

Sustainable urban development through sustainable urban green spaces: The Case of Sanandaj City in Iran

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Abstract: Sanandaj city as the capital of Kurdistan province enjoys a special position at the provincial level and its physical development and growth has been impressive in recent years. The important point here is that growth course of the population of the city is faster than its harmonious and sustainable development course; and the result of this event is marginalization increase, overcrowding and population density, urban traffic problems and especially environmental problems. One component that can restore balance to the urban development state is developing parks and green spaces that are considered one of the most important factors of sustainable development. Therefore, this paper attempts to review the status quo of parks and green spaces of Sanandaj and then compare it with the existing standards. Then by analyzing the collected data and comparing it with ideal and optimal status proposed strategies for the development of parks and green spaces be explained. Hence, some part of the mission of urban sustainable development which is truly green spaces development and its ecological improvement can be answered. [Mohammad Azad Ahmadi, Amir Tayyebi, Jahede Tekyehkhah. **Sustainable urban development through sustainable urban green spaces: The Case of Sanandaj City in Iran.** *J Am Sci* 2012;8(8):195-201]. (ISSN: 1545-1003). <http://www.jofamericanscience.org>. 30

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1. Introduction

Late 19th century and early 20th century was the period of ecology science maturing and growth of nature conservation movement (Moughtin, 2007). Generally, there were first some institutions and organizations related to non-domesticated animals and to conserve and manage wildlife areas. Their some organizations were formed to protect the environment; eventually it was attempted that this attitude be applied in urban management. In today's world relations of human society and natural environment have been affected by the phenomenon of urbanization and urban development; a phenomenon that has global and general character and is one of special aspects of new civilization (Mahalati, 2005). Organizations that today are the custodians of urban development and protection must have enough information about ecology, systems, and environmental functions to be able to provide a scene of health and welfare for its citizens. Cities that move in line with sustainable development must interact with their surrounding rural environment, and not only help people welfare but also nature welfare as well as social advances, equitable facilities, environmental improvement and protection and economic development.

In this regard, parks and urban green spaces were found to be very important in planning and urban spaces management. These spaces should be considered not only for their recreational importance but also due to their vital role in ecological balance of urban environment and air pollution mitigation and also because of providing open spaces, breathing' relaxation and tranquility of citizens' spirit. Development and rapid growth of cities not only do not cause green spaces development and growth, but also make them to disappear, over congestion of buildings and loss of open and respiratory spaces.

2. Statement of problem

Quality of life in city's concentrated centers has been extremely low, such that the resulting situation not only threatens human life but also survival of all living organisms (Bahreyni, 1998). Parks and urban green spaces are essentially in the environment and landscape architecture, and there are different theories in this field. The environment and landscape architecture gives us insight to realize that "what kind of people we are". Environment and landscape is considered a huge investment and important changes in the environment and landscape are created as a result of important cultural transformations (Seyed Sadr, 2010). Development

and expansion of cities and high congestion of urban areas have caused to disrupt air quality balance and excessive destruction of human life environment. In such a society, people need a place to relax and spend their leisure time that constructing parks is one of the most important strategies in this field (Chiesura, 2003). By investigating, identifying and analyzing the

existing situation and expanding green spaces as a basic model in urban sustainable development and its interaction with urban management, good results can be achieved which can be considered and valued in terms of various aspects of environmental, social, economic, traffic.

