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The effectiveness of the protection of riparian landscapes in Israel

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ABSTRACT

Riparian landscapes are natural habitats of unique ecological, environmental and scenic values, which are highly sensitive to human intervention and impact. Yet, due to their qualities, and especially the presence of water, they are also usually attractive for recreation purposes. This is more so in arid and semi-arid zones like Israel. Nevertheless, in the past, the importance of riparian landscapes in Israel did not receive adequate attention in policy and planning. As a result, over the years they were exposed to various negative impacts, including pollution by industrial and agricultural effluents, diversion of water for agricultural and other purposes, and land use conflicts. Although in recent years, with the growing awareness of their ecological and recreational potential, considerable efforts are being invested in the rehabilitation of deteriorated riparian landscapes, their protection is still deficient.

This article reviews and examines policy tools used for the protection of riparian landscapes in Israel, focusing on legislation, institutional structure and physical planning as they emerge from relevant laws, reports and literature. It reveals, among others, gaps and deficiencies in legislation, institutional dualities along with split authorities both expressing a particularistic approach, and, until recently, lack of relevant designated planning. The article concludes by offering some suggestions for improving the protection of riparian landscapes in Israel, including: integration of existing laws based on a whole watershed approach; reorganization of institutional structure to facilitate a national vision of riparian landscapes rather than the existing particularistic approach; formulation of structured planning procedures to ensure the realization of designated national plans; and promotion of awareness to riparian values at various levels.

Introduction

Riparian landscapes are natural habitats of unique ecological, environmental and scenic values, which are highly sensitive to human intervention and impact. Yet, due to their qualities, and especially the presence of water, they are also usually attractive for development as well as for recreation purposes. This is more so in arid and semi-arid zones like Israel. Nevertheless, in the past, the values of riparian landscapes in Israel did not receive adequate attention in policy and physical planning. Consequently, they were exposed over the years to negative impacts, including pollution from various sources, water diversion for agricultural and other purposes, geopolitical disputes and land use conflicts (Bar-Or, 2000; Gafny et al., 2000). In recent years considerable efforts are being invested in the rehabilitation of deteriorated riparian landscapes in Israel. Nonetheless, according to a recent report most of the rivers and their surroundings still suffer from pollution and other negative impacts (Ministry of Environment, 2007).

This article presents the protection of riparian landscapes in Israel, describing the policy tools used up to the year 2000 and examining their effectivity, based on a study and analysis of relevant laws, reports and literature. The first part of the article introduces the importance of riparian landscapes, covering among others ecological, environmental and scenic aspects. It than presents the subject of riparian landscapes in Israel, and the factors that affected related policy and priorities. The second part reviews and examines protection tools, focusing on legislation, institutional structure and physical planning. The third and last part discusses the deficiencies that were revealed and proposes improvements to the existing state.

The importance of riparian landscapes

According to Naiman and Décamps (1997) a riparian zone encompasses the stream channel and that adjacent portion of the terrestrial landscape from the high water mark toward the uplands, where vegetation might be influenced by elevated water tables or flooding. The width of a riparian zone and the diversity of its functional attributes are related to the size of the stream, its position within the drainage network, the hydrologic regime and the local geomorphology (Gregory et al., 1991; Naiman and Décamps,

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1997). In other words, a riparian zone may be regarded as a linear physical landscape entity composed of aquatic and terrestrial components and the interface between them. Riparian landscapes are unique ecosystems, highly important ecologically and environmentally, which constitute a visually and functionally outstanding component of the open space system. They form complex habitats, richer than the average with species of plants, animals and microorganisms, thus contributing to overall biodiversity (Gregory et al., 1991; Naiman et al., 1993). These habitats and the richness of species they sustain are especially sensitive to various impacts and interferences, including seasonal or other changes in water physical qualities (e.g. temperature, salinity or electric conductivity) or quantities (Allan, 2004; Gafny et al., 2000; Gasith and Resh, 1999; Naiman and Décamps, 1997; Paul and Meyer, 2001; Pollock et al., 1998; Shandas, 2007). They are considered the most diverse, dynamic and complex habitats (Gregory et al., 1991; Naiman and Décamps, 1997).

Riparian ecosystems perform a variety of environmental and ecological services (Allan, 2004; Brauman et al., 2007; Hale and Adams, 2007; Naiman and Décamps, 1997; Naiman et al., 2000). Many of these are considered life-supporting systems, although they are difficult to evaluate in economic terms (Chavas, 2000). Due to their linear configuration, riparian landscapes are natural ecological corridors, allowing connectivity between habitats and patches in the landscape (Bentrup and Kellerman, 2004; Lees and Peres, 2008; Naiman et al., 1993, 2000; Van Der Windt and Swart, 2008). This is especially important in populated areas, where riparian landscapes may be the last remnants of open natural space within a built-up area. Also important in populated areas is their potential as catchment basins for floods, thus avoiding damage to property and lives (Brody et al., 2007; State Comptroller, 1993). In addition, they are attractive for recreation and leisure activities, and due to their linearity are natural candidates for greenway planning, combining opportunities for recreation with conservation of nature, landscape and heritage values (Asakawa et al., 2004; Bryant, 2006; Fábos, 2004; Toccolini et al., 2006; Walmsley, 2006; Weber et al., 2006). Open lands along rivers and streams are also often used for agriculture, because of their fertility, due to embedded sediments, and relatively level plains (Bentrup and Kellerman, 2004).

