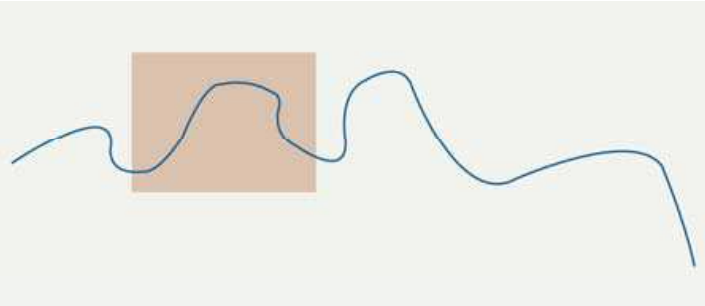
Ministry of Environmental Protection

River Restoration Administration

Jerusalem Institute for Israel Studies

Where City and Stream Meet



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Summary

Israel's streams, including those passing through urban areas, have been subjected to many years (even decades) of abuse. Streambeds in Israeli cities have been disregarded or treated as a nuisance or even as a hazard. Where crossing through municipal districts, they have been regarded as a risk to municipal infrastructures because of their flood potential, possible health hazards or other forms of damage. Urban watercourses tended to become contaminated with toxic substances and wastes. Attempts to control such "risks ", through regulation has either damaged or altogether eliminated their natural and scenic values. The result has been that Israel's cities lost a central asset, which has instead become a neglected "back alley".

A recent and welcome change of attitude to streambeds by Israeli authorities can now be seen both in planning policies and implementation. However, the attention of Israeli authorities has mainly focused on the management of streambeds flowing through open landscapes, whereas urban stream issues have largely been ignored.

The present study provides a review of the conflicts that arise around the interface of the stream and the city and presents updated approaches from around the world on the planning of urban watercourses. It presents design, planning, and management principles for the development and restoration of urban streams and for creating positive links between the urban and undeveloped sections of streams. Finally, the present study offers recommendations for formulating a comprehensive policy for the planning of watercourses in urban environments.

The study presents selected case studies which exhibit and demonstrate the issues relevant to streams in urban environments. It presents an analysis of the measures available to municipal authorities for administering watercourses within their jurisdiction and outlines accepted practices in the field. Its purpose is to classify and characterize the primary barriers preventing urban streams from being attractive elements in the urban landscape and to identify ways by which the situation could be improved.

Separation of the discussion on urban streams from the general discussion on watercourses is due to the differences in character and in function of streams situated in urban environments as opposed to those situated in open landscapes. The challenges and objectives of planning an urban stream differ fundamentally from those of planning streams in undeveloped areas. They therefore need targeted, specialized policies.

Finally, as a policy paper, this study proposes policy recommendations for the planning and rehabilitation of streams situated in urban environments which may also contribute to facilitating urban renewal. The study will be made available to planning, municipal and national authorities (such as the administration for the restoration of Israel's streams), as well as to the general public, individuals and communities which have a particular interest in urban streams.

Our Approach

The interface between the stream and the city is an encounter between two separate worlds which can be in conflict with one another – the regulated, man-made city, perhaps the epitome of human creation, and the natural, dynamic stream that runs a free course.

The present study is an attempt to fuse the nature of the stream and the character of the city together into a single unit. It views the conflicts between the city and the stream as an opportunity and intentionally accentuates their differences in an attempt to enrich human environment and experience.

When properly planned, a flowing stream in an urban environment offers the city and its surroundings a scenic asset that also carries social, cultural, environmental and economic benefits. An urban stream can support urban and outdoor recreational and leisure activities that include, but are not limited to, restaurants, commerce, tourism, education and housing. Furthermore, restored streams can stimulate communal and social renewal in a city.

While the conservation of streams in open landscapes focuses on ecology, environment and scenery, the rehabilitation of urban streams focuses on social and visual aspects, on planning in the context of the urban environment and on ensuring that the city's residents have access to open spaces for recreational and leisure activities.

