

Investigation the position of gardens as one of the dimensions of urban vegetation in the management of large cities located in the plains and its maintenance strategies

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Abstract

Population growth and turning to machine life caused the development and expansion of urbanization and this expansion had many destructive effects on the environment. Urban greenery has become an important concern for city management and citizens. According to the mentioned proposition, by examining the location and importance of gardens in big cities located in the plains, we investigated the effects of gardens on the city and explained each of these effects and urban ecology, and while examining some of the reasons for the destruction of gardens, we sought to present There are solutions to prevent the destruction and preservation of gardens located in the path of urban development. The importance of gardens as one of the forms of urban vegetation and the most important of them is that it is considered as one of the indicators of sustainable development in the path of countries to achieve development. It can be the research method carried out in this article is of an applied type and it is a theoretical research method based on analogical reasoning methods based on library studies and the review of available documents in relevant organizations and institutions as well as field studies that led to the compilation of this article. And the final achievements of the article will be presented in the conclusion section.

Keywords: Garden, Plain, Ecology, Metropolis, Urban Management.

Introduction

Iranian gardens play a key role in the formation of the city and the landscapes of traditional Iranian cities and are considered to be the reason for the connection of architectural seeds, green infrastructure and natural organs of the city. The Iranian garden is one of the masterpieces of outdoor design in the world and is the result of the thought of a people interacting with nature and using nature to create an outdoor space [1]. The city is a social arena that is created on the natural arena [2]. Urbanization, as the second revolution in human culture, has caused a transformation in the mutual relations of humans with each other, with the increase of the urban population, the exploitation of the environment intensifies [3]. The increase in population and expansion of urbanization causes urban green spaces to become rough and impenetrable concrete surfaces; And this trend is more serious especially in developing countries and the third world [4]. It seems that in Iran, cities that have faced the problem of rapid expansion of their settlements, this development is associated with the destruction and destruction of urban gardens. In other words, a large part of the land required for the physical development of the cities has been obtained by changing the use of the garden area [5]. The expansion of cities, the increase of urban population, the expansion of urbanization and human progress in the field of technology have caused the gradual distance of man from nature and the destruction of the ecological balance of the environment. Excessive population density and interference in the natural environment and the creation of environments that are designed and built with human thought, reveal more and more the physical and mental environmental needs of humans [6]. Therefore, the administrators in the urban area take decisions to solve this deficiency by building gardens and artificial green spaces inside the cities. Gardens, as one of the unique aspects of urban green spaces, produce oxygen, reduce pollution caused by industrial fine dust in the atmosphere, regulate temperature, stabilize soil, beautify the environment, control pollution, and create artificial air arteries and generate wind in cities. They are located in the plain area. It is worth mentioning that the cities located in the plains do not have natural lungs of air and these gardens are the rule. The artificial lungs of the cities located in the plain area play a role [7]. Preserving gardens and preventing their degeneration in the urban area is one of the means to achieve the realization of sustainable development in urban management. It is worth pointing out that for the development of the urban space and area, the cause of the destruction of the gardens is first provided, and after understanding its place and importance, the destroyed space is replaced. The occurrence of this vicious cycle, in addition to incurring exorbitant costs in the management of megacities, makes the efforts of third world and developing countries to achieve sustainable development fruitless.



Figure 1. Aerial image of Sattar Khan street in Tehran, between 2004 and 2015



Figure 2. Aerial view of the gardens of Elahie district of Tehran, between 2008 and 2013

Plain

Geographically, the plain refers to flat or relatively flat lands that are surrounded by high mountains and these lands generally have one or more flowing rivers. The cities located in the mentioned position generally lack the natural lung of air flow due to being monopolized and isolated by high mountain ranges, i.e. not benefiting from the passage of natural wind in the plains [8].

Functional separation of cities from the consequences of modernism

A behavioral camp is a small social unit that results from the stable integration of an activity and a place in such a way that it can fulfill the essential functions of that behavioral environment in a regular process [9].

Modernism reduced the behavioral function of the formed behavioral camps of the city and threatened the established behavioral camps throughout history and basically due to the characteristics such as crudeness, slowness, inflexibility and difficulty of creating a camp. did not have the new ones [10]. Such consequences in Iran started from the first Pahlavi period with the implementation of the map (street implementation) and damaged many urban gathering places that were the behavioral base of urban pedestrian flows. Today's urban parks are the result of developments in the field of social life and ways of constructing gardens, which began in the Qajar period along with other aspects of architecture and urban planning, but in the Qajar era and the early Pahlavi era, the need for a park in its modern sense It was not felt and the construction or naming of such spaces had more of an imitative and modernist aspect [11].

