

Investigating the Effectiveness of Iranian Architecture on Sustainable Space Creation

Mansour Nikpour, Mohsen Ghasemi, Elahe Mosavi, Mohd Zin Kandar

Abstract—lack of convenience condition is one of the problems in open spaces in hot and dry regions. Nowadays parks and green landscapes was designed and constructed without any attention to convenience condition. If this process continues, Citizens will encounter with some problems. Harsh climatic condition decreases the efficiency of people's activities. However there is hard environment condition in hot and dry regions, Convenience condition has been provided in Iranian traditional architecture by using techniques and methods. In this research at the first step characteristics of Iranian garden that can effect on creating sustainable spaces were investigated through observation method. Pleasure space in cities will be created with using these methods and techniques in future cities. Furthermore the comparison between Iranian garden and landscape in today's cities demonstrate the effectiveness of Iranian garden characteristics on sustainable spaces. Iranian architects used simple and available methods for creating open architectural spaces. In addition desirable conditions were provided with taking in to account both physically and spiritually. Parks and landscapes in future cities can be designed and constructed with respect to architectural techniques that used in Iranian gardens in hot and arid regions.

Keywords—Iranian garden, convenience condition, landscape, sustainable

I. INTRODUCTION

IRAN has various climates due to vast region of Iran. The vast area of Iran has Hot and dry climate and the raining average rate is less. This region is located in the east and central of Iran. There is no plant and no rain.

Characteristics of this climate are as follow:

- 1-Hot and dry climatic in summer cold and dry in winter.
- 2-Very less rain.
- 3-Few trees and plants.
- 4-Less humidity.
- 5-High difference in temperature between day and night [1]

However there is a hard climate in this region, traditional architects have used suitable methods and techniques for creating desirable environment for live and it can be shown in designing Iranian gardens.

II. METHODOLOGY

This research has been carried out through observing and studying previous studies regarding specifications of Iranian

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gardens, and the effect of physical and non-physical elements of the garden on creating a suitable condition has been studied so that the possibility of creating sustainable spaces in urban areas can be provided through recognizing techniques with using these physical and non-physical elements.

III. FINDING AND DISCUSSION

Iranian gardens are the most important and the oldest garden in the world. Iranian garden have been mentioned in ancient Greek text and Bible. Agronomy and constructing garden was holy in ancient period of Iran. After entering Islam constructing garden has been developed around Islamic world

A. Iranian Garden's Characteristics

If There are common certain features in all Iranian gardens which can be defined as follows:

1. A garden's laid out on: steep ground.
2. The area of the garden is surrounded by a wall.
3. There is a main canal in it.
4. The area of the garden is divided into four.
5. There is a mansion or palace in the middle.
6. The planting of rose-bushes is frequent.
7. A close relation with nature is obtained in a simple manner and there is no interval or boundary line between the mansion and the rest of the garden, so that it cannot be seen where one begins and the other ends.
8. A large number of trees are planted for the sake of shade, and as a result the garden contains narrow walks.
9. Canals are so designed that the flow of the water produces a sound.
10. The design of the garden is based on the use of straight lines.
11. Provision is made for the flow of the water to be visible, and grooves are cut in the bottom of the canals to cause the water to flow roughly as if it were flowing over rocks.
12. There are a large number of fruit trees; the bigger the garden the more fruit-trees are planted (Figure1, 2, 3) [2].

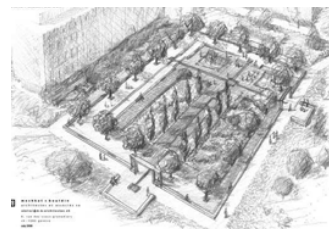


Fig. 1 Typical Iranian garden

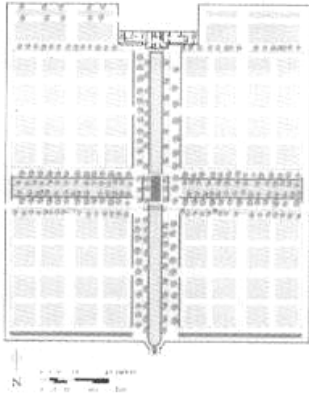


Fig. 2 Plan of Golshan Garden in Tabas, Iran

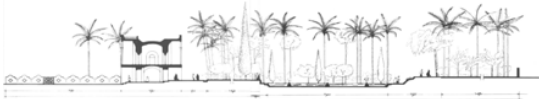


Fig. 3 Section of Golshan Garden in Tabas, Iran

Contributor elements in Iranian garden are physical and nonphysical. One of the most important characteristics of Iranian garden is geometry of garden. Iranian gardens are divided into 4 parts. The original of this geometry based on land division and irrigation. Every part of the garden, which is rectangle or square, is divided to smaller squares. The most obvious feature of this geometry is the separation of the rectangle to four equal parts by two intersecting streams in the center. These streams are connected to rectangle axis of symmetry and there usually exists a pond in their intersection point [3].

