REVIEW AND ANALYSIS THE INDICATORS OF GREEN CITY WITH NDVI (STUDY CASE SHEIKH TAPPEH NEIGHBORHOOD IN URMIA)

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Abstract

Increasing urbanization and rapid population expansion and its specific problems such as air and water pollution, environmental degradation, increase in mental illness, housing, infrastructure, education and transportation and other problems of urban society more than ever threatens this contrary which is against the principles of sustainable development and green city projects is one of the urban environment measures in this field that has achieved success in the world. The idea is that the city is a place that forms human opportunities and abilities and in addition each city has its own life, soul and even its own special character therefore each city most be recognized as a whole and form it as a place of residence. Specific problems of urbanization has faced urban management with challenges in the field of population density, housing shortages, environmental degradation, pollution and supplying infrastructure services and facilities, and issues of the Green City project is more involved which results less public participating in cities sustainable development.

This study analyzes the characteristics of green city's indexes in Sheikh Tappeh neighborhood in Urmia. This is a descriptive -analysis study and data collection was conducted by library documents and field survey. According to survey results Sheikh Tappeh neighborhood is far from favorable indicators of health status and standards of green city and city planning and public participation is required.

Keywords: Sustainable development, public participation, green city, Sheikh Tappeh neighborhood, Urmia city

Introduction

Urban land accounts for a small fraction of the Earth's surface area but has a disproportionate influence on its surroundings in terms of mass, energy and resource fluxes (Lambin and Geist 2001). According to the Worldwatch Institute (2007), half of the world's population is now living in cities, and in the recent past, the main increase of the urban population occurred in underdeveloped and developing countries. Cities are the most obvious human environment, and now about 49 percent of global populations live in cities. But the context of cities as places that should have good quality for human life, the needs of its residents and positive impact on their life quality are in trouble, "cities are work tools but can not work properly any more and have lost their impact" Lokoboziyeh says in this regard

(Yaghfory, Rafieian and Razdasht, 2006, p:2). Relationship between urban planning and management and social health is not new but what has changed now is health crisis, whether in developed or developing countries (Northridge, Sclar & Biswas, 2003, p:556) In second environment and health Conference at 1994 in Helsinki, the city's health and giving priority to other matters were discussed for first time. At this conference it was stated that many health issues that cities should left to local authorities until almost all decisions were taken in the central government (Lawrence & Fudge, 2009, p:15). This phenomenon is associated with several social and environmental impacts that have led to environmental degradation (Grimmond, 2007; Parnell et al., 2010). Green City project is one of these approaches to achieve this goal in both global and regional level. Green cities movement is considered as a creativity and initiative plan in the promotion of health, urban planning, urban ecosystem conservation and move towards decentralization of government to public sectors, the intersectional activities and social participation (Leeuw , 2009, p:1). green city is known a city that by creating continuous development and physical conditions next to Social, environmental and efficient use of existing resources residents rise their ability while they are working together and support the community Participation in group life and do all their capabilities to deliver maximum. The idea of the Green City in order to create a massive change in environment protection and health promotion had been welcomed as a notable experts, professionals and city officials health issues (Tabibian, 1997, p:62). Therefore, the process of greening cities can be used to attenuate the effects of urbanization (Baycan-Levent et al., 2009). According to Chiesura (2004) , urban green areas are strategic to the quality of life in cities. Overall the goals of Green City's project is formed by frameworks and formulated guidelines for implementing the World Health Organization, in line with the slogan “Health for All” and the Ottawa Declaration for Health Improvement (MahmoudiNejad, 2009) and Global project becomes a movement at the national level. Thus, urban green areas should be an important element in the urban planning. These areas must be planned together with the other cities policies, such as transportation, housing and sanitation. The indicators are important instruments that can provide support to policy formulation for these areas in an urban planning context because they can provide information for all phases of the planning.

Importance and necessity of research

Many cities, especially in developing countries have faced over recent decades with the destruction of the urban environment and increase health inequalities, social and economic scale among its residents. That is why these cities from the 1970s have been faced with urban poverty, and living standards and standards related to the environment in many cities are faced with the problem (Hatami and Nikpey, 2010, p:2) , one of the new approaches to sustainable development is health issues and the participation of the people. World Health Organization (WHO), knows Healthy human as some one who has physical and social health, spiritual and psychological benefits (Boone Kamp & others, 1999, p:104) Health planning is a relatively new term in this connection that is created by urban and regional planners who always trying to join urban environment with citizens physical and mental health (Thompson , 2007). Green city project was raised first time at 1984 by Professor Leonard Dohel at a conference entitled "Beyond basic health care" in Toronto, Canada (Edris , 2003, p:166). In his view Green city is where the ecological perspective views have been incorporated into a comprehensive health and wellness and this attitude that the city will be green with different dimensions. In fact, advocates of urban development projects rely on logic that try to increase the sustainability of all aspects of economic, social and government considerable issues and look realistic (Pag, 2005). Participation and social empowerment are known as the core of the Healthy Cities movement which is considered the “health for all” principles of the World

