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The Effect of Optimal Use of Soil on Sustainability of Iranian Desert Buildings with Iranian Sustainable Architecture Approach

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Abstract. In the past architecture of Iran, traditional architects had been able to provide comfort for residents through the smart use of architectural materials and strategies. Soil architecture is the most original type of Iranian architecture and the use of soil with characteristics such as high thermal capacity and thermal latency is at the cutting edge of this field in energy consumption and the pursuit of sustainable architecture in the world. This type of architecture not merely in the form of constructing a building in a single ground, but it has been united proportional to the scale and location of the project on the ground and an indivisible part of it. The research method adopted in this paper is based on text studies and the use of visual documents in the context of library research and descriptive-analytical method. In this research, a comparative study of the principles of sustainability with the vernacular architecture of Iran and the sustainable elements, including Shaw Shawādāns[2], sunken gardens and etc. have been addressed in traditional Iranian architecture. The results of these studies show that desirable solutions derived from this vernacular architecture for achieving sustainable architecture can be presented for reducing fossil fuels and as a result reducing contamination that plays a significant role in these issues and the issue of sustainable development.
Keywords: Soil Architecture, Sustainable Architecture, Shawādān, Sunken garden.

[es] El efecto del uso óptimo del suelo en la sostenibilidad de los edificios del desierto iraní con un enfoque en la arquitectura sostenible iraní

Resumen. En la arquitectura precedente de Irán, los arquitectos tradicionales pudieron brindar comodidad a los residentes mediante el uso inteligente de los materiales y de las técnicas arquitectónicas. La arquitectura del paisaje es el tipo más original dentro de la arquitectura iraní y el uso del suelo con características tales como la alta capacidad térmica y la latencia térmica, están a la vanguardia en lo que al campo del consumo de energía y a la búsqueda de una arquitectura sostenible en el mundo se refiere. Esta clase de arquitectura no solo consiste en construir un edificio en un solo terreno, sino que va unida proporcionalmente a la escala y a la ubicación del proyecto en el terreno y a una parte indivisible del mismo. El método de investigación adoptado en este artículo se basa en los estudios y en el uso de documentos visuales en el contexto de la investigación en bibliotecas y el método descriptivo-analítico. En esta investigación, se aborda un estudio comparativo de los principios de sostenibilidad en la arquitectura propia de Irán y de sus elementos sostenibles, incluyendo los Shaw Shawādāns y los jardines hundidos, entre otros. Los resultados de estos estudios muestran que las soluciones deseables derivadas de esta arquitectura vernácula para lograr una arquitectura sostenible, pueden presentarse como método para la reducción del uso de combustibles fósiles y como resultado de ello, la reducción de la contaminación, lo que supone un papel significativo en ello y en el propio desarrollo sostenible.
Palabras clave: suelo, arquitectura, arquitectura sostenible, Shawādān, jardines hundidos.

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[2] SHAWADAN is one of the underground special spaces in Dezful of Iran with hot and semi humid weather

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Introduction

1. Statement of the problem

Human nature is immingled with soil. He has been created from natural and earth elements. Hence the soil architecture is the most consistent architecture with man's nature. The return to the innate and natural nature of man in relation to the architecture is the growing need of today's world.

The soil architecture is the oldest form of architecture in Iran'. It's a kind of art originated from the ingenuity of vernacular technology in the way of life and it is immanent. Yet this architecture, like natural structures, has reached the highest levels of sustainable nature, that is to say, creating the maximum space of the frame with minimal materials.

Nowadays, by studying some of the traditional spaces, it has been proven that many of them have been constructed with due regard to environmental considerations and sustainable development. Iran's soil architecture has been more advanced than similar architecture in other parts of the world for centuries. Whether continuous structures have been constructed based on environmental coordination and the efficiency of a suitable climate design for the comfort of residents, gravity and compressive strength. Additionally, in a place that most of the world's cultures have used this architecture for shelter and useful structures and are often outspoken. Excessive accumulation of waste and building waste and environmental pollution by human beings to obtaining industrial products whose primary purpose is human comfort has become a devastating disaster and this is nothing but a separation from natural life. [1] In this research, we have tried to address some points of the soil-related architecture that modern architects have forgotten, including the use of existing soil and the use of excavated space in the ground.

2. Importance and necessity of the problem

The traditional architecture of Iran has had a different shape in different climates, the solutions that were empirically achievable and had been more useful regarding the comfort are a lot in the vernacular architecture of Iran. Modern architecture, which is a symbol of the architecture influenced by impact of technology, developed fundamentally is a development and the applied technology not only transformed architecture in the area of modern construction, but also

Modern facilities also made fundamental changes to the architecture, most notably the oblivion of architectural patterns that had been emerged were consistent with the climate. Undoubtedly, the architects of Iran have also forgotten climate-friendly design

with advent of the modern architecture and modern acceptable systems. With regard to the above mentioned items, architects must consider designing in line with nature. Because the purpose of this method of environmental architecture is the creation of a sustainable and organized balance between nature, living organisms and artifacts.

