

ANALYSIS OF THE PATTERN OF SPATIAL-LOCAL DISTRIBUTION OF GREEN SPACE (CASE STUDY OF MEHR CITY IN IRAN)

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ABSTRACT

Although city dwelling has brought welfare and comfort to the humans, it has been accompanied by unwanted consequences too. The growth in population has created issues such as problems in traffic, different forms of urban pollutions (sound, air, and water pollution), devastation of environment, cultural and social issues and many other problems. Such problems have compelled the planners and authors to think of finding solutions. Among possible solutions, parks and green spaces are appropriate to solve the environmental issues and change the urban environment to a habitable place for citizens, because of protecting urban social systems and providing ecosystemic services. Severe shortage of urban open space is sensed notably in Mehr city which is studied in this paper. Based on the findings of this research, the total per capita green space of this city populated with 6307 individuals was 0.77 m² in 2006. This is far from the standard set by Ministry of Housing and Urbanization which defines an appropriate green space of 12 m² per person. In the meantime its spatial distribution is imbalanced and inappropriate as the green space per person in district 1 is 1.58 m², while districts 3 and 5 which make up% 24.89 of the city's population and% 23 of its total area have no green space. The present research has been carried out based on descriptive-analytical method using various statistics. The available information shows that despite the national and international standards provided for green space per person, the area of green space in Mehr city is very low with imbalanced spatial distribution in five districts of Mehr city. The city is facing much insufficiency in this regard.

KEYWORDS: Green Space, Distribution Space - Where, City Mehr

The rapid growth in urban population of the world has caused new issues and consequences in relation with residence and settlement of human communities. Such complexities have surpassed beyond economic issues and found social and environmental aspects. On the basis of estimates of UN between the years 1975 and 2025, the ratio of city dwelling throughout the globe has increased from 37.7% to 61.1% and urban population has risen from 1.58 billion to 5.6 billion, indicating an average growth of 2.38%. But the average growth in urban population of developing countries will be faster. Today urbanization has applied a sort of urban development pattern that has not only caused instability in the cities, but it has also led to instability in the surrounding areas. The first outcome of concentration of population and activities in the cities is environmental issues in various forms of pollutions such as air, water, soil, sound, and so on. Also in social and economic aspects, rapid growth of urbanization particularly in big cities and metropolitans have caused issues such as imbalanced distribution and insufficiency of services and facilities, outstanding difference in land and house value and its residence conditions, and finally class gaps and social and economic segregation in population characteristics, the percentage of usages and statistics of service centers and facilities in urban areas and districts. Poverty, devastation of environment, lack of access to suitable

land and shelter and low level of life style are among the crises associated with this issue (Maleki, 2011:1). This research is trying to study the way of spatial-local distribution of green space application in Mehr city as regards qualitative and quantitative aspects.

STUDY OF TOPICS

By urban open spaces it is meant application of urban land by man-made plant coverage which is capable of both social productivity and ecological productivity (Saeidnia, 2000:29).

As regards maintenance and ownership, urban open spaces are divided into three groups:

1-Public green spaces. 2- Semi-public green spaces. 3- Private green spaces. 4- Street green spaces.

Public green spaces: these are urban green spaces that are capable of social productivity. These spaces are used by the public for spending spare time, recreation and chatting with friends, and social and cultural assemblies. These spaces are designed or mobilized basically for this purpose. Bench, light, drinking water facilities, restroom, pavement of passages and access ways are among components of social (public) green spaces. These green spaces are usually called park. In fact social green space comprises

all public green spaces mobilized with services and facilities.

Semi-public green spaces: green spaces that have ecological efficiency but people using these spaces are fewer than people using public spaces. Therefore these spaces lack full social efficiency. Among these spaces we may refer to open spaces in hospitals, garrisons, departments, etc (Saeidnia, 2004: 32).

