

Title:

Urban Ecological landscape of Tehran

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Abstract

Urban ecological systems can link terrestrial ecological, physical, and socioeconomic components of metropolitan areas in an ecological approach to landscape planning in urban environment. The experiences and theories demonstrate that ecological patches and corridors play a crucial role in the sustainability of urban environments and their transformations directly influence the ecological functions of the city. Basic Landscape Elements in *Tehran* concluded natural topographical features or landforms like the mountains, valleys, hills or ridgelines or other features forming distinctive landscape elements which give a sense of place. For ecological network designing in Tehran, applying landscape ecology approach as could be interpreted in urban ecological planning, determining the current situation and analyzing the natural and built elements of the ecological systems of *Tehran*, applying strategies for structural and functional improvement of natural and built urban ecological systems and finally proposing a ecological model for the application of ecology in landscape scale.

Keywords :

ecological systems, Landscape Elements, *Tehran*, ecological model

Introduction

Recent developments in theoretical urban studies which emphasize on the relationship between land use pattern and ecological processes have important consequences for understanding spatial processes [13] involved in resource management and land use planning in cities. Spatial solutions for addressing urban development planning have been provided through improved understandings of chorological interdependencies between heterogeneous environments [5].

Now we realize that what we see today in towns is produced by flows and processes of yesterday [2], [6]. Urban ecological systems can link terrestrial ecological, physical, and socioeconomic components of metropolitan areas [10] in an ecological approach to landscape planning [11],[12] in urban environment. The experiences and theories demonstrate that ecological patches and corridors play a crucial role in the sustainability of urban environments and their transformations directly influence the ecological functions of the city. The underlying premise of urban ecology is that the explicit composition and spatial form of an urban landscape mosaic consisting of interdependent ecosystems affects ecological processes in ways that would be different if the mosaic composition or arrangement were different [2],[8],[13].

Urban ecological systems can link terrestrial ecological, physical, and socioeconomic components of metropolitan areas [10] in an ecological approach to landscape planning [11],[12] in urban environment. The experiences and theories demonstrate that ecological patches and corridors play a crucial role in the sustainability of urban environments and their transformations directly influence the ecological functions of the city. The greenway theory and parkways are introduced as parts of this ecological system and urban rivers are converted into blue-ways, by opening up access to the banks of rivers. Eco ways are established networks of ecological space in cities by using and merging urban water courses, public utility corridors, parklands and private gardens into a single integrated system of ecologically important components. Some general points for structural and

functional improvement of patches and corridors in the urban context are categorized in Table 1.

Improvement considerations for patches, corridors and matrix in the urban landscape context	
Patch	1 Large patches Protecting large patches with high ecological value amid the urban built environment often surrounded by other conflicting land uses
	2 Small patches Integrating the small patches for better functioning of the ecological systems especially in densely built-up and populated areas
	3 More patches Making more patches for facilitate the penetration of the ecological flows into the urban fabric
	4 Patches vicinity Creating close patches for increasing their ecological functions, more convenient and less obstructed flows between the patches
Corridor	5 Corridors Connectivity Connectivity of the corridors will benefit the individual and overall ecological functions of them
	6 Corridors branching patterns The interwoven structural pattern of both branching natural or circuit built corridors in their hierarchical order and their interactions directly influence their ecological functions
	7 Patches and corridors Connecting patches through natural or manmade corridors for higher ecological performance
Matrix	8 Integrity Interconnections between the ecological patches and corridors in the urban natural and built matrix to enhance and protect integrity of the city and ecological flows
	9 Regional perspective Considering the ecological systems beyond the city limits where the ecological flows are continued or originated

Table 1. Considerations for structural and functional improvement of patches, corridors and matrix in the urban landscape context (Adopted from Aminzadeh and et. al , 2010)

The application of landscape ecology in improving urban ecological systems based on patch-corridor-matrix model depends on the local and regional ecological conditions. The case of Tehran metropolitan area will help to recognize the natural and built systems’ potentials and restrictions and the ways by which the urban ecological structure and function could be improved.

