

A NEW CHAPTER IN PERSIAN GARDENS

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A NEW CHAPTER IN PERSIAN GARDENS

a new scenario in the relation of past,
present and future of Persian gardens and

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dedicated to our Iranian patriot for their courage

Woman
Life
Freedom

Relator: Prof. Alessandro Colombo



Preface

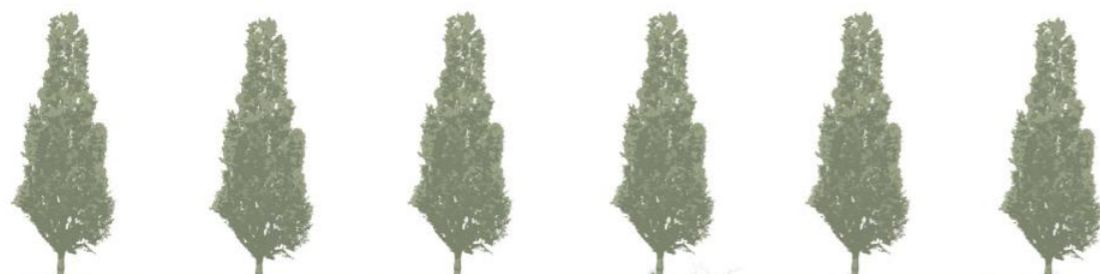
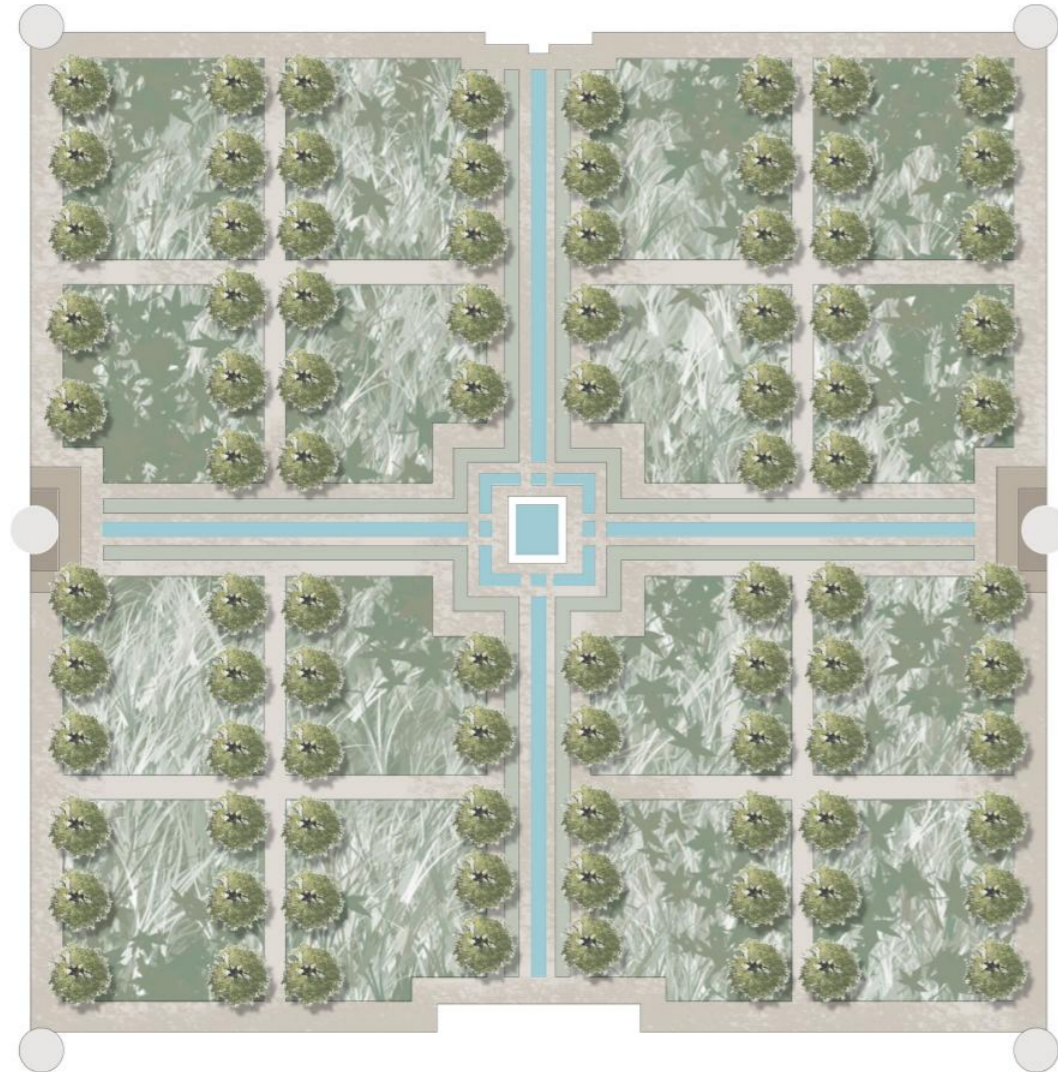
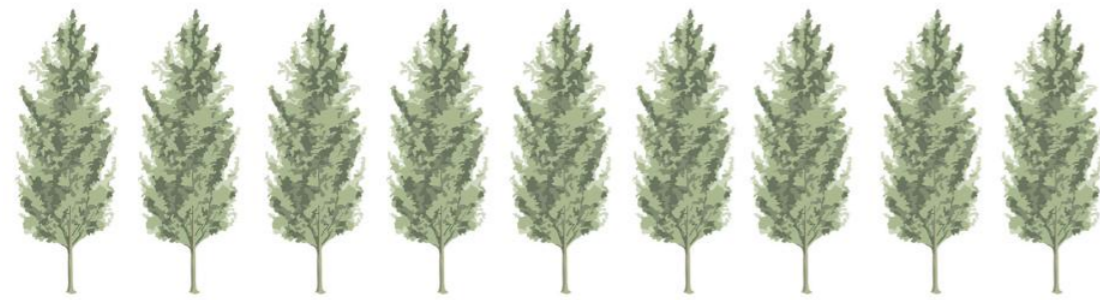
During Our master's degree courses in Politecnico di Milano, we always think about that there are lots of differences between the architecture, concept inspiration and design in Our country, Iran and here in Italy. Here We usually see the mixture of old designs and architecture with the new and modern one.

So, we thought that maybe We can do same thing with one of the famous Iranian elements and represent it in a new way of a combination between past, present, and future.

In May 2022 We decided to focus on one of the Persian Gardens which is close to our hometown, and we visited so many times and always sad about that no one care about the capability of this site and how we can represent it to the new generation to being aware of their culture and past. Also, this garden is one of the most special Persian Gardens in our country, it has lots of elements that different types of gardens had, so it has so many statuses to focus on it.

Born in this culture help us to touch closely the spirit of history and ancient believes, at this moment we wanted to appreciate this special feeling and pay it forward to the next generation the sentimentality of our ancestors. It was an opportunity for us to speak up again and make visual all the things about the Persian Gardens.

This credit allowed us to experience the substance of the Persian Garden and old meditations not only as a viewer but also as an Architect or a Designer who deeply merge her spirit with culture.



Abstract

Starting a new chapter in each field always pursue with new steps, exchanges and help to change the perspective and look through another window. These changes can help us to make the previous situation better and more flexible and make an improvement in the existing one.

In this splendid modern world that we live, we usually try to make an advancement in our traditional architecture with the new technologies and adapt it with our modern life, so here we tried to do a new and never happened pace in Our country, Iran, to help to save, survive and display to posterity one of the most valuable and important architecture elements, which is called Persian Gardens.

What is going to happen here is lead to innovative thinking and the new trends in Persian Gardens nature and creating a place to be born in inspiration and edutainment (education+ entertainment) rather than just a sightseeing and relaxing location.