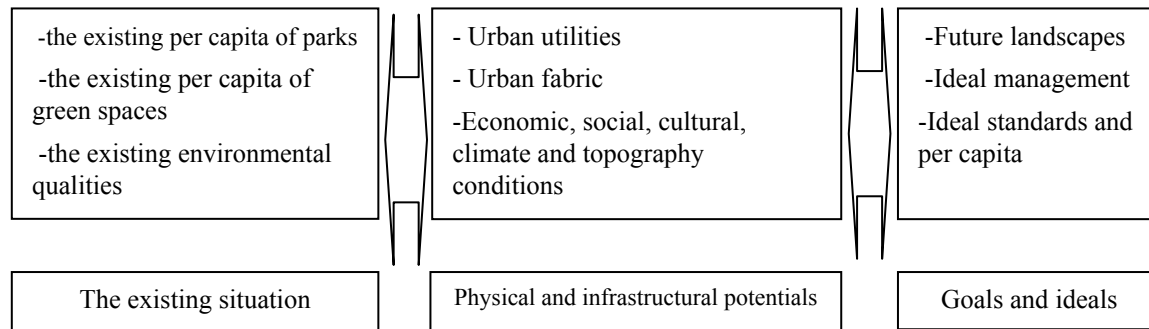


Figure 1. Diagram of the triple relationship of urban green spaces development (source: author)

3. Research methodology

The method used in this study is a documentary-analytic one. In this way that after reviewing and studying references related to parks

and urban green spaces, factors and elements of these spaces will be searched, classified and analyzed. Then main elements will be selected and green spaces indices will be prepared.

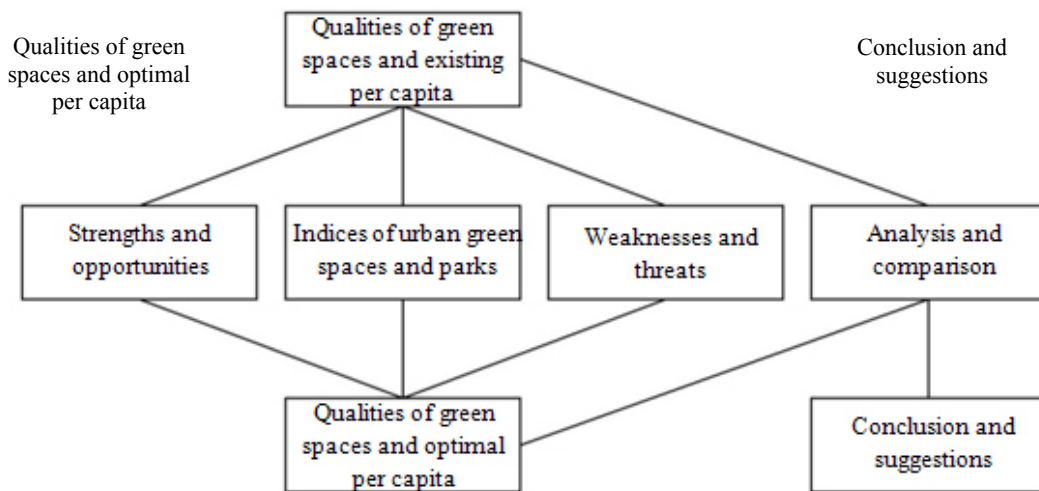


Figure 2. Flowchart of the research policy in this study (source: author)

Then, regarding the existing situation of parks and green spaces and the mentioned indices, constructive suggestions will be presented. After that, the existing and optimal situations will be compared according to the performed analyses; and if its achievement is reasonable, the desired result will be achieved.

4. Definitions

4.1 Urban sustainable development

It is a development that does not hurt the environment and assists the city’s capability in maintaining its economic and social structures (Moughtin, 2007). Sustainable development includes planning and running a process of human exchange with its surrounding environment, such that the relationship is formed and in equilibrium the best way possible and creates the least problem for future generations. This relationship involves the use of energy resources, the environment and nature, social relations, economy and etc. noteworthy point have is

that urban green spaces development is itself one of important criteria and scales of urban sustainable development.

4.2 Urban green space

The term “green space” is less than half a century that has a special position in the world’s urban literature and culture. Green space includes that part of areas that have plants, greenery including trees, shrubs, flowers and grasses. However, when green space is located in urban fabric, it will tend to a part of urban hierarchy and will be divided into different scales at the city level (Seyed Sadr, 2010).