The importance of ecological landscape in Tehran’s urban design

With the latitude of 35° north and an average altitude of 1500 m above sea level, *Tehran* sits on the southern slopes of the *Alburz* mountain chain. *Tehran* Province is one of the

31 provinces of Iran. It covers on area of 18,909 square kilometers and is located to the north of the central plateau of Iran's largest urban area and city, one of the largest cities in Western Asia, and is the 21st largest city in the world [3].

Tehran, located at 1000 to 2000 meters from sea level over the southern slopes of the Central *Alborz* Mountain that is situated in mid altitude of the largest drainage less water basin (depression) ending to the salt lake desert of Iranian Plateau. The city is in a strategic and symbolic place, at the intersection of the historic east–west (Silk historic Road and north–south trading routes between Caspian see in the north and arid central plateau in the south), and at the foot of Mount ` , 5678 m high, the highest peak in Iran and higher than any other summit to the west of it in Asia or Europe [7]. *Tehran* served only as a village to a relatively small population for most part of its history, but began to take a more considerable role in Iran after it was made the capital in the late 18th century, and now is one of the largest metropolitans of the world. Located on the slopes of the mountains and at the foot of the magnificent Mount *Damavand*, it has been the country's capital city for only 200 years now [4]. The contemporary urban development pattern of *Tehran* dates back to only after the Second World War; when a significant rural exodus transformed the cultural landscapes of provincial centers and was particularly noticeable in the capital city.

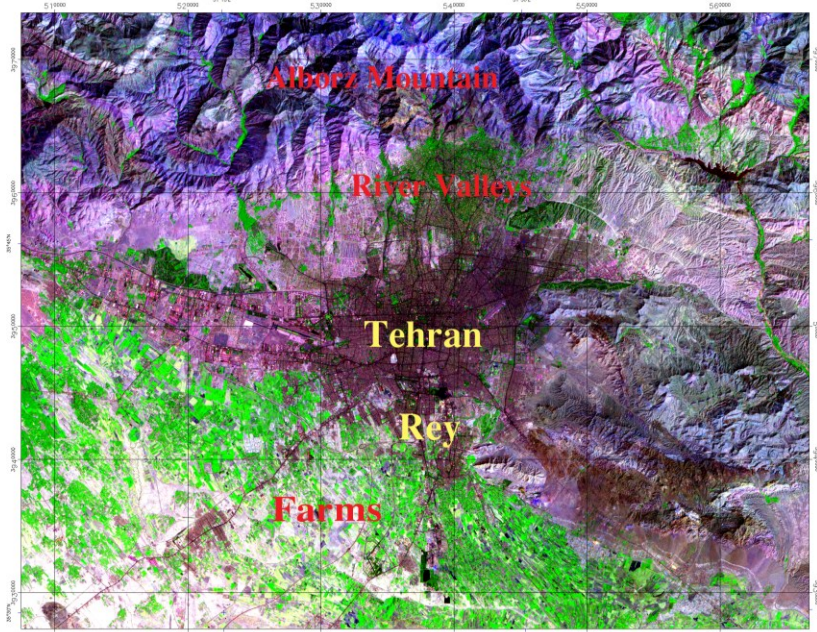


Fig. 1. Environmental Structure of Tehran and position of Damavand

Until the 1980s; urban growth patterns were directed by the main north to south transportation corridors. Due to continued migrations; the urban growth pattern around major vertical (north-south) axes was first replaced by a temporary east to west axis of growth, but supplanted later by a sporadic, patchy growth pattern in the suburban zones.

An analysis approach

According to landscape ecology principles, the vital presence of natural ecological functions and processes in urban regions may be achieved by means of natural matrix penetration and connectivity throughout the city. Landscape fragmentation due to urban development poses a threat to environmental integrity. Therefore the main ecological corridors and the patches of landscape that bring the ecological values from the natural environment beyond the urban boundaries should be taken into consideration in the future planning of the city. In this way the nature and its processes penetrate into the human realm and into urban areas.

