

Principles and basics of the sustainable design and weaknesses and strengths of the sustainable landscape design of the urban rivers valley

Nahid Toozande Jani

M.Sc. Department of Environment Engineering, Faculty of Natural Resources and Environment, Science And Research Branch, Islamic Azad University, Tehran, Iran.

ABSTRACT

Uneven expansion of the cities without utilizing of environmental power has disturbed balance between the city and environment. Urban rivers valley as one of the ecological structural elements of the cities can play an effective role on balancing between human space of the city construction and nature and the relationship between the human and environment.

The current study with surveying valley rivers literatures has investigated the programming process of reviving environment of the rivers valley and has provided strategies as initial proposals to programming for revival of the rivers valley environment using documents investigation, according to facilities and opportunities, restrictions and threats. Results of the study have indicated that determining boundaries for the river valley, regulating construction, creating continuous pedestrian axes, fixing river walls, preventing merging of polluted waters with their water, preserving and expanding vegetation, protecting of views and open landscapes and various landscaping and changing it to appropriate place for different ceremonies and etc. can be effective in revival of the river valley as an environmental, recreational and service life line in improving the life quality in the city.

Key words: River Valley, Revival, Environment, Sustainable design, Landscape

Introduction

City as a space which has been constructed by human for living effects on living environment. These effects in its turn result in reactions on city and living in the city after passing steps and time.

Currently, there is no balance is seen between urban networks and natural patterns. Human occupation process and expansion of land use are the major reasons of ecological network decomposition. On the other word, urban networks are dominating on vulnerable ecological networks. To change this process, researching to access a combination from urban network accompanied with ecological patterns is the basis of the best comment in the relationship between the human and nature.

Sustainable design or green design is one of the most controversial issues in the today word. In the sustainable attitude, design is done in a way that these three cycles are placing in an appropriate communicational cycle and the results of resources consume in the present can be benefitted in the future.

Meanwhile, urban landscape is important as it reveals totality of the city as a text and makes it possible to read this text. It is just through urban landscape that intangible dimensions of the civil life such as poverty and wealth, prominence of the certain institutions and values, aesthetics tastes, depth of the city history,

safety and security of the society, the manner to respecting to society and etc. through a system of signs are revealed and makes positive or negative assessment possible. The concept of landscape urbanism is a dynamic (and not static) concept that is able to accept novel duties for itself in adjustment with paradigmatic transformations of the urban design and respond to new expectations (Golkar, Koroush, 1990).

Construction of the new multipurpose parks on the side lines of the roads, river valleys and rivers are novel instances of public ownerships and have experienced and successful samples all around the world.

River valleys are environmental and economic opportunities which have been exploited years before in advanced countries. These river valleys are organizing and using with varied objectives such as increasing security and appropriate ecological situations and sustainability of river basin, increasing variety of the recreational places, increasing sport grounds and cases such that.

The procedure of urban river revival, especially with prosperity of sustainability principles in development, has changed to the current global paradigm. Today, great and international projects with the subject of reconciling between the city and nature and reviving and returning natural heritages of the cities to the life of the citizens are the concern of the urban executives and the subject of many great projects of the designers and architectures of the landscape and international landscape architect corporations. Understanding the role of natural elements of the city and returning them back to the everyday life scene as confirmed in realized cases will be facilitator of many today problems in the cities.

Therefore, sustainable design given to varied and rich biology of the mountain valleys can help to empower and maintain these important and critical species and development and preservation of these areas. It seems that preserving the quality of the river valleys both visually and from natural attractions point of view is estimated with sustainable and systematic landscape design. Given to what stated in this study basis and principles of the sustainable landscape design align with protection of the erosion and environmental degradation and keeping sustainability of the environment and facilitating the organized relationship between the human and nature are taken in to account.

Methodology

This study is descriptive- analytic. In order to conduct this study documentarily data are collected and analyzed and integrated. In the documentary step data were collected from the books, magazines, studies, maps, aerial photographs and internet sites. Finally recommendation were provided through facilities and opportunities, limitations and threats resulted of this understanding which are provided a strategy to apply facilities and opportunities and removing limitations and threats in the form of SWOT tables.