Riparian landscapes are extremely vulnerable to human impact. Their potential for conservation, recreation or agriculture is diminished by diverse conflicts and liabilities, such as: diverting river water for irrigation and other uses, which decreases the availability of water for ecosystem functions; pollution by industrial, agricultural and household effluents, which harm the landscape, disqualify water for irrigation, prevent recreational water-related activities (e.g. swimming and boating) and repel potential users in general; and land use conflicts. The presence of water attracts development, which unfortunately often ends up with the construction of buildings and infrastructure too close to the water line, thus interfering with the riparian ecosystem.

Considering their uniqueness and attractiveness along with their vulnerability, riparian landscapes need effective protection from inappropriate uses. This is more so in a hot and dry land like Israel.

The rivers in Israel

The priorities concerning water and riparian landscapes in Israel stem from physical conditions – mainly climate and geomorphology – combined with ideological and geopolitical factors. Israel is situated on the eastern side of the Mediterranean basin, with climate and geomorphology changing both along the north-south axis and the east-west one. The north and center of the country lie within the Mediterranean climate zone, characterized by a short rainy winter and a long, hot and dry summer, while the south is more desert-like (see also Gasith and Resh, 1999). The mountainous northern areas are the rainiest, with an average of 800–1000 mm per year, decreasing in the center to 500–600 mm, and decreasing down further to 100 mm and less towards east and south. These quantities may fluctuate considerably from year to year, affected also by frequent droughts. All these factors add up to a continuous water shortage (Bar-Or, 2000; Menahem, 1999).

The area of the state is intersected longitudinally by a series of mountain ranges that divide it into an eastern basin, where rivers flow towards the Jordan River, the Sea of Galilee and the Dead Sea, and a western basin, where rivers flow into the Mediterranean Sea, crossing the densely populated coastal plain. Due to the limited rain quantities, many river sections are in fact seasonal streams, drying out in the summer until the next rainy season. Only a few rivers that are fed by year-round springs have water flowing in all seasons. Seasonal streams' landscapes are exceptionally vulnerable because of the fluctuations in water availability for habitat performance (Gasith and Resh, 1999). This also affects their image as landscapes fit for conservation or suitable for recreation purposes. Consequently, they are under pressures for development, especially in areas of level topography.

The most important rivers considering landscape impact and recreational potential are in the western basin, crossing the coastal plain in Israel's core where the majority of the population (about 80%) is concentrated. However, their proximity to densely settled areas has resulted in their deterioration due to human negative impacts (Bar-Or, 2000). The deterioration is expressed among others by visual degradation of the landscape, decrease in ecosystem functions and loss of biodiversity (Gafny et al., 2000; Goren and Ortal, 1999).

In addition, the national water policy focused on keeping control over all water sources and prioritizing the use of water for agriculture and other uses. Thus, for example, since the mid 1950s most of the water from the Yarkon springs was captured and transported to agricultural fields in the Negev (the southern region of the land) through the Yarkon–Negev pipeline, while the Yarkon River, the main river in the core, densely populated area of Israel – once so wide and deep that the British soldiers had to cross by boats when conquering the land from the Turks in 1917 – deteriorated into a narrow and shallow stream, where most of the flow consisted of industrial effluents and initially treated sewage. The deteriorated state of Israel's riparian landscapes calls for examination of existing protection and management tools and their effectivity.

Protection of riparian landscapes in Israeli legislation

The protection of landscapes by legislation is a universally accepted model for the conservation of outstanding scenic and natural values (Maruani and Amit-Cohen, 2007). Yet, although legislation is a strongly effective policy tool, it has its drawbacks, including low flexibility, requiring a long bureaucratic process whenever a change in legislation is desired, which is complicated by conflicts between conservationists and developers and landowners. On the other hand, a statutory declaration is stronger than any other protection tool, and provides the relevant authorities with enforcement measures.

In Israel, legislation concerning water resources, including rivers, is complex, involving a multitude of laws and regulations as well as a multitude of authorities and organizations that are meant to enforce them (Laster, 2000). This section presents three laws that are the most relevant to the protection of riparian landscapes, as fol-

lows: the Water Law, the Drainage Law and the Rivers Authorities Law.