Health Organization in the Ottawa Charter, which emphasizes health promotion and activities should be done by the people and not for the people (Heritage & Dooris , 2009, p:45). Essentially green city is a city that it's empowers citizens areable to identify factors affecting their health and maximize their capabilities and the community to take action. In a healthy society there is always this belief that the mere absence of disease can not be an expression of healthy city. but a healthy city Citizens also should have the capability and high quality of life (Services department of health & human, 2001, p:1). When we look at the history of cities and places we noticed that the neighborhood is always an element of active citizenship and has had effective relationships one of the main plans of Green City project is considering neighborhoods as one of the main components which form part of the city.

Research objectives

General Target : Survey Indicators of Green City, cultural features in the context of leisure and education facilities , study features of literacy rates of social participation of people, biologic environmental problems , background of noise pollution and green space in Sheikh tappeh neighborhood in Urmia.

Table 1: Studies summary about green city in recent years

Region	Method	Goals	Scholar
Iran	Descriptive and analytical	Study population - social status of urban areas in Iran and comparison with the average level of developed countries	Gadami, Mustafa, Dive salar Asadullah (2010).
Isfehan	Survey	Identify and explain the function of community parks	Rabbani. Rasool, Nazari.Javad ,Mokhtari. Marziyeh (2011)
Tabriz	Descriptive and analytical	reorganize regional Green spaces and its necessity	Gorbani rasoul (2008)

Research questions

Is Sheikh Tappeh neighborhood in a favorable status in the term of environmental indicators?

Is Sheikh Tappeh neighborhood in a favorable status in the term of social indicators?

Is Sheikh Tappeh neighborhood in a favorable status in the term of cultural indicators?

The geographical features of study case

Urmia is the center of Urmia City and West Azerbaijan province, which is located in Center of Province, north of the city is Salmas, and tinsel from the south to the Mahabad city, it is limited from East to Urmia Lake and from West the border of Iran and Turkey (The Housing and Urban Development, West Azerbaijan Province, 2010). Urmia population since census in 2006, is about 583 255 people (Statistical Center of Iran, 2006). Figure 1 shows the position of Urmia city in iran:

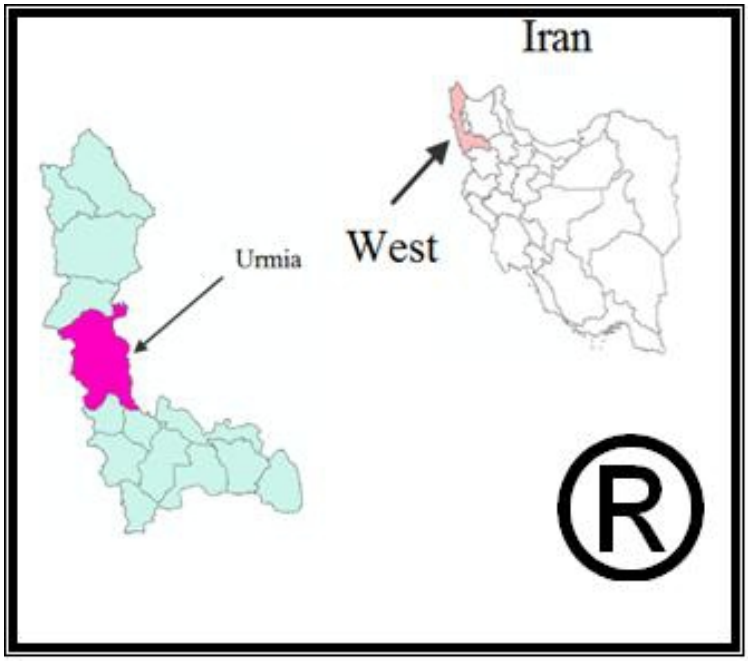

Figure1. The situation of the study area.

Materials and study methods

Current Study is a quantitative research and used methodology is descriptive - analytic. According to study subject two methods of data collection means library of documents and field research are used , theoretical foundations, assessment indicators and census data were collected by document library, and to determine the parameters in the neighborhood of Sheikh Tappeh, The field data have been collected by field forms such as questionnaires and interviews with residents and shopkeepers, local residents. In this paper, Landsat TM images captured in 1984 and 2011 are employed for digital image processing . Figure 2 shows Landsat TM image were used in this study .