3. Research Questions

1. What is the effect of the soil on the architectural style and physical elements of the buildings?
2. How does the application of ground capabilities respond to human needs?
3. What are the characteristics of different layers of the earth and how does the way of using it influence the shape of vernacular architectural spaces?
4. What factors in architecture have made life in Iran's desert areas possible for hundreds of years?

4. Research Method

The method of this research is descriptive-analytical. According to this method, information on the Iranian vernacular architecture is collected from various books and visual documents, then some samples are selected and various environmental sustainability factors have been investigated. Then there has been correspondences between them and the results are gathered in the form of strategies and charts.

5. Sustainable Development

One of the relatively new ideas that has been raised in architecture and urban planning issues is the theory of sustainable development. Issues related to the relationship between human beings, environment and development, the concept of sustainable development was noticed in the 1791s. Academic researches of universities and science specialists of the United Nations in 1799, set the principles for sustainable development. [2] The Sustainable Architecture of the Environment and Human Development at the World Commission following the reports of Gorham Brentland in 1799 rests on two principles: Some focus on designing buildings based on their relationship to the environment and other groups pay attention to reduce energy consumption in the building. [3] The official introduction of the concepts of sustainable development to the world took place at the Environment and Development Conference of Rio de Janeiro in 1772 which eventually became an integral part of the Declaration of Rio 1772 as a unified system, and it was explained in detail on the agenda of 21 and its method and ay of achieving it specified. [4] The most important factors influencing the formation of sustainable architectural approaches are in various layers of the design process, the process of building and the process of producing environmental materials, environmental climate and its changes, reducing energy consumption and ecological issues. Sustainable development has deep themes in three areas: Cultural sustainability, economic sustainability and environmental sustainability. [5] Consistent design with nature is among the goals of environmental sustainability. In the definition of sustainable development we see that sustainable development is a development that addresses the current needs of the world without compromising the ability of future generations to meet their needs [6].

Table 1. Sustainability types and its related cases.

Economic Sustainability	Environmental Sustainability	Social Sustainability
Coordination with the needs and the prevention of inefficiency	Coordination with the climate	Flexibility
The use of vernacular materials	Use of renewable energy	Welfare and social security
----------	Coordination with the site	Democracy

5.1. Economic Sustainability

Economic sustainability is a term used to identify different strategies for enabling people to access the best-performing natural resources, indeed, sustainable economic development can be driven by a localized and self-sustaining development that addresses global ecosystems and social welfare. In this development, people are looking for holistic strategies [7].

5.2. Environmental stability

Sustainable development is a kind of development that will meet the needs of the present age without compromising the capabilities of the next generation [8]. In this dimension of sustainability, the main goal is to improve the quality of human life within the framework of the capacity of the supportive ecosystems' range and improve human health and the ecological system in the long run [9].

5.3. Social sustainability

Social sustainability has the capacity to change and coordinate with the new conditions, and a system based on social sustainability, the ability to control and construct materials and the resources to show the flexibility in facing potential problems. [Mark Ruthland 2005] In short, the sustainable society can be considered to be a society with integrated, diverse and democratic systems to meet the needs of individuals [10].

6. The use of available soil to create architectural space

In this procedure, the architect has used the soil as a clay or laminate to construct walls and ceilings in a variety of ways. The extremely high temperature difference between summer and winter, night and day can be used to balance living spaces from indigenous materials such as mud and clay with (very high thermal capacity) [11]. This characteristic of the clay has even made it possible to be used in luxurious buildings such as Persepolis that the quality of materials are very much appreciated in comparison with affordability and ease of access. For example, it is possible to mention covered enclosures, such as Sābāt[3] and traditional markets, which are the common architectural constructions in desert areas and used to prepare necessary bricks and materials from the soil available at the site.

[3] Rooms or roofs that were made as ceiling of alleys

1.6. Covered enclosures (Sābāt and traditional markets):

Large sundresses have a good ability to correct heat conditions in the summer and winter. The presence of brick and mortar in the construction of these spaces that have a high thermal capacity, has led to the moderation of temperature fluctuations around the clock, resulting in more tolerable conditions for long inhabitancy. [12] The existence of water cisterns and shops at these sites proves the availability of long inhabitancy in the winter and summer in these places. These routes serve as a small market in the neighborhood with effective shades and natural ventilation.

Figure 1. The great ability of Sābāt for (creating shade and natural ventilation) for long inhabitancy in Kāshān.