Sustainable city

Sustainability and sustainable city is a reasonable and justified alternative for destructive urbanization of the twentieth century. In a sustainable city in which healthy transportation and without pollutant especially walking and cycling are dominant, sustainable form of the city should be in such a way that facilitates activities. In this alignment, Frye proposed below criteria for construction and sustainable form of the city (Frye, 2004).

Following to design of sustainable development discussion, architectures and urban designers such as the experts in other fields have provided patterns for adjusting their activities in the mentioned framework. Alkin et al. in his book titled "Reviving the City" in 1991 has introduced four principles for sustainable city which included futurity, environment, equity and participation. According to "sustainable development" requirements common principles of the urban design revised by experts and some more visited resources of this course are completed and published with revising and new additions which are predicted for answering to mentioned requirements. Adding three new principles (energy efficiency, protection of ecosystems and decreasing pollutions) to seven principles collection of the "responsive environments" can be known as efforts made align with synchronization of the previous theories with sustainable development conversation.

Generally, urban design objectives in the frame of sustainable development are emphasized on preserving "environment" and "manmade environment" simultaneously. According to the consensus of

theorists three below principles can be introduced briefly as the “three principles of sustainable urban design” (Moughtin, 1996).

First principle: Prioritizing for recycling of the buildings, places, infrastructure and available network of passages through their adjustment with the new situation and needs. Indeed, in sustainable urban design is specially emphasized on preservation and optimization of the available buildings and urban textures.

Second principle: sustainable urban design concerns about protecting the natural resources, natural landscape and wildlife. Then every new constructional material has been required to be obtained from sustainable resources such as wood gained from correct and normative forestry.

Third principle: sustainable urban design in development of new urban areas (such as construction of new places and cities) concerns about decreasing energy consumption. This goal is followed through using correct urban skeleton, suitable constructional types, appropriate space distribution of the usages and using optimal density. On the other word, saving energy consumption is made possible through closer relationship between different urban usages and controlling building designs from energy efficiency perspective (Owen, 1991).

Characteristics of the sustainable urban landscape

Basically, urban landscapes is the contact surface between the human and city phenomenon and then considerable part of this knowledge and citizens’ environmental emotions is forming under its influence and its importance is in the extent that it is called as a tool that reveals the city. Sustainable urban landscape is a product of sustainable urban design pattern and its main characteristic is that it is discussed as a special-social structure. Total framework of the sustainable landscape can be considered as sustainable location paradigm in which four elements of the physic, activity, imagination and ecosystem are contributed in provision and formation of urban landscape coordinately.

One another characteristic of the sustainable urban landscape is it’s mimicking from the nature and keeping up with it. Such a landscape has four functional, subjective aesthetic, objective- perceptual aesthetic and environmental roles.

From functional point of view, it is revealed at the role of a wall that separates inside and outside of the environment. Subjective aesthetic role of the landscape is devoted to the expression of the ecological and perceptual aesthetic and natural references.

Physical elements of the environment and landscape in different times are understood differently by every people. In addition to momentary perception of the person from the environment, analysis are done based on previous perceptions in the mind and a picture is formed specially for that person at that time which is mental imagination of the landscape and includes identity, cultural, memorial and historical factors besides perception of each person from a given environment. On the other word, by adding the time factor to the three other factors of space can form a correct analysis of mental imagination of the landscape (Menam, 2005).

Principles and regulation of the sustainable landscape design

Environmental design such as other disciplines is dependent on a series of principles as the basis for designing. Some of these principles are related to form and some others to content of design. The number of these principles can be decreased or increased in terms of the design attitude of the subject is designed. Some may be main principles and some secondary ones (Matloch, 200).

In this section given to the opinions, available and mentioned methods and theories in relation to the issue of sustainability of the factors to reach to sustainable design in different scales and areas of understanding landscape making factors and their sustainability and effectiveness of different factors on sustainability of a landscape system and the effect of landscape formation from various criteria, regulations to access to a sustainable landscape design with emphasis on seven below approaches is extracted and described in details.