Generally, green spaces contain almost a third of urban areas either being designed or accidentally (Moughtin, 2007). Urban green space is actually a part of urban open space that its natural and artificial components meets the ecological and social yield and is maintained or constructed by human considering (its related) regulations and specializations to improve welfare and living conditions of citizens of a city. In fact, urban green spaces make up living part of the body of a city. In general, urban green spaces include parks and gardens and service green spaces such as law of squares, triangles, margin of streets, gardens, parks, urban farms, urban forests, green corridors, such as banks of rivers or channels, urban streams and other incidental spaces.

But what today is very valuable in urban sustainable development, is multi-functional green spaces. These spaces are in very valuable places above land that are simultaneously where people leisure, sports spaces, the protected environment, green lungs, etc. in creating green spaces the environment qualities and its beautification are of great importance. The environment beautification can create a particular attraction in a green space. This issue increases the effect of green space in providing comfort, spiritual security, motivation, and artistic and intellectual inspirations of visitors several times. This issue is a fundamental pillar in the construction of green spaces (Seyed Sadr, 2010).

4.3 Types of urban green space and its functions

There are a variety of classifications of green spaces in terms of functional, social, etc. green spaces can be divide into urban and rural in one state; and ecologically and functionally it can be divided into green space (green volume) and green surface. Green spaces are more effective than green surfaces in reducing noise pollution and temperature. Green spaces can be classified socially into public, semi-public and private green spaces. Functions of urban green spaces include defending against flooding and soil permeability, controlling soil erosion and

stabilization, improving air quality, providing shelter and shade, recreational places and spending leisure time, habitats for non-domesticated animals, enhancing property values, dividing space, creating a fence or barrier, controlling noise, controlling traffic, controlling reflections of disturbing lights, etc.

5. Discussion and the subject analysis

From system management viewpoint to design urban environment and landscape, management is the first and foremost importance. From this theory perspective, a responsive design for systems does not lack creativity but is a creative response to the behavior of the system and is a move coupled with alignment that is beyond only expressing designer’s mind and considering the field. Unfortunately, many officials consider the environment and landscape as wealth and property and in term of this insight, people are owners of the land and economic value is the most important value and other values are at the second grade according to the investment potential of the land. Land is considered as a good that its value is determined in the market and based on the currency and rests on the best and highest use. Of course, this view considers many factor generally is regularly updated according to the new situations.

If we consider urban environment and landscape as a location, then each location will be unique and have its own particular sense and ultimate value. That’s why many people will be motivated when travelling to different cities or countries and strolling in certain areas. Building location is one of important efforts as an expression of human thoughts and focus of meanings. In the attitude of “the location spirit”, the human spirit is in combination with the location spirit and human’s health and well-being is essentially dependent on the health and well-being of the environment. Plants and trees can play a in the space identity (Spirn, 2000). For example, Abarghu cypress is part of Abarghu identity or some streets have their own identity because of trees on both sides.



Figure 3. Sanandaj city in Iran

On the other hand, designing green spaces includes general principles that dictate us functional features of factors and requirements of the program, and necessary conditions for responding psychological and social needs of society classes and also some other minor factors. Of course, meeting psychological and social needs is far more difficult than understanding functional features of factors and requirements. But what is certain is that these two are mutually dependent.

6. Case study

The selected city for this study is Sanandaj. The population of this city is 311, 446 according to Census Population and Housing in 2006. The city is divided into four zones that all of them have been considered for conducting the study and the required information about it has been collected. Currently, green space per capita of Sanandaj is 5.3 m² while the average green space per capita of country is 8 to 12 m². These statistics indicate poor green space per capita of Sanandaj. Data related to population, parks area, green spaces area, parks positions, etc. were collected from sources such as National Statistics Center of Iran, the latest version of the comprehensive plan of Sanandaj (prepared by Tadbirshahr Consulting engineers), referring to municipality, relevant organizations and field and was analyzed using computer software. The statistical population of this study is citizens of Sanandaj and parks and green spaces of Sanandaj which has been classified into four groups of regional, area, local and neighboring.