The role of gardens in the formation of behavioral norms

Before the first Pahlavi period, the effective and ineffective gardens were one of the components of the local scale, which as an intermediary element in combination with other urban components such as schools, mosques, tombs, almshouses or in the form of a collection of concentrated gardens in the cities [40-42]. has forgiven. The emergence of large government gardens with aristocratic mansions, as well as newly emerging imported elements such as the zoo, in the second period of Naser al-Din Shah Qajar's rule and after that, became the basis for the creation of urban parks in the process of the

city's peaceful development. This dialectical flow intensified the concept of urban gardens to provide livelihood and entertainment for the common people and the aristocratic concept of green space and designed plants. Nevertheless, until the beginning of the first Pahlavi period, productive and non-productive gardens maintained their value and importance for the public as multi-functional green spaces. In the process of forming and stabilizing the landscape of fine-grained gardens in the city, intra-tissue feedbacks between gardens and other components of small arsenics on a local scale and the role of monitoring residential contexts, cause an increase in behavioral performance, flexibility and, as a result, a sense of belonging to these gardens. have been [39]. With the beginning of the sudden changes of the first Pahlavi period with emphasis on the human society, a modernity was formed in Iran, which, unlike the endogenous modernity of the western society, was not formed based on the gradual changes in the cultural structure of the society. The result of this process was the phenomenon of physical and cultural separation instead of the integration of inner city forces. Even before modernity, the inner city garden had a high behavioral performance by having a local scale and covering a wide range of behaviors supporting this scale., they had a more non-diverse behavioral spectrum and heterogeneity with the needs of the urban cultural context. The result of this process was the gradual loss of the spiritual value of these fine-grained gardens and finally the beginning of destruction and replacement with building masses [12].

The place and importance of gardens

The destruction of gardens in Iran's big cities is not only happening during their development, but also now. Municipalities have not been able to effectively control the destruction of gardens due to lack of full authority. Although the approval of some laws has been able to increase the scope of the municipalities' powers, but there are still widespread violations caused by the deliberate drying of gardens in these megacities [13]. The significant decrease in the area of gardens in Tehran from 14,000 hectares in 1968 to 9,900 hectares in 1981 and the decrease in the area of gardens in Shiraz from about 4,000 hectares to 1,200 hectares in 1992 is self-evident and a proof of this claim [36-38]. It can be said that the main reason for the extensive

destruction of these gardens is, on the one hand, their placement in the path of urban development, and on the other hand, the significant increase in the added value of these gardens for their owners [2].



Figure 3 .Aerial view of the gardens of Qasr al-Dasht area of Shiraz, between 2002 and 2014

The importance of the functioning of gardens in the cities that are geographically located in the plains is so much that in case of destruction, it can be claimed that they have no alternative and their removal in any way and for any reason will cause irreparable damage to the city and the urban area. and it brings in its residents and severely challenges the city management. Considering that these gardens are located in a dense and consecutive area, they will follow the following mechanisms:

Increase in relative humidity

Due to the expansion of its leaf surface compared to other forms of green space, gardens can increase the relative humidity and softness of the air through transpiration. The act of sweating trees is associated with the absorption of calories. Thus, a strip of plants 50 to 100 meters wide reduces the heat by 3 to 4 degrees compared to the city center[31-35]. At the same time, it adds 50% to air humidity. The temperature difference obtained in this way causes a slight decrease in air pressure. A decrease in air pressure creates winds with a speed of 12 km per hour, and these winds are enough to completely change and clean the air of a big city in one hour [14].

Dealing with heat islands

Researchers consider urban areas as heat islands; Dark surfaces in cities absorb the sun's heat during the day by 3to 5degrees Celsius more than the adjacent lands, and in this way contribute to %30of air pollution. In urban areas where buildings and plumbing systems have the largest contribution to the earth's surface coverage ,natural cycles are short, and the disturbance in energy transfer has turned them into heat islands. In turn, it increases the pollution of the city [14].

Reducing the amount of lead

Gardens play an effective role in reducing lead levels. Comparative comparison of trees with other types of plants, such as herbaceous plants and agricultural plants, shows that trees have 10to 20times the capacity of herbaceous plants and 2times of agricultural plants to absorb lead [15].

