

## Conservation of Stream Corridors as an Urban Infrastructure Case Study: *Evin-Darakeh Stream Corridor*

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### Abstract

Fast development of Tehran in the last decades is the cause of deterioration of environmental capacities which continues. Stream corridors of northern part of the city which has an important role in optimizing environmental situation are not an exception. This continuous and joint network of soil and water which has been preserved by its consumers and keeps the climate approximately sustainable is prone to distortion gradually. Therefore special consideration to environmental capacities is essential. This article attempts to consider Evin-Darakeh stream corridor as a green infrastructure by describing other green infrastructures. In order to reach this goal planning principles for this stream corridor and the related strategies are explained.

**Keywords:** green infrastructure, stream corridor, Evin-Darakeh stream corridor, Tehran.

### حفاظت از دالان‌های رودخانه به عنوان یک زیرساخت شهری نمونه موردی دالان رودخانه اوین - درکه

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### چکیده

رشد سریع تهران در دهه‌های اخیر سبب از بین رفتن ظرفیت‌های زیست‌محیطی شهر گردیده است و این امر همچنان ادامه دارد. رود دره‌های شمالی شهر که نقش بسیار مهمی در کاهش آثار سوء ناشی از آلودگی‌ها و بحران‌های زیست‌محیطی شهر دارند نیز از این قاعده مستثنی نیستند. این شبکه‌های بهم پیوسته خاک و آب که از دیرباز توسط استفاده‌کنندگان حفاظت می‌گردید و اقلیم این نواحی را پایدار نگاه می‌داشت، به تدریج در معرض زوال و نابودی قرار گرفته است. بنابراین توجه ویژه به ظرفیت‌های زیست‌محیطی این نواحی ضروری است. در این مقاله رود دره‌های شهر تهران به عنوان پتانسیلی برای زیرساخت سبز دیده شده‌اند و از میان آن‌ها، رود دره درکه مورد توجه قرار گرفته است. پس از توصیف این رود دره و تشریح اجزای آن، اصولی برای برنامه‌ریزی این رود دره به عنوان یک زیرساخت سبز بیان گردیده و به دنبال آن راهبردهایی نیز جهت پیاده‌سازی این اصول تدوین گردیده‌اند.

کلید واژه‌ها: زیرساخت سبز، دالان رودخانه، دالان رودخانه اوین - درکه، تهران.

## Introduction

Natural features, as well as infrastructure such as highways, bridges and storm sewers, can create or restore community identity. These systems define the public realm, accentuating its unique spatial organization and delineating outdoor “rooms” in the landscape. (Morrish, 2006) On the other hand many of the problems plaguing urban environments—polluted water, polluted air, polluted soil—can be seen as the inevitable results of paying too little attention to the evolved wisdom of the planet’s ecological functioning. Instead of being guided by nature, we’ve created degraded urban habitats by ignoring basic natural processes and principles.

One of the most important natural infrastructures is stream corridor which can be conserved by planting trees and creating built environments during a time span in order to become a sustainable environment.



Figure 1- Stream corridors. Stream valley slopes and floodplain gradients influence stream corridor function. ([www.nrcs.usda.org](http://www.nrcs.usda.org))

Historical points of irrigation waterways and stream corridors, illustrates that there were some rules to conserve these waterways. As traditional management lacks legislation such as codes and limits, it inevitably causes lots of destruction in natural infrastructures.

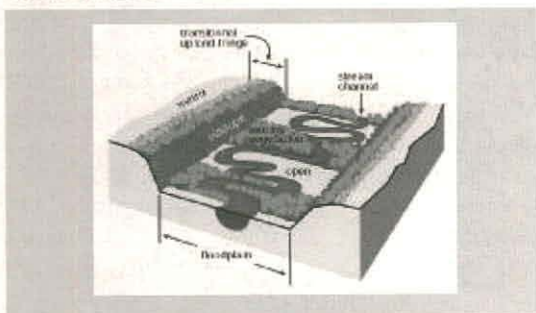


Figure 3- Components of a stream corridor ([www.nrcs.usda.org](http://www.nrcs.usda.org))

It must be taken into consideration that natural infrastructures such as stream corridors should be more than developing built urban infrastructures.