- Environmental sustainability approach
- Functional- physical sustainability approach
- Social- economical sustainability approach

- Cultural sustainability approach
- Aesthetics sustainability approach
- Protective sustainability approach
- Development sustainability approach

Urban rivers

Human activities have had undeniable effects on rivers. But the history of human intervention on the rivers has not been so successful. Hydrological system which determines river's geometry before expansion is transforming invariably to generate repeatedly higher intensity flows. Higher intensity flows of the urban rivers loading higher amount of the sediments compare to before. Adjustment of urban rivers with these transformations can be done through broadening of the riversides or digging bed or widening it or with integration of all.

Urban rivers respond to urban development not only through increasing their width and depth but through changing the slope and twists and turns. Meanwhile, many transformations have taken place to protect these rivers against erosion of the edge as well as storm. Up streams are closed several times by storm drains while other channeled rivers are straightened or are sealed and equipped with big stone parts. Another change that has been occurred in the urban rivers is the establishment of sewage system under or in parallel with the channel of the river (Leghai, 1388).

Principles and basis of the sustainable landscape at the urban river valleys

Revitalization of the ecological systems such as river edges and buffers of streams cooperates in creating healthier environment, improves the situation for recreational activities in these regions. For achieving above mentioned objectives designing urban rivers should be done according to special principles and regulations.

- 1- River is the crucial element and life axis of the city and region.
- 2- Revival of the river life with preserving its natural and ecological features.
- 3- Natural form and normal route of the river should be preserved.
- 4- Habitats of the edge and inside the river are revived and native plants are planted again in order to preserve river's natural functions.
- 5- Management of the floods becomes environmental management with very low cost.
- 6- Improvement of ecological conditions of the watersheds leads to revival of the wildlife and their optimal reproduction.
- 7- observation of the vegetative spatial arrangement in the planting design.
- 8- Preservation of the old gardens and optimal use of the fruitful and non-fruitful trees in different parts of the given design.
- 9- Creating and generating more safety in the region by taking in to consideration arrangements such as sentry, creating lighting in the dark hours, creating guard and fence and etc.
- 10- optimal use of the surface water flow and creating linear- beach resorts at the edge of the river
- 11- Reconstruction of the river with twists and turns and curves of a natural river and basins and varied depth and width in addition to biological structures inside the river.
- 12- Preserving and reviving of the ponds with their natural form which can improve drainage process and is fed by floods.
- 13- Decreasing impermeable hard surfaces and replacing them with permeable soft surfaces (such as different kinds of the vegetation)
- 14- Taking in to consideration buffer around the river in order to preserve ecological totality of the river.
- 15- Communication between green and natural stains, integration of the smaller strains and creating bigger strains for greater ecological sustainability
- 16- Preserving the totality of the landscape and creating coordination between different parts to have a unit glance and characteristic to the site.
- 17- Creating an alive and dynamic space that can attract the city to itself and on the other hand, its size should correspond to the scale and size of the city.
- 18- Every space or connection should have legibility in its turn.

19- Hard topography of the region is changing based on the condition of the protection against flood and ground shape.

20- Landscaping should be in the way that opens lines of vision towards the sky and river.

21- Designing should be done in a way that park is accepting users as well as disabled and different age groups and be usable at different times of the year.

22- visual attractions and beautiful unique landscapes in park designs can stimulate the sense of surprise and curiosity.

23- Creating place sense and milestone which gives real identity to the region. Milestones can be in the form of a restaurant or resorts in the elevated point of the site and with a historical characteristic which acts as a sign. For example an old brick bridge on the river or an old big tree with twitted branches and leafs can itself creates a novel landscape.

24- Legible design, keeping legibility in each spaces and connections makes the environment clear and transparent then creates the sense of security and peace for the viewer.

SWOT technique for urban design

When SWOT technique is used in the area of the business management four categories of weakness, strengths, threats and opportunities can be differentiated via ease of separation of indoor and outdoor environment. According to the Cliff Moughtin category when a site is analyzed for providing a project weaknesses and strengths that is negative and positive features of the site are taken in to account. Opportunities are applied for the appropriate facilities that discussed project will bring with itself for the given site and threats refers to the risks that the site will be faced at the influence of any intervention (Moughtin, 1999).

Given to the qualitative characteristics of the urban design it seems that SWAT four categories can be investigated based on two factors of “nature” and “actuality”. On the other word, every quality of urban system (including product quality or urban development process) can be positive (desirable) or negative (undesirable) firstly from “nature” point of view and secondly “potential” or “actual” from “actuality” point of view.