Figure 4. Abidar forest park in Sanandaj

7. Change and transformation of Sanandaj over time and effects of the city development on green spaces

In the past, instead of the current Sanandaj city, there was a city called “Seir” that this word in Persian means “30-head”. Sanandaj “Seneh or Seneh Dej” is of ancient and sacred cities which date back to Sun rituals and Zoroaster in this part of Iran. The

relationship between this city and its adjacent areas with Indo-European athletic mythology show its importance and antiquity (Najafi, 2002). The new city of Sanandaj was founded in the Safavid period in days of Shah-Safi by “Soleyman Khan Ardalan” in 1064 AH (lunar calendar). In terms of geography and urban activities of Safavid and Qajar era, Sanandaj enjoys a valuable traditional urban fabric that several residential and benevolent buildings such as baths, mosques, markets and gardens have been remained and has arranged of cultural and historical fabric with an area of 112 hectares (Wikipedia, 2012). By changing Qajar government and starting Pahlavi government and Reza Khan Reign, modernism was rapidly followed and for the first time in the history of the country urbanization, the government decided to transform city faces and buildings not based on internal evolution and thought but based on external idea and change (Habibi, 2009). By constructing Ferdowsi and Inghelab Streets in Reza Khan Period the district order of the city torn apart and physical-spatial structure lost its integrity (Rassoli, 1997). One of the most beautiful four-garden that was built after Isfahan four-garden in Iran was Sanandaj four-garden in the north of Bazaar. This four-garden became four-garden residential neighborhood in the Qajar period. Of course the impact of Isfahan architecture style was continued in Zand and Qajar periods as well, and Khosro Abad four-garden and mansion was built in south west of Sanandaj which is one of beautiful four-garden of Iran that now Khosro Abad mansion and part of the four-garden have been remained. Garden-building in Kurdistan was expanded because of Kurdistan governor’s interests in Iranian architecture style and Iran garden-building. Among several four-garden now only name of some of them has remained in Sanandaj. Some of gardens of this city are: Amirieh Garden, Amanieh Garden, the four-garden, Khosro Abad four garden which is one of the most beautiful four-garden that had been built after Isfahan four-garden. This garden was exactly divided into four parts by four streets which were also available until about 1966, but the new urban planning caused that the houses that now exist around the mansion were constructed. Except trees surrounding the mansion and central water stream, other elements of the four-garden have been disappeared and many trees and ponds have been destroyed.

After a period of stagnation, again from 1957, the first guide plans of some cities were prepared by the Technical Bureau of the Ministry of Interior. The producers of these urban control plans were foreigner and especially the U.S. Peace Brigades. Therefore, thoughts and methods of foreigners were used in the shape of Iran cities which

were based on modernism (Mojtahed Zadeh, 2008). Following the modernization process, the government prepared physical development plan for several cities including Sanandaj relying on the Truman's four principles. In this plan, Salahodin Ayubi Street perpendicular to the direction of Ferdowsi Street, Shohada Street parallel to the direction of Ferdowsi Street, and Keshavarz and Abidar Streets branches off the current Azadi square in the southwest were proposed and implemented (Gazrani, 2000). The population of Sanandaj in 1956 was 40461 with 7900 households and in 1966 it reached 54578 and 15106 households (Najafi, 2002). While, based on the General Population and Housing Census in 2006, the population of Sanandaj was more than 311446, i.e. within 50 years it has been 7.66 times larger. Many gardens and green spaces of Sanandaj were raped and destroyed in the mentioned periods. Between the years 1978 until now, urbanization has entered a new phase of rapid growth. On the one hand, the city was faced with a transformation of concepts and functions and on the other hand, being unplanned and removing restrictions along with the start of Iraq imposed war against Iran, uncontrolled immigrations from rural areas and surrounding cities caused the Sanandaj to be faced with the greatest physical growth in this period (Habibi, 2006). Unfortunately, many elevations and natural effects that could be used as natural landscape and resorts were under construction of rural migrants. Today, many arid agricultural lands and gardens around the city have been used for

physical development that part of fabric has been grown parallel to the communication roads.