Streams can be excellent open spaces in cities. The flow of an urban stream, even if only active for a short period each year, can be a great recreational attraction. Stream channels provide characteristic topography along corridors which can serve riparian wildlife and vegetation, and tributary streams can connect up with residential neighborhoods The channels of urban streams which fulfill drainage functions, are appropriate corridors of urban green spaces for the enjoyment of city residents.

Recommendations

The present study relies on the assumption that every stream and every city require an individually-tailored solution, and that it would be impossible to develop a single, "one-size-fits-all" template for the restoration of urban streams. Policy recommendations in this study are not intended to serve as a uniform set of solutions for the problems of urban streams, but are intended to be used as a check-list of suggestions for urban planners to be adjusted according to a particular situation.

The recommendations were developed on the basis of case studies and are intended to demonstrate the diverse issues and possible solutions that every planner should consider when planning a stream habitat in an urban environment. A particular case will require the choice of solution which fits best to the particular conditions in (maybe: on) hand. The suggested solutions outlined in the present study are intended to stimulate ideas and a rigorous dialogue that should help planners find and arrive at the desired course of action. The list of recommendations is open ended and may not include all valid solutions.

The recommendations focus on the most important aspects of urban stream management and planning. The development of a comprehensive policy, incorporating all aspects, is a prerequisite for planning urban streams and for developing a sound policy that successfully balances the needs of the city with those of the stream. The essential considerations which need to be taken into account in the planning of urban streams are: urban design and town planning, hydrology, economy and society, management and organization.

I. Urban Design and Town Planning

Urban streams can serve as a primary urban structure for planning an entire city and can generate urban renewal and development. An urban stream can determine a city's "natural structure" and when taken into account in a city's design, has the power to enhance the unique character of the city.

This chapter is crucial to the present study and concerns the relations between the city and the stream within it:

- The role of the stream in the development and design of a city – the city's structure, the urban fabric and borders in relation to the stream;
- The point of contact between the city and the stream – the type of construction and development along the stream channel and municipal regulation of the stream banks.

The chapter presents different cases and planning situations including: planning streams in existing built-up urban areas; planning streams in new urban developments; planning streams in industrial zones; planning a stream situated in a metropolitan park around the city and along the streambed. This division is somewhat artificial, owing to the significant overlap between the different cases. The recommendations have been concentrated in specific sections for reasons of methodology but are often applicable to other cases.

Planning a Stream in an existing Built-Up Urban Area

It is usually difficult, if not impossible, to change or correct distortions relating to the visual surroundings of a stream in an existing built-up urban environment. Nevertheless, this option should not be rejected and efforts should be made to identify places where failures in urban planning have impaired the stream's functionality and diminished its contribution to the city. This information provides the first step to correcting the situation. By taking advantage of small opportunities as they arise and by concentrated effort, planning mistakes can slowly be corrected and the stream's advantages can be realized, even if only in a few confined areas.

Implementation:

Protecting the area adjacent to the stream

Statutory status – stream channels should be granted a special statutory status. They should be protected under a designated land use of "stream channel" in municipal master plans.

Halting construction along the stream channel – construction in close proximity to the stream channel should be restricted until a detailed plan is prepared, particularly in areas subject to flooding.

Planning the built-up streambank

Preference to public uses along the stream channel– empty plots of land and deserted buildings located along the stream channel should be converted and designated as far as possible for public uses.

Construction along the stream channel – when public uses are located along the stream channel, construction should always be parallel to the channel (never across it), so that they do not block or interrupt the continuity or flow of the stream.

Linking the stream to the city

Continuity of open spaces – "a string of parks" – every park or open space in the city which can be connected to the stream channel should be identified in order to create a string of parks extending from the stream into the city. The city's parks can be linked together by street signs and directions to create a continuous and uninterrupted chain of green spots which support each other, increasing the stream's accessibility to the public and contributing to the city's organizational form.

Bridges – bridges in a city are public structures that offer opportunities for urban renewal. They should therefore be designed to fit in with the city's character with regards to their building materials and architectural style, should fit into the context of the urban environment, and their design should primarily serve pedestrian needs. Plans for a bridge over a stream channel should leave space alongside the stream channel to enable the stream bank vegetation to be taken into account and leave room for a pedestrian walkway. When roads are aligned along and across a streambed, rest stops and viewpoints should be considered. Essential infrastructures and pipelines should be aligned with the bridge so as to prevent disturbance of the natural habitat around the stream.