The remarkable thing about the market is its ability to improve its climate in summer and winter, day and night (Fig. 1). In summer the environmental temperature inside the market is lower than the local temperature due to the existence of long rows with dome roofs and high thermal mass used in its brick walls and ceilings, the day-night temperature fluctuations are well controlled. In sum, we can say that the architecture of the market plays an effective role in the success of this space because in hot weather openings can provide natural ventilation and hot air discharge and during cold weather because of the thermal mass over the walls and the presence of the population, the temperature inside the market increases over the local temperature.

7. Use of drilled space

The use of open space drilled on a large surface and the use of soil volume and its application to pave the adjacent building, that includes the ditch and the fence of old cities, water cisterns and ice houses, which in many old towns and villages, the fence of the city has also been used as the ice house wall. In this way, the open space is drilled and the building and the form of the mansion are built like a container and its content (Fig. 2) such as the ditch, fence, or wall of the city that are actually necessary and interdependent.

7.1. Cisterns

The large covered pond underground which its ceiling is made of bricks, is the place where water is stored [Amid Persian Dictionary Page 2]. The appearance of cistern in different parts of Iran is different, but their overall structure is almost the

Figure 2. Zarsif Ice House in Kerman, a photo from the Center for Documentation of the Faculty of Architecture and Urban Planning, Shahid Beheshti University, to the registration number : 3443

same. Water reservoir has remained an indicator of urban structure since the past (Fig. 5), which is the result of expensive experiences of brick, clay and stone and is considered to be a symbol of the combination of art and human effort to eliminate the need for water .[13] (Fig. 3) There were some subtleties in the construction of cistern, which helped to maintain its durability in particular, the pond should be constructed in a way that it does not have a hole for the subsidence of water (Fig. 4) even in cases where the floor and wall of the pond are covered with lead to prevent water loss.

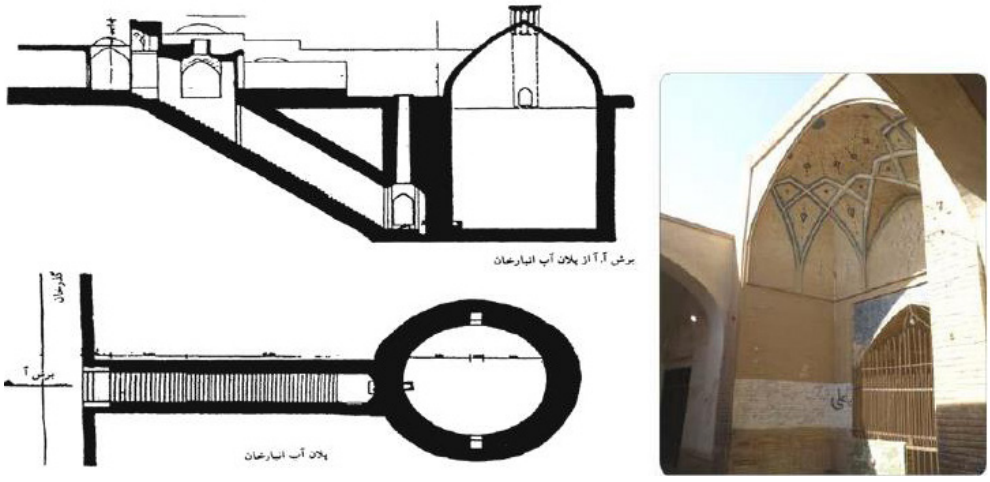

Figure 3. Khān Cistern, Located at Khān Passage behind the Āqā Buzurg Mosque, Kāshān.

