



## The effect of green spaces on cities with health and efficiency approach

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**Abstract.** Being in modern space and increasing population and urbanization growth have turned the cities into the center of living gatherings and various activities and they are encountered with the shortage of public green spaces. By transition from modernity space and being in postmodern world and nostalgic sense in these spaces, the need of citizens to spend leisure time is increased and returning to green spaces in modern cities has caused that it has great social, mental and cultural effects on urban dwellers in these spaces. This study is based on descriptive-analytical method and besides explaining the importance of green space in current modern cities and the analysis of social, cultural and mental effects of development of these spaces; some recommendations and solutions are presented to improve urban management performance regarding the improvement of social, cultural and mental effects of urban green spaces in metropolises. The suitability of design of open space in various dimensions and its consistency with cultural, social, natural features and living conditions as the result of coordinated performance of various layers of city by affecting the behaviors of residents can make the neighbors comfortable and create intimate and good townships. The findings of the study are: Green spaces in cities above ecologic return have good effects in most of social and psychological fields but these spaces in case of weak urban management performance can provide some unsuitable functions. Urban green spaces and urban management affect each other as urban green space has no suitable function without active and sustainable urban management.

**Keywords:** Green space, Environment psychology, Environment, Mental health, urban green space, Good space, mental comfort

### 1. INTRODUCTION

Urbanization and urban development are the most important phenomena of recent periods. Rapid urban growth in developing countries has created many social, economic and physical problems as increase of poverty in cities, housing problems and inefficiency of urban services, creating slum areas and illegal houses, social delinquency, air pollution and reduction of urban green space, etc. (Hessamian, 1998, 41). By the increase of population and urbanization development, people are away from nature and high density of population and interference in natural environment and creating of anthropogenic environments showed environmental, physical and mental needs of people.

To fulfill these needs, urban dweller person creates gardens and artificial green spaces in the cities (Saeednia, 2004, 26). Open and green urban spaces not only are considered due to their recreational importance, they are valuable due to the role in the balance of urban environment and reduction of air pollution and mental and physical development of city dwellers (dunnet,2002,4).

Unfortunately, the development of urban green space is always with some problems and the reasons are urban rules and lack of determining standard green space per capita as presenting some statistics of 7m<sup>2</sup>

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per capita of green space from some organizations to 50m<sup>2</sup> green space per capita from other organizations. Unfortunately, development of urban green space is with many problems and shortages as the reasons are urban rules and lack of determining standard green space per capita as leading to some statistics of 7m<sup>2</sup> of green space per capita from some organizations to 50m<sup>2</sup> green space per capita from other organizations. Other factors are associated to abuse of some people and ignoring people and some of authorities to develop urban green space (Mohammadi and Eskandari, 2006, 48).

As urban green spaces by planning can show human virtues, also they can turn to a place with different urban crimes via unsuitable and simplistic planning and have adverse social, cultural and mental effects on urban dwellers. This study attempts to investigate the good and unsuitable effects of urban green spaces on citizens.

Urban spaces and cities in the past had specific autonomy, personality and identity but now, the main structure of many cities is similar. In most plans, instead of considering natural, local and available perspectives, uniform vegetation with inconsistent buildings with traditional texture are built. In most of urbanization plans relationship with nature is one of the main factors in city identity definition and it is ignored. Planning without considering extension of green spaces around the cities has shown that human environments as abandoned are failed completely (Tibalz, 2008, p.5). Green spaces besides fulfilling economic, environmental and health needs have created suitable welfare facilities to pass leisure time and they had many mental effects on quality of urban life. Today, the lack of suitable green space in big cities created many mental and physical problems. One of the most important features of natural spaces is giving identity to cities as these spaces play important role in emphasizing and increasing readability of urban signs (Bahramsoltani, 2005, p121). Green spaces based on their scales and form act as one of the features of city and can improve identity of city. One of the indices of identification of cultural identity of city is natural component (Behzadfar, 2007, p54).

The unduly development of cities is a threat to environment and has adverse effects on function of natural systems as vegetation, surface water and underground water and quality of air of cities. In many cases, changing land use is done without considering the continual structure of green spaces and their relation with surrounding environment. Lack of consideration of green space continuity, natural nature and their performance are changed. Despite the attempts regarding the increase or maintaining the spaces, most spaces have lost their efficiency and they were turned into regions without support and identity. Urban unstable environments have lose their identity and citizens are inclined to live in new locations.