One group of professionals which is making lots of attempts to meet this challenge is landscape architects. This group is using new green technologies to solve these problems. Green technologies are living system such as wetlands and greenways which are used to solve these kinds of environmental problems. Green technologies are a form of intermediate technology. Unlike highly engineered technologies, intermediate technologies are relatively expensive, require little energy and generally easier to comprehend and use. Green technologies, such as constructed wet lands and greenways, are also sustainable or regenerative.



Figure 2- Stream corridor have great economic, social, cultural and environmental value, ([www.nrcs.usda.org](http://www.nrcs.usda.org))

## Green Infrastructure

Green infrastructure is the interconnected network of protected land water that support native species, maintains natural ecological processes, sustains air and water resources, and contributes to the health and quality of life for communities and people. Green infrastructure should be planned and designed according to, and be invested in following, the same principles and approach that are used for built infrastructure of roads, sewers, and utilities. Green infrastructure planning should be the first step in land-use planning (Morrish, 2006). Webster’s New World Dictionary defines infrastructure as “the substructure

or underlying foundation, especially the basic installations and facilities on which the continuance and growth of a community depends". Most people associate infrastructure with roads, sewers and utility lines (the "gray" infrastructure) or hospitals, schools and prisons (the "social" infrastructure)—collectively, the "built infrastructure".

Today, people are talking about another kind of infrastructure that is critical to "the continuance and growth of a community"—"green infrastructure" (Walmsley, 2006).

"Green infrastructure" has been defined as:

"Our nation's natural life support system—an interconnected network of waterways, wetlands, woodlands, wildlife habitats, and other natural areas; greenways, parks and other conservation lands; working farms, ranches and forests; and wilderness and other spaces that support native species, maintain natural ecological processes, sustain air and water resources, and contribute to the health and quality of life of America's communities and people". (Benedict and McMahon, 2002).

"Green infrastructure" is a term that describes the abundance and distribution of natural features in the landscape like forests, wetlands, and streams. Just as built infrastructure like roads and utilities is necessary for modern societies; green infrastructure provides the ecosystem services that are equally necessary for our well-being (Weber *et al*; 2006).

### **Why is Green Infrastructure Important?**

The conversion of natural areas, farms and other open land to urban uses has resulted in:

- loss of natural stormwater retention and flood control resulting in flood damage
- loss of natural filtration of pollutants resulting in dirty air and water
- habitat fragmentation
- loss of biodiversity and wildlife populations

-disruption of larger natural landscape processes increasing the risk of natural disasters. ([www.cdfinc.com](http://www.cdfinc.com))

Most land and water conservation initiatives are reactive not proactive; haphazard not systematic; piecemeal not holistic; single-scale not multi-scale, single-purpose not multi-functional. Current conservation efforts often focus on individual pieces of land, limiting their conservation benefits to the environment and human health. The Mission of Green Infrastructure is to illustrate that identifying and planning for Green Infrastructure - multi-purpose green space networks - provides a framework for smart conservation and smart growth.

A Green Infrastructure network can create a framework for future growth while also ensuring that significant natural and cultural resources will be preserved for future generations.

The "stormwater management, flood control, and water quality components" are connected to and part of the ecosystem and economic processes and benefits provided by Green Infrastructure. The 'watershed' is a good planning unit to address Green Infrastructure needs. The Green Infrastructure plan will help us identify where the best opportunity sites are for watershed Best Management Practices.