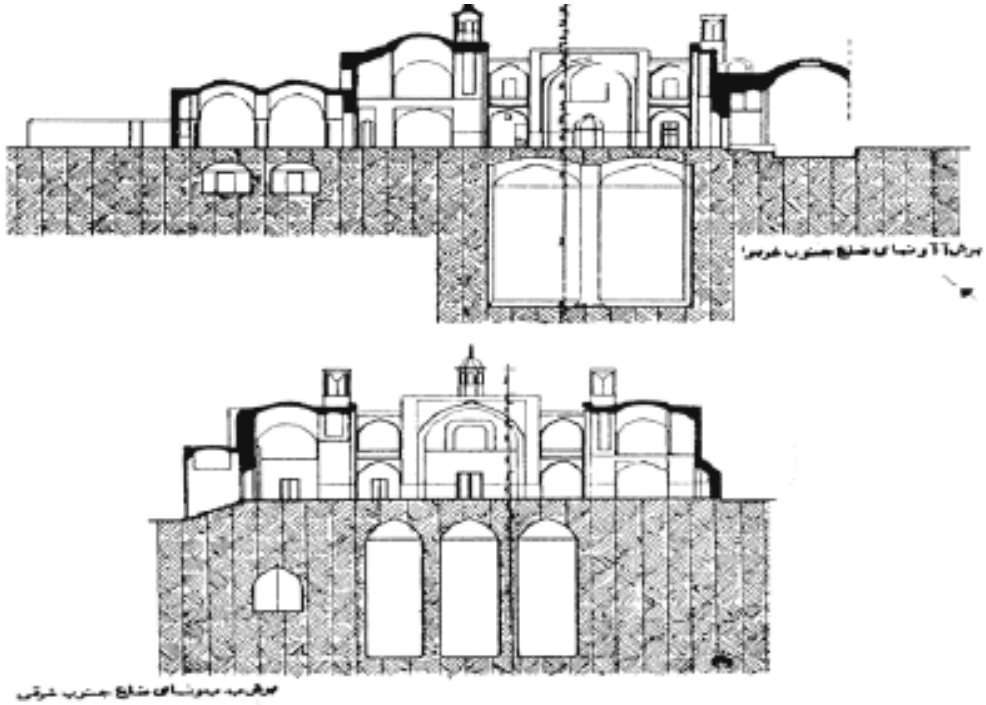

Figure 4. Section of Mīrzā Muqīm Cistern, Kāshān.

Figure 5. The location of the Pāshīr (the place under the ground where the water used to be taken from it) and staircase of the cistern in Darb Rīg of Arān and Bīdgul, Kāshān.

7.2. Ice House (Yakhchāl[4])

The ice houses consist mainly of three parts, a long shadowy wall, ice cisterns and little ponds for producing. Shading Wall: This Wall is very long and lengthy, the height of these walls, which sometimes reaches 11 meters, during the day protects the frozen waters in ponds from sunlight. Sometimes, in order to strengthen the wall of the shade, they used to build large backboards in the southern part of the wall. Shading walls have a high thickness at the bottom and this thickness gradually decreases in the upper parts. Ice-maker ponds: This is a rectangular hole that is dug in parallel with ponds, shading walls and in the northern part of it, and its length is slightly less than the length of the wall and its depth is 31 to 51 cm and sometimes more than that (Figure 6). This pit was a place for making ice in cold winter nights. The ice tank of these storages is usually at the back of shading wall and in its southern part and, in some cases, through one or more entries to the northern section. Ice storage is also a deep and big pit that are drilled in the middle of the ice tank. The shape of these pits in dome-shaped glaciers is circular of radius of up to 4 meters and sometimes more. The walls of these pits are made of stone or bricks or laminated thatch and the back side of them are filled with insulating materials such as coal dust or other materials. [14] (Fig. 7) Shardin portrays the prospect of Kashan in his travelogue and displays the glaciers of this city outside the castle and the tower of the city and also refers to the architecture of the glaciers in Isfahan.

8. Using the drilled space under the ground

This technique is one of the rational solutions to meet the challenges of hot and cold areas. It has been proven that at a depth of 7 meters the temperature is always constant and it is at about the average temperature in the coldest and warmest day of the year. In residential architecture areas of Kashan or Abarqo and ... in the basements, this way is used to build full basements and ponds.

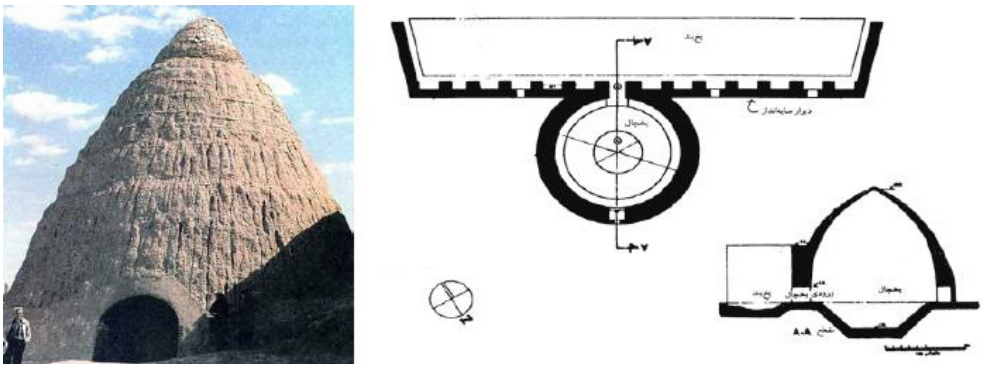

Figure 6. The section and an image of the Icehouse, Kāshān.

[4] Yakhchāl is an ancient type of evaporative cooler. Above ground, the structure had a domed shape, but had a subterranean storage space; it was often used to store ice.