The Water Law

The Water Law, enacted in 1959, should be understood in the context of the scarcity of water resources in Israel on the one hand, and the centralistic governance style on the other (Menahem, 1999). The main objectives of the law were to secure the State's sovereignty over all water sources and ensure their utilization for the benefit of Israeli society. The law determines that "... the water sources in the State are owned by the public, controlled by the State and designated for its population and development needs. The water sources for that matter are the springs, the streams, the rivers..." etc. (Water Law, sec. 1-2). The law regulates the management of water sources, including allocation for users and preservation of water quality. For these purposes, the law created several institutions, among them a National Water Board, headed by the Water Commissioner. The law prioritized the agricultural sector, which at the time was regarded not only as a leading sector in the national economy but also as the ideological and political elite of Israeli society (Menahem, 1999; Schiffman, 1999). This was reflected in various attributes of the law, among them its subordination to the Minister of Agriculture, including the power to appoint the Water Commissioner, who was to lead the design and implementation of water policy in Israel. Thus, it is no wonder that the first seven elected commissioners were from the agricultural sector, as were also most of the National Water Board members (Menahem, 1999). The Water Commissioner used his powers to divert water from springs and rivers, and allocate it to consumers, thus reducing the natural flow, ignoring the ecological consequences, which in turn also affected negatively the attractiveness and availability of the surrounding area for recreation. Only 40 years later, in the 1990s, following ideological, political and social change processes in Israeli society, including the decrease in the economic and ideological importance of agriculture and the acceleration of development (Schiffman, 1999), the Water Law was transferred to the authority of the Minister of National Infrastructures, and some of its powers were split among several other institutions.

The only reference in the Water Law to the protection of land near water sources is the available option to define buffer strips that are wide no more than is necessary for the purpose of the buffer strip. Thus, the Water Law reflects a utilitarian approach towards water resources, and almost completely ignores the protection of landscape or other values embedded in the terrestrial area outside the water itself. Although some years ago the law was amended, and to the list of objectives for water allocation was added the "...protection and rehabilitation of nature and landscape values, including springs, rivers and wetland habitats" (sec. 6), there is no other reference to such a goal anywhere else in the law, and its implementation is totally dependent on the awareness and good will on the part of decision makers. It should also be noted that the interests of the Head of the Water Authority (who replaced the original Water Commissioner, following an amendment from 2006) and the Ministry of National Infrastructures do not coincide with the interests of landscape conservation. This was even more true in the past, when the main interest of the Water Commissioner and the Ministry of Agriculture was the supply of water to the agricultural sector.

The Drainage Law

The Drainage Law (or in its full name: the Drainage and Flood Prevention Control Law) was legislated in 1957, after floods in the mid 1950s covered vast areas in Israel, mainly agricultural fields, causing severe economic damage. The objective of the law was to prevent the recurrence of floods by forming suitable institutions to manage drainage. This law, too, was – and still is – subordinated to the Minister of Agriculture since agricultural lands were perceived as being the most threatened by potential floods. The priority given to agriculture is expressed in the first section of the law, which defines drainage as any operation intended to concentrate, to store, to carry or to remove surface or any other water that harm or may harm agriculture, public health, etc.

The Drainage Law states that the Minister of Agriculture may establish a drainage authority (sec. 11), but the establishment of such an authority is not obligatory. The law also specifies the duties and powers of such an authority, including regulating drainage and initiating drainage projects within its jurisdiction. The roles of a drainage authority as they are specified in the law do not refer to the protection of the relevant riparian landscapes in any other way. In addition to drainage authorities, the law determines the establishment of a National Drainage Board to advise the Minister on matters of drainage, such as the declaration of drainage zones or the approval of drainage projects (sec. 2). This is an obligatory body, complementing the relevant institutional structure for regulating drainage and preventing floods.

The Drainage Law defines some relevant terms for its purposes, including "channel" and "buffer strip". A channel is defined as river, stream and any other water route where water is flowing or standing always or occasionally. A buffer strip is defined as strips of land along both sides of a channel (sec. 1). The law prohibits agricultural cultivation or construction within a buffer strip. However, the overall width of buffer strips on both sides should not exceed half the channel's width, and no more than 5 m each (sec. 5-6). Given such conditions it is needless to say that the potential protection of the riparian habitat is very limited.

The Drainage Law, like the Water Law, expresses the priority given to agriculture. Most drainage projects during the 1960s and 1970s were intended to solve drainage problems in agricultural and open areas, although in populated areas potential damage from floods to property and life is much higher. Moreover, since the legislation of the Drainage Law in 1957, the scope of development for residential, occupational and infrastructure uses increased greatly, much of it was at the expense of open and agricultural lands where rains could have previously penetrated the soil. As a result, the amounts and intensity of surface flow towards rivers increased considerably, and with them the risk of floods. Nonetheless, the Drainage Law was not updated to include instructions regarding measures for the control of drainage in new development plans. This neglect resulted in recurrent flood events in various areas, causing millions of dollars worth of damage (State Comptroller, 1993, 1999a).

