

The Role of Sustainable Greenways in Achievement of Improving the Quality of Life (Tehran's greenways as a case study)

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Introduction

Urban growth and development is caused to increase exploitation of natural resources more than environmental capacity and lead to instability in the cities than ever before. Accordingly sustainable development emphasizes the role of green area and in order to achieve this goal, “greenway” is considered as one of the most important tools for improving urban sustainable development. Moreover, urban green spaces and elements consider as a main factor in the improving of quality of life. Greenways are “green infrastructure” to link people and places (Fabos, 1995) and can be planned at different scales and for multiple purposes, “including ecological, recreational, cultural, aesthetic” (Ahern, 1995), and also to provide people with access to open spaces close to each other where they live. At the city scale, the urban greenways can help improve the city, making it more livable, equitable and environmentally sustainable. In addition, urban greenways provide pleasant, efficient, and healthful and environmentally travel by foot or bicycle. The most important benefits of greenways in urban areas are environmental protection, recreation, and alternative transportation. These benefits cannot be realized unless the greenway planners take a multifunctional approach to the greenway paths and also consider the main role of settlements who lived there as a key factor (Shahani, 2010).

In the present study, the greenways of Tehran (Islamic republic of Iran) are analyzed more in-depth to evaluate the quality of life based on perception of people who lived there and the study sources in this field. Tehran urban area and its greenway's parts are the main material of this research and the greenways of Tehran are evaluated in the frame of urban natural formations of research. Besides, the data that would form the base of the Tehran greenways proposal is gathered from the literature study, greenway theoretical study and international greenway planning applications.

This paper is formed of three phases. A literature review is made to establish a theoretical base for the study. Then, Tehran city and its greenways are analyzed. In this regard, city's green space compounds are recognized as a major structural component in the process of green paths influence. The most important goals of this paper are considering greenways as a main factor of quality of life in urban area to improve sustainable development. To achieve the main goal at the third part, required index is determined in the study area and evaluated. Some of the main factors which are assessed the quality of life in the main greenways of Tehran in this research are: access to transportation, pollution, accessibility, social interaction, people's health and fitness, recreation and economic growth. Three main greenways of Tehran (Vali-Asr St- Shariati St- Mirdamad Blv) are considered to evaluate sustainable development indexes in the field of quality of life. To reach this, the questionnaire regarding quality of life is designed. Analysis of Questioners about the concept and understanding of greenways are prepared and evaluated based on responses for ranking indicators. Finally, after a detailed analysis and comparative result, some strategies and solutions are proposed for Tehran's greenways as an applied tools or factors to enhance the

quality of life as the most important index of sustainable development.

Literature Review

Sustainability is a vision and it was born by changing people's view in the world. The views of environmental issues are mentioned in the Brantland Report of World Development Commission. In an exact definition "sustainable development is the progress of life quality for protecting environment"(Shearman, 1990), and in this expression, the concepts of “development” and “environment” are comparable each other and describe one goal. In the environment, functions of human being are so considerable and sustainable development emphasizes human's rights for health and new life with nature harmony. All the recent numerous and complex environmental problems in sustainable development planning, lead to consider sustainable development strategy as a main tool to use green and sociable spaces. The balance between various parts of city development and between city and green spaces are considered by the most effective and relevant components of sustainable development such as, “favorable city image with human proportions”, “urban identity” and “green and active spaces in the urban environment” (Chiesura, 2004).

Previous studies on the human ecosystem perspective and sustainable communities provided the basis for a conceptual model to integrate these ideas in the context of urban facilities (Fig 1). The model is developed in an attempt to recognize the basic relationships between component parts of a place in terms of its physical, social and economic realms. The model also indicates that quality of life is created by an ongoing interaction between community, environmental and economic qualities. Another basic idea about this model is that a sustainable community cannot be accomplished by focusing on just one of these three (economic, social, or environmental) aspects of the place and needs other facilities that should be planned and designed for a balance among the economic, environmental, and social characteristics of an area so that its residents can lead healthy, productive, and enjoyable lives (Shaffer, et al, 2000). For this reason, the quality of life is considered in the middle of the model as a main and effective element in humans being.