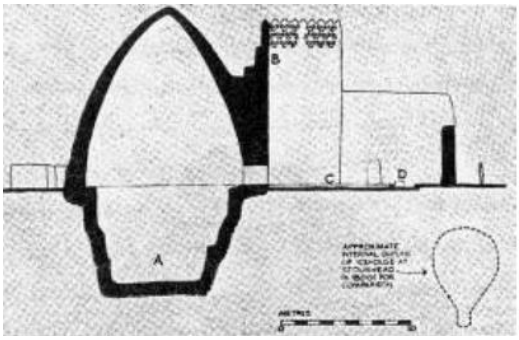

Figure 7. A complete section of the Icehouse.

8.1. Springhouses and Full Basement

The springhouse in the basement is one of the architectural approaches for using the sulfur dyes of the full basement during summer in Iran and in some aristocratic buildings and palaces (Fig. 9). In Abarqo, due to the difference in soil characteristics, the excavated underground was in a way that due to its low thickness and hard layer, the drilling was carried out in the lower soft layer of the lumber, and the hard layer acted as a ceiling. In Kashan, we reach a layer of soil in a low depth which, in terms of strength, is capable of bearing and maintaining the structure of the building, which is known as pond soil, and the full basement is carved out of this soil. Where the soil has this ability, the walls and ceiling are entirely from this layer of soil. (Fig. 8) The full basement is constructed beneath the northern parts of the house and is like a porch, a semi-open space, and often a there is also a pool. At Abbāsīyān's house in Kashan, there is an excellent example of the spring house and the full basement (Fig. 10). In Kashan here are plenty of spaces in the area known as the spring houses on the ground floor, underground or in the corners. In this city, the vaults are called full basements, which is constructed below each of the building's facades, especially the summer, and often have a broken cross shape. These spaces are used in conjunction with earth-work architecture to create an integrated harmonic architecture. Even the

Figure 8. One of the cisterns and a sample of carvings decorated into the soil, Hakīm Bāshī's home.

Figure 9. Springhouse of Ṭabāṭabā'ī's Home, Kāshān.

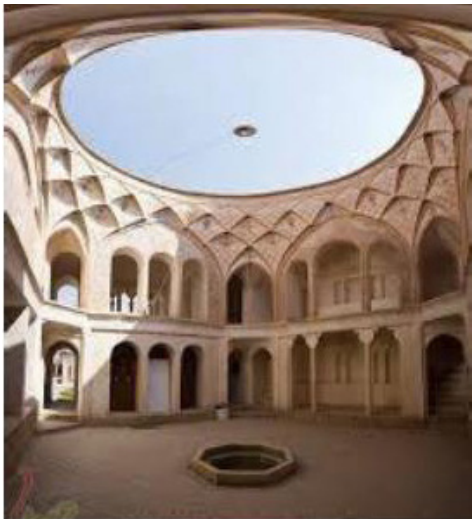

Figure 10. Springhouse of Ṭabāṭabā'ī's Home, Kāshān.

decorative style in the walls and the walls of these spaces is designed in a way that give you more sense and inspiration. The top surface is carved in a way that is perfectly similar to the brick and earth-work architecture. The building is characterized by chipped (mostly geometric) shapes carved on the sulfur dyes or embossed on it. Mostly geometric patterns used in the ceilings are somehow associated with the ornamentation of brick arches. (Fig. 11). In Kashan, the spaces in the house's full basement are often decorated in Yazdi-bandi[5] with plaster or simbel. The most com-

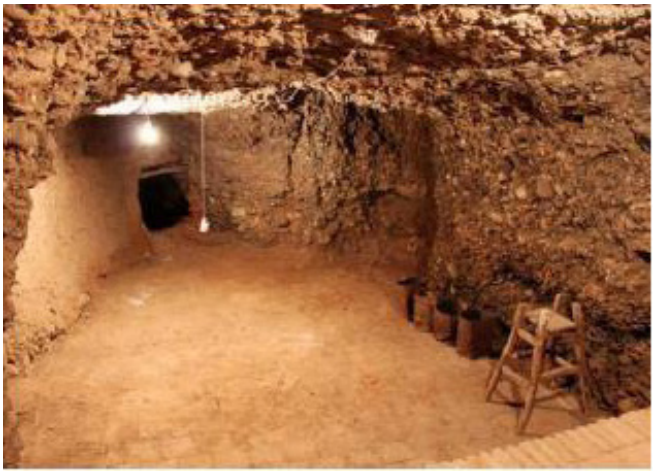

Figure 11. The internal space of Shawādān, Shūshtar, Source: the author.

[5] Yazdi Bandi Domes considers as a one of the roof ornaments in Iranian traditional Architecture that in local expression called "Karbandi"

monly used pattern in the springhouse is the broken cross. Usually the wind catchers are this space, and the blow of the wind in the pond creates a subtle air in this space.