Private green spaces: these spaces intensify the ecologic efficiency of the city but still lack social efficiency. Examples of these spaces may include green spaces inside residential units (Esmaeili, 2002:14).

Street green spaces: these are a type of urban green spaces that usually make up the tree layout in the narrow path between sidewalk and roadway or have formed in relative small parts of squares, or in the grounds surrounding highways and streets (Hosseinzadeh Dalir, 1992:14).

Functions of Various Green Spaces:

- Ecologic function.
- Protective function.
- Environmental function.
- The function in anatomical infrastructure of the city.
- Social-mental function.

Ecologic Efficiency of Urban Green Spaces:

- Reduction of ambient temperature.
- Increase of relative humidity.
- Providing shadow.
- Absorbing carbon dioxide.
- Oxygen production.
- Optimization of hydrological conditions.
- Soil protection.
- Creating new habitats for birds .

Whereas our aim in this research is identifying the status of green spaces of Mehr city and since applications of urban green space creates a suitable place for the citizens, here we are going to refer to one of its ecologic functions. From one side, urban green space changes the level of radiant energy in the city by changing angle of incidence, the amount of albedo, and expanding shadow in border and microclimate layer of city surfaces. On the other side, vaporization and transpiration of plant contributes to adjustment of city

heat island by converting sensible heat to latent heat of vaporization. For example in a sunny summer day, four acres (4000 m²) of common grassland vaporizes about 11000 liters of water. This means that each acre of grassland transforms almost 500000 calories of sensible heat to latent heat of vaporization in a day. Hence it plays an important role in cooling the air. During vaporization from a beech tree, over 252000 calories is effective in cooling the air. The temperature difference of grass surface and asphalt surface could simply exceed 14°C. The heat from earth surface could sensibly influence the air temperature in microclimate scale up to one meter. Sometimes this effect exceeds 5.5 °C. Neighborhood of green spaces with other urban surfaces with no evaporation leads to difference of temperature in various surfaces in horizontal direction. This in turn leads to an air current that flows from cooler surfaces covered with plants toward the buildings, resulting in natural ventilation as a natural way of cooling and refreshing air. Therefore urban green spaces should increase to the possible maximum amount. Shadows of trees should be provided to the possible extent for the surfaces and spaces made by humans (Ghobadian and Mahdavi, 1997:114).

Green Spaces Standards and Capitation

In the history of contemporary urbanization using the word “per capita” has been innovated by one of the founders of modern urbanization engineering in Germany Reinhard Baumeister. Therefore the inception of using per capita dates back to 1876, i.e. 135 years ago. In addition to determining net residential space per person in the cities of Germany, Baumeister considers that regulating a method of distribution of full and empty spaces are among the functions of detailed planning (Pakzad, 2007: 121-123). In his book “Urbanization Based on Artistic Principles (1989)”, Comolist focuses on developing large and vast parks and suggests calculating and estimating the population of the desired area in the next fifty years and determining the spaces required in the future based on the needed quantity, area, and equipment. After determining their quantity, it is necessary to classify and optimally locate them and determine the needed accesses. He states that designers are bound to determine the quality and quantity of public and open green spaces and places first, and then specify the location based on the best connection among them. He recommends that green spaces should have appropriate dispersal and it is better to arrange green spaces and parks inside the grounds than adjacent to streets (Poormohammadi, Mohammadreza et al. 2011:8).

According to authors, today planning and designing urban green space is not possible without heeding to the optimum issues and standards in urban spaces optimization, development, and designing. In other words, planning and designing urban green spaces is one of the important cases of interfering with the urban life and organization which is organized based on understanding and analyzing the needs of urban society on one side and environmental needs, limitations, and facilities on the other side. Thus the rules and regulations of related standards are of high significance (Saeidnia, 2000:82). Standard indicates an optimum status that intervenes in various theories and tastes. The open and green spaces standard has social, welfare, and technical aspect which is provided with regard to location, climatic condition, and specific culture of the residents of the concerned place, and their needs and values, which demands its special aspects. Under these circumstances we could not provide a standard volume or surface for green space throughout Iran because quantity of green space depends precisely on climatic conditions and particularly on the bioclimatic conditions of each area. For example the area of green space that is considered for a city like Yazd is certainly different from the area to be considered for Sari city. On this basis and with regard to the meaning of the word "standard" in the sense that it indicates a static scale,