The aim was mostly protecting the physical effects of these resources but presence in green spaces was turned from physical need to mental need over time. Using green spaces is used as a solution for natural identity to city and the importance of locating green spaces in cities was mostly emphasized. Fair distribution of urban green spaces can fulfill the needs and satisfaction of all residents. Thus, recognition and identification of distribution models of urban green spaces in urban design and planning are of great importance.

In new approaches of urban planning, not only green spaces but also its distribution is of great importance in various regions and city relationship with surrounding nature in sustainability of urban spaces. Maintaining consistency of urban green spaces besides increasing access of residents and their participation in urban affairs play important role in perception of green space and natural identity of city. This issue as a necessity is less considered and in most cases, lack of information of its benefits can separate, disturb urban spaces in various regions. Indeed, mechanism of management of urban green spaces is a vital issue and it is the requirement of development of green urban spaces, having correct policies and using scientific methods in these researches (Pourahmad, 29, 2009-55).

Having such ground of perspective and health can change planning and landscape design. Thus, introduction with the effects of landscape on prevention of these diseases and increasing of health of society are important. Today, sustainable urban planning is based on development of concepts to achieve social welfare by citizens and mental health of citizens is one of the types of this welfare.

Disorder of urban spaces is based on lack of suitable response to the expectations to cities. In recent years, urban modern life creates mental diseases arising from mental, environmental pollution and this leads to depression and stress in urban communities. In urban communities, to reduce stress and increase mental health of citizens, considering urban environment belonging of citizens as natural elements, recreational places, parks, etc. and inviting them to be present in these urban places is one of the main indices in planning.

## **2. HYPOTHESES**

2-1 It seems that urban green spaces help the improvement of quality of air of cities. The researcher assumes that by performing these plans in the closes distance to residential spaces of cities can get much influence of these spaces.

2-2 It seems that the effect of these green spaces is high in increasing morale and passing leisure time of residents of those cities away from natural environments and villages.

2-3 It seems that urban green spaces in development of tourism industry can be effective. The researcher assumes that urban landscapes in attracting tourist were effective.

2-4 It seems that urban green spaces were effective on improvement of quality of water of cities. The researcher attempted that these spaces were effective in cheap treatment of water of cities.

## **3. STUDY PURPOSES**

3-1 Adjustment and improvement of air quality of urban spaces namely in metropolises and cities with polluted air.

3-2 spending leisure time and making citizens close to each other to establish social interactions and natural environment and creation of a pretty landscape

3-3 Development of tourism industry in cities

3-4 increasing the quality of water cities and avoiding water pollution

3-5 Avoiding soil corrosion

## **4. STUDY METHOD**

The study method in the present study is analytical-descriptive and the data is library and existing resources are used form books and articles.

## **5. REVIEW OF LITERATURE OF GREEN SPACES**

Various articles are regarding the importance of green spaces in morale of people and life quality, etc. and are presented in various conferences.

## **6. THE VIEWS AND THEORIES**

### **6-1. mental health theory**

This theory recommends participation of citizen in forming city and this theory reminds the role of planning as a factor to reduce delinquency and they have sad view to great industrial cities. This group presents per capita, thresholds and suitable criteria in life (urban land use) (Ziari, 2002:16).

This theory raises mental health. The followers of this theory believe that using modern urbanization principles as zoning formed non-dynamic and uniform environments and it led into unsuitable behaviors and endangering their mental health. One of the initial principles of this theory is dynamics of space and creating emotional environments, the principle of neighborhood relations as protecting values and

traditions, the principle of considering street as stable physical foundation of city regarding structure of city. Ms. Jane Jacobs was one of the followers of this theory (Razavian, 2002, 43).

### **6-2. Creating new spaces (Otto Wagner):**

Wagner was the first one who found that cities should be designed based on the needs of residents, the needs that are different based on different people. Wagner mostly focused on creating healthy environment for average class. He found that various needs required various plans for residency. Wagner presented some plans for residential township in Vienna to prevent confused growth of city and open and relatively wide spaces were predicted in center of township and it was called breathing center. He believed that development cannot be blind as the past and urbanization cannot be only for those taking benefit of land. The sudden attack of industries to cities and attack of people from other places for working in factories destroyed natural form of cities and residential areas with unsuitable form put urban space under pressure. Urban services are mostly low and other spaces were under influence of residential areas. The regions were deprived in terms of face and access to services. In such environment, Wagner with optimism to industry raised his views in the form of plans consistent with the needs of urban society and applied his deep consideration to promote other urban spaces (Razavian, 2002:38).