8.2. Shawādāns

From other cities where the land characteristics and unique features of the soil have had a profound effect on the formation of architectural spaces are Dezful and Shushtar. One of the most important features of Shushtar is the location of this city on a stony ground that has had a great influence on the shape and structure of the buildings. This feature of land has been used in the creation of spaces called Shawādān that are excavated in the underground. Shawādān is an underground way which is very deep and the roof is dome-shaped and without a structure. (Fig. 13) At the top of the ceiling, there is a hole that usually reaches the floor in the yard, suction of the roof hole, causes the air to flow, it uses the latent influence of seasons on the ground. In this so depth we are usually faced with a temperature of one or two last seasons.

This digging on its route first at a depth of about 6 meters reaches a place called the basement of Shabestan comes with called Kat, then at a depth of 12 meters, it reaches another underground, usually larger than the first underground, and in the central location with Kats on three sides that from one corner there is a staircase and is connected to the neighboring Shawādān and passes through the stairs to the river ...[15] To build it, they first dig a canal on the ground, which is in fact the Shawādān connected staircase, and continues to the point where there is no longer a risk of land slide. Then, the necessary space inside the rock is dug that has a spacious lounge with pavilions around where you sleep and rest (Fig. 14). Ventilation, lighting and lighting in the building of Shawādān was provided through cavities in the courtyard, alley or even rooms, it was also linked to the neighboring Shawādān through a route. Shawādāns are practically not decorated, and often they do not have a clear pattern of space, but in excellent samples they have a broken cross shape. (Figure 11).

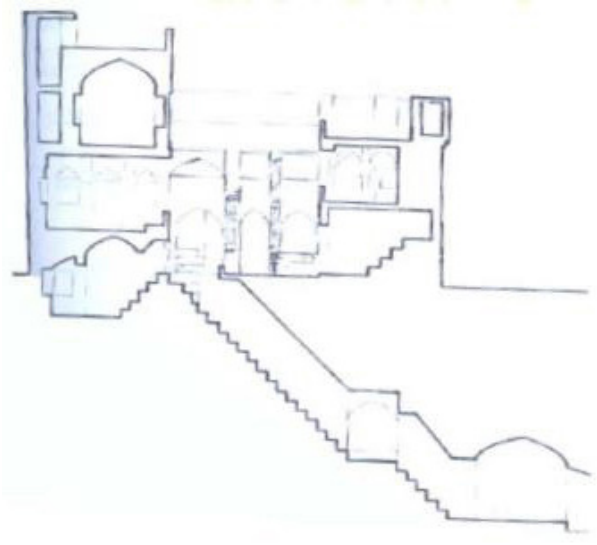

Figure 12. Cross Section of Shawādān, Dizfūl.

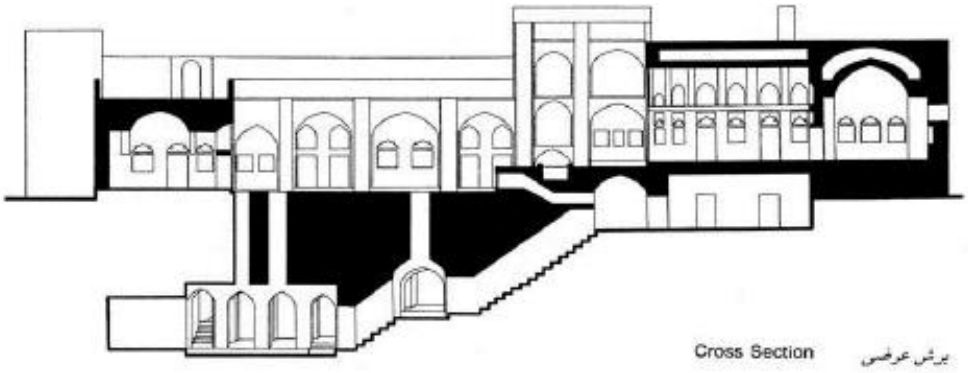

Figure 13. Cross Section of Shawādān, Dizfūl.

8.3. Garden pits

In the middle of the central courtyard, a floor was dug into the ground and the soil of it was to provide the bricks in the building. In this way, access to the aqueduct is provided. Therefore, we usually see in the pit garden the flowing water filling the middle pond and moving it over to other houses. On the edge of this courtyard, mostly porches and sometimes several rooms are built half-open. Considering the smaller size and lower height of these yards and the use of moisture and coolness of the earth, in addition to the humidity of the plants and the coolness of the water, in fact the underlying spaces are far more shaped by climates than the courtyards. The Abbāsīyāns' pit garden in Kashan and the mosque in Āqā Buzurg School are good examples of these spaces. In the desert, they built houses deep to make it the insulator of heat and sound and have an easy access to the aqueduct and to be earthquake resistant [15]. The existence of a pit garden, while creating a central layout in the design of the house, re-emphasizes depth and the size of the courtyard, because it creates a surface that is part of the courtyard and an independent arena. (Figure 14) Creating different landscapes moving from one level to another and the form of its openable stairs are from other works of the garden pit. This part of the house was used in hot and cold climates due to lack of moisture, as a space with suitable side rooms. It also made it easier to access the water level in a dry climate by entering the basement. [16] The garden pit and the surrounding spaces because of being sheltered by the soil are protected from cold winter winds