The result of this discussion is that Sanandaj sometime has the most beautiful four-gardens, gardens and promenade; while over time and due to lack of planning or a codified thought and merely for creating new physical changes to increase the capacity of population accountability either as natural increase of population or migration and mushroom-like marginalization caused that natural capacities and potentials of keeping and developing gardens, parks and urban green spaces have been severely weakened and almost destroyed.

8. Analyzing the existing situation of green spaces and parks of Sanandaj city

8.1 Reviewing the existing situation and evaluation deficiencies

Today, air pollution and noise pollution due to transport are of great importance in Sanandaj, that by developing green space these two types of pollution can be greatly reduced. Considering a car for each 3.8 households in 2006 and given the population of 311446 and also considering 4.56 persons as household dimension, there are about 19000 motor vehicles in the city (Tadbir Shahr, 2011). Green spaces and population distribution in the four zones of Sanandaj has been inadequate; thus, it should be tried to establish a balance.

Table 1. Table of parks and green spaces area in Sanandaj, per capita and shortages (source: the author, using Sanandaj Comprehensive plan)

position	Green space area (Parks and green paces) (square meters)	Population (person)	The required green space area (based on 12 m ² per capita of each person)	Surplus or shortage (square meter)	The existing per capita (square meter)	Per capita shortage (12 m ² per capita of each person)
Zone 1	362973	95308	1143696	-780723	3.8	-8.2
Zone 2	318332	90948	1091376	-773044	3.5	-8.5
Zone 3	525978	70687	848244	-322266	7.44	-4.56
Zone 4	127948	54503	654036	-526088	2.34	-9.66
Jungle parks (outside of the comprehensive plan scope such as Abidar)	315432	-	-	-	-	-
The entire city	1650663	311446	3737352	-1962110	5.3	- 6.3

As mentioned, population and green spaces distribution and consequently green space per capita in the four zones of Sanandaj have been inadequate (table. 1). The most population distributed in the zones is related to zone one while it is in rank two in terms of green space area and with 3.8 m² green

spaces per capita, it has 8.2 m² per capita shortages to reach the standard 12 m². However, zone three is in the third rank in terms of population, it has the most green space area, i.e. 525978 m², and the most per capita, 7.44 m², and has 4.56 m² per capita shortages to reach standard 12 m². Zone two with 90948

inhabitants and 318332 m² green space areas has 3.5 m² per capita with 8.5 m² per capita shortage. Zone four with low population, about 54503 and 127948 m² green space areas has the lowest per capita, 2.34 m², and 9.66 m² per capita shortages. Of course, the important point here is that the tourism edge of Abidar Mountain and resorts made on the body of Abidar Mountains were not considered due to being out of scope. The reason is that we're seeking to find strategies in this study that can lead to maintain and develop intra-urban green spaces with little distance with where people work, live and travel. Actually, the value of these green spaces is far more than green spaces that can be used merely on holidays, leisure and by cars.

8.2 Reviewing determination of strengths and weaknesses, opportunities and threats

In order to review and better analyze the subject and achieve results and if necessary, present suggestions, it is essential that strengths and weaknesses and also opportunities and threats be predicted and proposed. The performed analyzes can be related and led to results and suggestions using this model. Of course prioritization of these cases is difficult and requires other studies. The most important cases are as follows:

8.2.1 Strengths and opportunities

- The background of the four-gardens, gardens and green spaces existence
- The condition of topography, elevations, hills and natural effects of Sanandaj to be used as resorts and landscapes
- Appropriate weather climatic conditions of Sanandaj
- Lack of water resources restrictions
- Kurds and Sanandaj citizens' interest in nature, green spaces and resorts
- Existence of empty spaces inside the city and arid agricultural lands and gardens surrounding Sanandaj