### **6-3. The theory of social role of land**

Land has basic effect in terms of value and social role in comfort, security, beauty, welfare and life quality of human life (Ziari, 2002, 6).

### **6-4. Functionalism theory**

Based on rationalism principles and cost-benefit, using urban fields is considered as a tool to facilitate urban functions and improvement of urban efficiency and the necessity of “logical use” and “optimized use” of land and space are on priority (Ziari, 2002, 12).

### **6-5. Naturalism theory**

This theory recommends human release from artificial environment and considering natural use as leisure time (Ziari, 2002, 14).

### **6-6. Post Modernism theory**

In this theory, modern criterion and its dull use as turning cities to dull match box and administrative towers, great stores and great buildings and lack of civilization are criticized. A combination of new and traditional elements with local art concepts and sublime art in construction of cities were proposed (Ziari, 2002, 16).

## **7. DEFINITIONS OF SOCIAL HAPPINESS, LAND USE AND URBAN DESIGN**

Happiness is internal happiness as stable. Happiness leads to one’s enjoyment and happiness is not always with smile. There are various definitions of planning urban land use but most of them emphasized on common points. Planning urban land use, spatial organizing of activities and urban performances are based on the desires and needs of urban community and it is the basis of urban planning (Saeednia, 1999, 13).

Planning urban land use is spatial distribution or geographical model of various performance of city (Pourmohammadi, 2008, 3). Some performances as residential, industrial, commercial, retailer and space dedicated for administrative use, institutions, social symbols and passing leisure time.

## **8. URBAN GREEN SPACE AND ITS EFFECTS**

Alienation is one of the origins of problems as involved with people all around the world. This issue is mostly emerged among people and their artificial environment (Hanna, 1958:148). Public green spaces are of great importance in terms of fulfilling the environmental needs of urban dwellers and in terms of leisure space and their social interaction ground. Thus, urban green space is a type of urban land use with artificial vegetation with social and ecological return (Suzanchi, 2004, 5).

Population increase, development of cities, creation of metropolises and being removed of traditional and natural texture of cities caused that theorists of urban environment designers try to renovate vital needs of cities as green space and natural landscapes and they use new equipment to do this. The theorists of urbanization and architecture have always attempted to turn the noisy environment to a calm space for the residents. The important point is the importance of green space. They believe that green space leads to mental safety in people and in most cases is most important factor of reduction of environment pollution. Green space links urban person to nature and it fulfills aesthetic desires of urban dwellers and is effective on fulfilling health, environment, mental and social expectations of urban community. The industrial human being attempts to invite natural life effects by creating green space and accepting high costs. The most important effect of green space in cities is its environmental function as making the cities as human community environment meaningful and fights against the adverse effects of industry development and increases living quality of cities. The components of urban development effects can disturb living system of cities by various methods. Suitable green space in cities is one of the effective factors on reduction of these effects namely regarding air pollution and dust, quasi-forest green space are breathing lungs of cities.

Generally, green spaces and their effect on cities are unavoidable as without it, the cities are not sustainable. If green space is used as a texture of cities and a part of urban services, it cannot be separated from the needs of urban community. Thus, green space should be consistent with physical volume of city from quantitative and qualitative aspects (buildings, streets and roads) and society needs (mentally, spending leisure time and health needs) and based on ecological conditions of city and its future development to be used as active green space with environmental and continuous return (Majnunian, 1995, 45).

One of the basic problems of Iran in recent decades is rapid increase of population namely its urban population. This rapid increase is based on migration of villagers to city and it causes that some small villages and cities are turned into big cities and middle cities are turned into metropolises and this issue increases the problems in cities namely metropolises.

On the other hand, urban development in recent decades has been as it led into inconsistencies in using urban land and imbalance in distribution of public services in cities. The spatial manifestation of local and regional imbalance is observed in formation of rich and poor townships, unduly use of cars for intercity trips, the use of low income class of public transportation and ascending trend of intercity trips. Among various urban services, green urban spaces and parks are considered for their recreational aspects and also they play important role in balance of urban environment and reduction of air pollution. Also, urban green spaces reduce building density and develop physical and mental aspects of citizens (Shie, 2012, 315-321).