### **Stream Corridors**

Floodplain naturally supports stream corridors, which are the bands of Vegetation that flank a channel or lake. Stream corridors provide important habitats; filter suspended sediments from flood waters, and uptake nutrients from shallow groundwater, leading to better water quality. Distinct riparian vegetation zones can be identified, defined by hydrology and substrate materials, each offers habitats to distinctive suit of species. Floodplain water bodies, such as side channels, are commonly hot spots for biodiversity. During floods, floodplains are often important feeding or breeding areas for fish. ([www.nrcs.usda.gov](http://www.nrcs.usda.gov))

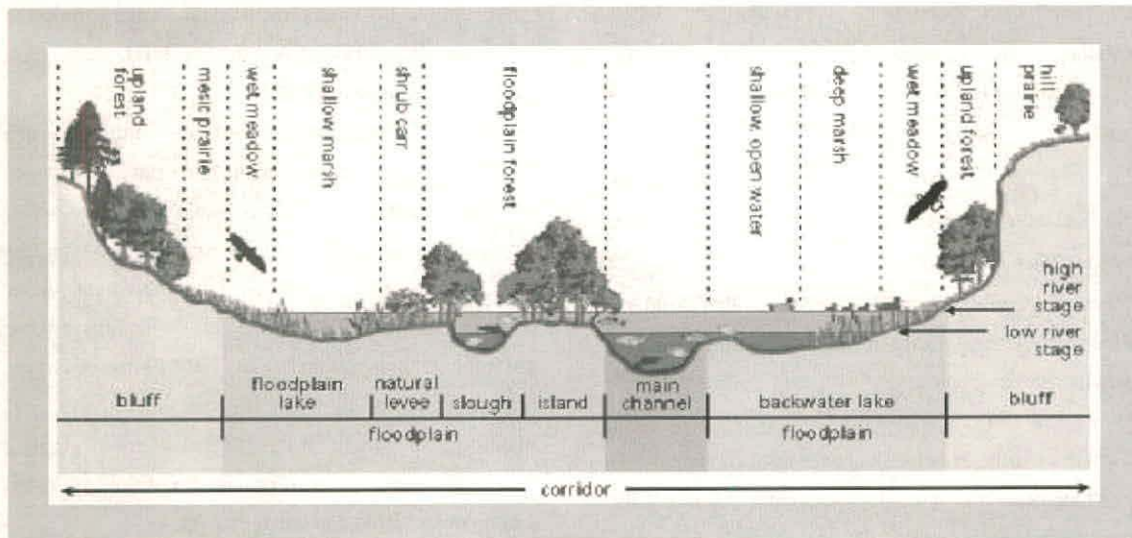


Figure 4- Cross section of a stream corridor ([www.nrcs.usda.org](http://www.nrcs.usda.org))

#### Principles for Conservation of Stream Corridor as an Urban Infrastructure

*Identify and protect stream corridors before development.* (APA, 2006) Green infrastructure and stream corridors need to be identified and protected in advance of land development where possible, due to the high cost of restoration and the difficulty of creating human-made systems that function as well as natural systems. Identifying where green infrastructure is needed will aid in public and private protection of resources.

*Engage diverse people and organization in a green infrastructure initiative.* To be successful, green infrastructure initiative must excite and engaged many people. Plan and implement green infrastructure systems by involving public input and incorporating the comments and issues of citizens, community organizations, and private landowners. Green infrastructures and stream corridors can be considered as substantial elements which can create or restore community identity. In different projects such as widening corridors or creating built infrastructures, natural infrastructures should be protected and they must be prevented from changes.

*Emphasize that green infrastructure benefits are afforded to both natural and people.* Green infrastructure provides a diversity of public and private functions and values that address both natural and human needs and benefit the environment and communities. These benefits need to be documented, both in terms of their ecological values for people and the environment and their economic values to society. *Interference along stream corridors should be bounded.* Concrete waterways are not a good solution to improve the efficiency of these infrastructures. On the other hand the contaminating functions should be eliminated from the preserved area.

*Green infrastructure should be designed holistically.* Like our transportation system, green infrastructure should be designed to link diverse green space elements into a system that functions as a whole, rather than as separate, unrelated parts.

*Green infrastructure should be laid out strategically.* Like our electric power, communication and water systems, green infrastructure systems need to be laid out strategically to connect across multiple jurisdictions and incorporate green space elements and functions at each level of government—State, regional, community and parcel scales.