8.2.2 Weaknesses and threats

- Material and monetary perspectives of the concerned officials and public on land and empty spaces
- Improper distribution of green spaces inside Sanandaj and major presence of resort spaces outside city limits
- Lack of long-term planning and strategic plan of urban green space
- Allocating low areas to green spaces, destroying gardens and changing use
- Severe weakness in supervising on the good implementation of laws and regulations

- Restrictions on economic system and financial resources of the province and consequently Sanandaj
- Lack of cooperation and coordination of various organizations (for example, in a rare and unusual action, Endowments and Charity Affairs Organization of Kurdistan cut more than 3400 fruit and non-fruit trees near Mellat Park in Sanandaj in 2010 without any coordination with the mayor or city council member with judicial order).
- Environmental pollution, implementing civil works and construction, pests and diseases of plants and trees
- Problems arising from transferring green space to the private sector.

9. Discussion and conclusion and providing suggestions

Today, techniques and methods of urban spaces management especially maintenance and creating urban green spaces are both so complex and critical. So that urban sustainable development and imagining a promising future depend on this vital issue. Therefore, maintaining and developing urban green spaces require having short- and long-term programs and sound policies. In the city comprehensive plan and development plans long-term landscapes of green spaces conditions and their per capita based on population, potentials and the city climate and morphological weaknesses must be specified and explained. Considering various uses of parks and green spaces such as ecological, recreational, social, economic, etc. uses can be helpful in planning and designing. Of course, public participations in this field can play an important role and sufficient attention should be made in this matter. Parks and urban green spaces development is only possible in terms of urban sustainable development and meeting its requirements. Liveliness of urban spaces and having identity, spatial qualities of parks and urban green spaces, etc. all should be placed in sustainable development plan. Although sustainable development has long-term goals and are highly valued, but to bring it to reality mostly depends on the regional and local forms of the governance than particular forms or urban planning type and comprehensive plans, etc. therefore, sustainable development of parks and urban green spaces depends more on local governances and people of that district; and effective public participation and popular culture and insight are important foundations for this development. Municipalities can study and identify fields and areas of commercial activity and investment around or inside parks and green spaces to be effective in employment and income. Hereby the municipality can maintain a relative balance costs and incomes. By crating and expanding green spaces

and parks added value of commercial and residential units will be higher. As a result, municipalities can consider this added value in determining taxes that receive from residents around these places. Of course, this requires studies in relation to the impact rate of these green spaces and parks on their added value. Nowadays, it seems that what officials can be in Sanandaj is attempting to preserve the existing green spaces and maintain and revitalize the remaining elevations and natural effects for developing and expanding landscapes and resorts so that maybe in future we can find a place to relax and breathe in this crowded urban environment with a variety of increasing pollution.

9.1 Suggestions that can be presented in the field of maintaining and developing urban green spaces and parks are as follows

- Promoting insight and knowledge of managers and officials about the sensitivity of urban green spaces issue; and promoting a sense of responsibility towards it can removing material and self-seeking views about land
- Preparing Sanandaj comprehensive plan of urban green space and compiling a long-term program for it which has within itself scientific principles of planting and maintaining places in Sanandaj climate and feasibility and positioning to create and develop urban green spaces, etc
- Providing strategies to strengthen municipal funds of Sanandaj through ways other than selling land congestion and ownership from self-seeking view that result in more investment in maintaining and developing green spaces.
- Using the capacity of people's interests in nature and promoting public participation through acculturating, providing necessary trainings, and reinforcing their sense of responsibility, etc.
- Protecting the existing green spaces and developing them in urban empty spaces, arid agricultural lands and authorities' resistance against their use change
- Strengthening system of management and supervision of parks, green spaces and trees in streets
- Strengthening the coordination between various systems and organizations in facing with the category of urban green spaces
- Promoting public use of green spaces through providing security, facilities, easy access, compatibility with the surrounding environment, etc.

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