It is an inescapable fact that our roots are connected to the past and early humans and from past to present, human always do lots of scramble to be grown and level up the quality of life and culture and make them more useable, in this specific case it is more like a mix between what is going to happens in future and the real past, a new chapter in Persian Garden life, and travelling in a loop of time.

Creating a close atmosphere between basic elements of Persian Garden, culture, people, landscape, and future, even when people from different field and background meet at the same time here in this place having almost same feelings and vibes, is one of the biggest approach of this action.

The future Persian Gardens will be a reflect of technology and modernity in past and provide the best adaptability and unlimited flexibilities, and as an adaptive place of ancient culture from temporary people point of view. The most important parts of this collaboration between past and future is the high degree of sharing history with modern life and material, and help the relation between building, landscape, atmosphere, new generation, history and garden.

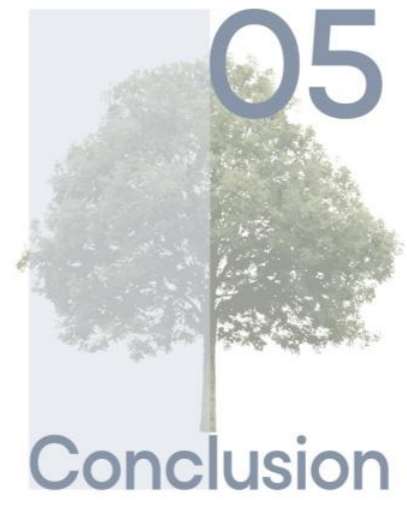


Thesis statement:

This thesis will discuss the main key approaches to turning over a new chapter in the concept of one of the world's special gardens while maintaining a connection with the existing context.

Culture is a strong connection between people and their ancestors. A connection that is adhered to and has been modified countless through time.

Consequently, developing a direct relationship between the past, present, and the future in the concept of the Persian garden and promoting some new potentials on the way to reach progress and considering all the phases like environment, social and economic values, and sustainability, will going to prepare a positive base and impact for this collaboration of time.



01- Description

1.1 | Meaning

- 1.1.1 | The concept of Persian gardens
- 1.1.2 | Semantic values and symbols
- 1.1.3 | Religious Beliefs

1.2 | creation

- 1.2.1 | The Ideas and reasons
- 1.2.3 | Effects on the other countries
 - 1.2.3.1 | Orangery (Narenjestan)
 - 1.2.3.2 | Pavilion (Kushk)
 - 1.2.3.3 | Plant species
 - 1.2.3.4 | Eslimy or arabesque motifs
 - 1.2.3.5 | Street as an elements of the city
 - 1.2.3.6 | Water and irrigation system

1.3 | Structure

- 1.3.1 | Garden geometrical structure
- 1.3.2 | Persian garden design principles
- 1.3.3 | Garden types
- 1.3.4 | The water
- 1.3.5 | The plants

02- Case studies

2.1 | Fin garden

- 2.1.1 | Garden structure
- 2.1.2 | Axes
- 2.1.3 | Terrace and Trees
- 2.1.4 | Fountain and water supply system

2.2 | Mahan garden

- 2.2.1 | Garden structure
- 2.2.2 | Architecture
- 2.2.3 | water supply system

2.3 | Mughal gardens

- 2.3.1 | Structure
- 2.3.2 | Architecture
- 2.3.3 | Water system

2.4 | Spanish gardens

- 2.4.1 | Structure
- 2.4.2 | Architecture
- 2.4.3 | Water

03- Background

3.1 | The description of properties

Abbas Abad garden

- 3.1.1 | Location of geographical
- 3.1.2 | Gardening in Abbas Abad garden
- 3.1.3 | Features existing in the garden
- 3.1.4 | Water
- 3.1.5 | Water supplies
- 3.1.6 | Water distribution
- 3.1.7 | View and landscape

04- Project

4.1 | Project Introduction

- 4.1.1 | Verifications
- 4.1.2 | Material board
- 4.1.3 | The passage of time
- 4.1.4 | Line and routes
- 4.1.5 | Activities and fun
- 4.1.6 | New insertion

4.2 | Scenario I: The power of view

- 4.2.1 | Case studies

4.3 | Scenario II: Peculiarity of water

- 4.3.1 | Case studies

Introduction

What makes Persian gardens more characteristic than other gardens?

The answer to this frequent question is having a special feature that other gardens do not have it. This important item is that: Persian garden reflects Heaven. (Ansari, 2014)

Building paradise on earth and the desire to create it has been the dream of Iranians since ancient times. Persian garden is not a body and shell, it is a culture. It is a collection of art, architecture, plant system, irrigation system, trust, oral literature, lifestyle, and aesthetic rules. Thereupon, the traces of the Persian garden can be followed as far as this culture is present.

Although the spread of the Persian garden is mostly limited to the territory of Iran, but if we consider the garden as a cultural matter, it can cover a wider sphere of influence.

Art and design means give a chance to the life of the beauty, and beauty plays an essential role in spirituality. So, for a contemplative, beauty is a reminder of the world of meaning. (Schwan Hof, 2003)

The most obvious example of these inspirations is composing an earthly paradise in the material world and show it like this is a reflect of heaven in another level, as we know it, Persian gardens.

From the Islamic viewpoint, art has the responsibility of creating a relationship between man and the environment, and the relationship between people, human and history, and the most important one is the relationship between man and numen. (Ayatollahi, 2006)

The garden is a mirror of the world and the reality of its uniqueness, like the uniqueness of God, cannot be seen by human senses and is beyond human understanding.

Understanding the beauty of the world has a close relationship with creation and natural order and is full of goodness and blessings in Iranian thought. Therefore, creatures represent the characteristics of harmony and natural order. The pristine nature and its view beyond the garden wall are desirable.

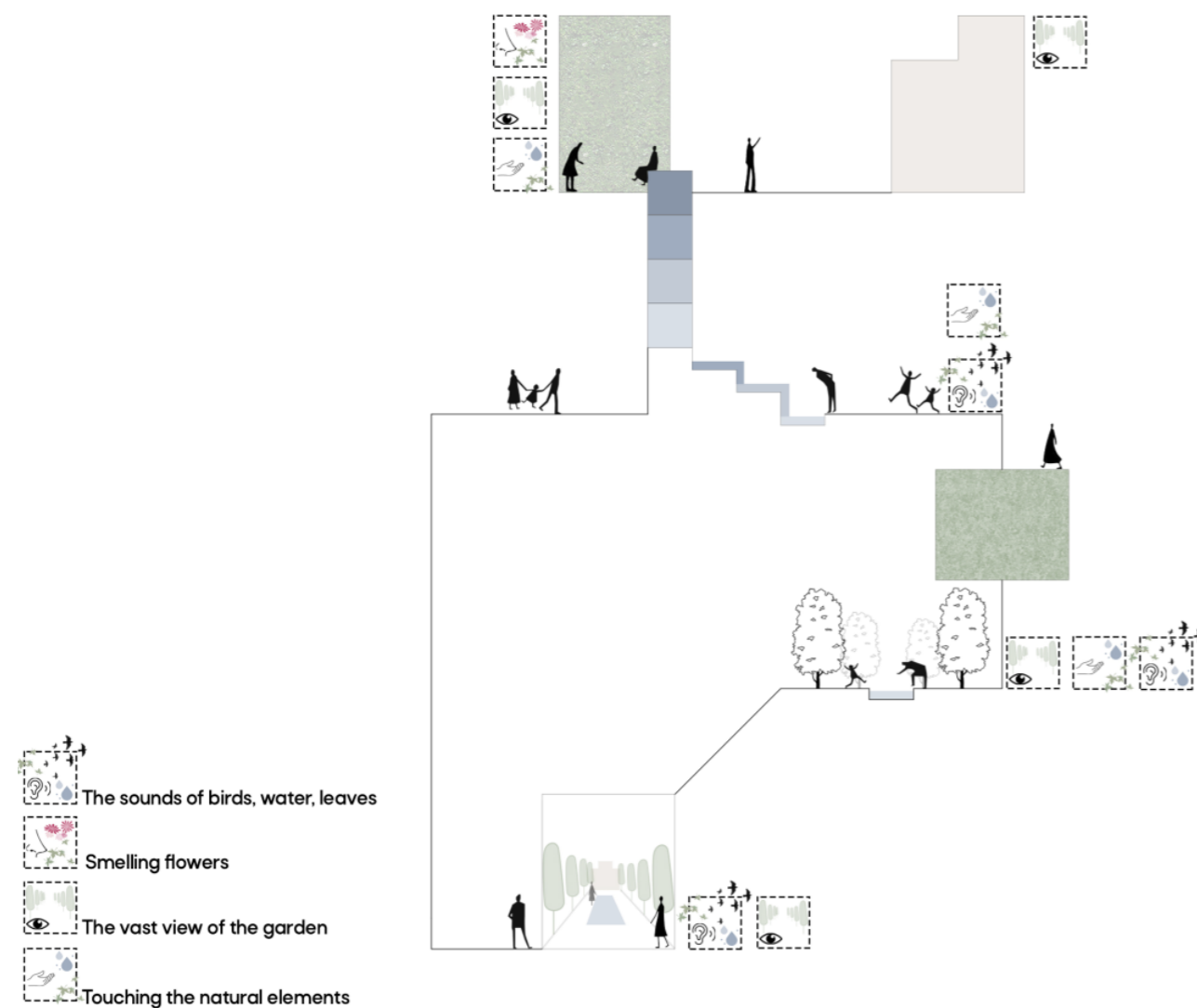
Evidence shows that the Persian Gardens appeared before Islam and developed during the Islamic era. It has a different pattern from other gardens in other countries, and this difference has been famous for a long time. Many believe that the Persian garden design has a religious meaning and goes back to Zoroastrian and Islamic beliefs about heaven.