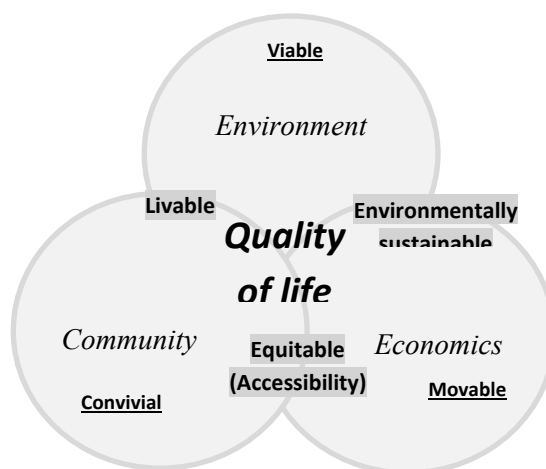


Fig 1. A Conceptual Model of Factors that Contribute to Community Quality of Life.

There are five key ideas contained the definition of greenways: First, the spatial configuration of

greenways is primarily linear; Second, linkage; Third, multi-functional based on compatibility of certain uses; Fourth, complementarity between nature protection and economic development and the Fifth factor is greenways represent a distinct spatial strategy based on the particular items and advantages of integrate linear systems (Ahern, 1995). Greenway planning and design corroborate the principles of landscape planning and design, focusing on valuable areas and resources (Fabos, et al, 1993) and also promoting better metropolitan landscapes.

Greenways have some social benefits those are helped the sustainability such as: Improve leisure time and sport facilities, Have an alternative transport route, Help the public mobility, Enhance well-being through contact with nature, Prepare healthier lifestyles, Facilitate social equity, social cohesion and Have a positive influence on human behavior (Vasconcelos Silva, 2006). The greenways profits are reinforced when they are connected in a comprehensive greenway network, linking the main significant areas of natural, ecological, scenic, social, economic, recreational, historical and cultural values of an urban area. Through these benefits, greenways are an appropriate response towards greater urban sustainability. In other words, greenways are a vital planning tool and can help make progress towards greater urban sustainability as well as more general benefits. One of the most important of social benefits in greenways definition is quality of life (Fig 2).

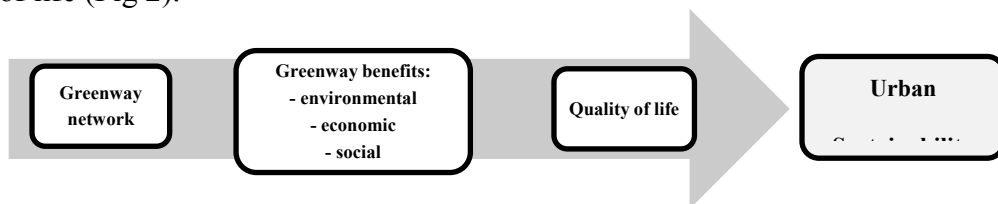


Fig 2. Greenways Network and Urban Sustainability.

Greenways are a part of a resource that has the potential to influence many quality of life factors. In a study of greenway in the urban it is found that, more than anything else, people like them for its scenic beauty. Responses about 'nature' and 'trees' are also among the top characteristics that people like about greenways uses (Gobster, 1995). Users of a greenway appreciate them most for opportunities to exercise, relax and appreciate nature, regardless of whether they are walking, running or biking. The two largest benefits perceived by residents around greenway study are related to health or fitness and preservation of open space, while recreation, community pride and aesthetic beauty are stated.

This study wants to measure user perceptions to evaluate the effectiveness of greenway in terms of quality of life. It is also examined the ranking of characteristics of quality of life by people. Understanding public perceptions about these facilities provides useful information which can be employed to identify shortcomings in current facilities, to develop new facilities, to develop and justify planning strategies or evaluate usefulness in achieving objectives. There are many indexes for evaluation quality of life, but based on the similar research or studies -Shaffer, et al, 2000, and Shahani, 2010- the most important and applied factors are selected. These characteristics are Natural areas present, Access to public transportation, Amount of pollution, New business development, Opportunity for other transportation use, Accessibility to shopping areas, Social interaction among residents, Conditions of people's health and fitness, Accessibility to work/school, Cost of transportation, Residents pride in community, Time spent on commuting and shopping, Accessibility to recreation, Economic growth and Features contributing to community identity. These are all listed characteristics related to the quality of life need to help

sustain a community; In addition these factors are extracted from literature review and some research that is related to the subject of this study. These fifteen indexes are examined for ranking importance and contribution of greenways in the study area and considered quality of life as a main factor of people who lived there for achieving sustainable development.

