptions which have served national river planning are compiled. These foundations have been widely discussed within the framework of the Israel River Restoration Administration, in the documents produced by this organization, and in river restoration plans themselves. In this respect, this document seeks to consolidate the theory and practice of different aspects of river planning, based on past experience. In the framework of the document, the experience of other countries in river restoration is also presented. It is only fitting that this experience should serve future planning and implementation in Israel.

Alongside the compilation of material, other aspects are discussed: the place of rivers in national planning frameworks and their function as central axes in the open space system and the national drainage infrastructure, and as setters of the foundations of physical planning in Israel.

There is a clear advantage to the compilation of the information and its placement on a national scale: the advantage of the whole over the sum of its parts. The possibility now exists to review river planning activities in a national and comprehensive context, a review which is substantially different from localized observation alone.

This study represents more than a summary or an epilogue; it is in fact a prologue, an opening toward new and critical thinking, which leads the way to wise restoration of Israel's rivers in the future.

Part A - Introduction

Framework

The purpose of this document is to **formulate planning principles and a comprehensive national policy on river restoration, regulation and management**. This subject has become a central issue in the framework of national plans. The document presents a planning approach in which river restoration is viewed as an inseparable part of physical-spatial planning in Israel. As a convergence point for open spaces, rivers provide a framework that aids in preserving the continuity of open spaces and introducing a structure for open spaces in national plans. The main points of this conception were integrated in Israel's masterplan for the 21st century (Israel 2020) and in the Integrated Outline Plan for Planning and Building (NOS 35), and they provide the guiding principles for river planning on regional and local levels.

River Restoration Worldwide

River restoration holds an important place on the environmental agenda of the Western world. Trends and worldviews on the subject have undergone an unrecognizable transformation over the past few decades: from a one-dimensional vision based on controlling and harnessing the river - by damming, shortening of meanders and walling of riverbanks - to a view in which the conservation and cultivation of the river's ecological and landscape values are central goals. Within the framework of "green" approaches, changes in perception have also occurred - from an attempt to freeze the existing state of the river or to reconstruct its "pristine" characteristics - to a conception of the river as a dynamic, frequently changing system, in which **the goal is to preserve river processes**, rather than a static situation of one type or another.

The measures taken in different countries to achieve improvements in the state of the rivers are wide and varied, and they integrate planning, restoration, legislation, enforcement, information exchange and public participation.

River Restoration in Israel

River and spring systems have been severely damaged as a result of the intensive exploitation of Israel's water resources. Overpumping of groundwater and impounding of spring waters have blocked the natural flow of the rivers. Watercourses, which once abounded with water, vegetation and wildlife, have been transformed into barren and dry channels. Moreover, with the growth in population and its concomitant requirements, public authorities and private bodies began to discharge solid waste and municipal and industrial sewage to riverbeds. Pollution at one point of the river immediately impacted other points along its path and affected the entire ecosystem. Rivers were thereby transformed into a national network of waste and pollution conduits. It may be said that Israel's rivers still constitute ecological and aesthetic nuisances which pollute the environment, groundwater and open space.

Part B - Principles of River Restoration

River restoration and the recovery of the river's environmental and social functions have taken an increasingly important place on Israel's public agenda in recent years. Most of the country's river restoration plans and activities are implemented by the Israel River Restoration Administration, headed by the Ministry of the Environment and the Jewish National Fund, in cooperation with drainage authorities, green bodies and government ministries.

Restoration activities are already bearing fruit — in raising interest and awareness of the subject among authorities, planners, research and educational institutes and the general public, and in significantly changing the condition of the rivers. The ideas and plans raised in recent years on river restoration constitute a conceptual platform, a basis and background to this document of principles.

River restoration, planning and management are meant to achieve a wide range of targets in different and varied realms. Specific and detailed chapters are dedicated to each of the different aspects of restoration - integrative, ecological, hydrological, and social.

Integrative Aspects

Rivers bear the foundations of the national open space system and play an important part in shaping the relation between built and open. This document presents the integrative function of rivers, their relative advantages in different parts of the country, and the means of strengthening and exploiting their inherent potential in suitable sites.

The contributions and advantages of rivers in different parts of the country can be divided into a few topics:

Shaping and consolidating the spirit of the place: Rivers strengthen the cultural and scenic character of an area and preserve its inherent natural resources. These are primary functions for rivers flowing in the open space in the north of the country and in the Negev.

Creating buffer zones between urban systems and delineating the relation between the built and the open: This function is dominant for rivers which transverse the densely populated heart of the country, for they congregate open space around them thus separating built up and open areas.

Social functions: Rivers serve as green lungs and leisure areas, and as metropolitan parks that strengthen the urban image. These are the central functions of urban rivers which transverse the city or its environs.