The Rivers Authorities Law

The Rivers Authorities Law (RA Law: the full name being "Rivers and Springs Authorities Law") from 1965 complements the Water Law and the Drainage Law by referring not only to the water but also to the adjacent land, thus expressing the values of riparian landscapes for the first time in Israeli legislation. This was also reflected in the ministerial subordination, which initially was to both the Ministry of Interior and the Ministry of Agriculture, transferred later to the Ministry of Environment after it was created in 1989.

The RA Law states that the Minister may establish an authority for a certain river or part of it or impose on a drainage authority powers of a river authority (sec. 2), meaning that a river authority – like a drainage authority – is not obligatory. Among the duties of a river authority the law counts the protection of the landscape

and nature values along the river on both sides, but also regulation of the river's water flow and drainage within its jurisdiction (sec. 3). In other words, there is a partial overlap between the duties of a drainage authority and those of a river authority, albeit they are related to different ministries. Laster (2004) claims that although the law was intended to manage the rivers on a watershed approach basis it actually did not enable that, since it demanded subordination to the Water Law and the Water Commissioner. Moreover, the jurisdiction of a river authority may not necessarily cover a whole watershed, as is the case with the Yarkon River Authority's jurisdiction that was limited to 20 m on each side of the river.

The RA Law was implemented for the first time in 1988 – 23 years after its legislation – with the establishment of the Yarkon River Authority. Six more years elapsed until the establishment of the Kishon River Authority, in 1994, which was the second, and so far the last. Laster (2004) comments that it took so long to implement the law because of the original subordination to two ministers. Another critical point is the lack of a national body, something like the National Drainage Board. In other words, the RA Law represents a particularistic approach, referring to each river separately and lacking a broad vision on a national scale.

Institutional structure

While legislation is a source of regulative powers, there is a need for institutions to use these powers and enforce the regulations. Out of several institutions that are related to management and protection of Israeli riparian landscapes, the most important are Drainage Authorities, River Authorities and the River Restoration Administration. They differ by their status, composition, main objectives, powers and budgeting.

Drainage Authorities

Drainage Authorities (DAs) may be established by the Minister of Agriculture, as already mentioned, subject to the consent of the Minister of Interior and the relevant local municipalities, which are also represented in its composition. The DA is responsible for initiating, developing and maintaining drainage projects within its jurisdiction. It may contribute to the protection of the relevant riparian landscapes also by restricting development along the water route.

In 1960, following the legislation of the Drainage Law, the Minister of Agriculture issued an ordinance establishing 26 DAs, specifying the jurisdiction allocated for each DA, generally consisting of low-elevated plains, mainly agricultural lands (State Comptroller, 1993). Laster (2000, 2004) comments that the large number of DAs was due to political pressures rather than hydrological needs. Most of them operated in fact as organs of the relevant Regional Councils (which are the local municipalities in the rural zones) and were dominated by representatives of the agricultural sector, thus reinforcing its control over water sources.

The recurrence of flood events implies the existence of deficiencies in the Drainage Law's implementation in general and in DAs' operation in particular. Especially memorable are the floods of winter 1991/1992, disrupting the course of everyday life and causing fatal casualties in addition to severe direct and indirect economic damage to households, businesses, public property and agriculture. The State Comptroller's report pointed out the DAs' faults, stating among others that the drainage infrastructure had been neglected over the years (State Comptroller, 1993).

Following the State Comptroller's report, the Minister of Agriculture issued in 1996 an ordinance reorganizing the DA system. Their number was decreased from 26 to 11, each one's jurisdiction overlapping a natural drainage basin, directed independently of the Regional Council system, thus intended to apply a whole watershed approach rather than serve local interests (Laster, 2000). Although some flood events have recurred since this reorganization, it seems that – especially since 2000 – DAs are taking more active measures to prevent flooding, revealing a more environmentally oriented approach, including the conservation of landscape and ecological values in riparian zones, in collaboration with environmental institutions and organizations, such as the Ministry of Environment, the Nature and Parks Authority and the Society for the Protection of Nature.

Rivers Authorities

A River Authority (RA), which is authorized to limit and control development along the river, is a potentially effective tool in the protection of riparian landscapes. However, this potential cannot be fully realized, partly due to constraints imposed within the RA Law, such as the obligatory compliance with the Water Authority (RA Law, sec. 4), even when their interests are contradictory. Conflicts between government officials and local municipalities' representatives in the RA's board and the existence of a DA in the same jurisdiction with partly overlapping responsibilities may also hamper the RA's functioning. In addition, the RA Law is particularistic, expecting an RA to manage independently a particular river, following its board's specific objectives and policies, thus disregarding the need for a leading national comprehensive policy towards riparian protection. With the absence of national policy, the influence of local interests may dominate, allowing development and infrastructure within or adjacent to riparian landscapes.