Goals and objectives

The most important and obvious goal in this paper is quality of life and how can be achieved it in the green way based of sustainable development. In the three green ways of Tehran (Iran) some special characteristics that are related to the improvement of quality of life are examined by the people with questionnaires. The main output of this research is ranking the key characteristics of quality of life and proposing the strategies and solutions to develop it in urban area. The presentation will promote the concept that greenways are more than just roads. There are several key factors that show a greenway can help create an acceptable city with including promotion of the connection and continuity, the aesthetics and multi-function and environmental protection. Without these key pillars of support greenways become unsustainable. A Successful Greenway should be considering the quality of life for their settlements as a basic feature besides other roles of them.

Methods

Location of Tehran (Islamic republic of Iran) in the southern slopes of Alborz Mountain range gives special benefits to it. Most of green ways in Tehran are gathered in the north part of it and they are near rivers or valleys. They work as recreation or health area for people who live in Tehran. The shape of city's relationship with nature in north part is different in various sections, the three selected greenways are on the northern sections in Tehran and due to their green masses with beautiful scenery they are considered to evaluate exiting green liner patterns. The composition and distribution of urban greenways in Tehran have been more related with the specified purposes and has linked elements in the environment and liner structure and also consider specific spatial and functional feature for multi-functional purposes.

The three main greenways of Tehran in connected each other in the north part of it; they are Vali-Asr St- Shariati St- Mirdamad Blv, (Fig 3). Mirdamad Blv is cuts off Vali-Asr St and Shariati St, in another word Mirdamad Blv is in the middle of this map of Tehran's greenways and is created the backbone of "H shape" in their structure. These roads were selected as greenways in the Master plan of Tehran (2007), Detail plan of Tehran (2012) and Tehran vision (2024), moreover the green spaces and social interaction in these ways among people are so obvious, and therefore these three ways are the places that this research examines the characteristics of quality of life in greenways. The paper purpose is to demonstrate greenway significance towards the improvement of sustainable development in urban area. The case of Tehran's greenways wants to present the achievements on urban planning and the receiving the factors of quality of life.

In order to accomplish the purpose of this study, a survey procedure was conducted from May to June 2012. Users of each way were sampled on all the days of a week and users were intercepted between 3 p.m. and 7 p.m. daily. A table was set up at the intercept point and signs were placed

down the ways in both directions indicating that a study was in progress. An effort was made to invite every user who passed the intercept point to take part in the survey.

One questionnaire forms was developed. Fifteen items were selected and adopted from literature related to quality of life and sustainable development. Respondents were asked to provide their perceptions twice regarding these items. First, respondents were asked to rate the importance of each item (on a five-point Likert type scale, 1: very unimportant, 5: very important) to their community's quality of life in general.

Then they were asked to score (on a five-point Likert type scale, 1: poorly to 5: extremely well), and also requested how they perceived their greenways to contribute to each quality of life item. Questioning people about both the importance of characteristics and their performance of contribution allowed for a more complete evaluation of their relevance.