Planning a stream in a new urban development

A stream crossing through a city is a key natural phenomenon which, when properly planned, can be a central factor influencing the urban fabric and design of a new city. In some Israeli cities, including Jerusalem, Haifa and Modi'in, the urban fabric was planned around natural wadis, and as a result, these cities enjoy a long-lasting advantage that continues to be relevant today. Other Israeli cities expected to expand significantly in the near future are now following suit and developing a new urban structure based on their natural stream channels.

Implementation:

Comprehensive Planning

Comprehensive spatial planning – a typical stream crosses through several localities and through large sections of undeveloped areas, hence urban planning should attempt to look at the "bigger picture" and consider the stream's interconnectedness to sites outside the city limits.

A master plan – a municipal master plan is important for the development of local urban streams (or, at the very least, a chapter within a municipal plan should be devoted to the development of local streams). Such plans should aim to reinforce the centrality and functional importance of the stream channel as one of the city's axial lines and address the issue of regulating its streamflow.

Urban Functions

The stream as the framework of the urban structure – the possibility of using the stream channel as a basic plan for the organization of the city's open spaces should be considered.

Linking together the old and the new – when a city is expanded through the construction of new neighborhoods flanking older ones, the newer neighborhoods often have a remote and extrinsic character. The stream channel offers a way to correct this disjunction by functioning as an open, public parkway connecting the older and newer areas of the city.

Maintaining a direct connection between the built-up areas and the stream – when building new neighborhoods in the vicinity of a stream, it is important to maintain unobstructed view points and walkways from the urban areas to the stream channel in order to attract residents to the area around the stream. The best time to identify and conserve the parks surrounding the tributary streams and connecting the city and the stream is during the planning stages of a new city.

Continuity – in order to preserve the continuity principle of the stream channel (the continuity of the open view and the stream's drainage channel), construction, road or infrastructure development should avoid obstructing the stream channel.

Planning the built-up streambank – development along the stream bank should be planned in a way that will benefit from its proximity to the stream, bring public facilities closer to the stream and serve as an urban front. Public buildings should be placed in the public, open areas of the city along the stream channel so that a large system of complementary (free) public spaces can draw large crowds to the stream.

Urban nature – the main advantage of the urban stream lies in its contribution to the leisure activities of the city's residents. However, a stream also presents a golden opportunity for bringing natural values, such as flowing water, plants and animal life, from the open outdoors into the city. Good planning can preserve these values, which add color to the urban grayness, by conserving, cultivating and highlighting the stream's natural values. Designating land along streambanks for

botanical gardens, ecological nature points and urban outdoor sites can attract the city's residents to the stream.

The urban streambank – descending streets to the streambank or the stream walkway, present the optimal point of contact between the city and the stream. City planners should avoid aligning noisy, congested streets which can separate the stream from the city's residential areas.

Planning a Stream in a Metropolitan Park

A metropolitan park is a wide open space on the outskirts of a city that provides the leisure needs of the city's residents and serves as a "green lung". Metropolitan parks have become a central component of urban development in Israel over the last few years.

A metropolitan park functions as an urban nature leisure area that allows the city's residents to enjoy outdoor recreational activities close to home. On the national scale, metropolitan parks contribute to separating urban agglomerations and defining the borders and the unique character of each city. They also help to encircle cities with "green belts".

Implementation:

Stream channels that flow near cities can function as main axes around which the cities' metropolitan parks can be planned. Promenades, walkways, and nature sites should be placed along the streams so as to best integrate the potential of a flowing stream habitat and urban social needs. With increasing free time awareness and demand for leisure and recreation services is rising and with it the desire to spend out-of-work hours in a meaningful way.

Planning a Stream in an Industrial Zone

A stream passing through an industrial zone is a subcategory of the classification of streams crossing through built-up environments; we therefore chose to include it in our discussion of "urban streams." Streams passing in the vicinity of industrial zones, or even directly through them, are common in Israel. Many have deteriorated and become polluted through uncontrolled disposal of refuse, wastewater, and other hazards that are common byproducts of the lack of environmental management in industrial production.