using it to mean dynamic green space would not be free from shortages. To determine the area and volume of required green space the environmental conditions in the city under study should be reviewed primarily to provide solutions based on the specified and known needs in order to make the utmost use of green space (Saeidnia, 2004:69). Different standards and capitation used for every urban application are different for different cities regarding the geographical conditions of the city, anatomical-physical characteristics, climatic conditions, economic factors, social factors, cultural factors, and so on. Hence a clear standard and capitation could not be considered for the cities of a country as each city needs different per capita regarding its conditions and the provided standards are used as a guide (Esmaeili, 2002: 24-25). Based on the studies and investigations of Ministry of Housing and Urbanization, the common and acceptable urban green spaces per capita in the cities of Iran is between 7 to 12 m² which is below the indicators determined by UN Environment Department (20 m² to 25 m² per capita) (Saeidnia, 2000:83). Quantitative assessments are made based on comparison of existing capitations of the existing applications with related standards or by study of present and future needs of the region under study (Poormohammadi, 2010:109) (Table 1).

Table 1: The Standard Per Capita Suggested for the Cities of the Country Research Methodology

Declaring Sources	Suggested Standard Per Capita Level
Ministry of Housing & Urbanization	7 to 12 m ²
Management opinion of Iran's organization of municipalities and village management departments	20 m ²
Regulations of designing urban green space- plan and budget	Minimum 12 m ² to favorite level of 40 m ²
The opinion of experts of environmental organization	30 m ² to 50 m ²
Tehran municipality green spaces and parks organization	25 m ² to 50 m ²
Comprehensive project of Sorkhehesar and Khojir national parks	15 m ² to 50 m ²
Pooladshahr Consulting Engineers	25 m ²
Itak Consulting Engineers for Tehran city	10 m ² to 35 m ²
ALP Consulting Engineers	21.75 m ² to 29.75 m ²

The present research is a combination of descriptive-analytical and developmental methods. Theoretical fundamentals and literature have been studied and statistics and information have been collected based on desk study. The statistics related to green spaces and population of Mehr city was gathered

through referring to the concerned organizations and field work and analyzed in Excel software.

THE AREA UNDER STUDY

Mehr city measures 2354 m² and is located between 52°45' north latitude and 27°42' south latitude from Greenwich Meridian. It sits in the southern

extreme of Fars province 500 kilometers from the center of province. It faces Jamvariz city in Booshehr province from the west, to Lamrood city from east, and

to Southern Pars Special Economic Zone from south. Mehr city is the center of Mehr Township, which easures over 345.7 acres.(Fig 1).



Figure 1: Location of Mehr city in the Country and in the Province Demographic Characteristics

In statistical terminology every set of distinguished entities or a set of human beings, plants, etc. which share at least one common property is called a population or a statistical population. In demographics, all or part of the habitants of an area is called a population. The term population may be applied to any community of human beings, at any place, whether constantly or provisionally. But to provide a final definition, population is a congregation of human beings who live permanently and usually in the form of households in a specific area (village, city, township, province or country) with unit political base, and national and tribal conditions (Torabi and Taghavi, 1983; 749 and Amani, 1973; 1). The word population

means all individuals who live in a geographical area such as city or village (Wehmeier, 2005, 1171). In demographics, all or part of the habitants of an area is called a “population” [13]. By definition, all individuals who permanently live in a geographical unit (country, province, township, city or village) in the form of household and family are called population (Kazemipour, 2004: 13). Mehr city is one of the small cities of Fars province with a population of 25328 according to 2011 census. The population of this city was 1772 in 1976, which has increased 14.29 times within 35 years from 1976 to 2011. The criterion in this research is the population of the city in 2006 when its population was 6307 persons (Fig 2).