Nevertheless, an RA is still the only institutional structure that is essentially specified for riparian nature and landscape protection in Israel. The Yarkon River Authority (YRA), for example, was a pioneering model in river restoration in Israel. Since its establishment in 1988 the YRA initiated – and is gradually implementing – a master plan for the Yarkon River aiming to restore the riparian ecosystem, contribute to environmental quality, enhance aesthetic values and promote recreational activities. Regretfully, however, so far only one more RA was established (the Kishon River Authority). Although both the Yarkon and the Kishon rivers are large and important, passing through densely populated areas (the Yarkon in the Tel Aviv metropolis, in the center of the State, and the Kishon in the northern Haifa metropolis) several other large rivers in a similar deteriorated condition could have profited from such a specified institutional structure to manage and restore them as well.

The River Restoration Administration

The River Restoration Administration (RRA) was established in 1993 as a mutual initiative of the Ministry of Environment and the Jewish National Fund (JNF), the latter being a historical non-governmental organization that is currently intensively involved in forestry and outdoor recreation. Other institutions and organizations take also part in the RRA, including the Society for the Protection of Nature (SPNI), which is an environmental NGO. The aims of the RRA include, among others, formulation of an integrated national policy for preservation of rivers' environment and preparation of master plans for restoration (Bar-Or, 2000). The RRA initiates and promotes restoration projects, especially since 2000, and supports local river administrations. For instance, the RRA takes part in the steering committee of the successful restoration project for the Alexander River – a large coastal river in the Sharon region, and one of the first to enter a restoration program along with the Yarkon River. This is done in collaboration with 17 other governmental and municipal institutions and environmental NGOs. It is clear that

when so many organizations are involved, conflicts and clashes of interest are unavoidable, as might be the case with a strongly development-oriented organization like the Israel Lands Authority (ILA) confronting conservation-oriented partners like the Nature and Parks Authority and the SPNI. Such conflicts may hamper conservation efforts. However, the RRA that is guided by a statewide vision regarding rivers and riparian landscapes can bridge such controversies and promote restoration and conservation efforts.

Nevertheless, since the RRA is not a statutory body, and consequently lacks enforcement powers, the protection it offers is limited. Whenever action against polluters is needed, it is the Ministry of Environment that is supposed to interfere and take steps towards enforcement. In the absence of direct regulative powers it is also difficult for the RRA to stand against contradictory interests of local authorities. The RRA's potential effectiveness is reduced still further by budget limitations, since budget allocated for riparian management is divided among too many organizations, including DAs and RAs (Laster, 2004). The lack of a statutory basis is also a source of instability for the RRA, as it may be dismantled by a ministerial decision as quickly as it was established. Nonetheless, the RRA is so far the most dominant factor in river restoration in Israel.

Physical planning as a protection tool

Riparian landscapes are integral parts of the land. As such, physical planning of land uses at national, regional and local levels is a potentially strong tool for their protection. In Israel, land uses are determined by a statutory planning system, according to the Planning and Building Law (PBL) of 1965 (which replaced former British mandatory legislation from 1936). The system is three-tiered, with Planning Commissions at national, district and local levels, each having the power to initiate outline plans within its jurisdiction and to control lower-tier decisions.

National planning

The Sharon Plan

The Sharon Plan was the first comprehensive national master plan prepared after the declaration of statehood in 1948. The plan was initiated and prepared within the (then) Planning Department of the Ministry of Labor and Construction, by a team headed by architect Arie Sharon, and published in 1951. Although this plan was not statutory it nevertheless had significant long-range effects on spatial planning in Israel. The plan refers to five main facets of planning: agriculture, industry, transportation, parks and new towns. The agricultural plan is based on a national water policy that wishes to divert water out of relatively rich sources – among them rivers in the north and the Yarkon river in the center of the State – and carry them to the dry south, thus enabling agricultural settlements that are regarded by the plan as a key factor in development and economic independence (Sharon, 1951). In other words, the Sharon Plan again reflects the economic and ideological values attached to agriculture, and grasps the water of the rivers as input for agriculture and not as a landscape component to be protected.

The Sharon Plan proposed conservation of certain areas of outstanding nature and landscape values. Four of those were to be established immediately as national parks, among them two mountainous landscapes (Mount Carmel and Mount Jarmak), and two riparian ones, around the Yarkon and Ayalon rivers in the Tel Aviv metropolis and along the Sorek River west of Jerusalem (Sharon, 1951). However, while the Carmel and the Jarmak parks did materialize, the proposed riparian parks were ignored, as was also the call for using river corridors as buffers between built-up areas.