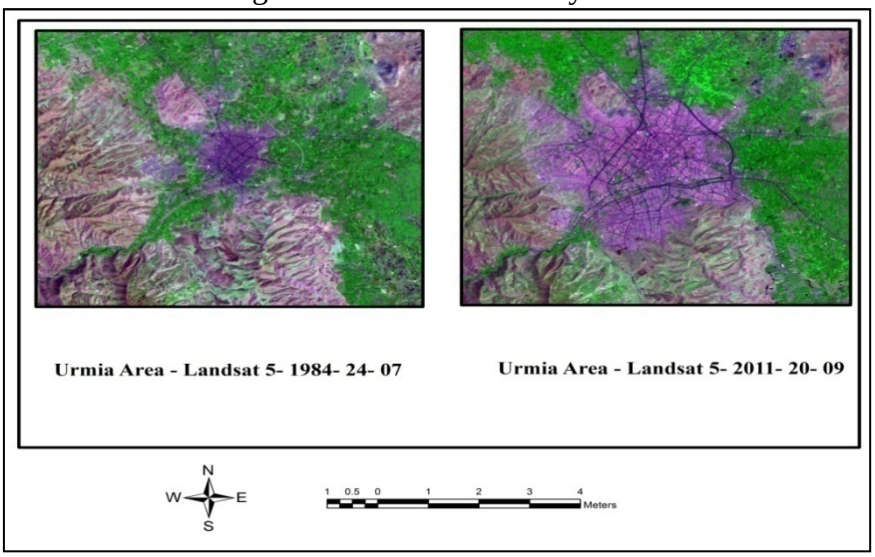

Figure2. 741 Landsat TM colour composite images from case study area

The normalized diffrence vegetation index (NDVI)

The Normalized Difference Vegetation Index (NDVI) is a numerical indicator that uses the visible and near-infrared bands of the electromagnetic spectrum, and is adopted to analyze remote sensing measurements and assess whether the target being observed contains

live green vegetation or not. The NDVI algorithm subtracts the red reflectance values from the near-infrared and divides it by the sum of near-infrared and red bands.

$$\mathbf{NDVI= (NIR-RED) / (NIR+RED)}$$

or

$$\mathbf{NDVI} = \frac{\boldsymbol{BAND\ 4 - BAND\ 3}}{\boldsymbol{BAND\ 4 + BAND\ 3}}$$

Theoretically, NDVI values are represented as a ratio ranging in value from -1 to 1 but in practice extreme negative values represent water, values around zero represent bare soil and values over 6 represent dense green vegetation.

Performance indicators for healthy cities

World Health Organization indicators which are set for healthy cities have been classified in three major groups of environmental parameters, Socio - demographic indicators and health indicators. Indicators for each of these groups are shown in table No. 2:

Table 2: performance indicators of healthy cities

Environmental Indicators	Socio-demographic indicators	Health Indicators
Air pollution	The unemployment rate	Vaccination coverage levels of children 6 years old
Water quality	Percentage of disabled people who are employed	Total mortality (all ages)
Level of green space	Average education of boys and girls	Low weight infants birth
Recreational and sports venues	Adult Literacy	are there educational programs for health
Percentage of households areas living under the standard	Percent of those receiving less than per capita income	Infant mortality
Waste	Occupation	Nutritional quality

Indicators used for evaluation of healthy cities in different countries and regions, are different. For example, one the cities that has achieved remarkable success in the context of green cities project is the capital City of Taiwan, Taipei. The most important indicators which were considered in this town to perform healthy city program are pointed out as following:

Security : secure roads, secure work, reduced crime and violence, reduced events of fire.

Life: the Comfortable and Live environment , The Bike Riding, Park And Green Space , Physical Activities.

stability: Plumbing Sewage, Improvement Pavements, Developed Transportation And Quote General Recycling Waste, Reduced Water And Air Contamination .

Culture: the Cultural Legacies (Taipei Healthy City Project, 2005).

To evaluation indicators of Green City in another research which had been done in Korea Jin-ju , studied index was classified in four Category Physical, Economic, Social And Physical Health Environment Indicators Classification That Each Includes several Factors Like :

Physical Environment: The per capita park space per person, drinking water supply, road cycling, the amount of waste produced, GDP, unemployment rate, exports of agricultural products.

Social Economic: the number of components, number of teachers per students, participation rates in social activities, crime rates.