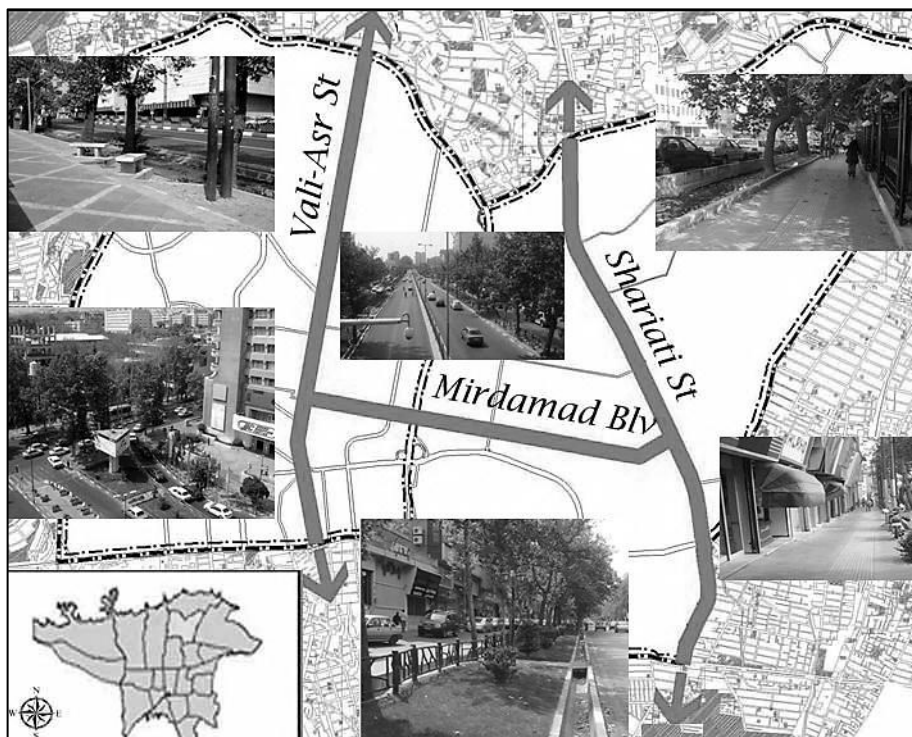


Fig 3. The General View of Three Main Greenways of Tehran.

After that section, data are analyzed using descriptive statistics, and ‘an importance-contribution analysis’ is used to examine how greenways might influence community’s quality of life. Mean values for importance and contribution provide plot points for “an importance-contribution analysis” grid. Importance scores are placed on the horizontal (x) axis and contribution scores are placed on the vertical (y) axis. Interpreting the importance-contribution grid into action is fairly straightforward. Each of four quadrants in the grid represents considerations for planning and management, (Fig 4). Issues of importance to users, and those to which ways contribute well, will fall into the upper right quadrant of the grid. Greenway planners and managers can point to these items as ‘Quality of life performers’. These items act as indicators of how the greenway is best meeting concerns. Items that are seen as important to quality of life, but to

which the greenways do not contribute, fall into the lower right part of the grid. These items may require attention in future planning and management efforts if those are to meet full potential. Items in this area might be labeled 'Quality of life priorities'. Issues of low importance, but to which the greenway is seen as contributing well would fall in the upper left quadrant and might be considered 'Quality of life windfall'. Finally, some items may be perceived as unimportant and also receive a low contribution score. Based on user perceptions, these items are apparently of little to no concern and the fact that greenways do not contribute may not matter much. These items would fall in the lower left part of the grid and might be labeled 'Quality of life inconsequential'.

Results

At first the user characteristics information are described. The average age of respondents is 38 years old. Overall, approximately 40% of respondents are female and 60% of them are male. Greenways users in this sample are well educated. Over 75% has a college degree and 46% has a graduate or professional degree. These demographic variables suggest a need to look more closely at socio-cultural 'equity' on urban greenways. The meaning of these three greenways to quality of life is presented in this part. Table 1 shows the importance that users put on 15 characteristics related to community quality of life. Overall, respondents indicate that the things most important to their community's quality of life are the presence of natural areas, amount of pollution, social interaction among residents, and accessibility to work and school. Each of these characteristics is scored over 4.3 on a five-point scale (between 'important' and 'very important'). On the other hand, such things as accessibility to shopping areas, time spent on commuting and shopping, and features contributing to community identity are perceived to be the five least important characteristics (mean scores are <3.6 on a five-point scale). Generally, respondents from each road perceive these characteristics similarly in their levels of importance.

Main characteristics of quality of life	Overall sample in the three greenways (Vali-Asr St- Shariati St- Mirdamad Blv)	
	Mean	Rank
Natural areas present	4.50	3
Access to public transportation	3.98	9
Amount of pollution	4.38	4
New business development	3.87	10
Opportunity for other transportation use	3.82	11
Accessibility to shopping areas	3.50	13
Social interaction among residents	4.61	1
Conditions of people's health and fitness	4.22	6
Accessibility to work/school	4.53	2
Cost of transportation	3.74	12
Residents pride in community	4.11	8
Time spent on commuting and shopping	3.40	15
Accessibility to recreation	4.26	5
Economic growth	4.17	7
Features contributing to community identity	3.46	14

Mean values are calculated based on a five-point scale where 1: very unimportant, 2: unimportant, 3: neither, 4: important, 5: very important.

Table 1. The Level of Importance That Users of Three Greenways Placed on Quality of Life Characteristics

As shown in Table 2, respondents indicate that greenways have contributed most to community quality of life through natural areas present, social interaction among residents, conditions of people's health and fitness, and accessibility to recreation (mean scores are >4.2 on a five-point scale). These users generally perceive that their greenways do not contribute much to quality of life through access to public transportation, opportunity for other transportation use, and cost of transportation (mean scores are <3.7 on a five-point scale).