“Urban Landscape” refers to the physical arrangement of human communities and helps to determine the nature of public spaces, streets, parks, neighborhoods, towns, suburban and rural landscapes. Urban Ecological Landscape design is a multifaceted undertaking that engages the landscape at many scales. It requires an understanding of numerous areas of knowledge and an extensive range of professional skills [9].

The other common theme of urban landscape design is people. In the vast majority of situations, urban landscape design for real people with specific needs. Rarely does urban landscape design abstract environments or places devoid of people. If successful, good landscape architectural design is appropriate to its site and context, functions safely, looks attractive, and fulfills the needs of the people it is designed for. The ecological principles and requirements for the urban ecological landscape are as follows: a) Structure and function, b) Clarity and consistency, c) Functional and ecological diversity, d) Biodiversity and eco-services, e) Distribution of green space and creation inter connection as a green network.

Basic Landscape Elements in Tehran and need for a landscape strategy

These consist of areas of, or associated with, natural topographical features or landforms in *Tehran*, like the mountains, valleys, hills or ridgelines or other features forming distinctive landscape elements which give a sense of place. They are inherently linked and identified with *Tehran* or particular parts of it. The *Alborz* mountain chain in the north of the City, the river valleys of the *Darabad*, *Golab Dare*, *Farahzad*, *Kan*, *Evin* and the low hills and urban forest parks (ex. *Lavizan*, *Sorkhe hesar*, *chitgar*, *Quchak*) are examples of primary landscape elements which are intrinsically linked with *Tehran* ecological network, and provide an essential sense of place which can be appreciated from many vantage points within the city. There are other more local landscape elements which can help to give areas a sense of place that can be referred to as secondary landscape elements. Many areas of higher ground have been the recent focus of attention from telecommunication and security operators wishing to erect communication towers. The skylines of some of the surrounding hills have also been in danger of being breached by buildings. Some attractive river valley locations have received the attentions of house builders. These areas, however, can all be identified as having local landscape significance which merit safeguards if *Tehran's* landscape setting is to be maintained for future generations to enjoy. A river valley corridor network may provide the needed spatial design closely adapted to ecological network layouts that also assure regional scale vertical connectivity within the upland-lowland context of the closed water basins continuum system of *Tehran*.

Conclusion

Urban environmental quality and the landscape structure of *Tehran* metropolitan area and utilizing natural river valley corridors for ecological restoration of urban environment in landscape scale and other ecological features were studied to improve the ecological structure and consequently mitigating some of the environmental constraints the city encounters in an increasing rate. The main objectives of network ecological design in *Tehran* must be do by : 1) To apply landscape ecology approach as could be interpreted

in urban ecological planning, 2) To determine the current situation and analyze the natural and built elements of the ecological systems of *Tehran* which faces numerous environmental problems and pollutions due to its rapid growth, 3) To apply strategies for structural and functional improvement of natural and built urban ecological systems of the case under study, and 4) To propose a model for the application of ecology in landscape scale.