B. Physical Element

1) *Water*: In Iranian gardens, water is supplied through qanat (underground water channel) or spring and water flows in the garden through the paths predicted in the garden. It waters trees and flowers. Since in hot and dry weather humidity is low, water movement increases humidity of the environment and thus prevents severe heat in day and severe cold at night. As humidity increases, plants can overcome unsuitable desert conditions and maintain their green structure. In the intersecting point of streams, there are ponds which both provide humidity and act as resources for low-water conditions. Water fountains which make the environment more beautiful and supply the humidity increase the humidity and help the humid and thermal comfort of the garden [4], [5], [6].



Fig. 4 (Golshan garden) with a View from Tabas City, Iran

2) *Tree*: Tree has a more functional role and provides shade which is one of the most fundamental elements of the garden to create a suitable place for people so that people can escape the heat of sun under these shades in hot and dry climates. Trees are considered as living elements in bad conditions and provide shade and humidity. Planting tall trees in both sides shows the path and prevents the entrance of desert storms to the garden [5].

3) *Shade*: Shade is formed by elements like trees, buildings and walls, but in hot and dry weather, existence of these elements plays the most important role in formation of desirable environment protected from burning heat; mainly in hot and dry climate, temperature difference between shade and sun is completely noticeable. Thus, shade has played a positive and important role in Iran's climate and can be considered as one of the main elements of Iranian garden especially in conditions in which adding water means more humidity for the environment. Combination of these two elements forms the Iranian gardens fundamentally and causes comfort in these gardens. Shade, as one of the most fundamental elements of Iranian gardens, has a direct relationship with specifications of hot and dry climate [5].

4) *Wall*: One of the physical elements of a garden is its walls because the nature and greenness of garden in the dessert starts from the border of the wall to the garden; in fact, wall denotes the garden limits and it plays an important role in security and prevention of storms (Figure 4).

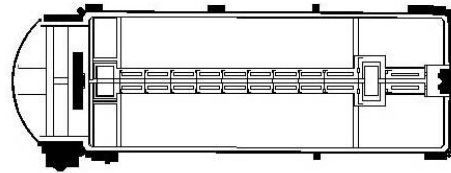


Fig. 5 (Plan) Shahzadeh garden, Mahan, Iran



Fig. 6 Shahzadeh garden, Mahan, Iran (View from gateway toward to the inside of the garden)

C. Non-Physical

1) *Virtual extent*: Existence of main landscape appeared directly and straight in longitudinal axis of garden opposite mansion and also planting tall trees in both sides of the garden have an important role in creating a perspective which shows the garden longer. On the other hand, a natural slope used in most Iranian gardens has provided a suitable situation for location of pavilion in an elevated point of the garden. Concerning human sight, when he stays in a low point, he feels his distance less than the time when he watches the same distance from a higher point. This difference, which is related to difference in human visual angle in higher or lower points of horizon, causes the mansion to be seen closer from the entrance door and thus encourages the viewer to move toward it and walk this apparently short distance and when he looks at the garden from the pavilion, this distance looks more and the garden looks larger and bigger (Figure 5, 6, 7) [3], [7], [8], [9].

2) *Continuity*: Stimulating visual sense and existence of a close visual relationship among elements of garden create a kind of virtual extent and continuity in garden space. Indeed, in Iranian garden, we always observe the phenomenon of transferring from one space to another. Mainly, one of the main features of architecture in Iranian garden is the combination and mixture of garden and building; these two are mixed and connected so much that nobody can feel where the garden starts and where it finishes. This relationship and this combination are formed through creation of spatial relations and relation of elements forming the garden.(Figure 8) Also, making use of people's feeling stimulating to create such space is one of features of Iranian gardens. Building, in Iranian garden, doesn't cut the garden but rather creates continuity with other parts of the garden. Stimulating visual sense and existence of a visual relationship between inner and outer spaces of the mansion create a type of continuity between these two [3], [7], [8].



Fig. 7 Shahzadeh garden, Mahan, Iran (view from inside of the garden toward to the gateway)



Fig. 8 continuity of interior and exterior spaces

IV. CONCLUSION

Since Iran's climate is mainly hot and dry, all designing techniques were used to increase humidity and to reduce temperature. Iranian traditional architects used physical elements like water and tree, and used designing techniques with the aid of geometry to create shade and thus a suitable and desirable place with lower temperature and higher humidity in desert hot and dry climate. Also, by using non-physical elements, they created virtual extent and continuity in the garden as well as thermal comfort. They created spiritual comfort for the people who were in the garden. Therefore, the effect of features of Iranian gardens is obvious on creating comfort in hot and dry environment; thus making use of these features and architectural techniques can create sustainable spaces especially in hot and dry regions in open spaces of future cities.

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