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Persian Gardens and Heritage-Based Urban Design: Indigenous Knowledge of Cultural and Historical Landscape for Sustainable Development of Cities and Settlements

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ABSTRACT

This article, offers valuable insights into the relationship between traditional landscape knowledge and contemporary sustainable development. In this regard, author utilized his observations and accumulated knowledge from years in this field that are clearly evident in the text. Persian garden, with its brilliant history as one of the best landscape models, is a result of the productive interaction of the Iranian man with nature. Persian garden is enclosed by a rectangular fence with vertical axes which are parallel to the sides of the fence. Plant, the earth and the water, and the architectural components are four elements forming the body of the garden. The Persian garden is both physical and spiritual experience. The aroma of succulent plants, the melody of water and birds, the smooth tiled texture and taste of wet earth and the sun, the fruits, the flowers and the colorful mosaics that are reflected in a calm catchment, are all outstanding. Considering the existing environmental potential as well as Iran's ancient history of gardening, it is hoped that environmental and landscape designers keep with the principles of sustainability in planning and designing. The rehabilitation of Persian gardens, along with respect for the principles of sustainability and consistent with sustainable urban planning, can play an important role in the development of urban green spaces and, consequently, sustainable urban development.

Keywords: Persian gardens, Indigenous knowledge, Sustainable development, Urban design, Environment, Desert areas, South Khorasan province, Iran

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INTRODUCTION

Nature-based Solutions (NbS) are recognized as innovative strategies to address urban challenges while offering multiple socio-environmental and economic benefits (Aza *et al*., 2026). Climate change is primarily driven by the increasing concentration of carbon dioxide in the atmosphere. Trees in urban green spaces (UGS), including street trees, parks, gardens, and other vegetated areas within cities, play an essential role in mitigating this change by sequestering and storing carbon (Tsuzuki and Inoue, 2026). Residential yards and gardens provide a multitude of benefits for people, including green infrastructure, access to nature, and improved mental health (Ballut et al., 2026). Today, returning to nature and patterning it seems to be one of the most important needs in the world. Iranian architects have been successful in applying scales and connecting different scales to one another, as well as facing nature around them (Sadafi and Atashinbar, 2023). Experiences, when are written and documented, can turn into knowledge and expand human sciences (Joudavi, 2017). Iranian garden, with its brilliant history as one of the best landscape models, is a result of the productive interaction of the Iranian man with nature (Sharghi *et al*., 2020).

The Persian garden is an enclosed, organized garden with an internal focal point that is meaningful along the street. In Iranian culture, the garden is a landscape; in other words, a Persian garden is a phenomenon derived from the interaction between the Iranian mind and nature that puts the audience on a specific path to interpret the environment; therefore, this phenomenon underwent some physical changes from pre-Islam to the Qajar period, which was accompanied by the entry of Western colonizers, but its meaning remained constant for the Iranian audience (Sadafi and Atashinbar, 2023). In Iranian culture and art, a garden is an integral part of Iran's identity reflecting how human beings have interacted with nature. Planting and vegetation designs are an important part of a garden. Since vegetation is a decaying element of a garden, its replacement and restoration as an architectural monument is not quite easy. Therefore, examining the history of the garden and the study of its initial patterns are of particular importance (Ghasemi and Golzar, 2018).

The concept of the Persian garden is known as one of the symbols of civilization and architectural patterns of the Iranian region, from Transoxiana to Mesopotamia, due to its

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continuity and widespread presence in the geography of Iran. A closer examination of documents, travelogues, and the analysis of the evolution of the physical aspect of this phenomenon reveals that social, cultural, political, agricultural, and economic conditions have had a slight influence on the symbolic system of the Persian garden in each period (Sadafi and Atashinbar, 2023).

Mirfandresaki defines Persian garden as follows: Persian garden is enclosed by a rectangular fence with vertical axes which are parallel to the sides of the fence. Plant, the earth and the water, and the architectural components are four elements forming the body of the garden (Ghasemi and Golzar, 2018). In the Persian garden, the garden architecture system is consisting of organizing, operational, physical and semantic systems. Also, systems of landscape, perspective, light, shadow and sound are combining and mixing the resulting quality of physical system. Most researchers emphasize that "in the Iranian garden materialism will be improved to spirituality". In fact, the Persian garden creates a pure, calm space. It is a space without any tension and an environment of great thinking. It can be said that the quality of comfort and relaxation and its quality as a place for thought, contemplation, meditation and creativity are created by structural elements such as number, geometry, color and material. The Persian garden is both physical and spiritual experience. The aroma of succulent plants, the melody of water and birds, the smooth tiled texture and taste of wet earth and the sun, the fruits, the flowers and the colorful mosaics that are reflected in a calm catchment, are all outstanding. These characteristics exist both at a symbolic and abstract level and at an experimental level, in the same time (Bathaei, 2018).

The most important principle in the design of the Iranian garden is its structural system, which is based on the geometrical order. Iranian garden, while a wall surrounds it, is divided by vertical axes on the main and secondary axes. In addition to creating a peripheral composite wall, the construction work on the Iranian Garden deals with stair-breaking walls, paved surfaces, streams, ponds, and pools, all of which follow the geometric order of the garden and in fact, form the landscape of the garden. The main garden buildings are on two scales, big and small. The big scale contributes to the main space of the garden and the small one defines the garden surroundings. On a large scale, the facade, staircase and mansion are usually built on the main axis, while on the small scale, secondary structures such as bathrooms and other services are located on the side walls, whose entrance is sometimes simple and other times composite. Architecture of Iranian garden is organic. The term "organic" represents an architectural concept, not an essence. The original meaning of this term in architecture is associated with the link between the total and the parts (Sharghi *et al*. 2020).