## **9. PLANNING OF HEALTH-BASED SUSTAINABLE CITY DESIGN**

Exact urban planning with the aim of urban sustainable development as fulfilling the mental health of citizens on priority is not possible without evaluation of various effects of natural landscape in various regions of a city. The aim is fulfilling the needs of citizens as it is called "human needs" as classified:

### **9-1. The inherent need of contact with nature**

Wilson considers inclination to nature as the natural feature of human being (Guenther, 2007). The effects of contact with nature include emotional, mental and physical health aspects of human being.

These effects should be investigated in various aspects of urban elements. Green paths, urban parks at big scale and gardens of residential areas and hospitals at micro scale are urban landscapes. The need to contact with nature is classified as the planners to consider all aspects to achieve their health features:

#### **9-1-1. The contact method with nature**

It evaluates the various fields as they are considered as a ground for human being contact with nature. Parks, schools site, hospitals, residential areas, etc.

#### **9-1-2. Aesthetic preferences**

It evaluates the public interests of people in natural views as with human-based urban landscapes, its effects are increased. For example, the interest in stone gardens of Japanese to the grass covering of people in England gardens.

#### **9-2. The need to have contact with others**

Communication is one of the most important psychology issues by which we can reduce stress in urban places as parks. The important aspect in the design of these landscapes is as some conditions should be provided in public areas as parks to fulfill the need to privacy the same as social communication with others to increase mental effects of nature of parks and urban landscapes to the maximum level (Evans G, 2003,80).

### **10. THE EVALUATION OF THE POSITION OF LANDSCAPE IN HUMAN PLACES OF CITY**

In health-based sustainable urban design, all places in which landscape is effective on its quality improvement should be considered.

The landscape effects in health centers of landscape and garden design in health centers are important and they are ignored in overcrowded cities now. The most important effect of hospital gardens and its contact is reduction of pain in patients as in the hospitals with overlooking window to garden, painkillers are less used and admission days in hospitals are also reduced considerably (Malenbaum 2008; 134:241-244).

The role of nature in improvement is high. Alrich evaluated two recovery rooms in surgery ward as one of them was overlooking to brick walls and another one to natural landscape and found that recovery after surgery in the rooms overlooking garden was highly rapid. Wilsson presented nature love hypothesis and proved that due to inherent relationship of human and nature, as human being is in natural environment, individual health is improved (Guenther, 2007). Another important aspect of effects of nature in health centers is reduction of medical errors by health staffs as environmental stress is reduced.

### **11. THE EFFECTS OF LANDSCAPE ON JOB SATISFACTION**

Kaplan (1993) compared the offices with nature view and those without this view and found that in the offices without nature, chronic diseases and reduced job satisfaction with important role in work sustainability were observed. The design of central atriums with gardens in the places without good view to outside can increase satisfaction of environment and job satisfaction (Kaplan,1993,26).

### **12. THE EFFECTS OF LANDSCAPE ON EDUCATIONAL CENTERS**

In the study done by Grahn (Grahn,1997, 145) on open spaces of schools namely its playground as the central area of schools landscape showed that In the schools with high natural elements low diseases and low distraction of children were seen. The idea of healing gardens with historical dimension was used in health centers.

In a fundamental study in Hong Kong University, it had tangible effects on students as presence in university site and their social interactions as the most important stress reduction elements were increased (Lau 2009,34).

### **13. THE EFFECTS OF LANDSCAPE ON COMMERCIAL CENTERS**

Van den Berg et al., (2003) conducted a study on some commercial centers and evaluated two types of urban commercial centers as on one side, there was street, stores and on the other side as a water channel with landscape. In the next case, both sides of Commercial Street were designed. Under the condition commercial centers are combined with landscape, stress of environment is lowest and even the sale of commercial center is high and it is due to comfort by natural landscape to buyer (Van den Berg ,2003,23).

### **14. THE EFFECTS OF LANDSCAPE ON URBAN VIEW**

The most comprehensive effects of landscape are in public urban form. The daily movement in urban areas leads into routine presence in urban areas as autobahns, streets, etc. The increase of green space in all urban areas reduces environmental stress. The important point is the elements considered in urban populated areas and the areas with less natural areas.