From a long time ago, the green space and garden in our country has been a symbol of the heavenly sanctity of heaven, and after Islam, this meaning with the Persian garden is an allegory of heaven, one of the factors in the formation of the garden, thinkers who believe in this model They also know that it is a product of this attitude. All elegance is connected to the new religion. The garden is divided into four parts that are separated by streams of water, symbolically referring to the four streams flowing in heaven, or the four directions of the gate, and are designed. (Barati, 2004)

In the Qur'an, four heavenly rivers are always mentioned. It is easy to know the geographical features of Paradise in four regions, in Persian carpets also follow this rule. In Iran, there is a type of carpet called Charbagh. Classical Persian gardens always follow this rule. The waterways are built in such a way that it is surrounded by places full of trees and flowers. at the intersection of waterways and streams, there are ponds or garden houses. (Adrian, 2002)

01-Description

1.1 | Meaning



The involvement of human senses in the Persian gardens

1.1.1 | The concept of persiangardens

According to the definition provided by the Charter of Florence and course the Committee of Historical Gardens in 1982, a garden is an architectural combination of immortality and vegetation, so it is a living work that represents the culture of each nation and the climatic conditions of its birthplace. (Shahcheraghi, 2009) Also, Garden has been defined as the purest of human pleasures and the greatest refreshment to man's spirits. (Bacon, 1883)

According to Hunt, gardens are concentrated or perfected forms of place-making. (Hunt, 2000) The Garden is also perceived as a symbolic site, resulting from the human attempts to materialize Eden on the earth. (Alon Mozes, 2004) In the Greek text of the Bible, a garden has been expressed as a Paradise. In Hebrew, Eden is translated to an unidentified region or country. In Persian literature, the word garden (Pardis) derives from the word Paridaiza which means walled Garden, and that has been summed up as a luminous and perfumed place populated by a few angelical and beautiful creatures. (Babaie, 1997)

A historic garden is a link between civilization and nature, a place for feeling and thinking, and a paradise.

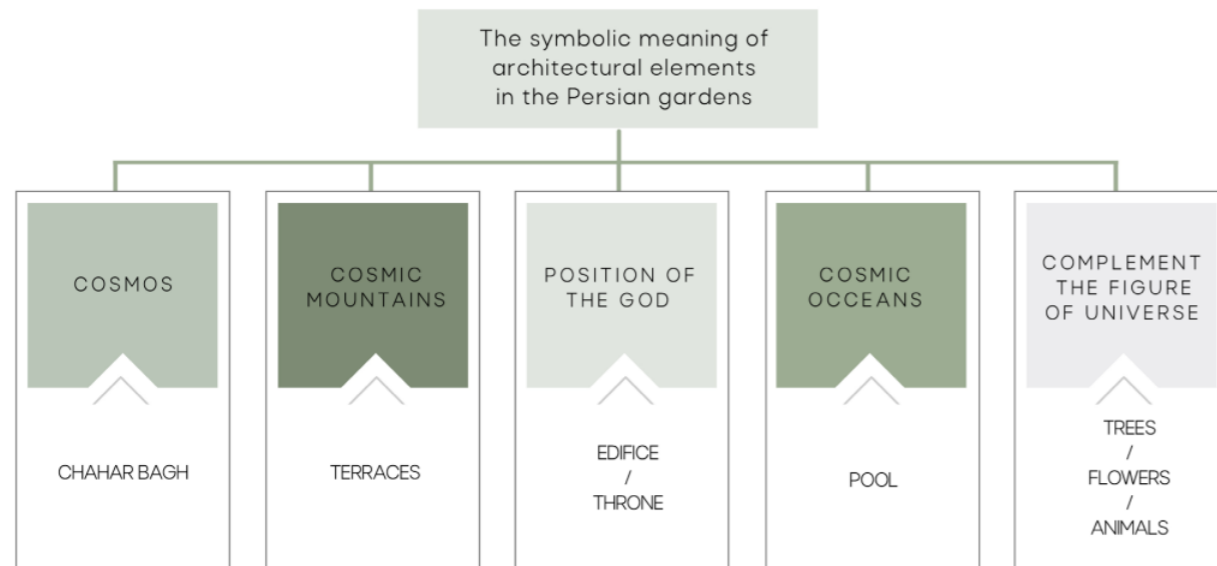
The phrase « historical Garden » is proof of a style, period, or artist's thought. It is used for significant recreational purposes, and the architectural element

is inseparable from the historical Garden. Persian gardens have evolved through the history of the Persian Empire regarding the culture and beliefs of the society. Persian gardens are not only about geometries and shapes; but also, manifest different design elements, each representing a specific symbol and its significance in society.

In a sense, eastern nations knew themselves as a part of nature. They did not consider humans as the owner or dominators of the natural environment. In Persian gardens, all-natural elements (water, trees, fruits, and flowers) have congregated to produce a space where people can enjoy and praise nature. Iranians have fabricated the perception of a paradise and the universe in their gardens despite the possibilities and limitations.

The Persian Garden symbolizes the universe, and the terraces symbolize the cosmic mountains. The creation of the edifice or throne at the highest level represents the position of God. A great pool is placed in front of the edifice representing the cosmic ocean as the source of all water which can irrigate the whole Garden.

The presence of trees, flowers, and animals around the edifice complements the figure of the universe. (Alemi, 2011) According to Clark, Islamic Gardens have been designed based on the spiritual conception of the world and aim to strengthen the relationship between the visitor or user and God. (Clark, 2004)



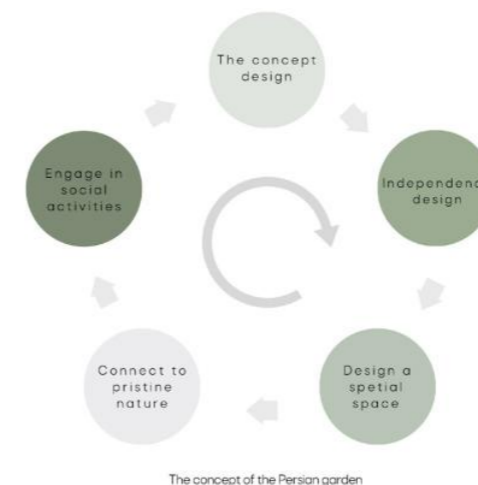
1.1.2 | Semantic values and symbols

Culture and identity in society can affect architecture and the meanings intertwined with architecture. Mythology and symbolism are the elements that may shape the culture and influence the architecture of a nation and, in this case, the garden. Architectural representation in a city can give substantiality and embodiment to the meanings and beliefs within society. Whether considered myths or not, some objects were believed to be sacred throughout the ancient world. Things such as the sun, moon, water, tree, and mountain were respectful to the ancient cultures. Some of these objects and their associated symbolism were utilized in Persian gardens and have affected their architecture, design, and patterns. The relationship between architecture and landscape might be rooted in society's worldview regarding nature.