Implementation:

The principles of restoring industrial streams naturally differ from those of restoring streams passing through residential areas or open spaces. Relevant principles primarily concern the following: preventing industrial and non-industrial waste and sewage from reaching the stream channel; installing targeted waste treatment systems; installing adequate collection systems and adequate preparation for emergency situations such as disruption or overflow; cleaning sludge and industrial waste from the stream channel ;establishing activities compatible with the area's industrial character –such as including industrial elements in the park around the stream as visitor attractions in their own right.

II. Hydrology

Urban streams are, first and foremost, the primary drainage channels of cities and open spaces. Drainage concerns are particularly important in the urban environment, as flooding could result in extensive property damage and even in loss of life. Nevertheless, increased construction along elevated levels of the urban stream decreases groundwater infiltration and is a cause of increased runoff and subsequent flooding down-slope. The desire to promote the urban stream as a public open space often clashes with the need to maintain effective drainage by removing stream bank vegetation, dredging and straightening stream channels, and trapping the water before the stream enters the city. In short, there is a need to strike a fine balance between drainage requirements and the social values of the stream.

Water Quality

Streams in urban environments are more contaminated than in undeveloped areas. Pollution, as a result of increased urban runoff, runoff pollutant loads, and intentional discharge of urban sewage into the channel, poses health risks to people living near the stream (mosquito breeding-grounds and groundwater or drinking water contamination) in addition to causing ecological and aesthetic damage. In most cases, it is not entirely possible to prevent water contamination in an urban stream, particularly that caused by nonpoint source pollution. Addressing water quality issues, point-source pollution and finding ways to prevent diffuse contamination are necessary pre-conditions for restoring an urban stream.

Implementation:

Efforts need to be made to identify and curb all pollution sources contaminating the stream. The following should be carried out simultaneously: efforts to address the physical pollution affecting the stream, to develop the stream and to rehabilitate the stream. These actions should also be supported by educational and promotional

activities designed to change the public image of the stream among the city's residents.

Water Quantity and Quality

The majority of streams in Israel are ephemeral, which means that the streambed is dry most of the year. Nevertheless, a streamflow gives each stream – even ephemeral streams – its particular, unique character. Re-establishing stream flow is usually only relevant for perennial streams, in which water used to flow, although there is room to consider the possibility of allocating water for both ephemeral and perennial urban streams, because of the attractiveness, social and aesthetic values of water flowing through an urban environment. One possibility is to set up closed-circuit water systems designed to catch winter runoff. (Preference should be given to allocating water from natural sources or treated water purified to meet the strict Inbar sewage treatment standard.[1])

Implementation:

Efforts should be made to generate a flow in the stream in sections that pass through the city. Highly purified wastewater or flood runoff collected and stored at higher elevations can be used for this purpose. Water flowing down the channel should be the responsibility of the local authorities generating the treated wastewater.

The Stream Channel

A winding urban stream is often viewed as a nuisance in planning the surrounding urban environment. Drainage considerations, however, do not necessarily require that stream bends be straightened. Urban streams can be re-channeled underground if problems of water contamination arise or where they interfere with proposals for high-value property in the city. Channeling urban streams in closed underground culverts is common practice but it is responsible for the loss of an important urban natural resource, and involves high maintenance costs. Experience in other countries now suggests that it is better to "daylight" urban streams, to re-open closed culverts and redirect streams above ground.

[1] (The Inbar Standard) Public Health Standards (Standards for Treated Wastewater Reuse) 2008. The purpose of these standards is to enable the reuse of treated wastewater for unlimited agricultural irrigation, to protect public health, and to prevent the contamination of water sources from treated and untreated wastewater.

Implementation:

The practice of straightening stream channels or aligning them in closed culverts should be avoided as far as possible, and opportunities for "daylighting" enclosed streams should be considered. The difficulty is that urban streams need to accommodate and support urban functions, which, for the most part, do not enable water to flow along its natural channel. Although it may not be possible to entirely avoid regulating the streambed, its natural channel and characteristics should be preserved to the highest extent possible.