Hydrological Aspects

Restoration of Water

Restoration of water to the rivers: The ultimate aim of restoration is recovery of the historic flow of clean water in the river. Under today's conditions of severe water scarcity in Israel, intermediary means, such as discharge of effluents along with fresh water, will be needed. Discharge of water to the rivers will be at a quality, quantity, place and season, which are most suitable for river restoration and revitalization. Efforts should be focused on developing an awareness of the river as a legitimate consumer of water, equivalent in value and importance to agricultural areas, public gardens, pools and domestic consumption.

Continuity of flow in the riverbed: Israel's rivers are characterized by a regime of high tides and floods. Preserving the natural characteristics of the hydrological system allows the river to fulfill its water transport function and to minimize flood damages. Therefore, the restoration plan will assure riverbed continuity and water flow and regularization of proper drainage in the river and its surroundings.

Water Quality

Good quality water: Sewage and waste discharge into riverbeds has been legitimized for too many years. As a result, numerous rivers have been transformed into open sewage canals. A prerequisite for the restoration of river systems is the cessation of discharge of pollutants and the treatment of wastewater. River plans will specify water quality standards for the river and the activities necessary to achieve them.

Drainage

Drainage plans: River plans will include a comprehensive chapter on drainage issues. Steps should be taken to prepare a national outline plan on the subject.

"Green drainage": Drainage requirements will be met, as much as possible, while preserving the natural course of the river, protecting natural and landscape values and preventing damage to them. Drainage facilities, which were established in the past and which harmed landscape and nature, will be examined for the possibility of converting them into "green" and natural drainage measures which are integrated in the existing natural system.

Maintenance of drainage paths: Proper and routine maintenance of drainage paths is necessary for their continued existence and will be assured, in good time, within the framework of the river plan.

Watershed management: Israel's rivers will be managed as a single system whose significance is

expressed in the wise distribution of different land uses in the watershed area, based on a recognition and understanding of physical and hydrological features, in order to achieve optimal preservation and utilization of water resources, and to control flooding for infiltration and enrichment of groundwater.

Floods

Creating a balance between flood control and the river's ecosystem needs: A balance must be found between flood control measures taken to prevent damage to people and property and the necessary flood regime to maintain the river's ecological processes.

Flood water collection: Collection of flood water can provide a valuable supplement to the national water supply. However, attention must be given to its effect on the river's flood regime. The advantages and disadvantages of the location of the reservoir, whether in the river bed or to the side, should be considered in accordance with the river's specifications.

Surface Runoff, Erosion and Soil Conservation

Soil stabilization through impoundment and stratification: In arid areas, runoff will be managed by impounding it upstream and by stratifying slopes, developing limans to capture runoff, rehabilitating and maintaining stone terraces and building new terraces and facilities for stabilizing the heads of active riverbeds. Capturing and impounding runoff will facilitate more intensive infiltration of water to the soil and development of vegetation to aid in soil stabilization.

Soil stabilization through changes in agricultural management: Soil conservation and erosion prevention call for management of agricultural areas - undertaking special measures for agricultural cultivation in steep areas, promoting contour cultivation, maintaining vegetation cover, avoiding cultivation in riverbeds, and utilizing devices and structures that control runoff and stop erosion.

Ecological Aspects

Preservation of Ecological Values

Restoration programs will distinguish between rivers with different levels of ecological sensitivity, will aid in protecting the diversity of species in the river and its environs and will call for strict limitations in high-value sections (such as spring areas or habitats of rare species).

Ecological Corridors

Israel’s rivers play an important role in creating a national system of ecological corridors. The river serves as an axis which links open spaces and constitutes a corridor for animal migration and distribution of vegetation. Therefore, restoration plans will take care to preserve the continuity of the river corridor, assuring that it will not be fragmented by development and infrastructure.

Preservation of a Natural Course and "Green" Restoration

The natural course of the river has ecological and scenic value. River meanders and changes in the depth of riverbeds support unique habitats. River plans will present instructions on preserving

the natural course and natural riverbanks while preventing the straightening and shortening of meanders, concrete walling or underground conduits which conceal the river. Intervention for restoration purposes will be integrated, to the greatest extent possible, in the natural landscape and in "green" technologies such as stabilization with the aid of vegetation.

Social Aspects

Tourism

Cultural and tourist importance: Some of Israel's rivers have major cultural and historical importance. They are cited in the Bible, their names are associated with historic events which took place in their realm, they constitute landmarks in history and in human consciousness, and they tell the story of the country. These rivers should be integrated into the national tourism system and should be accentuated, documented and marked as essential elements in the heritage of the land.

Along the rivers' course: Rivers cross Israel's landscape from the mountains to the sea and desert, creating an opportunity to transform them into central axes along the hiking and touring routes of Israel. The river restoration plans hold this hidden potential to transform rivers into hiking trails that link the attractions and areas around them.