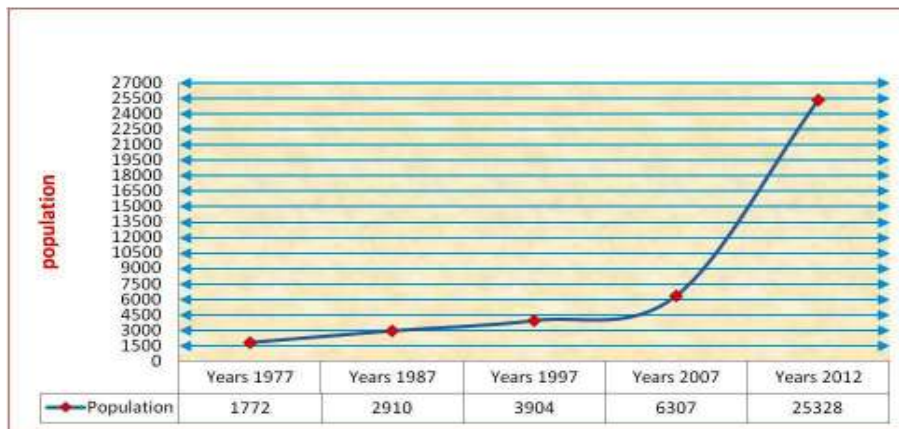


Figure 2: Growth of Population of Mehr City in Different Periods Status of Mehr City Green Spaces

In 2006, Mehr city had a population of 6307 who habituated in five districts of the city. In this year there were five parks in this city with an approximate area of 4910 meter square (Table 2). Having dividing

this area by the population of Mehr city in the same year we gained the per capita green space of Mehr city, i.e. 0.77 meters square. This per capita green space is not distributed evenly so that districts 3 and 5 have no

green space and district 1 has a green space of 1.57 m² per person. District 2 has a green space of 1.26 m² per person while the green space per capita in district 4 is equivalent to 1.08 m² (Fig 3). Taking into account the standard capitation suggested by Ministry of Housing and Urbanization, i.e. 7 m² to 12 m² per capita it is evident that 0.77 m² per capita is very insufficient for Mehr city and is very far from national and international

standards (Table 3). It is worthy of mentioning that the green space in Mehr city has problems not only as regards quantity but it lacks quality. This means that its green space is not distributed proportionately and evenly so that districts 3 and 5 that make up 24.89% of the city's population and occupy 23% of the city have no green space (Fig 4).

Table 2: Status of Green Space Available in Mehr City, 2006

No.	Name of Park	Type of Park	Park Area (m ²)
1	Fazilat	Neighborhood	630
2	Emam Reza	Neighborhood	540
3	Niyayesh	Neighborhood	1320
4	Payam	Neighborhood	1420
5	Farhang	Neighborhood	1000