Physical health: physical activity, number of physicians, the birth rate, the proportion of elderly population to total population. (Healthy Initiative of Jin- Ju city-Korea, 2005) .

The main studied themes in this research are using sources such as the World Health Organization, the Green City project in Developing countries such as Africa, Korea, Taiwan and markers in domestic projects, including the Zarand city (Kerman) and Saveh city (Markazi Province) and also markers of the case study as a comparative analysis of indicators of a healthy city in Global-National scale (study case, urban areas of Iran), they were extracted and combined other indixes and 3 Social , environmental and cultural indicator Groups with many features were created to analyze the indicators of Green City in the Sheikh Tappeh neighborhood in Urmia. Urmia is one of the Iranian cities which located in West Azarbaijan Province and is also the center of the city of Urmia. According to census of 2006, 577, 307 people live there and considered as the tenth most populous city in Iran. Urmia city is considered the most important region of West Azarbaijan province that is located in the centre of province. The center of this city is located at 45 degrees and 2 Minutes East length and width of 37 degrees and 32 minutes north and 1332 meters elevation above sea level. Urmia is limited to Salmas in north, Oshnavieh in south, from East to Lake and from West to the territory of Turkey. Lake in this city is considered the most important natural, economic and tourism phenomena. Urmia (center of West Azerbaijan province) is located in the plains by 30 km length and 70 km wide next to azure Lake of Urmia. The plain is covered by sediments of river Barandoz, river shaharchay, river Roche, river Nazlou that full it regularly every year. History and settlement of this town in the Caucasus, Armenia, Minor Asia and Mesopotamia and the fertile land and favorable climate, make it very special. Ways of access to this area are:

- The Urmia - Salmas road, with length of 80 kilometers.
- The Urmia – Mahabad road, with length of 137 km.
- The Urmia-Tabriz road.

Urmia City also has an international airport. Studied neighborhood is located in the southwest part of Old Town of Urmia city with a population of 5420 people and limited to Molavi neighborhood in East, Shaharchay neighborhood in north , Behdari neighborhood in south and Alborz neighborhoods in west. This neighborhood, due to exposure to the appropriate position (Forest Park) always is one of the cities traffic zones .

Theoretical Foundations

Green city project is a long term project and trying to put the wellbeing of people-centered urban development and create strong and full support for public health at the local level. The project aims to create a city with a relatively good condition and ensuring citizens about preserving and promoting health. Healthy city is an arena for public policies and coordinate administrative talents and creativity to provide a healthy environment for growth and health of citizens to provide appropriate space (Zarrabi and Ghanbari, 2009, p:5).

Introduction to healthy cities in the World Health Organization will introduce a model like this:

Clean and safe physical environment and quality of affordable housing.

Safe neighborhoods and supporting each other.

The proper use of public participation and people are living in areas that affect health and welfare.

Basic needs (food, water, housing and employment) for all citizens.

Despite the high level of health (low disease prevalence) .

Professor Duhel also expression a healthy city's parameter as fallow:

Citizen participation in decision making and formulation of policies and decentralization of power.

The relationship between all components and all citizens by urban managers.

Protecting and improving their infrastructure.

Healthy cities are multidimensional and have complex economic relationship between its components (Nickpay the Hatami neJad, 2010, p:2).

Population and sample

Population: 5420 persons are residents in the Sheikh Tappeh neighborhood of Urmia. Considering there are different formulas to obtain the sample size Cochran IV sampling method is used in this study, so that the population ratio of men and women, the literate and illiterate population and female population were obtained 7 , 136 and 73 ,the average of these there values was used as samples size. About 200 questionnaires were randomly distributed among local residents.

Analysis of research findings

About the questions related to social, environmental and cultural indices of Sheikh Tappeh neighborhood in general can be said many of the indicators and components of Sheikh Tappeh neighborhood are far from healthy standards and per capita in cities. The following parameters can be presented to compare the current situation of Sheikh Tappeh neighborhood with desirable ones (existing standards or conditions in developed countries):

Environmental indicators

One of the most important issues in this neighborhood pollution and noise pollution was noted due to excessive vehicle traffic. Other environmental indicators shows that the situation is relatively favorable in the neighborhood, because the per capita green space is located in Forest Park in this neighborhood with desirable green space. Other mentioned problems are lack of venues and places of recreation and sports venues per capita in the neighborhood with 0.25 square meters per person is far from per capita standard (5.2 square meters per person). In general it can be said Sheikh Tappeh neighborhood is not in a favorable situation in the term of indicators of environmental conditions.