According to this framework each of these four categories can be defined as fallow:

A- Strengths: are those procedural qualities of the urban system that has desirable and actual nature.

B- Weaknesses: are potential facilities that are available for promotion of the diverse components of the urban design quality maker at the site. These facilities are available potentially at the site and are not active just now and they need to planning, designing and targeted physical and non-physical interventions to be actual.

C- Opportunities: are potential facilities that are available at site for promotion of the various components of the urban design quality maker. These facilities are potentially available at site and do not activated yet and for their actuality, programming, designing and targeted physical and non-physical interventions are needed.

D- Threats: are limitations and potentially threatening trends that expose different components of the urban design quality maker of the given site at risk. These risks are potentially existed at the site and if not solved and required decision are not taken under the influence of the “continuation of current trends” will be activated in the future and decrease the quality of the environment urban design.

Table

Factors	Internal Conditions		External Conditions	
	Strengths	Weaknesses	Opportunities	Threats

Physical	<p>Existence of the valuable historical memorial buildings near the river valleys in the range of the first and second sequences</p> <p>Existence of the valuable buildings from native or architecture style perspective in the range of the second and third sequences</p> <p>Existence of the organic texture in the areas near the river valleys</p> <p>High percentage of using good materials in the buildings of the region</p>	<p>Lack of coordination of the new constructions near the river valleys with nature spirit and present morphology in the texture</p> <p>Undefined urban margins and discontinuity of the bodies and walls</p> <p>Low quality of the housing in the marginal textures (Aiak, Simin Ghale)</p> <p>Destruction and reconstruction without regulation in the parts of the region</p> <p>Making elevated buildings in inappropriate sites given to topography, accessibility and public services</p>	<p>Using of abandoned lands at the edge of the river valleys and using garden property as an area of the river valley</p>	<p>Irregular development and growth of heterogeneous constructions or surrounding and elevated construction making at the limitations of the near river valleys</p> <p>Irregular constructions and without urbanization regulations</p> <p>Chaos in density regulations and laws</p> <p>Destruction of the historical and cultural spaces under the influence of inappropriate preservation of the residential units in the area of faults and flood channels</p>
Functional	<p>The possibility of using Taxi public transportation, Aiak/Imamzade Ghasem and Glabdare for mountaineers</p> <p>Existence of the catering facilities (such as teashops and Kalk Chall camp) during mountaineering routes</p> <p>Diversity in shape and type of the mountaineering routes which leads to attraction of the different groups of the audiences</p>	<p>Lack of public rout at the edge of the river valleys specially at the third sequence</p> <p>Impermeability and lack of access from the streets and public spaces around a river valley at the second and third sequence</p> <p>Lack of public transportation system (bus) from Tajrish avenue to different parts of the river valley</p> <p>Lack of recreational usages at the edge of the river valley at the second and third sequence</p> <p>Lack of public long term activities at the edge of the river valleys</p> <p>Illegibility of the mountaineering routs at the range higher than 2200 m level</p>	<p>Exploitation of the abundant areas at the riparian zone of the river valley to use it during the design</p> <p>Possibility of developing the catering and pitching and bivying space in two valleys in two valleys (Bagh Afshar and Yek Bagh)</p> <p>Exploitation of the rocky and stony lands with slopes higher than 30% for rock climbing and mountaineering</p>	
Natural	<p>Preserving natural bed of the river valley at the first sequence (at the form of stone valleys or vegetation)</p> <p>Existence of the gardens and open spaces having old trees and bushes at the eastern zones of the second sequence</p> <p>Existence of the sloppy body with full of trees at the western zones of the river valley at the second sequence</p>	<p>Excessive erosion at the body of the heights of the first sequence</p> <p>Conflict of the concrete establishments of the flood control or the its surrounding environment at the first sequence</p> <p>Destruction of the natural bed of the river valley at the distance between Imamzade Ghasem up to Darband Street (Fist sequence)</p> <p>Destruction of the natural bed river valleys at the second and third sequences due to the aggression and compression of constructions</p>	<p>Soil erosion due to the existence of the human</p>	