National outline plan (NOP) 31

Statutory planning in Israel at the national level is delineated in the NOPs. Out of almost 40 NOPs prepared up to date, only two represent comprehensive national planning. The first of the two was the Combined National Outline Plan for Construction, Development and Immigration Absorption NOP 31. It was prepared and approved in the early 1990s, when Israel was facing a crisis stemming from an unanticipated increase in population due to mass immigration waves from the former USSR (Alterman, 1995). NOP 31 was the first comprehensive national statutory plan to incorporate environmental considerations on a large scale, stating objectives like: conservation of nature and landscape resources, preservation of surface water quality, nurturing open spaces – among them riparian landscapes – for recreation, and balancing between development and conservation. Nevertheless, NOP 31 contributed to heavy development pressures in the metropolitan core of Israel, even in rural peripheral landscapes.

NOP 35

The Combined National Outline Plan for Construction, Development and Conservation NOP 35 was approved and ratified towards the end of 2005, substituting NOP 31, which became obsolete in 1998. This plan, too, aspires to balance between development and conservation, taking this a step further by dividing the whole country into zones – referred to as "textures" – defined as development-oriented or conservation-oriented in varying degrees. The delineation of conservation-oriented textures in NOP 35 was considerably affected by the Nature and Parks Authority's proposal for national ecological corridors, including critical segments of riparian landscapes (Shkedy and Sadot, 2000). In addition, the plan specifically refers to river strips – including the water route and the banks 100 m on each side – requiring every relevant statutory plan to refer to conservation of the river and riparian habitat, drainage functions and bank stabilization and secure free access to the public. This seems promising indeed, but it will take some years before its achievements can be assessed. Unfortunately, past experience teaches us that sometimes the planning system yields to development pressures notwithstanding NOPs directives. This is exemplified by several development projects within the coastal strip of 100 m despite the explicit directives of the Plan for the Mediterranean Coast NOP 13 (State Comptroller, 1999b).

Sectorial NOPs and NOP 34/b/3

Most national outline plans are sectorial, each dedicated to a specific subject (e.g. roads, power plants, etc.). None of the 30 plans that have been approved until the end of the 20th century was designated for the protection of rivers and riparian landscapes, although some of them may contribute to riparian protection, depending on the main plan's designation. For instance, the National Outline Plan for Nature Reserves and National Parks NOP 8 from 1981 offers protection to riparian sections within areas designated as nature reserves or national parks (see for instance Goren and Ortal, 1999), but other sections remain unprotected. The National Outline Plan for Forests and Forestation NOP 22 from 1995 proposes plantings along riverbanks, albeit only in small limited areas, most of them outside of metropolitan zones where demand for recreation is especially high. Another example is the National Outline Plan for Tourism NOP 12 that designates some rivers as recreational spaces. Yet, intensive development for tourism may have negative impact on riparian ecological and environmental values.

Only at the beginning of the 2000s the Planning Administration in the Ministry of Interior initiated and promoted the National Outline Plan for Rivers and Drainage NOP 34/b/3 that was approved and ratified in December 2006. This plan relates comprehensively

to riparian landscapes for the first time in Israeli national planning, by aiming to ensure the continuous existence and functioning of rivers and their surroundings both for rehabilitation and preservation of landscape, ecological and cultural values and for recreational purposes, while also ensuring their role as drainage channels and flood retention basins. NOP 34/b/3 reiterates NOP 35 by demanding a significant width for a river strip (100 m on each side of the river), imposing restrictions on potential land uses and activities within this strip. In addition, the plan requires planning commissions to take into account drainage aspects – along with other environmental considerations – and consider the relevant drainage authority's opinion when dealing with local land use plans or building permits within or close to a river strip. In other words, this national statutory plan introduces for the first time drainage considerations as an obligatory part of the statutory planning procedure.

Although NOP 34/b/3 is relatively new and it is too early to evaluate its actual effectiveness, it may prove itself as an important tool in the protection of riparian landscapes in Israel, provided its guidelines and instructions are indeed embedded in the planning system. For the time being this is not the case, as our interviews with officials of the Tel Aviv District Planning Commission have revealed. For the potential effectiveness of NOP 34/b/3 to be fully realized, planning procedures – and especially the preliminary checking before a plan is presented to the planning commission – must be restructured to ensure compatibility with the requirements of the national plan for rivers.

Regional planning

District outline plans (DOPs) are essentially guiding plans, like NOPs, relating fully or partially to one of the six administrational Israeli districts. By the early 1990s almost all valid DOPs were out-of-date, and none of them conceived riparian landscapes as objectives for conservation. The disregard of riparian functions is exemplified by the Ayalon Highway, which crosses the Tel Aviv metropolis through the route that once was the Ayalon River, leaving a rather narrow channel for winter water flow. In the winter of 1991/1992 – soon after the Ayalon Highway was opened at the beginning of the 1990s – it was flooded and transportation along the highway stopped for some time (State Comptroller, 1993). This has since recurred several times, causing also some casualties.