Social - population indicators

5420 people live in the Sheikh Tappeh neighborhood and sex ratio is 0.85 ie 85 women per 100 men. Literacy rate in this neighborhood is about 96%. In the term of experience in participation in social activities, most of the residents said they either have experience or willingness to participate in these activities so that approximately 78% of residents have noted to participate in social activities. One of the factors that most residents were referred to was shortage and lack of street lighting and poles in most places and streets. Other deficiencies noted in the social indicators were lack of parking, streets and sidewalks crossing the dam and pointed out the lack of police station, so that 10 theft cases were mentioned by residents. Thus, in response of research question that is related to neighborhood social status can be pointed out that social status of neighborhood is not desirable.

Cultural indicators

Approximately 83% of residents had no knowledge about Cultural - Social programs of municipality in this neighborhood. In terms of leisure facilities for young people many educational - cultural deficiencies was seen in this area, most neighborhood residents called for the establishment of libraries and cultural complexes; Considering cultural indicators of green city status of Sheikh tappeh neighborhood in the term of cultural indicators is desirable.

Image preprocessing

High-precision geometric registration is the basic requirement of image preprocessing (Guindon et al., 2004). First, the Landsat TM image was geometrically corrected according

to the Universal Transverse Mercator projection at 30 30-m resolution, using second-order polynomial and bilinear interpolation. Forty ground control points were collected from the 1:50,000 topographic map.

Table 3. Summary of image classification performed in this study (Hectares).

Class	Land use Type	1984	2011
1	Orchards	1301.23	10794.06

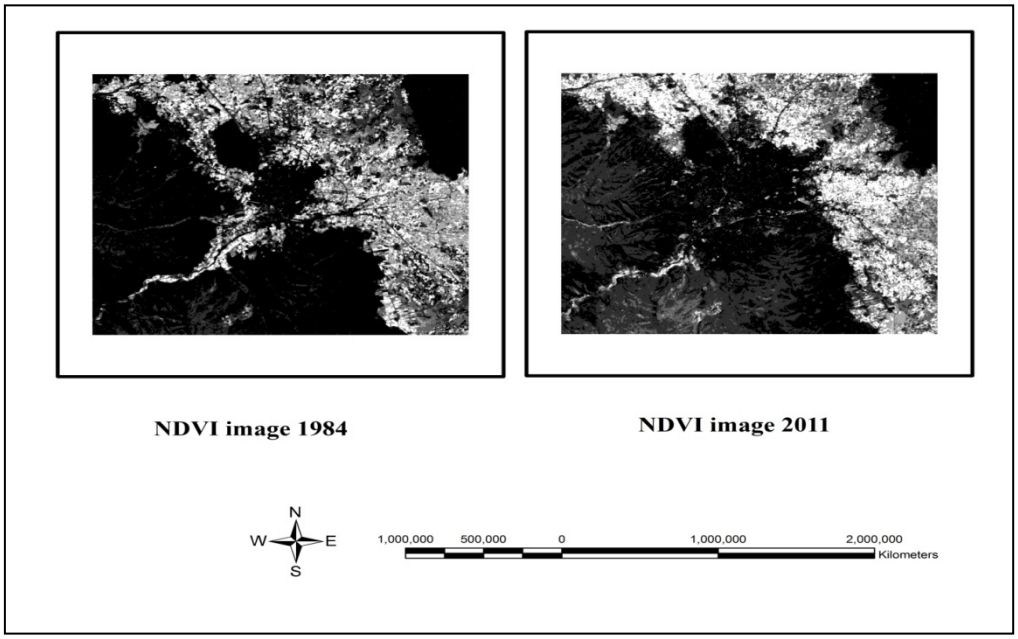

Figure 3. The image NDVI of the study area. Resource: Atuthors, 2012.

Conclusion

This article reviews the characteristics of green city in Sheikh Tappeh neighborhood in Urmia. First, by using literature-based studies indicators of green city which introduced by the World Health Organization and multi-country experience in this field, was extracted and then they were distributed among residents of the Sheikh Tappeh neighborhood in the form of questionnaires. Based on data collected at different stages of this research, particularly with regard to data analysis, survey questionnaires health indicators of Sheikh Tappeh neighborhood were identified, that show Sheikh Tappeh neighborhood is relatively in favorable situation in terms of cultural factors but other indicators of health (physical indicators of environmental, social and demographic indicators) are far from optimal conditions. Also there is significant relationship between knowledge of cultural and social programs of the municipality and willing to participate in community affairs. The results with NDVI showed that the proposed approach separated urban areas from green and orchards land to some extent.

Suggestions

Creating Institutions and centers of cultural, educational and health programs to increase awareness in the residents.

Developing public transportation.

Creating the sports halls.

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