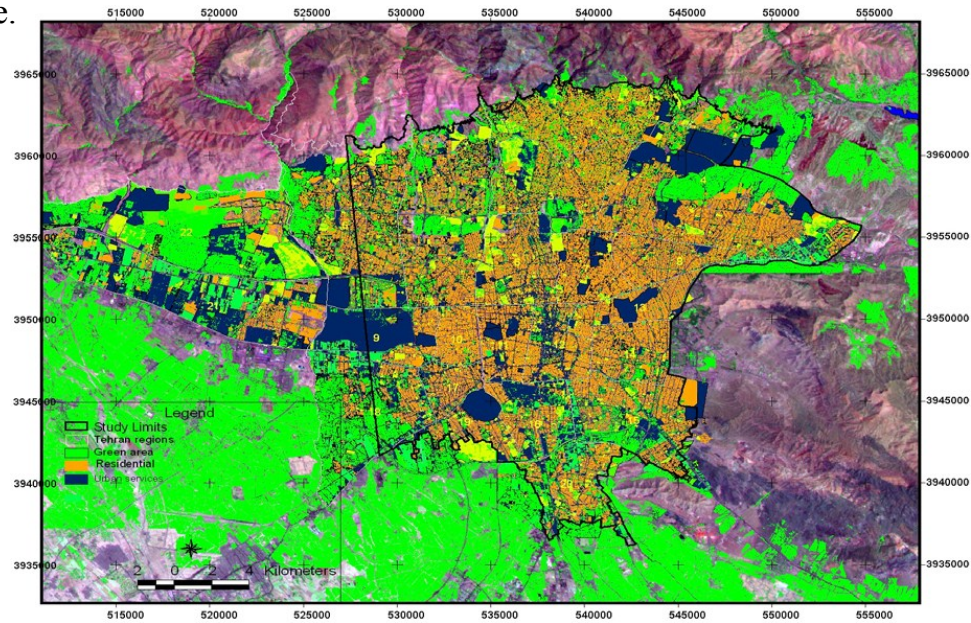


Fig.2. Urban landscape mosaic patch types in Tehran urban regions (Green corridors are important in green networks), Adopted from Yavari et al, 2007.

In an urban authority like *Tehran* there are a number of forces for change which have the potential for altering our environment.



Fig.3.Developing city towards west and north from 20 years ago, output of increasing population, now municipality try to interconnect between green patches by green corridors

The land use putting greatest pressure on the landscape setting of the City in terms of area, for example, is housing. Central government requires that local authorities achieve the major part of local housing developments from brown field developments within existing urban areas.

References:

1. Aminzadeh, B. and Khansefid, M. 2010, Improving the Natural and Built Ecological Systems in an Urban Environment. *Int. J. Environ. Res.*, 4(2), 361-372.
2. Burel, F., 2003, *Landscape Ecology: Concepts; Methods and Applications*; Science Publishers; Inc. USA Cutway, H. B.m 2005, *Urban sprawl*, Available at: <http://www.vtsprawl.org/>.
3. Chapin Metz, H., 1989, *Iran, a Country study*. University of Michigan.
4. Cleveland, W. L. and Bunton, M.P. *A History of the Modern Middle East* (Westview Press, 2000), 2nd ed., pp. 56-57.
5. Forman, R. T. T., (1995). *Some general principles of landscape and regional ecology*; *Land. Eco.*; 10, 133-142.
6. Forman, R. T. T. and Godron, M., (1986). *Landscape Ecology*; John Wiley & Sons; New York; N.Y; USA.
7. Ferrier, RW, 1795, *A journey to Persia: Jean Chardin's portrait of a seventeenth-century empire*, p. 110.
8. Igegnoli, V., (2002). *Landscape ecology a widening foundation* Springer.
9. Li, F., Wang, R., Paulussen, J. and Liu, X. (2005). *Comprehensive concept planning of urban greening based on ecological principles: a case study in Beijing, China*.
10. Pickett, S.T.A., M.L. Cadenasso, J.M. Grove, C.H. Nilon, R.V. Pouyat, W.C. Zipperer, and R. Costanza. 2001. *Urban ecological systems: linking terrestrial ecological, physical, and socioeconomic components of metropolitan areas*. *Annual Review of Ecology and Systematics* 32:127-157.
11. Sanderson, J. and Harris, L. D. (2000). *Landscape ecology a top-down approach*, Lewis Publishers, Boca Raton, Florida, USA.
12. Steiner, F. (2000). *The living landscape, an ecological approach to landscape planning*. McGraw Hill, New York, USA.
13. Wiens, J. A., (1995). *Landscape mosaic and ecological theory; Mosaic landscape and ecological processes*; Chapman & Hall London.
14. Yavari, A. R., Sotoudeh, A. and Parivar, P.(2007). *Int. J. Environ. Res.*, pp: 325-340, Tehran.