Gardens and wind production

Due to the production of oxygen by gardens and forests, and as a result, the creation of wind by the produced oxygen, forests and gardens are always known as wind factories in both small and large dimensions. Therefore, in the case of big cities located in the plains, gardens are referred to as artificial lungs that produce wind. It is worth mentioning that the wind carries the role of transporting pollutants in both vertical and horizontal directions [16].

Preventing the phenomenon of air inversion

It is a phenomenon in which, contrary to the natural state, the temperature increases with the increase in altitude, and in this condition, the temperature of the lower layer of the atmosphere is lower than its upper layer. In big cities, temperature inversion usually causes air pollution [28-30]. Among the reasons for the occurrence of this phenomenon, we can point out the lack of movement between vertical layers of the atmosphere due to the lack of wind, the presence of enclosing mountain ranges, the lack of wind entering the plain, low rainfall, etc [16].

Noise

Trees in gardens and urban green spaces, if they have the right species and proper planting, can reduce the sound up to 4 decibels. In particular, it reduces noise pollution caused by vehicles and urban transport fleet [14, 17-20]. To simulate noise pollution, the Finite Element Method (FEM) is a suitable and practical tool [24, 25, 26, 27].

Oxygen production and carbon dioxide absorption

In the urban macro scale, the role of gardens in terms of creating oxygen balance by trees can be significant, and in the urban micro scale, they cannot be ignored in any way. For example, each beech tree with a medium longevity can remove carbon dioxide from the air as much as three times the volume of two single rooms, while 30 to 40 square meters of trees can provide the oxygen needed by one person [21].

Radiation control and light reflection

Climate control is realized by modulating the effects of sun, wind and rain. The air temperature in the vicinity of trees is much cooler than in areas without trees. The bigger the tree, the bigger the difference. Absorption of solar radiation (long waves) by trees reduces the temperature difference between day and night. The air under the trees is cooler during the day and warmer at night [21].

Energy storage

Proper planting of trees can have a significant effect on energy consumption in buildings. The cost of heating or cooling buildings is reduced if trees are used correctly. Trees absorb 9% of solar energy in

summer and can also reduce the internal heat of buildings. In residential areas that are located in windy areas, planting trees as windbreaks can reduce the cost of heating buildings by 4 to 22% depending on the degree of windiness and density of the windbreak [22].

Wind control

Urban green spaces and especially gardens can be effective in guiding the wind and changing its direction. Urban green spaces, including trees and shrubs, have an effect on wind currents, while preventing soil erosion, they can be effective in selectively directing wind currents and control wind intensity [23].

Water flow control

Trees can slow down the movement and flow of water in the impenetrable surface of the city and delay the passage of water on the surface of the city. Conifer trees up to 40% and broadleaf trees up to 20% have the ability to capture rainwater and return it to the atmosphere through evaporation [21].

Trees and floods

By absorbing water from one side and directing it to their organs, trees slow down rapid and flood currents. On the one hand, the surface of tree limbs reduces the speed of floods by one-third and on the other hand, it reduces the costs of constructing flood flow control systems [23].

CONCLUSION

Considering the ever-increasing growth of urbanization and the development of urban areas, which causes extensive changes in the field of gardens, and the feeling of the need to increase the urban green space per capita by citizens and urban management in big cities, all of them indicate the strategic importance of gardens as one of the forms of green space to It is special for big cities located in the plains. Considering the ecological effects of gardens on the urban area, such as reducing the amount of lead, dealing with heat islands, preventing the phenomenon of air inversion, increasing relative humidity, controlling radiation, light reflection, etc., urban management is forced to search for solutions to preserve and prevent It has destroyed or changed the use of these gardens, but due to the added financial value of these gardens for the owners and other beneficiaries, it has created problems for the city management in this direction. The suggestions to preserve and prevent the destruction of this treasure are as follows: purchasing these gardens by the municipality and turning them into city parks (either public or family parks); Buying and transferring the ownership of gardens to the Medical Sciences Organization and turning them into botanical and medicinal plant gardens; Creating a memorandum of cooperation between the municipality and the endowment organization in the big cities in order to purchase and endow the gardens in order to prevent their change of use, the acquisition of the gardens by the cultural heritage organization for the use of the museum garden. Changing the use of gardens under the title of garden-school, which can be considered by the Ministry of Education and the private sector active in the field of education, as well as garden-reliance, which, in addition to preserving the body of gardens, can be used as a place for religious and ritual gatherings. be exploited.

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