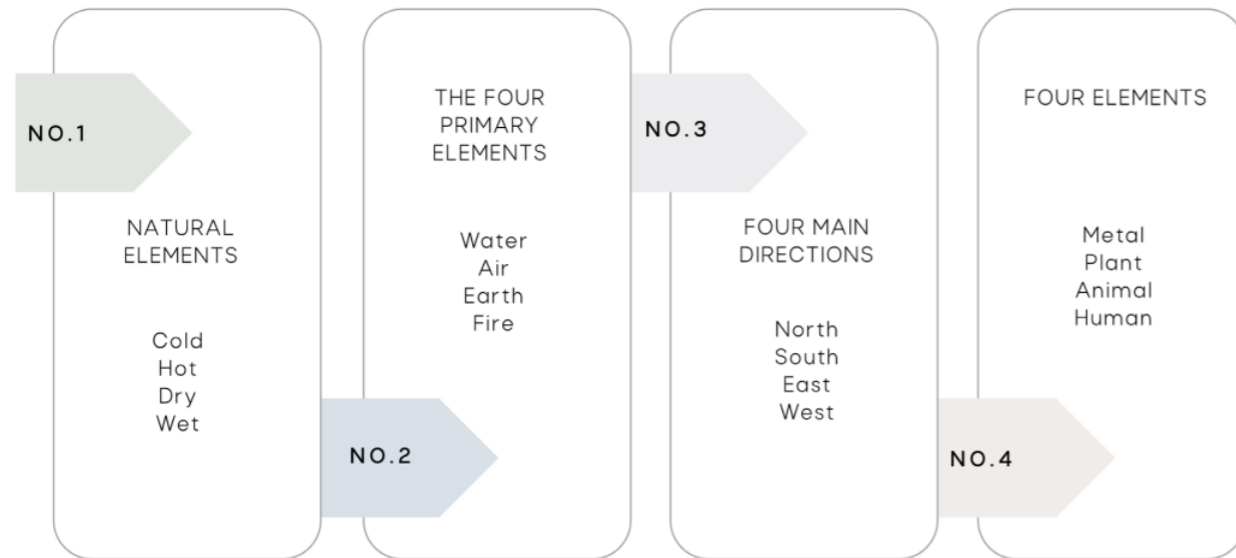
In eastern cultures, there has been a close relationship between humans and nature. Therefore, It seems like artists tried to use symbolic language to express inner concepts besides outward expression, so Persian garden artists also used the same way of symbolic language in their designs, and regard to this, they used natural elements, artificial elements, and numerical symbols in the design of the physical and spatial structure of gardens to represent their beliefs and opinion. (Pourjafar, 2011) The peculiar symbols in Persian gardens are divided into two categories: the first one is related to numbers, and the second category is about the symbols.

In the Islamic scripture, there is a special consideration for the numbers like ,4 7 ,40, and 70. Therefore these sacred numbers are used symbolically by Muslim artists very often, and each has a special meaning for Iranians. For example, the meaning of the number four in Islamic cosmology is:

- 1- Natural elements (cold, hot, dry, and wet)
- 2- The four primary elements (water, air, earth, and fire)
- 3- Four main directions (North, South, West, and East)
- 4-Four elements (metal, plant, animal, and human)



The concept of Persian garden



The meaning of the number four in Islamic cosmology

A logical square is formed whenever four elements want to relate to each other, especially in Iran's rationalist worldview and the futile conflict. The square is the most regular, the simplest, most intelligent, and the perfect form to create quadruple connections. The number four and its square symbol can be found in the following cultural examples:

- 1 The ancient belief of Iranians in the number four, division into four as a happy symbol. The world is divided into four parts, and the four main elements are the origin of the world. Dividing the space into four parts, the occasion of the four consecrated elements has been common. Square and circular shapes and a combination of them, like Mandalas as eternal images in ancient cultures.
- 2 The number four in the Holy Quran refers to the four rivers of heaven.

-3 Important examples of the number four, apart from «Charbagh,» can be seen in Iranian architecture in the form of Chartaq, Charsu, four-balconies (Chahar eyvani) mosques, four-balconies schools, four-balconies caravansaries.

-4 The use of square-rectangular geometry and quadratic divisions have also been used to determine the degree and create a suitable irrigation system. In this way, the Charbagh pattern has symbolic concepts and entered other arts.

The second category is related to architectural elements in which artists tried to use symbolic language, to express inner concepts besides outward expression. (Pourjafar, 2011)

Below, we will discuss the meaning of the Persian garden symbols:

-Water:

Water is one of the most sacred symbols of light on the earth. It is a symbol of thought and an element of grace because it circulates in the garden and is the beating pulse of the garden, the water that always flows in the garden and never stops. Let there be life, a happy, eternal, and prosperous life. Water is a symbol of blessing, fertility, and mercy. It is a sign of green and growth. The clearest crystal of the existence of water and its external sign is green. Water is a symbol of purity and clarity. It is the source of life, the origin of all creatures.

After Islam, the Holy Quran further emphasized the centrality of water in the perception of Muslim Iranians. Muslims respect water as the most important means of cleaning and purifying. The Quran describes paradise as a garden beneath which rivers flow (Tabbaa, 1987). The presence of water in the pond and the heart of the garden is a symbol of life, heaven, and a sign of beauty, and prosperity. The presence of water in the garden is a sign of the softness of the environment and an emphasis on the transparency of its space. Water is a symbol of life because with its magical power every day, A new effect appears in the garden. It is mentioned in the Quran that we gave life to everything from water. Still, water refers to stability, tranquillity, peace, and harmony.

The continuous movement of water around the garden is a reminder of the era that makes a closed circle. (Emami far,2010)

-Plants:

Plants symbolize death and resurrection, life force, and the life cycle as a divine blessing. Green life in the Persian garden is a two-character element symbolizing life and death. Spring green means life, and rusty green means death.

The green color in the garden symbolizes youth, hope, and happiness and, simultaneously, a symbol of change, destruction, and jealousy. Plants, including trees, symbolize peace, freshness, and beauty.

The tree symbolizes the whole universe, the combination of sky, earth, and water, vibrant life, the manifestation of the whole universe, and a symbol of spiritual mercy and enlightenment. In a Persian garden, plants are planted to create shade, harvest, and decoration. (Khosrowjerdi, Mahmoudi,2013)

-Pool:

The garden is a manifestation of the centrist form of the small or inner world. The space is surrounded by the location of the building and the tree. Just as in humans, the soul, which includes the soul, is surrounded by the body. There should

be a clean space between the form and the surface, full of peace and free from any tension and thought-provoking. The installation of the pond in this peaceful space provides the centre as a positive direction for creative imagination. In this way, the transversal creation of a person is connected to the longitudinal cause and the reconstruction of heaven is complete. (Bakhtiar, 2000)

Most of the ponds are built in one of the main axes, in the centre and heart of the garden, and it is a pole that affects the surrounding space. The pond is a symbol of unity, centrality, and importance. As we will mention below, water is a symbol of stability and stability.

The presence of a pond in the centre and heart of the garden is a symbol of introversion because it shows the importance of the interior as opposed to the appearance. It is an emphasis on the unseen world and an interpretation on one of the inner divine attributes.