Street paintings on walls of buildings, bridges, etc. are of great importance in urban planning but lack of consideration to selection of type of wall paintings by increasing environmental stresses can play negative role. The images designed on walls should provide mental feature as positive fun or positive distraction.

Positive fun (distraction) is an environmental element creating positive feeling in a person and can reduce stress and ideations (Ulrich R S, 1991; 3: 97-109). Only painting of natural landscape on billboards can leads to stress reduction and act as positive fun and advertising conceptual images, abstract images have negative results on citizens ( Heerwagen J 1990,280 -269).

### **15. THE ROLE OF GREEN SPACE AND ITS IMPORTANCE IN HUMAN LIFE**

The interest of human being in plant dates back to a long time ago. In the history, using plant had wide scientific process. Since the migration of mad tribe to Iran, the people attempted to develop green space and cultivate the plants as Iran was called the flowers and birds country. Unfortunately, recently plants are ignored in our country. To increase awareness of people regarding green space and plants features, it is necessary to avoid destruction of cities due to air pollution and environment. To give importance of the role of green space in human being life and interest in tree and flowers and grass is important and some of them are referred here. This motivates much interest and each person can encourage creating green space in the living environment.

#### **15-1. Ray's absorption**

Two types of solar rays have considered effect on human body and other creatures. One infrared, another one is ultraviolet ray.

The comfort given in the shade to human being is regarding absorption of infrared ray by tree (infrared rays with long wavelength generated heat) and also they absorb ultraviolet ray. Today, ultraviolet ray effects on cellular texture of plants and animals are obvious and the role of trees in supporting human and other creatures against sun ray is important.

#### **15-2. Dust absorption**

Due to distributing their leaves and branches, trees absorb dust. The trees fixed in soil absorb dust in earth. One hectare of green space with 200 trees planted can absorb 68 tons of dust in each rainfall. With these trees, cleaning 68 ton of dust is free.

### **15-3. Oxygen generation**

The air required for human being is about 15 kg per day and absorption of the need to water is 1.5kg and food 2.5kg. Other gases as carbonic gas, neon and Helium with azoth and sulfur oxides are a little part of air weight. For example, carbonic gas 0.03. Carbonic gas leads to human death. It is emphasized that great amount of oxygen in nature is generated by green space. If there is not green space and tree, human being have some problems with carbonic gas in air and shortage of oxygen. If the grasses are not cut, great green area is created. for example one m<sup>2</sup> of cut grass for height 3-5cm has 6-10m<sup>2</sup> green surface. If the grass is not cut, in each m<sup>2</sup>, it has 200m<sup>2</sup> of green surface. Based on this calculation, only 1.5m<sup>2</sup> of non-cut grass can generate oxygen as a human being.

### **15-4. Phytoncide**

Environmental theorists believe that the trees as walnut, pine, fir, oak, hazel, juniper, eucalyptus, weeping willow, maple tree, ash and *Celtis australis* release phytoncide to kill bacteria and fungus and some microbial creatures. This matter makes human being happy. The scientists believe that human grain is composed of left and right hemispheres. The right hemisphere is important in regulating instinct and natural feeling of human being as affection, sleep and other needs. Left hemisphere organizes mechanical works of human being as regulating time. The urban dweller as involved with routine works and environmental conditions mostly focus on his left hemisphere and this makes disturbance in two hemispheres and natural performance of brain is disturbed. The scientists know that trees with releasing phytoncide can balance the two hemispheres well and they give natural comfort to him. Thus, the comforting role of trees and green space is revealed well.

### **13-5. Air adjustment**

By transpiration, trees play important role in reduction of microclimatic temperature and increasing relative humidity. The temperature of a hectare of green space in Mordad is 4.5 degrees less than surrounding space without tree. Thus, relative humidity inside green space is 11% more than outside environment. By adjusting two mentioned parameters, green space creates microclimate with suitable physical comfort for human being.

### **15-6. Effective on air pollution reduction**

As Tehran air pollution or pollution of black and dirty ponds are observed, most of Tehrani citizens ignore the noise consciously or unconsciously and consider it as a part of urban life. The noise of pedlars with loudspeaker, motorcyclists during day, cars with horns and broken exhaust, various drilling for digging and piping and asphalt of streets, the noise of various loudspeakers are some examples of noise pollution in city.