The Planning Administration in the Ministry of Interior promoted preparation of new DOPs, some of which have already been approved since 2000. The new plans are much more environmentally oriented, including special references and directives for riparian protection and conservation. For example, the new DOP 3/21 for the Central District designates "river and its surroundings" for conservation. However, there are considerable variations between DOPs in their definitions and conservation directives, which may cause confusion and inconsistency in protection offered by DOPs. Moreover, since most current DOPs are relatively new, it will be some time before their effectiveness in riparian protection can be evaluated.

Local planning

While national and district outline plans offer general guidelines, local outline plans (LOPs) are more detailed and serve as platform for issuing building permits. The permits are approved and issued by Local Planning Commissions, which are composed of the elected political representatives of the municipal board and are thus, in fact, organs of the relevant local municipality. As such, Local Commissions are more interested in the promotion of local economic development than in conservation, tending to ignore broader regional needs. Despite District Commission's control that is supposed to minimize the influence of local economic and political interests on land use decisions, development initiatives within riparian areas recur, assisted by Local Commissions regardless of their negative impact and potential flood risk (Brody et al., 2007; State Comptroller, 1993). The recurrent flood events in Israel imply that the District Commissions failed to adequately restrict local development interests.

Discussion

The examination of legislative, organizational and planning tools used for protection of riparian landscapes in Israel revealed flaws and deficiencies that may explain why, despite restoration efforts, mainly since 2000, almost all rivers are still polluted and ecologically deteriorated with only limited sections available for recreational uses.

Table 1 compares the effectiveness of protection tools by parameters of designation, relevance, power, scale and implementation as they emerge from the analysis above. The comparison shows that no one tool can be highly rated on all parameters. In addition, no parameter shows a consistently high rating for all tools. One fundamental problem is that no tool – with the possible exception of the RRA and the national rivers plan NOP 34/b/3 – is dedicated to the objective of protecting ecological, environmental and scenic values embedded in riparian landscapes. For example, although each of the laws examined makes some contribution to this objective they

Table 1
Comparative effectiveness of protection tools.

Protection tool	Designation	Relevance	Power	Scale	Implementation
Legislation					
Water Law	Low	Medium	High	National	Low
Drainage Law	High	High	High	National	Low to medium
River Authorities Law	High	High	High	National	Low to medium
Institutional structure					
Drainage Authorities	Medium	High	Medium	Regional	Low
River Authorities	High	High	Low to medium	Regional	Low to medium
River Restoration Administration	Very high	Very high	Low	National	Medium
Physical planning					
Sharon plan	Low	Low	Low	National	Low
NOP 31	Low	Low	Medium to high	National	Low
NOP 35	Low	Low	Medium to high	National	?
NOP 34/b/3	Very high	Very high	Medium to high	National	?
Other sectorial NOPs	Low	Low to medium	Medium to high	National	Low
DOPs	Low	Low	Medium to high	Regional	Low
LOPs	Varies with plan	Varies with plan	High	Local	Varies with plan

differ in aims and scope and none of them regards the protection of riparian landscapes as its main aim. In addition, none of these laws reflects a whole watershed approach, theoretically or practically, albeit activities taking place anywhere in the watershed area, especially development and various pollution generators, eventually affect the river and the landscape along it. The conservation interest is negatively affected also by the partial overlap between the aims and directives of the Drainage Law and those of RA Law, which are a constant source of ambiguity and fuzziness as to duties and responsibilities, on one hand, and inter-organizational and inter-personal frictions and conflicts, on the other.

The different tools are interconnected. For instance, legislation determines the structure, responsibilities and operational procedures of the organization intended to implement it. Subjects not covered by the law are left to the discretion of organizational decision makers. Hence, awareness of riparian values on the part of decision makers is an important factor in effective protection. Statutory physical planning, too, relies on legislative power, and therefore the existence or lack of inter-relations between laws may affect organizational actions. For example, the Drainage Law does not refer to statutory physical planning, while on the other hand the Planning and Building Law does not require a preliminary examination of possible impacts on drainage before the approval of a new development plan. The State Comptroller (1993) stated that the planning system allowed development too close to water routes and approved plans without ensuring suitable measures for rain infiltration within their boundaries. He argues that the severe floods that were the cause for his report could have been prevented, had suitable instructions been embedded in the Planning and Building Law, thus preventing construction within flood retention areas and conditioning plan approval with proper infiltration and drainage solutions. In fact, the national rivers plan NOP 34/b/3 was intended to fill in this gap.