In these regards, the general purpose of this study is as following:

- Study and discuss most important aspects of Persian gardens and heritage-based urban design.
- Utilizing Indigenous Knowledge of cultural and historical landscape for sustainable development of cities and settlements, environment and optimal life.

The specific objectives of this study are study and discuss following items as:

- Persian gardens and heritage-based urban design: situations and approaches.
- Role of Indigenous Knowledge of cultural and historical landscape for sustainable development of cities and settlements, environment and optimal life.
- Desert ecotourism and sustainable rural development.
- The use of green architecture in urban life.
- Persian gardens utilization for sustainability of urban spaces and parks, cities and settlements.
- Environmental sustainability, Urban Heat Island (UHI) effect and role of the parks and Persian gardens.

The aims of the research are intended to be said with this study and the reasons for conducting this research can be stated as following items:

- Recognizing most important aspects of Persian gardens and heritage-based urban design.
- Providing appropriate solutions and approaches for improving and utilizing this Indigenous Knowledge of cultural and historical landscape for sustainable development of cities and settlements, environment and optimal life.

The main research gap in this study is:

- Are Persian gardens and heritage-based urban design, providing appropriate solutions and approaches for utilizing this Indigenous Knowledge of cultural and historical landscape for sustainable development of cities and settlements, environment and optimal life?

METHODOLOGY

Main source and initial information and data for writing this article is author visiting from the three global world heritage and national Persian gardens in Birjand and Tabas cities, South Khorasan province, Iran. Plus visiting from the various Persian gardens in various provinces of Iran, during 1990-2025. In this regard, author utilized his observations and

accumulated knowledge from years in this field that are clearly evident in the text and offers valuable insights into the relationship between traditional landscape knowledge and contemporary sustainable development. Also, other initial information and data were collected from published documentary studies and written sources in the field of Persian gardens and their ancient pattern of indigenous knowledge for sustainable development of cities and settlements, environment and optimal life. The research method is descriptive-analytical in an interpretive approach and based on the collection of written documents and sources and qualitative content analysis method is employed. In this regard, author field visits were transformed into systematic observation and qualitative analysis. Data analysis was conducted qualitatively and through document content analysis. This method allows for the identification of root causes and providing structural and long-term solutions. At the end and finally the research conclusions have been presented as a conceptual result, principles and components of Persian gardens and their ancient pattern of indigenous knowledge for sustainable development of cities and settlements, environment and optimal life. In this regard, sustainability criteria in the environmental sector have been presented in Table 1.

Application of green architecture in urban life

Green architecture (sustainable architecture) describes architectural designing techniques that are in line with environmental attitudes and is shaped by the idea of respect for nature. Green architecture is not a new trend as it has been fundamentally present in ancient civilizations and traditional architecture, including the traditional architecture of Iran. Its prominent and systematic examples can be seen in Feng Shui science. Today, in the face of the negative outcomes of the industrialized world (such as the increasing pollution of the air and the environment, the reduction of natural resources and the energy crisis) the preservation and sustainability of the world's natural resources have become one of the most important concerns. Green architecture is designed to minimize the negative effects of industrial materials on the environment by increasing the efficiency and optimizing the use of them. With the progress of human life, environmental degradation continues and the biological balance of environment is disturbed. These environments should exist in the lives of humans and in the current urban texture as forest and national parks with a sustainable approach. All these points occur when the level of the general culture of society increases and the members of the modern society themselves, reduce the environmental degradation factors. In this situation, it is essential to build parks in accordance with sustainability principles in today's societies to speed up this process (Table 1) (Bathaei, 2018). . The results were in accordance with Bharath et al. (2025).

Table 1: Sustainability criteria in the environmental sector (Bathaei, 2018)

Objectives of Sustainable Development	Objectives of Sustainable Development Criteria
Healthy environment	• Protecting natural habitats, • Protecting existing green belt, • Reusing land • Reducing light and sound pollution • Protecting quality agricultural land areas • Protecting water and its quality • Protecting landscape and view • Protecting cultural heritage • Protecting and promoting specifications of settlements

Golshan Garden in the heart of the city of Tabas just like a green gem

The Golshan Garden in Tabas, is one of the most important Persian desert-historical gardens and one of the tourist attractions of Tabas in South Khorasan Province, east of Iran. It was founded at the end of Zand era and the start of Qajar era. It is inscribed on Iran's National Heritage List because of its unique features, including its design. The garden is known for being rich in diverse plants. The garden has an area of 8 hectares and a length of about 266 meters and a width of about 260 meters and was constructed by a Tabas governor, Mir Hosein Khan. The date of garden construction in 1798 has been written in its endowment deed. Plants in different species from various climates and thousands of fruits trees have made the garden unique (Ghasemi and Golzar, 2018) (Fig. 1).

Tabas Golshan Garden, the city's most important garden, falls into the category of governmental gardens and has only a courtyard and no other monuments can be found in its interior. It investigates this garden by expressing its features (rotation, egalitarianism, introversion, centeredness, symmetry, and multiplicity) in Iranian landscaping, while fractal geometry has features including nonlinearity, irregularity, imperfection and non-Euclidean geometry, chaos, and special rules, representing its naturalistic aspect along with the lack of rest and relation of geometries. Tabas Golshan Garden as an example of Iranian garden are interpreted and compared with fractal geometry to explain the external validity. If the Iranian garden has fractal features in structural, vegetative, irrigation and functional systems, it can be extended to the whole garden. This garden as an example of Iranian garden represents fractal architecture design with all the features of fractal geometry and inspired by the nature as well as benefiting from geometric flexibility, definable and recognizable throughout the design and using a

form such as the pentagon found in nature (Sharghi et al., 2020; Daneshdoust, 1997).