The pond is a picture of the sun. Because of its octagonal or hexagonal shape, it is a symbolic representation of the Sun. The presence of water in the pond and in the garden reflects the sky, a sky full of sunlight. So, it is a sign of the continuation of life. In other words, light water has become physical. The same transformation of a visual symbol into a visual symbol with the presence of still water in a closed space. (Naini, 2002)

- Fountain

The fountain represents the general movement of water that never stops. It creates paths that guide people in the environment and being on the central axis makes the place unique.

The fountaining of water and the dropping of its drops were constantly reminded of the angels who rise above the shoulders, and as we read in the book of the sense of unity: "the fountain that generates water circles with increasing tail radii, the beginning of the cycle of expansion and contraction again."

It is conscious. (Bakhtiyar, 2001) (Because of its boiling point, the fountain is compared to a bubbling spring, which brings brightness, purity, and purity, just like the light of circles in the exact centre and behind each other. (Emami, 2010)

- Pavilion:

The Pavilion is a focused and extroverted space. Koushk or the pavilion is a building with eight doors opening from each side and it has an axial view facing four narrow branch roads.

The existence of this central pond has a regular cohabitation relationship with the hut above it.

The place where the axes meet in the heart of the garden and the four-row space that is open on the four sides of the garden is the beginning of the continuation of the horizontal movement.

- Barrier

The wall around the garden or the fence of the garden creates order in the environment.

The fence separates the inner environment of the garden from the outer area, and because of this boundary line, both the internal role is determined, and the internal landscape is well defined. The octagonal face of the pavilion is the reflection of God's throne, which is placed

on the shoulders of eight angels according to Islamic traditions and hadiths.

The fence creates an independent space in the garden by limiting it.

The fence is a symbol of introversion, because by surrounding the garden, it draws people to one of the principles of architecture like, introversion. It is a kind of distancing from the outside world. (Donald, 2006)

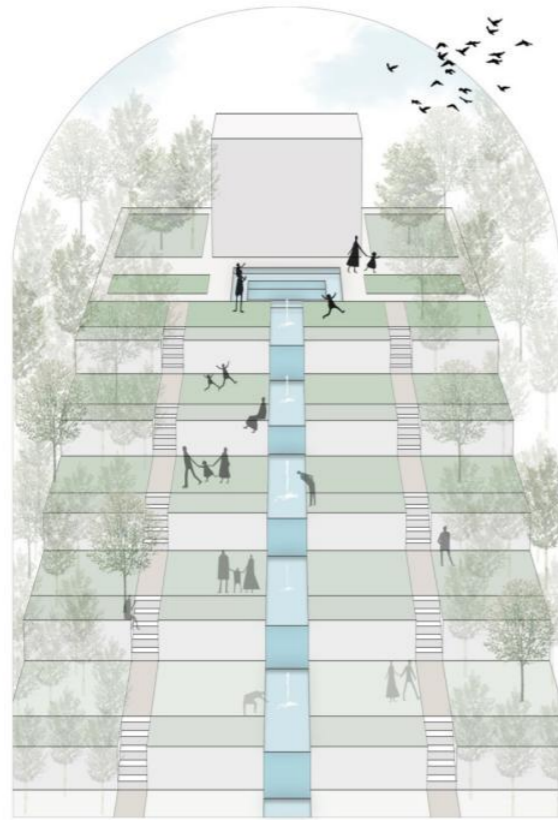


Persian garden symbols

1.1.3 | Religious Beliefs

Iranian gardening has always been closely related to religious beliefs, and they used these beliefs in the symbols of the garden. One of the essential elements that we should be aware of it is that the somatogenic and spatial structure of the Persian garden, follows the similar principles of before and after Islam; however,

the symbols that are used in Iranian gardening after Islam have different meanings, which are based on the projection of religious and Islamic beliefs, especially heaven. (Ansari, 2014) Alemi refers to Heravi's definition of the garden as a universe whose architect is God, and the human is a seedling planted and created by God. (Alemi, 2011)



A graphic view to represent the relation between Persian garden and Heaven

In the Achaemenid era, all the kings-built paradises wherever they lived. In Greek sources, these places are referred to as Paradeisos. Achaemenid paradises are often described as agricultural gardens and protected hunting areas. Even the palaces like mansions were an integral part of the garden, and the gardens themselves had become royal residences. It was the architecture of the garden that accommodated the palace, not the opposite belief. The Persian Garden, with its many facilities, pleasant shadows, and fruit trees, was considered a small example of the Heaven Garden in Islam. The names of the many Persian gardens in the middle centuries, such as Hasht Behesht Garden, Eram Garden, and Chehelston Garden, are a testimony to the general attitude of Iranians towards the garden as the Paradise of the earth. From the perspective of researcher Henry Corbin, the garden of Paradise is both a symbol of the earth and turns the earth into a symbol. He considered

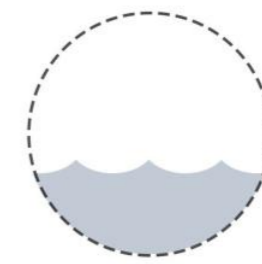
the garden of Paradise to be a part of what he called the dream geography of ancient Iranian religions, especially the Zoroastrian religion, because, in the religion of Zoroastrianism, the earth and the world are also dreams. (Corbin, 1960). The Persian Garden is a symbolic sign; that is, the relationship between the garden and its central theme, heaven, is a relationship of similarity. A garden is another form of paradise, a paradise that is absent. It can be said that because the man had seen heaven in the beginning, he had an image of it in his mind, and after descending from heaven, he wanted to create what he had seen before. It can be analysed that the descent of man from heaven influenced the garden effect. Man was looking for a safe place where good people live, so the garden has had a constant presence throughout history. In other words, it is a universal garden made by human hands, and because it is made of essential elements, it is something more than an abstract place. (Tusi and Emamifar, 2010)