The protection of riparian landscapes as was formulated and implemented in Israel expresses a particularistic approach, where each river is conceived as a discrete entity, with a separate DA or RA. For comparison, nature and landscape values within areas that have been declared as nature reserves or national parks all over the state are protected and managed by the Nature and Parks Authority, which is a national institution, established by the National Parks and Nature Reserves Law. It seems that the centralistic approach was efficient even when development pressures in Israel increased considerably towards the end of the 20th century. The establishment of the RRA indicates a conceptual change towards rivers as well, but its lack of statutory position and the multitude of other relevant organizations reduce its effectiveness.

The protection of riparian landscapes also reflects the evolution of environmental awareness in Israel (see also Fletcher, 2000; Vogel, 1999). For example, the Water Law from 1959 almost completely ignores the environmental functions of water sources, while the RA Law from 1965 already regards the protection of riparian environmental values as one of its main aims. The legislation also reflects the prevailing priorities in Israeli society at the time, affected greatly by ideological and national security considerations that prioritized agriculture, which was not only conceived as a main economic basis but was also used as a tool for dominating national space by dispersed agricultural settlements while environmental needs were overlooked (Schiffman, 1999). It should be noted, though, that all three laws examined were enacted before the global environmental revolution of the late 1960s. Moreover, as a consequence of the Stockholm Convention in 1972 Israel was one of the first nations to establish an environmentally designated institution in the form of the Environmental Protection Service that was established in 1973. However, the assimilation of environmental awareness was slow, especially among decision makers, until the 1990s when – following a sudden increase of population due to large immigration waves – development pressures increased considerably, threatening nature and landscape values, especially in the coastal area and in vicinity of water bodies. This also was one of the triggers for establishing the RRA.

It should also be noted that split authoritative powers, multiplicities and deficiencies that characterize the protection of riparian landscapes in Israel, tend to be typically characteristic of environmental issues, which are usually complex, interdisciplinary and bound up with economic and social conflicts. In addition, since its independence in 1948, Israel has been facing enormous challenges more than any other developed state, including an unstable geopolitical situation and recurrent wars, absorption of mass immigration waves and serious social conflicts (Alterman, 1995; Fletcher, 2000; Vogel, 1999). Nevertheless, all this still does not explain why former protection frameworks have not been reconstructed in spite of the advances in environmental management and administration in general. For instance, the Drainage Law that was mainly intended to prevent floods is still under the authority of the Ministry of Agriculture although in recent years floods caused severe damage mainly in urban areas and not in agricultural fields (State Comptroller, 1993). There is no doubt that the present state of affairs calls for improvement.

Conclusion

Riparian landscapes constitute extremely vulnerable ecosystems, which need protection to preserve the unique aquatic habitats with their biodiversity richness and ecological processes as well as their value for scenic and recreational purposes. Nonetheless, in Israel their protection until 2000 was defective in the absence of comprehensive suitable legislation, adequate institutional structure and designated physical planning. Although national planning has been enriched in recent years by two promising plans as far as riparian landscapes are concerned, it will take some more time before their impact on riparian protection can be evaluated. Moreover, the existing state of affairs is still characterized by a complex array of authoritative powers, some split and others overlap, and by flaws in formulation and implementation of policies. Only limited segments of specific riparian landscapes may, in fact, be regarded as functional healthy ecosystems.

Several lessons can be drawn from the above discussion. We wish to focus here on those that seem the most important and practical for the State of Israel in the immediate future. First, there is need for a revision of present legislation, integrating together existing laws – especially Drainage Law and RA Law – rephrasing their aims and directives, and rearranging the institutional structure and its powers according to updated environmental and other needs. This should be done considering a whole watershed approach as has already been suggested by Laster (2000).

Second, the prevailing, rather particularistic, approach should be replaced by a comprehensive centralistic one, based on vision and needs on a national scale. This ought to be reflected in all types of protection tools but especially in the institutional structure, as by establishing a national statutory designated organization (similar to the Nature and Parks Authority) or, alternatively, empowering the existing RRA by adequate legislation, including broader definition of its powers and responsibilities.

Third, it would be advisable to prepare a structured procedure for planning decision making, with an emphasis on preliminary checking of land use plans before they are presented to the planning commission for approval, to ensure their compatibility with designated national planning requirements.

Fourth, increasing environmental awareness in general, and awareness of riparian landscapes' ecological, environmental and

scenic aspects in particular, are a key element in promoting protection and conservation of such landscapes. This is true for the general public, as has already been claimed by Lowry (1998), but is even more important where decision makers are concerned. Therefore, educational activities, formal and informal, carry great significance for improving and intensifying riparian protection efforts.

Luckily, riparian landscapes bear within them the potential for rehabilitation, even when severely deteriorated, providing suitable protection, adequate restorative tools and a proper management (Hale and Adams, 2007; Kondolf et al., 2007; Naiman et al., 2000; Rohde et al., 2006). This is especially important in a small, dry and densely populated land like Israel.

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