If the Iranian garden has fractal features in structural, vegetative, irrigation and functional systems, it can be extended to the whole garden Tabas Golshan Garden as an example of Iranian garden represents fractal architecture design with all the features of fractal geometry and inspired by the nature as well as benefiting from geometric flexibility, definable and recognizable throughout the design and using a form such as the pentagon found in nature. The Golshan Garden, the most important government garden in Tabas, has only a transom. Inside the garden, there are not any other monuments. Plant, the earth and the water, and the architectural components are four elements forming the body of the garden. As some trees of this garden have vanished over time, our knowledge about this garden is scanty. The vegetation examined in this garden indicates an increase in planting inappropriate trees and seasonal flowers haphazardly. Therefore, in answering the question of why the productive landscape can be seen in different gardens such as productive, formal and designed, we can highlight multi-dimensional features and the multifaceted merits of this type of landscaping and underline its association with cultural, environmental, and cultural contexts and economic concerns (Ghasemi and Golzar, 2018; Hoseini and Torbaty, 2015).

Examining the planting pattern in the Golshan Garden shows that the productive plants outnumber the decorative ones. The combination of productive and unproductive trees in Iranian gardens improves both quality and aesthetic aspects of the landscape. It also reveals the multifunctional nature of the plants and a productive plant system. In fact, the productive landscape as a part of the native landscaping can contribute to production and decoration. It also serves as a platform for strolling and supporting traditional local culture and traditional agriculture. The concept of productive landscape is not limited to the selection of productive plants and is closely tied up with cultural and native components in the planning and design of Iranian gardens. Also, the function of this landscape approach is not restricted to agriculture, fruit production or the creation of visual diversity in the landscape. In fact, the use of a wide variety of plants from productive to unproductive, from a seasonal to a perennial, forms a multi-functional landscape which generates income, entrepreneurship, and self-sufficiency. Such a landscape can be characterized as healing, beautiful, safe and ecological, and an optimal. Although the condition of the region has influenced the diversity of cold or warm- climate plant species in the Golshan Garden, planting design by non-specialists often has expedited this change and caused serious disturbance to planting order (Ghasemi and Golzar, 2018).

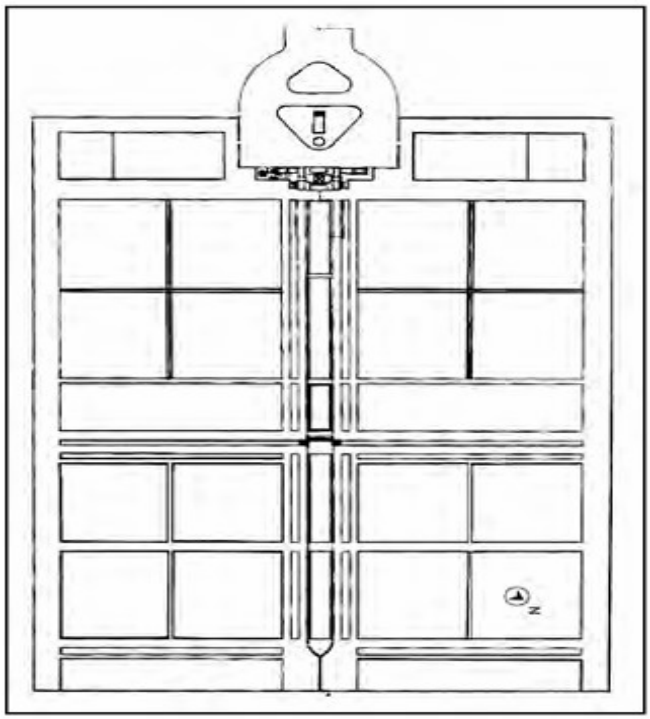
Many poets have visited the Golshan Garden, the beauty of the garden has fascinated them that there are so many descriptions in their poems about this green garden. This must-see landscape is one of the important gardens in Iran and in the world. Golshan Garden is one of the rare Gardens in Iran because there is always permanent running water flowing. Many fruit trees on this garden had created unique nature. Various species of plants in the garden with different weather climates, like plants for certain cold regions alongside the palms which grow only in tropical areas can be found there. People can spend their time in this garden with family and friends whilst enjoying the cool and fresh air in the middle of deserts. One of the main features of this garden is that it is a square-shaped one just like Taj Mahal mausoleum in India. This garden where has been developed in compliance to Iranian garden architecture. At center point of this garden, there is a pond that is the habitat of two pelicans that are named in the Mir Hassan Khan Trust as beneficiaries, and these birds are very familiar with visitors. This garden has been constructed and developed in compliance with Iranian garden architecture, with two crossed water streams. In addition, there is also an eight-acre monument with different fruit trees in each.