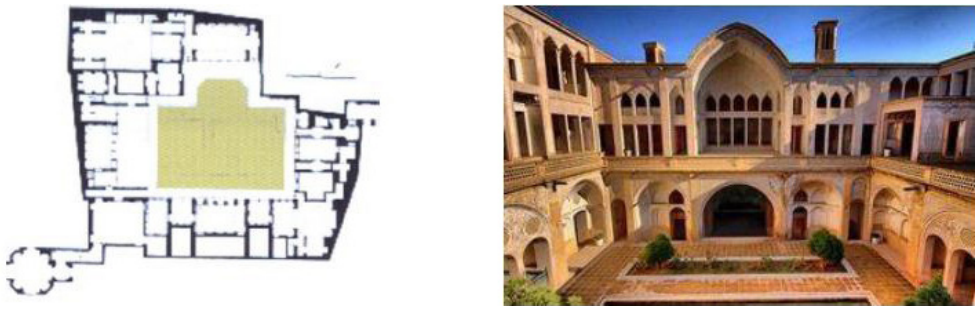

Figure 14. The plan and the Image of the Sunken Garden of Abbāsīyān Home, Kāshān.

in warm and dry climates while sandstorms cannot affect them. Because of the depth of the garden pit, the receiving of the solar energy is more limited than the higher levels. Of course, in a warm and dry climate, it is considered as a way of escaping from the burning summer sunlight. The garden pit can be considered as a responsive element to hot and dry climates, which can be applicable in the new sustainable designs.

The cases that have been used in these buildings as solutions for environmental sustainability can be mentioned as creating different functional layers for example the central courtyard that is in two floors, consisting of two upper and lower courtyards of garden pit. (Figure 15) This optimal use of wind energy as well as the reduction of external surfaces in the face of solar heating, and also the use of multiple gardens in the underside courtyard to maintain the humidity of the pond in it creates a very favorable conditions for residents of the underneath floor. [18] Fig 16 In addi-

Figure 15. An image of the sunken garden of the soil architecture in the ancient constructions of Kāshān, Source [17].

Figure 16. Sunken Garden of the Āqā Buzurg Mosque, Kāshān.

tion, taking a large part of the building into the ground and using its soil to build the other parts and using the existing materials in the environment such as brick and brick that minimizes transport costs is considered as a sustainable approach economically reasonable in these sets. [19] Which nowadays, is one of the issues of the day, creating buildings with the least energy consumption that is spent on the processing of materials with the least energy and cost.

9. Compliance of sustainable principles with Sustainable Iranian Architecture

A building has some features that considers it as a sustainable monument. These sustainability principles that are consistent with the architectural specification of the earth-work monuments are analyzed comparatively as follows:

9.1. Adaptation of the principles of economic sustainability in Iranian sustainable architecture

1. Appropriateness to needs and preventing inefficiency: In traditional Iranian architecture, a minimal space was used as much as possible. Design of traditional spaces is consistent with the basic needs of individuals and not on the basis of their wishes. Contentment and economy in past architecture as well as heating and cooling of these spaces was possible in winter and summer.
2. Use of vernacular materials: The main materials used in the described buildings, are the soil and its derivatives, including bricks and clay that are easily accessible in a warm and dry climate, easily replaceable and have prevented the additional costs for moving them to the place.

9.2. Adaptation of the principles of environmental sustainability in Iranian sustainable architecture:

1. Coordinating with the climate: Introversion and arrangement of spaces around a central courtyard; the central courtyard in addition to the organization of space serves as a cooling environment in warm and dry climates. This space creates shades during hot days, and at night, warm air rises and gradually gets replaced by the cool air of the night in the upper part of the yard. Planting trees and plants inside the central courtyard reduces dust, temperatures around the building and the speed of winds that are unpleasant. Other cooling solutions in the central courtyard of the studied spaces are the garden pits, which in addition to providing the required soil for the bricks used in the building, makes it possible to reach the water of aqueduct.
2. Reducing the use of fossil fuels and the use of renewable materials: Using in-form shapes, logical proportions and using inactive cooling solutions reduce the need for fossil fuels in traditional buildings. Also used materials, are building materials and mainly bricks that are renewable and vernacular in these areas and because of their high thermal capacity, they are used as insulators in these buildings.
3. Co-ordination of buildings with the site: Traditional buildings in this land are organic architecture and eventually are built according to the highest level of coordination with the site. The structure of the building, the central courtyard and the internal geometric order are arranged in an irregular mass in harmony with the site.