wind



fire



water

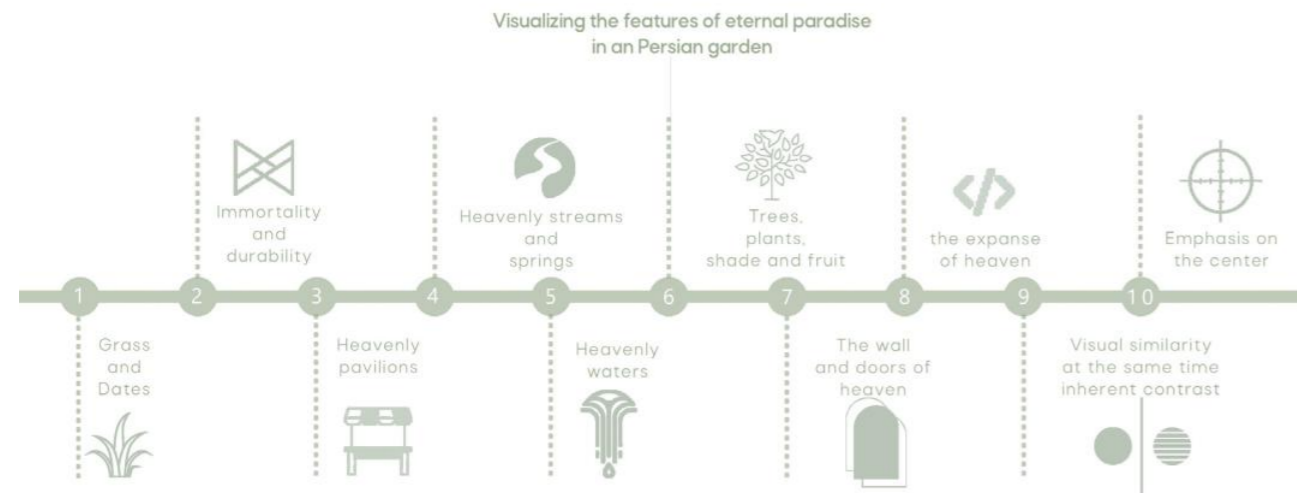


soil

Four main creation elements of Universe

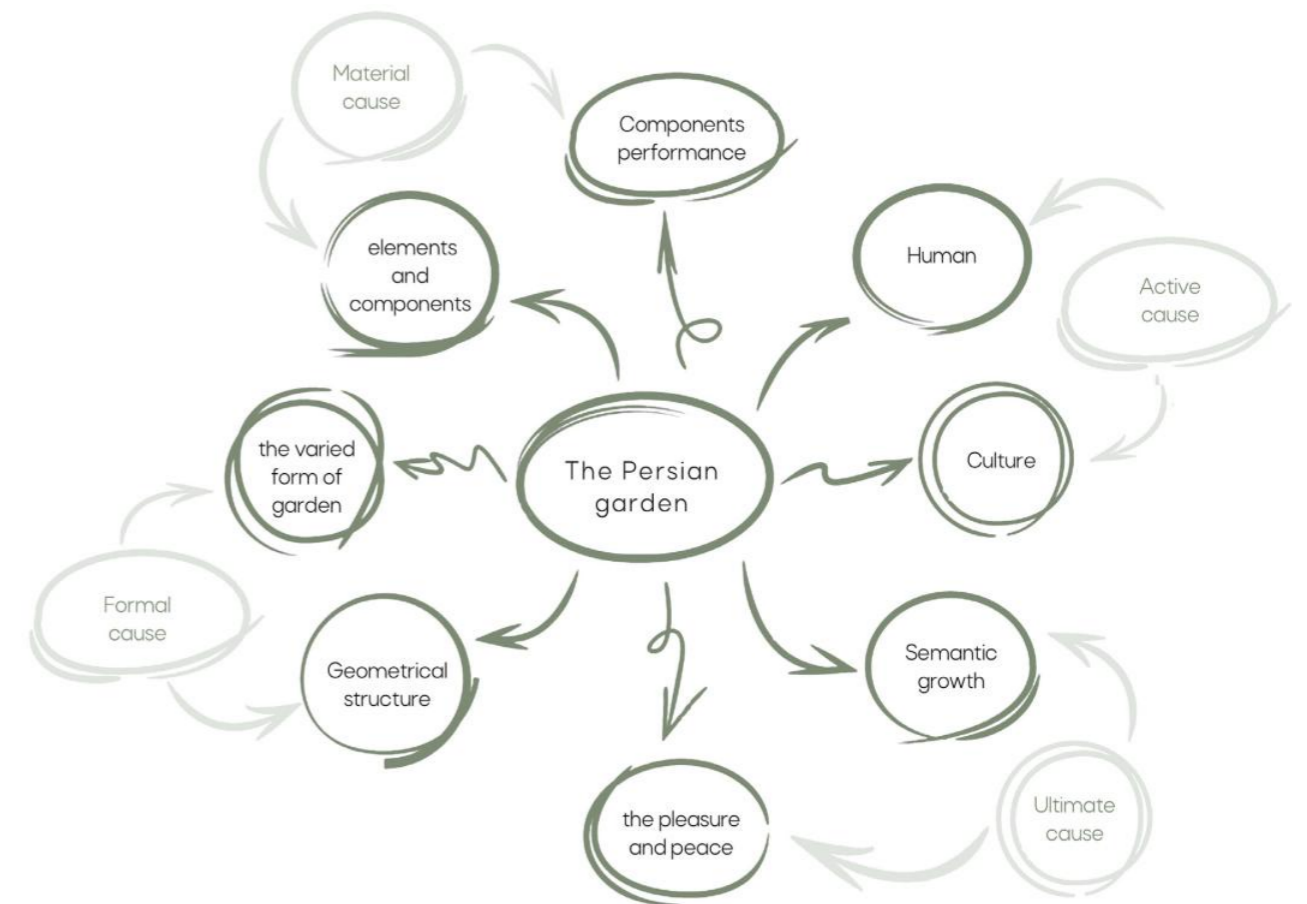
During the Achaemenid period, the garden was divided based on the Zoroastrian division of the universe into four parts, four seasons or the four elements of Water, Wind, Soil, and Fire. According to their beliefs, these four elements were the constituent parts of the world a mystical feeling for flowers and a love of gardens are integral parts of ancient Persian gardens. The Persian Garden manifests supreme values and concepts and is well-known as a bridge connecting the two worlds

of matter and meaning. (Karimi-Hakkak, 1998)
 In general, it can be said that Iranians view of the promised paradise, greenness and coolness, the presence of water in the dry regions of Iran, the captivating attractions of natural landscapes, and the abundance of comfort and recreational facilities, especially in the royal gardens, can be considered among the fundamental reasons for comparing the Iranian garden with paradise.



1.2 | Creation

1.2.1 | The Ideas and Reasons



According to the ancient Iranians' beliefs, God created each powerful being on one day, and each day had its ceremony. The creation of plants was a required course of Genesis. The All-Seeds tree first grew on earth, then two birds took its seeds and spread them all over the world, and this was how farms and gardens came into existence. Thus, the Iranians had a special ceremony to celebrate the creation of plants. Such a celebration continued to live in various manifestations as an architectural and cultural tradition and is embodied in Persian gardens. The great Roman historian of the reign of Shahpur II, Ammianus Marcellinus, mentioned a great garden near Ctesiphon where they kept several types of plants and animals, with its painted building with paintings of hunting scenes. (Pope and Ackerman, 1936)

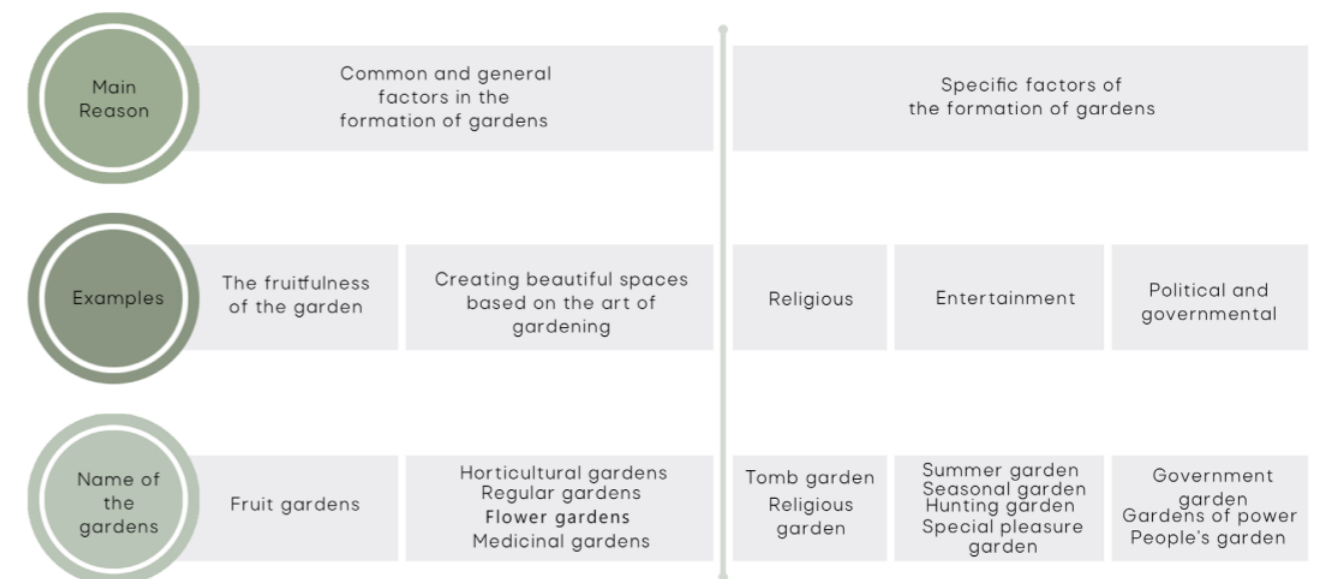
Byzantine historians also give accounts of Khosrow Parviz's great garden in Dastgerd, with all its lush plantation and diverse types of animals. All these instances show that most Iranian houses and palaces were attached to gardens. In the Iranian culture, the cultivation of trees and the construction of gardens have always been recommended as a key to entering paradise and cutting or uprooting trees has been ominous. as it goes in the famous Farsi proverb: "who he cuts a tree would live short." Creating artificial mounds in the art of garden

making of the Mesopotamian and Elamids Civilisations, planting holy trees along the rivers, and temples, which are marked on the clay tablets, illustrate the approach of people living in those civilizations towards nature. (WHC, 49 :2011)