III. Economy and Society

Urban streams, like other natural and scenic values, are a public resource for the enjoyment of the general population, whose economic value cannot be evaluated by market forces. This said, economic models can be used to estimate the value that a community would be prepared to spend in order to preserve a nearby stream in good condition. These models have demonstrated that the public is willing to invest significant resources in order to restore a stream's natural and scenic values.

A Model for the Economic Value of an Urban Stream

The restoration of an urban stream requires the allocation of significant resources which can put considerable strain on a municipality's budget. Beyond the resources required for the initial restoration and development of a stream, funds must also be set aside for ongoing maintenance of the water and drainage systems and of the public areas surrounding the stream.

Implementation:

Securing funding sources is a prerequisite for the implementation of a plan for restoration and development of an urban stream. One of the ways to cover the restoration and maintenance costs of an urban stream is to develop economically viable projects in its vicinity so that their profits can be used to maintain the stream. Possibilities for restoring urban streams by municipal economic development corporations should be considered, following the view that the urban stream is an economic asset to the city. Possibilities for using the peripheral areas surrounding the stream for commercial uses should also be considered. A balance should be found between a stream's resources and the commercial developments adjacent to

it. A designated maintenance fund for the restoration and ongoing maintenance of urban streams is an alternative measure.

The funds to cover the costs of restoring a stream may be procured, for example, by developing new real-estate projects in areas with high property value. Joint public and private initiatives may generate business initiatives specially designed to support the stream. Local communities and schools may adopt sections of the stream and contribute to their maintenance without damaging the channel or its natural values.

VI. Management and Organization

Municipal authorities often face a challenge in managing urban streams without compromising the stream's natural characteristics and its ecological complexity. Environmental organizations, though responsible for the protection of ecological systems, are often reluctant to take on the role of managing a stream as it passes through an urban environment. The urban stream is therefore frequently left without any authority or body taking responsibility for its protection and management.

Integrative Management

A stream is a complex physio-ecological system which needs to be considered as a single entity throughout its length, with due consideration of how each of its components affects the others. However, urban planning does not treat the stream as a single planning unit and only considers its urban section.

Implementation:

An integrative system of management is needed that brings together the various authorities in charge of environmental and water resources, architecture and planning and improvement of the urban environment. A master plan should be developed that will link together the development projects for different sections of the stream. Such a master plan should form an independent chapter in the general urban master plan and should be coordinated with a plan for open spaces in and around the city.

An Administrative Body

An urban stream differs from other open public areas in the city. Hydraulic, physical and ecological issues set the urban stream apart as a unique type of open, public space requiring high professional expertise. Municipal officials wishing to restore an urban stream often encounter difficulties in their efforts to recruit the necessary professional expertise and funds from authorities generally concerned with development rather than the rehabilitation of natural values. (The Ministry of Environmental Protection is primarily concerned with the rehabilitation of stream channels in open landscapes, although in some cases, it does provide assistance to stream rehabilitation within urban environments, as in the cases of the Yarkon, Kishon, Nahal Hadera, Beer Sheva, and Lachish streams The Ministry of Tourism may become involved in the restoration of streams in cities defined as tourist attractions. The Ministry of Construction and Housing and the Israel Land Administration are predominantly concerned with development in urban areas rather than conservation.)

Implementation:

The restoration of urban streams should be defined as one of the goals of the municipal planning division, which would include a professional with a multi-disciplinary background appropriate to perform this task.

Public Involvement in Restoring the Stream

The restoration of urban streams can benefit from public involvement. In the United States, more than 4,000 local associations have been established which are involved in the restoration of local streams around residential areas. Israeli case studies indicate that the public's involvement is an important factor in motivating local authorities to restore urban streams.

Implementation:

Public involvement and interest in the planning process should be generated to support restoration efforts of urban streams. Efforts should also be made to influence local authorities to increase their support for local grassroots associations dedicated to restoring and conserving local natural values.

The educational system should be encouraged and guided to use the urban stream as an educational opportunity. Schools can take walks around the stream, conduct classes outdoors, or experience natural phenomena or seasonal changes. Schools, youth organizations and public associations should be encouraged to adopt sections of the stream.