The river's advantages as a travel route: A river provides many advantages as a walking and hiking route. Its path is clear and animals and flora that depend on the springs and water supply can always be found along its banks. The river banks also expose earthen walls, presenting the geological cross section – a window to the past. The interesting morphology, the flowing water, the plant renewal, the gathering of animals that come to drink water and search for hiding places amongst the shrubbery – all of these components make the journey alongside the river a fascinating and interesting experience. The continuous course of the river and thus the ability to walk for hours without interruption or disruptions, add to the river's importance as a touring and hiking path.

Development of leisure, tourism and recreation: The river will serve as a green lung for leisure and recreation uses. The river will penetrate into the urban area, by means of its tributaries, and will bring nature and open space closer to the urban population. River restoration plans will present guidelines and instructions on the development of means of leisure, cultivation of vegetation, trails, and facilities along the river strip and its environs, with consideration for carrying capacity.

Continuity principle: The public right to free movement will be assured along the river axis. This principle will guide river master and outline plans as well as the establishment of paths along the riverbanks, which will preserve the continuity of passage for the benefit of walkers and cyclists.

Economic Aspects

Economic benefit of river restoration: River restoration is perceived as an ecological and social concern, but it has significant economic aspects as well. Restoration requires significant investments,

which will bear fruit in the future. Models should be developed to economically assess the benefits of the river, based on real estate values, tourism and recreation, flood prevention, etc. River programs will include an economic chapter, which will present these estimates.

Recruitment of the business sector for restoration: River plans will provide the possibility of recruiting businesses, which are based on the river's nature and landscape values, to finance and maintain restoration.

Community Participation, Education and Information

Information and education: River administrations will develop tools to explain the values of the river to the general public and to increase awareness of the need for conservation and restoration. Information activities will be based on educational programs, riverside tours, urban "river days", adoption of river segments, etc.

Public participation in planning and restoration: Local communities have an inherent interest in restoring rivers which pass in proximity to their place of residence. Municipal authorities and river administrations will develop means for cooperating with residents, who will take part, at different levels, in restoration activities.

Alongside the principles for river restoration, frameworks and principles were drafted, delineating the means to restoration and the form of management, organization and maintenance that will be applied to the restored river.

Nuisance Prevention

Infrastructure Passageways

Infrastructure must be constructed as far as possible from the river's path. Plans to place infrastructure adjacent to rivers will require the preparation of environmental and landscape impact statements to identify the best possible route in terms of ecology and appearance and to minimize the potential damage. Infrastructure lines should be concentrated into one corridor to prevent them from crossing the river's path.

Solid Waste

Solid waste disposal into the river and its environs should be prevented through enforcement and increased supervision. Public awareness of the subject and its potential hazards should be raised through education, information and clean-up campaigns by volunteers from the communities that border the river.

Mining and Quarrying

The river plan will devote a chapter to mining and quarrying nuisances that will relate to mines and quarries, both authorized and non-authorized, in the area of the river. The plan will evaluate the

environmental damage by these sites and propose methods to minimize the damage and the tools to restore inactive quarries.

Monitoring and Maintenance

Budgetary and Administrative Framework for River Maintenance

Overall maintenance of the river, its facilities and surroundings will be assimilated in the restoration plan from the outset. The restoration project will be conditional on the availability of a budget and an administrative framework capable of undertaking ongoing management and following up on its results.

Minimal Maintenance

The river plan will aim at facilitating the river's potential for self-restoration and renewal, so that requisite management will be as minimal as possible.

Monitoring

The preservation of the achievements of river restoration requires ongoing monitoring of the river's condition and of the potential sources of pollution that may flow into it. Monitoring will entail sampling of the river water and riverbed as well as sampling of reservoirs, wastewater treatment facilities, industrial plants, agriculture and other factors that may discharge water to the river.

Law, Administration and Organization

Preference for river-linked uses: Along the river axis and the river's impact area, preference will be given to land uses which are related to the hydrological, ecological and social functions of the river. These include designations which regulate such subjects as flow, drainage, pumping, green development, habitat restoration, planting, maintenance, and leisure and recreation uses. Uses, which are not necessary and vital to the river vicinity, will be moved further away to other areas.

Single integrative water law and river administration with wide-ranging authority: The administrative system which deals with water in Israel is complex and multi-branched, with each individual authority responsible for treatment of one aspect of the issue alone. This has prevented the implementation of a comprehensive river policy. Establishment of a single administrative authority to deal with all water issues in the river in an integrated manner is a prerequisite for river restoration.

Coordination: The river plan will be coordinated with the regional planning body, especially concerning issues that are directly related to it. For example: sewage treatment and disposal plans, urban and agricultural drainage plans, solid waste removal and planning for open and urban spaces in the river's vicinity.

Watershed management: The authority's activities can only be effective if they span the entire drainage basin and relate to comprehensive planning of all of its water resources. This approach will facilitate the implementation of a water policy that takes account of the full gamut of impacts within the hydrological basin.