It should be said that getting used to a type of pollution is not protection against it and this habit is laziness and involvement in pollution. The warning of physicians union regarding noise pollution should be considered as serious. Any unwanted noise is noise pollution. The reaction of human being to noise depends upon mental factors as noise intensity, its frequency and objective factors as acceptance or non-acceptance of noise sender. Mild noises created special reactions. If the noise is 70 or 80 dB, the noise effects can create permanent or transient deafness as receiving cells of ear are exposed mostly to noise. These effects are done directly. Indirect effects of unexpected noise are non-tangible. Insomnia, losing ideation, impatience, being nervous, mental diseases are outcomes of unexpected noise. Light sleep, reduction of deep sleep is unconscious noise pollution. Reduction of dream duration, jumping from sleep due to noise is conscious noise pollution. The above reactions are created by noise pollution equal to 40-50dB and these reactions reduce physical return. In addition, the reactions of plant nerves of human being are different to pollution:

- Reduction of heartbeat in heart cycle and blood (increasing heart attack)
- Reactions of neural pressure and releasing escape adrenaline and attack adrenaline hormone.
- The change of breathing and pulse tone



- Reduction of skill heat
- Reduction of resistant reaction to noise
- Coronary artery disease
- Disturbance in metabolism order of body
- Non-tolerating noise pollution as deviating plant and motor nerve system and this affects the entire body. This causes feeling reactions as disturbance in gastric, tumor in gastric, intestine, pain of members as annoying.

## **16. THE ROLE OF PLANTS IN NOISE POLLUTION REDUCTION**

Today, scientists have proven that trees can be effective on noise pollution reduction but the noise itself can endanger plant growth. Growth reduction about 41% of tobacco field exposed to severe noise is observed. Noise reduction quality in trees is different based on leaf size, density of leaves, and type of tree. With the tests, it was shown that trees and green space in the streets have high reduction effect compared to noise resistant pre-fabricated walls and building materials. The role of green space in reduction of noise pollution and reduction of construction costs (double windows and tall walls) and city beauty are revealed.

### **16-1. The relationship between noise and cancer**

According to the latest studies by French researchers, there is a close relationship between noise and cancer. The new studies and the results are mentioned in the latest French journal (parymuch) as: severe noise and its repetition reduce body immunity and his resistance against dangerous diseases. According to these studies, high noise has negative effect on body hormones and it disturbs their function (Shamgholi et al. , 2005, 6).

## **17. CONCLUSION**

If the city is the main center for human being, the more the green space in these areas, the much the comfort and human normalized growth. Green spaces play important role in creating green and happy cities. Today, the effect and social and psychological role of green spaces in cities is important. These spaces are the only regions making city dwellers as comfortable to spend their leisure time. Urban green spaces have high social, psychological effects on city dwellers. One of the most important effects is creating mutual and social link and enjoying natural beauties of green space, reduction of stress and comfort among citizens.

We should say that green spaces of metropolises in cities now are not only the space to have positive social and psychological effects and in case of weak urban management (in each of design, construction and operation stages) can provided unsuitable functions as various crimes in parks, illegal friendship, insecurity in users, etc.). We can say urban green space and urban management affect each other. Urban green space without active urban management and suitable function is no possible. These spaces increase attraction of region and can be effective on the views of tourists searching for sightseeing.

This study evaluated different urban landscapes and its effects on mental and mind health of citizens. The studies show that encountering with urban views can lead to stress reduction, increase of focus, rapid improvement in hospitals, increasing productivity in commercial centers, public welfare of people, increasing output and job satisfaction and etc. To increase these effects, planning and design in city should be purposeful to take benefit of it and some solutions are presented as followings:

Using green space in schools, hospitals, commercial centers, etc. Using green roofs in populated urban regions Logical combination of building area and green space in administrative, residential, commercial and industrial areas. The design and construction of healing gardens in health centers and using their therapy features Encouraging the citizens to create urban green spaces Taking encouragement policies for nature-friendly organizations Making norms and training at wide and public level to achieve citizenship rights The attempt of urban management to explain urban landscape position in urban affairs and its importance in health of citizens and achieving good results.

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