*Green infrastructure should be planned and implemented publicly.* Like our built infrastructure systems, green infrastructure systems should be planned and implemented with input from and involvement of the public, including community organizations and private landowners.

*Green infrastructure should be funded up front as a primary public investment.* Like other infrastructure systems, green infrastructure systems should be funded up front with other essential services, rather than with money that is left over after all other services have been provided.

*Green infrastructure should be the framework of conservation.* Just as roads, sewer lines and other built infrastructure provide a framework for the type and location of different land-uses, green infrastructure should be the framework of conservation.

### **Green Infrastructure Case Study: Darakeh Stream Corridor (DSC)**

Darakeh stream corridor is located in the north of Tehran, it is originated from Shahneshin mountains which passes Evin-Darakeh district towards south of Tehran. The planning for this green infrastructure has a great influence in enhancing ecological conditions.

#### **Darakeh Stream Corridor Components**

Referring to the researches on DSC, this green territory can be divided into three sections:

- 1- Darakeh stream and the green banks of it
- 2- Linear irrigation paths of gardens which branch from Darakeh Stream
- 3- The valuable private gardens

Each above mentioned components is separately an influential factor for planners.

### **Green Infrastructures Planning Principles of Darakeh**

Conservation and controlling of green areas is one of the important responsibilities of urban management. Urban management is responsible to preserve green infrastructures and natural resources as well as cultural

heritage. Therefore, specific strategies for infrastructures must be collected.

*Principle 1: Green infrastructure must be planned as integrated and joint networks.*

- Identification, categorization and evaluation of all green infrastructures.
- Consideration to the hierarchy of irrigation paths and their bounds.
- Providing a comprehensive plan for all of the green infrastructure networks and the preparation strategy for irrigation paths

*Principle 2: In the planning and design of infrastructures the scale of exploitation is important value (APA, 2006).*

- identification and evaluation of exploiters of these infrastructure
- capacity evaluation of this infra structure for local districts: region, district and city

*Principle 3: Beneficiary parties and stakeholders must be involved in the planning and execution of green infrastructure projects.*

- Organizing public meetings including all beneficiary parties and gain their satisfaction and support of them
- Training people to participate in the different steps of planning and executing of green infrastructure projects.
- Organizing a unique management to support all groups in the executing phase. (APA, 2006)

*Principle 4: Pay attention to the natural resources and the area ecology.*

- Consideration of leading surface water via these paths
- Preserving of the river-beds and optimizing them
- Consideration of environmental problems related to water and waste water pollutants.
- Special consideration to bed and... of paths

*Principle 5: Conventional rules and models of water dividing must be taken into consideration.*

- Special consideration to conventional rules of preservation and usage of irrigation paths and their ownerships

- Consideration to water dividing, periodic usage and comprehensive management of them
- Verification of conventional rules and legislation of new rules
- Evaluation of ownerships in the path direction
- Performance evaluation of conventional rules and extracting optimized rules from them

*Principle 6: In order to access the benefits of green infrastructures we need a strategic planning.*

- Information collection and identification of all related components which involve in the planning of green infra structures.
- River path and trees must be considered as fixed elements which are not changeable.
- Emphasizing of the recreating usage of green infra structures.
- Pay attention to the appearance of natural environment.
- Consider the financial profits of investment in the planning
- Creating comprehensive management for coordinated planning and their executions
- Statement and declaration of the rules of the water usage and their irrigation paths.

### Conclusion

Considering the problems of Tehran, special preservation and exploitation of environmental capacities are crucial. One of these capacities which can be named is the north o Tehran stream corridors which require special attention. In this article Darakeh stream corridor is mentioned as most important stream corridors of north of Tehran. We must mention to plan and design and integrated and joint stream corridors. Some of the most factors in planning for development of this stream corridor as a green infrastructure are acknowledging stakeholders, teaching them the principles of the planning and public participation. Taking into consideration of efficiency of traditional rules for land irrigations, it is essential that these rules being evaluated and optimized. By strategic planning for the districts and supervision of planning and

executing the entire above mentioned can be accessible.

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