The design of the garden has been copied from Char Bagh street in Isfahan and Quran verses about heaven that two flowing and permanent streams pass from each other. The original gate of the garden was historical mason that was ruined after 1978 earthquake and currently a new building with the same design has been construction. There are various plant species compatible with different climates. Different decorative palm, our orange and orange trees, grapes and decorative flowers have turned this garden into one of the most unique and dream gardens of the country. This garden is also the host of a considerable number of new year tourists and passing travelers every year, especially during the new year days in Iran. There is a relatively large pool with three fountains inside this garden. The only building of this garden is the sardarb building. It is a two-story building with a small basement. The place where the Golshan Garden was built was originally the garden of palm trees. Therefore, Golshan palm trees are the oldest trees in this garden. Flower bushes are an inseparable part of the design of the garden. The structure of Tabas Golshan Garden is comparable to fractal geometry in all parts of the garden, including plan, ornamentation, irrigation and vegetation (Sharghi et al., 2020) (Fig. 1).

This garden has a frontispiece that is located beside a rectangular form of square. It was destroyed during Tabas earthquake but has been reconstructed. The frontispiece is the only structure of the garden which is quite simple compared to other old buildings of the town. It has a ground floor, a first floor and an underground (UNESCO World Heritage Centre,

2000). This garden is like a palm grove due to its large number of scattered palms. Main lines of garden design include two major paths, one upon the entrance pivot and the other inside the garden and at a vertical position upon it. Inside the plots created by garden division, pomegranate and sour orange trees have been planted alternately. It is located on a stream created by conjoining the water of several springs coming toward Tabas. The stream enters the end of the garden and after irrigating it via jets and waterways exits from beneath the frontispiece bound for Tabas. Among features that qualify this garden as a perfect the Persian Garden are: Its vegetation which is suitable for local climate, its shadow casting trees, its lovely, enclosed space at the heart of the hot and dry desert as well as its irrigation system. It must be pointed out that the frontispiece has been damaged by the earthquake (UNESCO World Heritage Centre, 2000). Based on the obtained results, health status of public places and mosques in Tabas is in moderate condition. Regarding the importance of cleanness of public places and mosques in Islam religion, it is expected to adopt essential measures to promote the instruments and tools health and servants' personal health (Barjasteh et al., 2016) (Fig. 1). The primary architect of this garden has designed its Green Nature in form of a chessboard by using the different type of trees. An important feature of this garden is the water running through this arid and rainless area. In Persian tradition, a tree is the symbol of freshness, tranquility, and beauty (Ghasemi and Golzar, 2018) (Fig. 1 & 2).

Fig. 1: Golshan Garden in the town of Tabas, south east of Iran and its entrance gate, pool, trees, birds etc. (Pictures by author. 2023 - 2025).



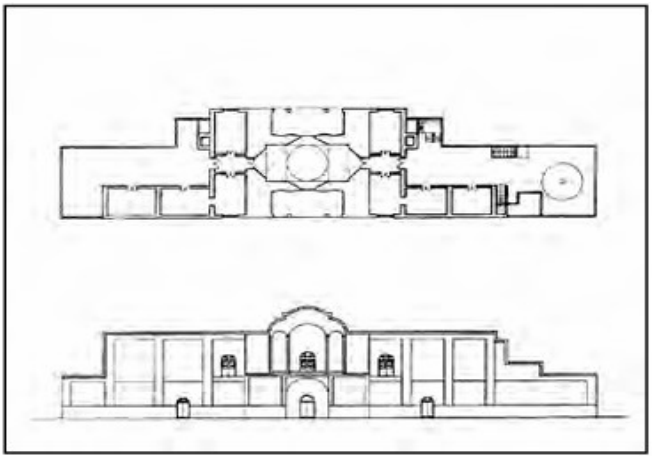


Fig. 2: Plan, section and elevation of Bagh-e Golshan (UNESCO World Heritage Centre, 2000)

Street conceptual role in the creation the Persian garden

The first spatial perception of the audience in the Persian garden is a combination of tall trees and the endpoint of the main axis that extends from the entrance area to the pavilion combined with the eye-catching play of water in the pools and basins and the shade of trees. This image, the most important and enduring image of the Persian garden, represents the Street of Garden and is one of the components of the Persian garden that has undergone the least changes in its shape and continuity in the historical process of the evolution of the Persian garden. The main street of the garden has a significant role in the design of Persian gardens and represents the highest manifestation of the garden's symbolic aspects. Throughout the history of Persian garden developments, the street has had a conceptual role in the creation of the garden and the stabilization of its constituent elements during different periods has led to the continuity of the Persian garden identity (Sadafi and Atashinbar, 2023; Golmohammadi, 2025) (Fig. 3).

Since the main features of Persian gardens are defined around their main axis, the street of the garden can be considered the main meaningful aspect in forming this archetype. Although it is possible to assign such a role to the other components of the landscaping of the garden, at the head of which is the Pavilion, the undeniable necessity is that the pavilion and its magnificent architecture are part of the "Street of Garden scenario"; Therefore, sometimes even the location of the pavilion changes from the geometric center of the garden and is moved to another place, but still has a strong relationship with Street of Garden (Sadafi and Atashinbar, 2023) (Fig. 3).

Abbasabad Behshahr Garden is one of the prominent examples where the main pavilion of the garden has moved out of the geometric center and its architecture is not even similar to the common architecture of pavilions, but the character of the street in the garden has remained strong and, in combination with other components, has created a powerful structure for the garden. It seems that the main essence of what is known as the Persian garden and has continued to this day is the "Street of Garden" which is considered the identifier component of the garden; in other words, the various patterns of the Persian garden have emerged from the transformations of its Street.

Fig. 3: The Akbarieh Garden in Birjand, South Khorasan province, Iran and its streets, pavilion, trees, pools (Pictures by author, 2013 – 2025).