Main characteristics of quality of life	Overall sample in the three greenways (Vali-Asr St- Shariati St- Mirdamad Blv)	
	Mean	Rank
Natural areas present	4.38	1
Access to public transportation	3.66	14
Amount of pollution	4.14	6
New business development	4.03	8
Opportunity for other transportation use	3.61	15
Accessibility to shopping areas	3.97	9
Social interaction among residents	4.33	2
Conditions of people's health and fitness	4.25	4
Accessibility to work/school	3.79	12
Cost of transportation	3.69	13
Residents pride in community	4.09	7
Time spent on commuting and shopping	3.85	11
Accessibility to recreation	4.30	3
Economic growth	4.18	5
Features contributing to community identity	3.88	10
Mean values are calculated based on a five-point scale where 1: poorly, 2: fairly well, 3: well, 4: very well, 5: extremely well.		

Table 2. The Level of Contribution Those Users Felt the Greenways Made Toward Quality of Life

Quality of life characteristics are plotted based on both the importance people placed on them and how well they felt greenways contributed to the community quality of life. Plotted points represent the characteristics listed in Tables 1 and 2. Quadrants are devised using the midpoint in the two response scales. (Fig 4) includes visual plots for the three greenways and indicates that most of the quality of life characteristics are perceived both as important and that the greenways are perceived as contributing well to quality of life in those ways. That is, the items are almost all located in the upper right quadrant as quality of life performers.

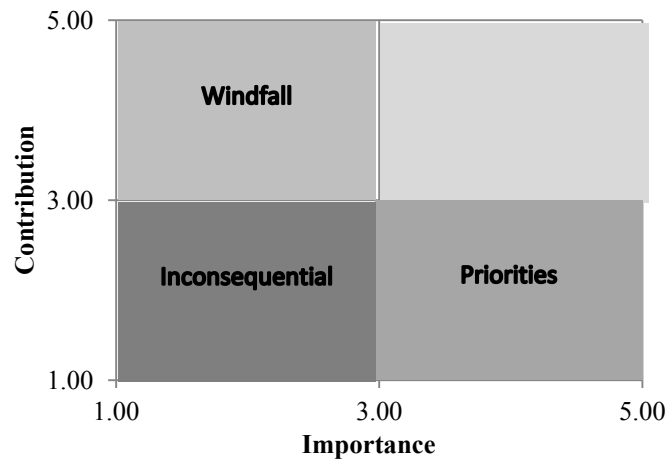


Fig 4. Importance-Contribution Grids of Main Characteristics of Quality of Life

An examination of the spatial pattern of plots for all greenways suggests that certain characteristics clustered into good, better and best categories of performers. Access to public transportation, opportunity for other transportation use, and cost of transportation are generally seen as least important and as receiving the lowest contribution. These items receive scores that could still be interpreted as good. But, when placed in the mix with other items they might also be considered quality of life inconsequential in order to focus energy elsewhere. Economic growth with new business development, access to work or shopping area besides residents’ pride fell in the better or middle range. Respondents seem to feel that these items are very important to quality of life and that their greenways also contributed to them very well. Finally, quality of life characteristics like social interaction, natural area, access to recreation along with considering amount of pollution and health represent the best of the quality of life performers. These characteristics are seen as extremely important and as receiving the highest contributions from these greenways.

Discussion and conclusion

Greenways have the capability to protect and link natural, historical, cultural, ecological and economic resources into a type of system that has greater value and higher use than each of its parts. Greenways respect the carrying capacity of the natural environment and they take into account the balance among the three parts of (urban) sustainability: environmental, economic and social. They help make urban areas more environmental responsible, healthy, attractive, vibrant and in one word sustainable. Greenways system help place particular emphasis on the question of how it is possible to move towards urban areas that are more enjoyable, more interesting, more humane and more legible.

Greenways like roads are used in different ways and for different reasons. The location of these greenways within their respective communities, the character and management policies all influenced these use patterns. Time spent on site inventorying, site characteristics and interviewing users led to that the greenways received more use from commuters because it prepared accessibility for them to work or school. The greenways have been especially helpful to

cycling and pedestrian because it was relatively straight, paved and had grade separations at many major intersections, these characteristics made it a relatively fast and safe for them and particularly it can help the social interaction in the urban area. Connections between the three greenways made it an attractive place for who work or live in that area especially for the lunch hour. The greenways may be serving to enhance relationships through the residents' pride and also they provide facilities to growth new business opportunity. Connectivity is a critical functional characteristic for people in greenway environments. Access to the greenway through good connections from work to home, entertainments and shopping area with considering health and fitness help determines influence and types of using.