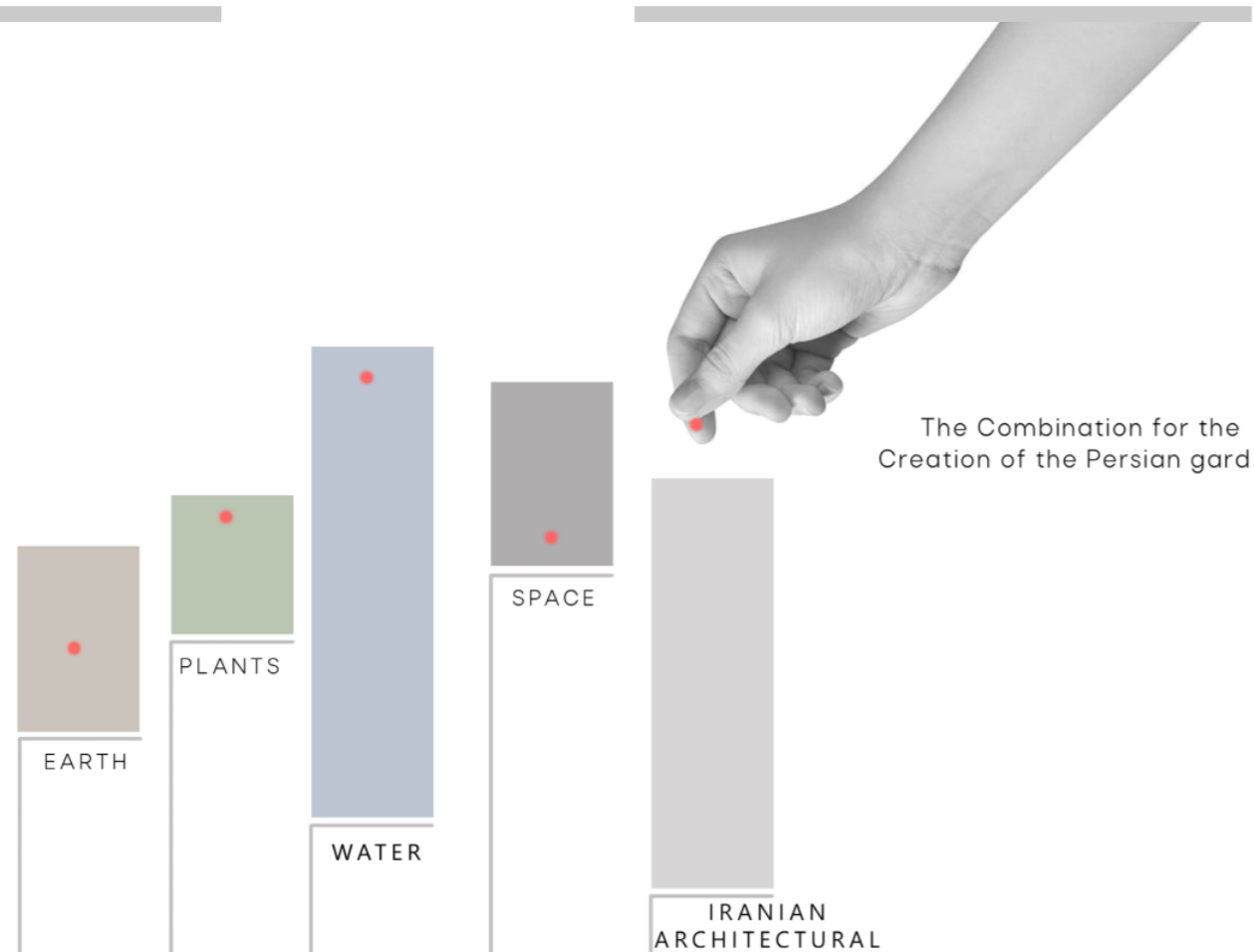
In the hot and dry climate of the land of Iran, the presence of green gardens and palm trees has always been considered a cool and peaceful place for comfort, pleasure, and entertainment. The existence of water, land, and suitable scenery makes it possible to create a garden. However, in addition to these, the reasons for creating Iranian gardens are some essential factors, some factors such as economic reasons and interest in planting and beautifying the environment are common factors in the formation of gardens and some other remarkable and primary cases, the most important of which are religious reasons, political, governmental, and entertainment. This set of factors has created gardens inside and outside the cities of the central desert of Iran according to the climatic, physical, and location conditions of the cities. Although gardens like Behshahr's samples were formed in different climates (temperate and humid), they are like the gardens of cities on the edge of the central desert in terms of their structural pattern and the reason for their formation. (Motedayen, 2010)

Suppose we pay attention to life in the Iranian garden. In that case, we will find out that the Iranian garden is not for enjoying the fruit or the shade of the trees, and not even for enjoying the beauty, which is made for fun and recreation, not being satisfied with material and artificial benefits, and paying attention to the aspect Their poetic works are general fundamental characteristics of Iranian culture. (Beheshti,2007) The Persian Garden created by the

combination of elements such as earth, water, plants and space, and the placement of space in the container of Iranian architectural thought. The meaning of any object is rooted in its relationships with other objects, and the structure refers to the formal characteristics of a set of relationships that are a whole, and this is how we can understand its existential qualities. (Madghalchi, 2014)



The reason for the emergence of historical gardens in Iran



1.2.2 | The history

The oldest discovered work, which is the root of many theories about Persian garden geometry and the four-part pattern, is a clay bowl found in Samarra. On this clay bowl, which is believed to date back to 2000 BC, cross lines are drawn that show four garden plots, and each plot has a tree and a bird. This plan is the same official and public plan that Iranians have used since the time of Cyrus until today. During the Sassanid era (633-224 AD), gardening expanded a lot. The high position of nature in Zoroastrian thought, especially the worship of water, caused that in addition to human order in the garden, landscapes and natural habitats

were also raised.

The gardens of the palaces of this period, such as Takht Suleiman and Firozabad Palace of Biston, were in attractive natural settings such as lakes and springs, also This trend manifested itself in garden design, with greater emphasis placed on fountains and ponds in gardens. Geometric diversity is the most characteristic feature of the gardens of this period. Axial, central, and quadripartite arrangements can be seen in the gardens of this period.

With the establishment of Islamic civilization in the Umayyad period, gardens were built in Samaria and Andalusia, which were modeled after

Sassanid gardens. During this time, the aesthetic rules by which the garden is governed grew in importance. An example is the Chahar Bagh, a form of the garden that attempts to emulate Eden (the four principal elements of sky, earth, water, and plant) representing the world. The invasion of Persia by the Mongols in the 13th century saw a new emphasis on highly ornate structures within the garden, examples of which include tree peonies and chrysanthemums. The Mongol empire then carried a Persian Garden tradition to other parts of their empire (notably India). Babur introduced the Persian Garden to India. Many researchers consider the most glorious era of gardening in Iran to be in the Safavid period. In this period, the gardens in the city were art that shaped the physical structure of the city and influenced the entire structure of the city as a green system. Gardening started in Qazvin during the Safavid era. This city was chosen as the capital of the Safavid dynasty and was organized as a city garden, which now has nothing left of the court gardens except for a few buildings. During the time of Shah Abbas, the capital was moved from Qazvin to Isfahan. In Isfahan, the geometric structure of this city garden was formed from the coexistence of urban spaces, streets, squares, and gardens. The evolution of garden design in the

Safavid period is also linked to the Timurid period like a chain, and in the Qajar period, due to the extensive cultural connections between Iran and Europe, signs of European garden design penetrated the gardens of Iran, and in the Pahlavi period, due to the ease of transportation between Iran and in other European countries, the construction of European gardens and parks or a mixture of them became popular.