Desert ecotourism and sustainable rural development in South Khorasan province, Iran

Today, tourism has become a very profitable industry with explosive growth and can solve many economic problems. Iran has a high potential to exploit the tourism industry at the international level. Today, different countries of the world are looking to turn the existing capacities in their country into tourist attractions (Barjasteh *et al*., 2016; Khanifar *et al*., 2023). After identifying and categorizing the types of tourist attractions in each country, it is possible to determine their importance for developing this industry (Khanifar *et al*., 2023) (Fig. 3 & 4).

The tourism industry has become one of the most important economic sectors. Tourism creates jobs, generates income, and contributes to infrastructure development. The tourism industry's contribution to the world economy's GDP was more than 10% before the Corona pandemic, and it was growing. The tourism industry in the world is expected to grow by 5.8% annually until 2032. Although Iran has many tourist attractions, it has not been able to take advantage of this industry significantly. Undoubtedly, marketing is the most critical action that must be done to develop Iran's tourism industry at the international level. Tourism marketing seeks to make tourist destinations better places to live in and better places to visit (Khanifar *et al*., 2023).

Identifying the spatial structure of tourist attractions is one of the basic requirements for developing a country's tourism industry. Identifying destinations will improve planning and management by providing tourism actors with information about how tourists consume the goal. Also, identifying the forces that bind attractions together is critical to efficient management, promotion, and preservation. The tourism industry is significant for job creation, alleviating poverty, and economic growth; therefore, it is necessary to provide marketing objectives. The first step to offering marketing objectives is identifying and categorizing Iran's tourist attractions (Khanifar *et al*., 2023).

Historical and natural attractions are part of conventional tourist attractions, and Iran is one of the wealthiest countries in the world in this area. Unfortunately, Iran, having many historical and natural attractions, has been unable to attract many international tourists. As nature-based tourism grows, protected areas will witness increasing pressure from tourists, with the quality of destination attributes exerting a considerable influence over their experience. Nature-based tourism in protected areas of low income counties can contribute to regional economies, reduce poverty, and help to develop rural areas, but there are also significant challenges. Fortunately, Iran has many protected areas that can be offered to international tourists by developing tourism services. For example, Shidvar Island in Iran can compete with Wasini Island in Kenya. Ecotourism pursues sustainable regional development, improved livelihood for the local population, employment opportunities, income source creation, and enriched service exports.

Iran's deserts are unique in the world. Iran's deserts alone can create a strong competitive advantage in competition with other countries (Khanifar *et al*., 2023). Ecotourism, as a type of tourism in nature, is of interest to Iranian planners because it has a key role in strengthening the local economy. Despite environmental constraints that exist regarding growth and development, South Khorasan province has diverse capabilities and attractions in natural tourism, one of which is desert tourism. Desert tourism and touches upon the challenges of developing settlements around the deserts that are the target of tourism. There are many factors involved in the development of tourism in desert areas, the most important of which were related to creating mental and emotional peace and using specific desert landscapes for activities such as photography. In terms of the economy, the impact of tourism on the economic status of households was evaluated in different dimensions. In addition, regarding tourism obstacles in desert areas, adverse natural conditions such as temperature conditions, dust, and fine particles must be described (Falsolyman *et al*., 2022) (Fig. 3 & 4).

Fig. 4: Visiting from the Akbarieh Garden and its inside museum in Birjand, South Khorasan province, Iran (Pictures by author, 2013 – 2025)

Persian gardens for sustainability of urban landscapes and settlements

Landscapes are "an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors" (Pazmino *et al*., 2026). In these days of worldwide political stress learning to cope gets more and more difficult. Most of us crave moments of peace and security, a chance to mediate and smell the air, or quite literally experience the scent of flowers. We can find this peace in an enclosed garden. We can bring sustainability to cities by the concept of Persian Garden. Because one of the basic concepts of achieving a sustainable city in the theoretical framework of the sustainable development is the impacts of urban green spaces. So, principles and components of sustainable development and sustainable city are studied with relation to the Persian Garden. This approach proposes a practical solution for architects, how to re-create Persian Garden in contemporary cities. Hence, city sustainability requires sustainable elements in different dimensions to ensure its sustainability in addition to establishing relationship with the elements in urban system (Ghodsvali, 2026). Also, with due observance to the concept of sustainability theoretically and practically and considering human need in all physical and metaphysical dimensions, Persian Garden is seeking to meet the human needs. It showed the role of the garden in increasing the sustainability in city and permanence of ecological balance is very evident and undeniable especially accessing of sustainability feature in Persian gardens (Bathaei, 2018) (Fig. 5 & 8).

The background of design in Iran shows that with the approach of sustainability, Persian gardens, buildings and landscape were designed to be most adapted to the dry and semi-arid climate of Iran. Inappropriate conditions in the environment and natural resources have led the Iranian to management of resources and solutions that are consistent with nature. These solutions are such as building "Ganat", building gardens in ditches, using rain water, building water storage and designing beautiful gardens. In Iran, achieving sustainability should be planned based on the culture and climate of the region. For this reason, due to the harmony between sustainable architecture and Iranian architecture, Persian Garden is a typical indicator of sustainability that has the best relationship between nature and artifact space. Also, the use of clean and indigenous resources and energies, without destroying nature, will bring ultimate calmness and comfort to human. Features and characteristics of sustainable architecture and its adaptation to Iranian gardening including items such as:

i. Energy Conservation: Persian Garden is based on the principles of native architecture, and the climate-cultural and renewable energy sources-creates a desirable environment for humans.
ii. Climate: In the Persian Garden, the climatic and natural elements are used with respect.
iii. Renewable Energy Use: Designing of the buildings (Pavilion) in Persian Garden are based on using renewable energies like as Solar and Wind powers (such as "Shazdeh e Mahan", Kerman city, Iran).
iv. Respecting users: The geometry applied to the Persian Garden is a four-dimensional geometry. This is the geometry that the human mind can easily understand. (such as Golshan" Garden, Tabas city, Iran).
v. Holism: There is complete harmony in the relationship between human and nature. The garden reflects the order of nature and the world in its regular form like as: The use of native plants, storage and reproduction of floods and other natural resources, infrastructure conjunction with the appropriate technology, preservation of the life cycle and wildlife conservation.