The finding shows that greenways contributed to quality of life mostly through what they contributed to the natural and social environments in their communities. The model in (Fig 1) suggests that quality of life is composed of at least three major variables in a society. The community of people (social environment), the environment (physical surroundings) and the economy (jobs, income) overlap to create a quality of life for the community. Results here suggest that greenways are contributing most to quality of life through what the model represents as "livability", in this case the interaction between a community and the environment is mentioned. Respondents in Tehran case study are appeared to value greenways for their support of the social and physical environments as same as the economic one. Urban greenways provide places for daily recreation and alternative transportation (especially public one) and encouraging positive personally interaction with other people. They also provide "nearby nature", a break and escape from the hard surfaces and noise levels of surrounding roadways and other development with considering public health. The emotions suggested by a place can be indicators of livability and people's quality of life.

Greenways are appeared to perform well in their contributions to almost all quality of life items in this study. This is good from the standpoint of justifying greenway designation and development. The clustering of good, better and best 'performers' suggests that planners and managers can gain insight through such an analysis prior to development. In this study all of the characteristics are being in the performance area and it is represented that the contribution and importance of the quality of life are approximately in the same level position. Differing approaches are important to understand if greenways are to maximize their utility as quality of life enhancement or not, these users perceived that greenways made strong contributions to reducing transportation costs and accessing local destinations because they, at least occasionally, used them for transportation. The fact they used greenways for several reasons have also lead to their stronger feelings about the way that greenways contributed to a community's identity and to positive social interactions among users.

A Successful Greenway becomes a backbone along which various sustainable development factors can be implemented including access to transportation, pollution, accessibility, social interaction, people's health and fitness, recreation and economic growth. According to conclusion, the main point is that before any action in the case study, should be prepared essential backgrounds in environmental, functional and social fields; otherwise any actions for promoting quality of life in the greenways will not be achieved any success.

Results are based on research finding, theoretical concept and along with principles of

sustainable development and users perception about quality of life in the Tehran's greenways. Therefore via them, it can be organized necessary fields in direction of future policy, move to improve exited shortcomings and create new facilities to improve the quality of life. The research is demonstrated that greenways program can be a good tool for the protection of the landscape heritage and also for strengthening the achievement toward quality of life for inhabitants of Tehran. As it is showed in Table 1 and 2 and also in (Fig 4), natural area, social interaction and accessibility are most important and key factors for improving quality of life in user's view. In conclusion, greenways are an important planning tool for achieving greater urban sustainability with quality of life. The expected outcome of this study is that the potential of greenways for enhancement sustainable development in urban environments is high, but will vary greatly depending on the details of configuration and composition of existing social interaction and also the people's view. In addition, the use of urban greenways as a tool for promotes the sustainable development should be with an emphasis on quality of life. Through these outcomes, this paper has demonstrated that greenways are a path towards urban sustainability with use of some key characteristics to improve quality of life in urban area. At the end of this research ,based on finding and characteristics of case study area ,some essential strategies and solutions which green ways can be progressed quality of life is expressed, however, they are so extended in different study fields. Thus, the effective and applied strategies and solutions are explained and in order to reach and improve mentioned characteristics, they are suggested in Table 3.

Strategies	Solutions
Emphasizing the integration of pedestrian and driving networks	<ul style="list-style-type: none"> - Reorganization of existing area in greenways and adaptation to surrounding land uses. - Considering greenways in urban transportation systems as main or secondary ways or roads in categories and providing the free movement of pedestrians. - Creating safe and quick access routes pedestrians and cyclists. - Give priority to pedestrians in passing the intersections.
enhancement social efficiency and performance	<ul style="list-style-type: none"> - Providing necessary infrastructures for entering people as pedestrians and cyclists. - Strengthening social stability in greenways by encouraging recreational and community activities. - Encourage residents to enhance community sustainability.
Prepare entertainment and attractiveness in greenways	<ul style="list-style-type: none"> - Creating spaces to satisfy the essential needs of pedestrians and bicyclists. - Providing recreational facilities such as a water fountain and green spaces to rest. - Organizing and forming business and market spaces. - Preparing Social and cultural attractions. - Considering surplus value for the owners of the surrounding area.
Use urban furniture to compliment and emphasize the space	<ul style="list-style-type: none"> - Locate and establish urban furniture along the walking path. - Improved pedestrian entrance and bridge. - Reforming and development route entrance to define and emphasize them.

Table 3. Proposal Strategies and Solutions for Improving Quality of Life in Tehran's Greenways

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