<p>Land use</p>	<p>Existence of the abandoned lands at the area Existence of the valuable ecological gardens at the area Existence of the valuable historical cultural buildings at the area Lands with public ownership (natural resources) at the level higher than 1800 Tendency to small tourism business by the land and garden owners with good location Desirable conditions of the density indexes (Household in residential unit, person in residential unit, person in room) compared to city</p>	<p>Private ownership of the gardens and shortage of their social power and shortage of facilities and welfare services for the tourists at the area Existence of the high residential density and compact worn out textures at the historical cores of the region</p>	<p>Devotion of the abandoned lands to the program of the natural corridor revival of the river valley Changing private gardens to park and green space to increase their social power Integration of the abandoned and green spaces to the Golabdareh green corridor to increase ecological power of the green spaces Leading of the land owners and available capitals to alternatives such as residential usages or public usages and recreational an tourism and cultural usages</p>	<p>Tendency to make construction without license and coordination with the municipality of the region by the private sector Tendency to ownership natural resources lands and create recreational cultural establishments without license or coordination with the municipality of the region Lack of effective supervision of the municipality which leads to constructions at the margin of the city at the area Continuation of the land usage of the gardens of the region and residential construction in them</p>
<p>Accidents</p>	<p>Existence of the routs and areas with the least requirement to skill and risk to use the nature Existence of the organizations related to relief and rescue in the mountain</p>	<p>Existence of the natural appropriate situations for misdemeanor and rape of visitors in the quiet and dark hours and when police forces were not present at the site</p>	<p>Existence of the open areas in order to make relief and rescue possible at the time of accidents Possibility of the development of relief and caring services for decreasing social and human lesions at the site Possibility of enjoyment from the earthquake crisis management system at the site at the unpredictable accidents</p>	<p>Existence of a big fault and the imminent danger of an earthquake Threat result from flood given to mountainous watershed, steep slope, irregular constructions and changing flood channels and waterways to concrete channels Existence of the worn out buildings incompatibility of some structures in the area with high seismic potential</p>
<p>water and waste</p>	<p>Existence of numerous aqueduct and springs in the area and permanence of the flow in the main rout of Golabdareh river</p>	<p>Lack of a modern and broad network for waste water at the area and near contexts and finally entrance of the water wastes to the Golabdareh river valley Existence of the well drains broadly and pollution of the aqueduct waters</p>	<p>Controlling and treatment of waste waters to improve environmental indices Implementation of sewage system in the region</p>	<p>Serious damages to the residents and visitors at the site on the influence of the running waters and aqueducts</p>
<p>Ecology</p>	<p>Environmental and climatic situation of the region which in addition to generate local advantages, play important role in improvement of the biome</p>	<p>Existence of the visible damages to biome in the form of trespassing on the riparian zone of the river valley and changes result from entrance of the different pollutants such as waste waters and solid trashes</p>	<p>Using local advantages of the biome as a potential for the development of tourism and recreational activities Revival of the natural conditions of the air corridor to increase the role of the site at improvement of the biome</p>	<p>Tendency to the expansion of the constructions and finally vegetation poverty and the shape of the river valley Lack of appropriate regulation and laws and lack of guarantee for implementation of these laws in order to preserve environment Continuation of the lack of attention to actual win capacity</p>