9.3. Adaptation of the principles of social sustainability in Iranian sustainable architecture

1. Flexibility: The physical structure of many traditional spaces in the warm and dry regions has been based on introversion, each of which has been modestly modified in accordance with its specific uses, so a single introverted pattern can fit itself into the needs of individuals. Other flexibility features include increasing and decreasing the quantity or separating and integrating spaces without changing their area. Since traditional Iranian architectural spaces are based on a modular system, it is possible to increase and decrease them in slightly.
2. Social well-being and social security: The design of traditional spaces is such that in addition to providing the residents' well-being and comfort, they also maintain privacy, comfort and security. The internalization of traditional Iranian buildings, the lack of visibility and direct connection of the spaces with the outside and the indirect access to the building creates the privacy and security of the users inside. Also, the use of green and water plants in the yard reduces nerve pressure and improves mental health in individuals.
3. Being people-friendly and democratic: One of the main principles in traditional Iranian architecture is the principle of democracy or being people-friendly. It means the construction of buildings commensurate with the scale and human needs. In design, the dimensions of the spaces and lighting, and ... have been consistent with the needs of individuals, which itself manifests the mentioned principle in the traditional Iranian architecture.

Table 2. Comparative Comparison of Sustainable Architecture Patterns with Persistent Iranian Elements. Source: The Writer.

Soil elements in Traditional Iranian architecture	Economic Sustainability	Environmental Sustainability	Social Sustainability
'Sābāt (Markets)	Use of ground-loaded soil for building, use of materials taken from the soil (clay and brick), reduction of transporting cost, suitable height of space	Being Eco-friendly and not producing toxic pollutants, integrated structure, reduced contact with outside environment, natural ventilation	Internalization to maintain calmness, Combining open and closed spaces
Reservoir or cisterns	Use of materials from Soil (brick and mortar), use of space drilled in the soil, minimum cost of transportation	The existence of water, Being Eco-friendly and not producing toxic pollutants	----------
Ice house (building)	Use of materials from soil (mortar, brick and clay), using the drilled space in the soil, Minimum transportation cost	Existence of water element, integrated structure, Reduced contact with the outside environment, Being Eco-friendly and not producing toxic pollutants	----------

Shawādāns	Use of materials from Soil (brick and mortar), use of space Dug in the basement and using the Soil, Minimum transportation cost, Appropriate space height	Integrated structure, reducing contact with the outside environment, being Eco-friendly and not producing toxic pollutants, natural ventilation	----------
Pools and full basement	Use of materials from Soil (brick and mortar), use of space Dug in the basement and using the Soil, Minimum transportation cost, Appropriate space height	being Eco-friendly and not producing toxic pollutants, the existence of water, reducing contact with the outside environment, natural ventilation	Internalization to maintain calmness
Sunken garden	Use of materials from Soil (brick and mortar), use of space Dug in the basement and using the Soil, Minimum transportation cost, Appropriate space height, Coordination of filled and empty spaces	Existence of green spaces, Integrated structure, reducing contact with the outside environment, being Eco-friendly and not producing toxic pollutants, natural ventilation	Internalization to maintain calmness, Combining open and closed spaces

Sustainability, which has been used in traditional Iranian architectural models in all respects like social, environmental, and economic development has led to a permanent existence for the vital elements of the traditional cities, so that today, despite the fundamental changes in the patterns of behavior, they are still alive and dynamic.

Conclusion

Nowadays, considering the limited energy resources, architectural tendency is towards construction of a building that can provide the residents with the comfort minimal by reducing energy consumption. The use of architecture with the use of soil capabilities can help architects achieve this.

That the traditional architecture of Iran has benefited from this feature, and traditional buildings largely without the use of fossil fuels and active systems have provided the residents with comfort, so many of these patterns can be used to achieve climate comfort and sustainable architecture in the design of buildings. Some of them are as follows:

1. Use of soil and its materials as building materials due to its high thermal capacity, which prevents the heat exchange inside the building and outdoors.
2. Take part of the inside of the ground, especially in very cold or warm areas, which causes temperature adjustment in these areas.
3. Use of soil as a source for storage in cold and warm areas by increasing the mass of external walls.
4. The use of soil for building can help preserve forests and mineral resources.
5. With the use of soil, the amount of rubble after construction can be minimized.

By examining the solutions adopted in traditional and indigenous architecture with the aim of complying with environmental sustainability indicators, especially in the times when mankind had to use purely natural energy, one can learn many things for architecture today. Especially today with the development of technology we can adapt old methods to the needs and conditions of the day and use efficient and effective energy from clean energies to maintain the environment.

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