The hallmark of cities in the third millennium is planning and designing in accordance with the nature and principles of sustainable development. Therefore, the necessity of introducing ecological issues in contemporary cities are perceived to be tangible. These ecological issues are embodied in concepts such as sustainable development, ecological city, ecological and sustainable parks. The symbol of sustainable urban development is the construction of urban parks consistent with ecological and sustainable indicators. As the population is growing, more communities are looking for spaces that are beautiful and sustainable. For this reason, sustainable parks are much more attracting (Bathaei, 2018) (Fig. 5 & 8).

Compliance of Persian garden with sustainable parks

1. The sustainable park can have straight-line geometry, curved or natural. Persian Garden also has straight-line geometry in accordance with nature (Fig. 5) (Such as"Fin" Garden, Kashan city and Golshan" Garden, Tabas city, Iran).
2. The sustainable park connects components of the outer spaces in a way that they provide intelligible networks for living organisms and natural systems. In the Persian Garden, the spaces are interrelated and there is no separation. Also, all the components are connected to each other (Such as "Narenjestan" Garden, Shiraz city).
3. The Sustainable Park is trying to provide an old view of the city as a garden. Persian garden is a symbol of originality, civilization and historical document of the country.
4. Sustainable urban parks can reduce adverse effects such as air pollution and traffic noise. These parks are self-sustaining. The native plant species are planted. It is not recommended to plant foreign ones. The spaces inside the garden are well separated from the outside of the garden (Such as Golshan" Garden, Tabas city, Iran).
5. In a sustainable park, flowers often have therapeutic

properties. They also produce grain for birds living in the area. They also have an ornamental aspect for users and their audience. In the Persian Garden, the flowers are not used just only as beautiful plants, but also have applications such as therapy, color production etc.

6. In the sustainable park, floods and water falls are collected, stored and refined to be used in streams or pools. In the Persian Garden, the irrigation system has been rolled around the entire garden, preventing flooding. In order to irrigate the garden in this system, splits are available at specific locations for each plot.
7. In a sustainable park, buildings are placed in a way that are close to paths, bike paths and roads. These buildings are designed to use the sun's thermal energy, natural ventilation, the natural light of day. Also all used materials are native. In Persian Garden, the passage of water from the inside of the pavilion and the connection between the interior and exterior of the buildings cause natural air conditioning (such as "Fin" Garden, Kashan city and Golshan" Garden, Tabas city, Iran).
8. In the sustainable park, restaurants serve organic meals from the vegetable planted in the park. In the Persian Garden, the fruit trees and vegetables are planted in there.
9. In these parks, the parking lots are minimized and, where necessary, penetrating materials are used. These materials absorb rain water and prevent water flows to the surface. Grains and gravel are used in passages. In Persian Garden, in the passages, gravel and soft soil are used to make it easier for people to pass and the plants grow there easily.
10. In these parks, thought, sports, the appreciation of nature and culture and art becomes very noticeable. Persian Garden is also a place of thought, privacy, relaxation and security (Bathaei, 2018) (Fig. 5 & 8).

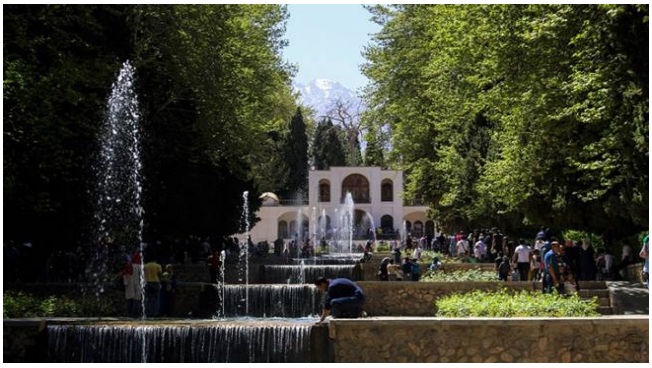


Fig. 5: Shazdeh e Mahan" Garden, Kerman city, south east of Iran. Some buildings etc. in this garden, and its entrance gate, pavilion, pool, trees etc. (Pictures by author. 2018 - 2022)

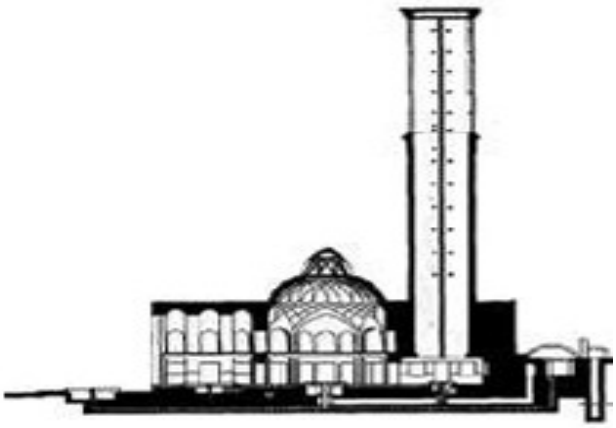


Fig. 6: Section of pavilion "Dolat Abbad" Garden, a historical garden in Yazd, Centre of Iran

Fig. 7: Tabas UNESCO Global Geopark Museum in Golshan Garden in the town of Tabas, South Khorasan province, south east of Iran (Pictures by author. Spring 2023 & Summer 2025).