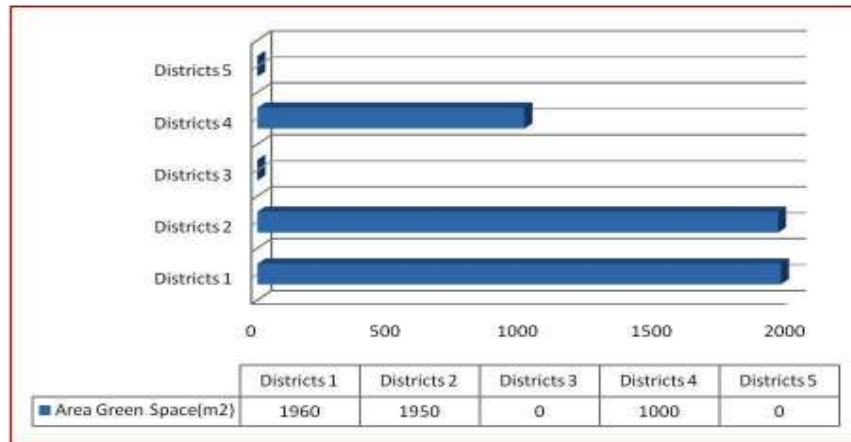


Figure 3: Comparison of Green Space in Five Districts of Mehr City

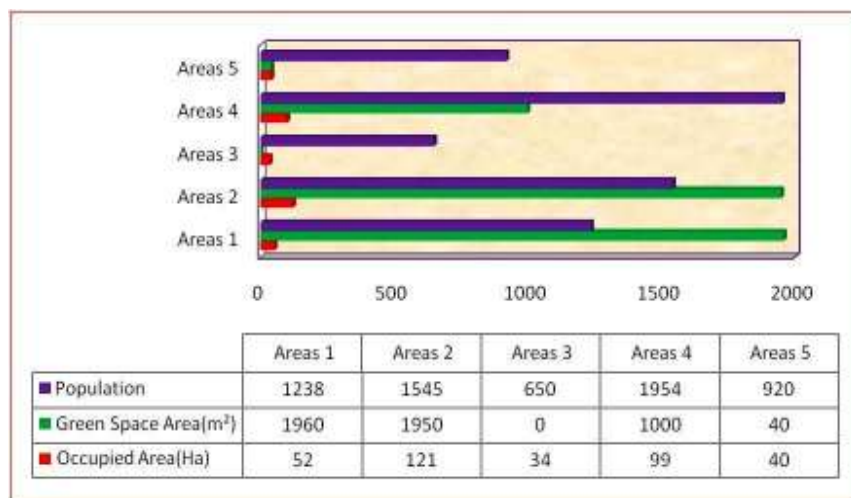


Figure 4: Comparison of the Areas of Mehr City as Concerns Occupied Area, Population, and Green Space Area

Table 3: Shortage of Green Space of Mehr City in General, and for Each Specific District

Districts	Available green space area	Population	Per capita	Shortage compared to 12 m ² suggested by ministry of housing and urbanization
District 1	1960	1283	1.58	13436
District 2	1950	1545	1.26	16590
District 3	0	650	0	7800
District 4	1000	1954	1.08	22448
District 5	0	920	0	11040
The entire city	4910	6307	0.77	67534

ANALYSIS AND CONCLUSION

Cities as centers where human activities and everyday life are concentrated have no choice but to accept a structure and function that is influenced by natural systems to guarantee their sustainability. Here the green space is an integral and necessary part of cities which play substantial role in their metabolism. Findings of field studies in Mehr city show that there are five parks in this city with a total area of 4910 meters square. We analyzed the green space of Mehr city based on the criterion set by Ministry of Housing and Urbanization suggesting 12 meters square green space per person. The findings of this study and analysis show that we are in shortage of 67534 meters square of green space. Regarding the studies it was known that the green space per person is 0.77 meters square in Mehr city which is notably different from national and international standards. Moreover this small surface is distributed unevenly in five districts of this city; district 1 has a green space of 1.58 m² per capita, while districts 3 and 5 with 24.89% of the city's population and 23% of city's area has no green space. As per definition of Environmental Protection Organization in the Green City Conference, a green city is a city whose people feel accountable toward their environment and collaborate with civil foundations and governmental organizations to make a healthy, quiet, and pleasant environment with the minimum environmental standards. In such a city, the green space per capita, and visual and sound pollutions are within acceptable limits and production per capita of garbage is in its lowest level, with the best form of recycling of wastes accompanied by their separation from the source materials. In this city energy is consumed in optimum way according to global standards as much as possible. Hence it is necessary that Mehr city management cooperate with people and other concerned organizations and bodies to take appropriate measures in order to increase the green space of the city per person up to favorite level and present a beautiful and green city to its people.

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