Social economical cultural	<p>Higher level of education, expert and income of the different groups reside in the region compared to a city</p> <p>Tendency of the residents to cooperation and participation in solving problems of the municipality of the region</p> <p>Existence of the social groups which are residing there long before as unofficial supervisors and controllers of the area at some parts</p>	<p>Social, cultural, and economical incongruity at the parts of the region</p> <p>Existence of marginalization at the area of the second sequence</p> <p>Lack of official supervision and control on the river valley specially at the first sequence and occurrence of the inappropriate social behaviors</p>	<p>Accommodation of influential groups (political, social and economic officials) national and international in the region</p> <p>Tendency to investment in the region due to generated economic advantages</p> <p>Creating acceptance and tendency for the Imamzade Ghasem pilgrims at the area of the river valley</p> <p>Utilization of residential areas near the river valley as its unofficial supervisors and promotion of the security in it</p> <p>Tendency to reconstruction of the worn out textures given to its profitability and economic advantages</p>	<p>High population growth rate compared to the whole city</p> <p>Increasing trend of the land and house (building) price</p> <p>Disturbing the social, cultural and economic homogeneity of the region due to the growth of the cooperative complexes</p> <p>Capital influx in to the housing and construction sector at the recent years at the region</p> <p>Development and stabilization of the heterogeneous social groups with the region in the form of marginalization at the abandoned regions of the second sequence</p>
Visual	<p>Good vision to the heights and Kalk Chal tower from Tajrish entrance which guarantees liability of the rout</p> <p>Existence of the sequential striking visions the area of the second sequence and Imam Zade Ghasem bridge up to Vaziri bridge</p> <p>Existence of the Alborz mountain and foothill heights as the main landscape of the city</p> <p>Existence of the hills and valleys and natural landscapes and vision corridors in the region</p> <p>Varied vision at the mountaineering routs due to passing from various parts (valley- ridge- waist) and twists of the valleys and variety on the motion directions</p>	<p>Loss of continuity of vision and creating visual disturbance through invasion of the constructions to the river valley area and visual impermeability from public spaces around river valley specially at the third sequence</p> <p>Inconsistent constructions with natural bed at upstream and existence of the unorganized without facade bodies at the edge of the river valley (specially at the third sequence)</p> <p>Monotonous and boring view at the bed of the river valley at the third and second sequence</p> <p>Landscape conflict of the flood controlling establishments with its surroundings visually and existence of the abandoned trenches at the big part of the river valley length</p> <p>Lack of coordination and visual communication between the old and new buildings</p> <p>Blocking and restriction of the visual corridors and accesses given to inappropriate establishment of the buildings and elevated making at the area</p>	<p>Bolding public signs (familiar areas for the public) to make river valley legibility and its surrounding</p> <p>Possibility of using natural complications of the region in order to improve vision and landscape</p>	<p>Disappearance of the visual corridor to the heights by the current high construction process</p>

Conclusion

Unlimited use of natural resources and so on all are human civilization process in this century and urbanization of the seventh century has the greatest influence on the environment. Therefore, sustainability theory requires changing physical, social, economic and managerial infrastructures at all parts of the city such as physique of the city, architecture of the buildings, environment, landscape and etc.

Creating man made and ecologically dull and boring spaces and landscapes neither are useful from social point of view not visually satisfactory. According to Hurg if landscape design can be described as an art and scientifically which aims to promote quality of life in the cities and provision of civilized

constructive places for those who are living in it, then the current basis of the shape is investigated too. Then the main problem is that not taking environmental views and present patterns in to account in natural bed is considered as the most fundamental problems of these cities.

These neglects are factors which are caused these cities showing off as separate stains and in contrast with the nature of the region and disruption in the function of the region which has no consequence except with stability in cities. Restricted amount of the open and green spaces and their insignificant area against constructed spaces at the city are considered as other instability of the cities. Indeed, in these cities green spaces and nature are considered as an element to fill empty spaces and without usage and do not have any effect on the physique of the city.

The goal of the sustainable urban design is the promotion of the environmental quality of the cities too and it is considered as an activity that arranges subjective and objective landscape using different social, economical, physical, environmental and aesthetics which requires regulations for Preservation and rehabilitation of green spaces, ecosystems and major habitats.

Therefore it is necessary that urban development strategies to be in such a way that lead to active preservation and sustainable exploitation of the natural resources , urban and suburban ecosystems.

Revealing natural forms and processes currently in the cities are the skill of the environment and landscape designers too which is the sole way for accessing to sustainable landscape.

Sustainable urban landscape is the product of sustainable urban design and its main characteristic is that it is proposed as a social- special structure which align with synchronization with the nature and modeling it has accepted four functional, objective aesthetic, subjective-perceptual aesthetic and environmental roles.

The objective of deterring principles for urban design is to access to the certain patterns in a general framework in order to generate arrangements of the environment and landscape design. These patterns which are generally are a function of designing principles, are considered specifically for providing design and for accessing to an appropriate design observation of all its aspects by the designer is necessary. (Momen Romiani, Eisa, 2001).

It this study it is tried that a sustainable land scape is achieved by taking in to consideration the principles of sustainable design at the edge of the urban rivers and preservation and revival of these rivers.

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