Role of the parks in environmental sustainability and urban heat island effect

Sustainability is a set of environmental, economic, and social conditions in which everyone in society has the ability and opportunity to maintain and improve their standard of living indefinitely without damaging the quantity, quality, or availability of natural resources and ecosystems (Bathaei, 2021) (Fig. 5 & 8). Environmental sustainability is defined as responsible interaction with the environment to avoid depletion or degradation of natural resources and allow for long-term environmental quality. The practice of environmental sustainability helps to ensure that the needs of today's population are met without jeopardizing the ability of future generations to meet their needs.

The United States Environmental Protection Agency (USEPA) defines green building as environmentally responsible and resource-efficient building throughout its life-cycle from siting to design, construction, operation, maintenance, and deconstruction. The difference in air temperature between developed and undeveloped areas is explained by the Urban Heat Island (UHI) effect. Flat dark surfaces like roadways, parking lots, and tarred rooftops absorb and retain solar radiation during the day, then radiate the heat back into the air at night. Communities may value views of natural settings (e.g., bodies of water, mountains, parks, forests) or manmade structures (e.g., iconic/historic buildings, avenues, skylines). A project must consider its relationship to the viewing public and the community feature (Bathaei, 2021).

Public amenities can be in urban or natural settings and may include, but are not limited to, parks, plazas, trails, playgrounds, recreational facilities, and wildlife refuges. Enhancing public space can also include beautification of streets, sidewalks, or right of ways. For natural settings such as parks and wildlife refuges, "public" refers to space accessible for human recreation and enjoyment. A green roof can be as simple as a 2-inch (5 cm) covering of hardy, alpine-like groundcover, generally termed an "extensive" system, or as complex as a fully accessible park complete with trees, called an "intensive" system. Green roofs provide many of the same benefits that trees and other ground level vegetation provide. Green roofs have an advantage, though, in that they can be used in dense, built-up areas that may not have space for planting at the ground level (Bathaei, 2021).

A water pond in a park reduced the air temperatures on its leeward side by 1–2 ^{0}C. When waterfalls and fountains were added, air temperature reductions of up to 4–5^{0}C were measured at a distance of approximately 10 m on the leeward side of the pond (Tao *et al*., 2026). Bathaei (2021) observed the influence of a water body on thermal comfort on very hot days in the World Expo garden. Their results showed that the water body effectively improves human comfort in the littoral zone. An area 10–20 m from the water's edge showed the greatest improvement in thermal comfort. Hathway and Sharples found a mean daytime cooling of over 1.5^{0}C above a river in spring, based on a field survey. They contribute to reduce surface roughness and ambient temperature, increase evapotranspiration and enhance human health and comfort. They can be everything from Urban Forestry (city parks and traditional streetscapes, like trees and planters) to more modern adaptations, like Green Roofs, and Vertical Gardens (Green Walls). The use of trees and vegetation in the urban environment brings many benefits, including lower energy use, reduced air pollution and greenhouse gas emissions, protection from harmful exposure to ultraviolet (UV) rays, decreased stormwater runoff, potentially reduced pavement maintenance, and other quality-of-life benefits (Bathaei, 2021) (Fig. 5 & 8).

Fig. 8: Eram Garden, Shiraz city, south west of Iran

CONCLUSION

Nature-based Solutions (NbS) are increasingly acknowledged as effective strategies for addressing water-related issues in urban and peri-urban environments. However, their implementation is frequently obstructed by institutional, technical, and financial barriers, particularly in regions of the Global South facing complex socio-institutional challenges. Cities disproportionately concentrate environmental burdens, yet existing environmental accounting frameworks often treat urban systems as spatially homogeneous and overlook variation in land quality, management practices, and social vulnerability. This oversimplification limits the capacity of sustainability assessments to translate ecological indicators into spatially actionable strategies that indicate where to intervene. The fundamental gap lies in the disconnect between environmental assessment, spatial planning, and trade-off management. Green infrastructure (GI) is defined as an interconnected network of multifunctional green spaces strategically planned to provide ecological, social, and economic benefits. Planning theory and practice has placed considerable attention on the conservation of ecologically and culturally significant landscapes (ECSLs). Iranian garden, with its brilliant history as one of the best landscape models, is a result of the productive interaction of the Iranian man with nature. Ecotourism must be marketing of Iran's target villages and towns for tourism along with mountaineering, desert tourism etc.

Sustainability is not a common concept to all societies and cultures. In fact, any society should achieve a definition of sustainability in relation to its culture, civilization and the specific environmental conditions in which exist. Considering the existing environmental potential as well as Iran's ancient history of gardening, it is hoped that environmental and landscape designers keep with the principles of sustainability in planning and designing. The rehabilitation of Persian gardens, along with respect for the principles of sustainability and consistent with sustainable urban planning, can play an important role in the development of urban green spaces and, consequently, sustainable urban development. Hence, with due observance to the concept of sustainability theoretically and practically and considering human need in all physical and metaphysical dimensions, Persian Garden is seeking to meet the human needs. Finally, it can be said that Persian Garden can be known as wise relationship of human and the heavenly nature. Recognizing secrets and mysteries of this relationship is possible in a systematic approach through the identification of Iranian traditional culture. To achieve comprehensive urban sustainability, all dimensions should be studied and analyzed in interaction with each other. The sustainable development and urban sustainability has a process concept which is running at the end of city as a result of a systematic approach and with considering various capacities of the city. Hence, city sustainability requires sustainable elements in different dimensions to ensure its sustainability in addition to establishing relationship with the elements in urban system. Persian gardens can provide healthy environment for achieving objectives of Sustainable Development Goals.

REFERENCES

Ballut N, Urcuqui-Bustamante A M and Minor E. 2026. Bird feeders and rat traps: Understanding the relationships among psychosocial factors, wildlife observations, and yard management decisions. Landscape and Urban Planning 270: 105603. Doi: https://doi.org/10.1016/j.landurbplan.2026.105603

Barjasteh A F, Salimi J and Davoudi M, Ansari S, Baghayi E and Khaksar B. 2016. Investigation of the environmental health status of mosques in Tabas in 2015-2016. (In Persian). Journal of Health Chimes 4(2): 32-38

Bathaei B. 2018. Achieving sustainable city by the concept of persian garden. Acta Technica Napocensis: Civil Engineering & Architecture 61(3): 2018-10.

Bathaei B. 2021. Decision Support System to Select the Most Effective Strategies for Mitigating the Urban Heat Island Effect Using Sustainability and Resilience Performance Measures [Master's thesis, The University of Texas Rio Grande Valley]. ScholarWorks @ UTRGV. https://scholarworks.utrgv.edu/etd/828

Daneshdoust Y. 1997. Tabas the town that was: the monuments of Tabas. Published by ICHHTO, Thran.

Falsolyman M, Mikaniki J and Nikshoar M. 2022. Desert Ecotourism and Sustainable Rural Development in South Khorasan Province. Green Development Management Studies 1(1): 117-132. doi: 10.22077/jgmd.2022.2284

Ghasemi H and Golzar M M. 2018. Planting plan playing the role of Garden's Land scape. Journal of MANZAR 10(43): 6-13. DOI: 10.22034/manzar.2018.68095.

Ghodsvali M. 2026. A decision support system for urban ecological sustainability: Optimizing spatial trade-offs among environmental effectiveness, social equity, and economic viability. Sustainable Cities and

Society 140 (1): 107241. Doi: https://doi.org/10.1016/j.scs.2026.107241

Golmohammadi F. 2025. Persian Gardens: Indigenous Knowledge for Sustainable Development. Ancient Pattern of Persian Gardens for Sustainable Development of Cities and Settlements, Environment, Optimal Life etc. ISBN: 978-620-9-28412-0.

Hoseini A and Torbaty K M. 2015. Comparative Study between the Architectural and Urban Design Patterns of Tabas Bagh-Shahr in the Zandieh Era and Isfahan Bagh-Shahr in the Safavid Era. Journal of Urban Landscape Research 1(2).

Joudavi A. 2017. Documentation of Tabas reconstruction after the 1978 earthquake. (In Persian). Disaster Prevention and Management Knowledge Quarterly (DPMK) 7(3): 239-249.

Khanifar H, Mohamadi Turkamani E, Ranjbar N and Khosromanesh R. 2023. Iranian Tourism Marketing Objectives: An Active Sports Tourism Approach. Sports Business Journal 3(1): 13-35. DOI: https://doi.org/10.22051/sbj.2023.42118.1061

Pazmino A, Morgan E A, Dedekorkut-Howes A and Howes M. (2026). Surveying the scene: A review of how landscapes are valued. Landscape and Urban Planning 270: 105605. Doi: https://doi.org/10.1016/j.landurbplan.2026.105605

Sadafi K P and Atashinbar M. 2023. Reading the Street Landscape in the Persian Garden. MANZAR 15(64): 6-15. Doi: 10.22034/MANZAR.2023.415074.2258

Sharghi A, Azizmoghadam M A and Gandomani J Z. 2020. Comparative study of fractal geometry patterns in Iranian garden and landscape architecture, case study: Tabas Golshan Garden. Bagh-e Nazar 17(85): 35-50. DOI: 10.22034/BAGH.2019.164706.3927

Tsuzuki Y and Inoue A. 2026. Measuring tree diameter at breast height in urban green spaces using ForestScanner: Implications for citizen science. Urban Forestry & Urban Greening 118: 129293. Doi: https://doi.org/10.1016/j.ufug.2026.129293

UNESCO World Heritage Centre. 2000. The Persian Garden : Identification of the property. Available on: https://whc.unesco.org/uploads/nominations/1372.pdf

Aza Y R, Galvis L K S, Popartan L A and Rodríguez-Roda I. 2026. Understanding barriers and enablers for the implementation of water-related nature-based solutions in the Andes: A mixed-methods study. Urban Forestry & Urban Greening 129367. doi: https://doi.org/10.1016/j.ufug.2026.129367

Tao Z, Newman G D, Song Y, Yu S and Zou L. 2026. Evaluating the role of green infrastructure features in post-disaster recovery – Case Study of Beaumont, Texas after tropical storm. Urban Forestry & Urban Greening 119: 129363. Doi: https://doi.org/10.1016/j.ufug.2026.129363

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