The most basic and simple geometric principle of the garden is to create an axis in the middle of the garden and parallel to its length. Usually, shade trees are planted on both sides of this axis. Garden geometry consists of right-corner divisions. The most important of these divisions is the arrangement of four parts. The arrangement of the garden is based on axial geometry and symmetry.

1.2.3 | Effects on the other countries

Iranian garden is not a body; it is a culture. It is a collection of art, architecture, and system.

Vegetation, irrigation system, beliefs, oral literature, lifestyle, and aesthetic rules. As a result, the footprints of the Iranian garden can be traced as far as this culture is present. If we consider the garden as a cultural matter, it can include a wider sphere of influence.

Other nations have imitated Iranian-style gardens. This style was popular among Muslims and Arabs and in India and inspired Europeans in the Middle Ages. At the same time as the Middle Ages in Europe, most Iranian cities were surrounded by lush and dense gardens and were a refuge for the comfort of their residents. The cities of Isfahan and Shiraz, as well as Neishabur, Balkh, Herat, Samarkand, and Bukhara, boasted of their beauty and freshness and had extensive and unique gardens in the world of that day. During the renaissance period, when gardening was on the rise in Europe, the rare views of Iran's gardens still amazed western tourists. The European tourist who at that time, they had seen Isfahan's gardens and recalled seeing such sights for the first time in their lives (Nasr, 2009). The style of gardening in eastern countries is also taken from the gardens of Iran. Babur Shah, one of the Mughal kings who ruled India, brought the Iranian style of gardening to India, and built

gardens in Agra, located in the north of India, of which only a few exist today. Then Jahangir, one of his successors, built gardens in Kashmir today, among the most famous gardens in the East. (Javadizad, Tabaian, 2016).

It isn't easy to examine the transmission of cultural phenomena such as the garden in separate components. Because cultural interaction is complex and intermingled. However, to find traces of the Iranian garden, it is necessary to examine all the components that have a share in Iranian culture and have been integrated or transformed in other countries over time, such as:

words related to the garden,
aesthetic concepts,
plant species,
geometric patterns,
application of water and irrigation system
and garden elements. (Mehrabani Golzar, 2019)

Here are some examples:

1.2.3.1 | Orangery (Narenjestan)

In Spain, the courtyard of mosques of the Islamic period (which later became a church), or the secluded garden of large mansions called: Patio de los Naranjos. Probably today, Spaniards don't know about the exact meaning of the Naranjos, and they don't even know the origin of this word, but the yard of oranges (Narenj) has a different meaning for Iranians. In fact, Narenjestan or Orangery is a place where orange trees (Narenj trees) and other citrus fruits are cultivated. (Barati, 2004)

The word Tangerine (Narang) is a Persian word, but it changes the form to Naranj and entered the Arabic language through the Muslims and reached the Spanish language, and the word Naranjos corresponds to it. Collins English Dictionary considers the origin of this word to be Sanskrit, which has gradually entered European languages.

The most famous Spanish orangeries are related to the Cathedral of Seville and the Cathedral of Córdoba. Also, the Palace of Vienna in the city of Córdoba also has an orangery.

The survey of the word Narenjestan does not end in Spain. One of the models that Renaissance gardening borrowed from Spanish gardens is the space dedicated to keeping citrus fruits. Due to the different climate of Central Europe, it was necessary to store citrus fruits in greenhouses, therefore, the orangery

of French gardens refers to a covered space where all kinds of citrus fruits are kept, and the trees planted in large pots are moved to the open space in suitable seasons. The French equivalent of Narenjestan is the word Orangerie, which is derived from the word orange and refers to a citrus garden. This element became an integral part of French gardens and later entered English gardens as well. (Barati, 2004)

1.2.3.2 | Pavilion (kushk)

The pavilion, considered one of the Iranian garden's main elements, has also found its way into other cultures. This word, which has changed to "kiosk" in Latin, is used as the equivalent of "Kushek" or "The portico" in the Uyghur language. In the same way, Latin and Uyghur words are derived directly from the Persian word. The word "Kushk" also found its way into the Ottoman territory and meant a separate building from the garden. (Zangari and Rahmaty, 2012)

1.2.3.3 | plant species

Researchers believe the Ottomans imported the plants and gardening culture they borrowed from their east (Iran) to Vienna, Venice, and other European cities. As an example, Europe owes the knowledge of Portugal to the Arabs. Egypt went to Amman and Iraq and then to Syria and from there to Europe, so it is possible to explore the traces of some species on the way to other countries and, in this way, check their influence on gardening culture. (Ibid, 2018)

Also, the origin of the pomegranate fruit is Iran and North India. This fruit has a special place in the ancient culture of Iran. For this reason, the pomegranate tree is a species of interest in Iranian gardening and works related to the garden.

Traces of this fruit can be found in Andalusian gardening. While this species

is not native to Spain, it has reached North Africa and then Europe along with Iranian and Islamic gardening culture. A specific example of the presence of pomegranate can be seen in a sculpture in AlHamra Garden. In the same order, this fruit has been used in decorating houses and churches and plant motifs.

The "Gate of Pomegranates" in the Alhambra Palace is another witness of the colorful presence of the pomegranate fruit in the gardening of Spain during the Islamic period. (Morton, 1987)



Pomegranate, Alhambra, Spain



The Pomegranate, Tisophon, Sasanian period

Seville cathedral orangery, spair

1.2.3.4| Eslimy or arabesque motifs

In French gardening, the complex and curved patterns and pictures decorated with flowers in the garden plots are called arabesques; although plant forms are used in Syria, Egypt, and Greece, their use reached the architecture of southern Spain (Andalus) through the Umayyads. For this reason, the term “Arabesque” or “Arabesque” is used for these motifs. It is believed that these designs first made their way to Sicily, Andalusia, and the

Mediterranean borderlands through the Arabs.

Then they were used in the design of flower gardens, and the second factor of transferring these patterns can be found in Iranian carpets. Iranian carpets have reflected the Iranian garden for a long time, and “garden carpets” are considered one of the main categories of Iranian carpets. (Mehrabani Golzar, 2019)



Castle of Vaux-le-Vicomte

1.2.3.5 | “street” as an element of the city

At least 200 years earlier than what happened in France under the title of expansion of the gardening pattern in urban planning, this pattern had been implemented in the cities of Qazvin and Isfahan during the Safavid period in Iran. Khayaban is a Persian word that means flower garden and grass, and it is a row built for passing in the garden, and its sides are decorated with flowers. (Barati, 2004) Therefore, the “street” is an element of the Iranian garden, which entered the city’s structure for the first time in the Safavid era of Shah Tahmaseb. After that, in the period of Shah Abbas in Isfahan, in continuation of this pattern, the Chaharbagh axis was built, a wooded and long promenade in the city of Isfahan and formed the ossification of the city’s development. Two centuries later, in the Baroque period, the same concept moved from the structure of French gardens to cities and added boulevards and street promenades to French cities.

1.2.3.6 | Water and irrigation system

Using water in the Iranian garden has the most significant influence on the west and the east. The “Medina al-Zahra” complex near Cordoba is an example in this field, which shows that this tradition is still preserved in Andalusian culture and in the culture of water use and irrigation systems. It has been influential in Europe.

(Anuarbe 2003)

The water supply system in the plateau of Iran is based on aqueducts. This system was used with the spread of Islam in Sicily and Spain. The aqueduct works in Madrid, Spain, continued to exist until 1930 and were a part of the city’s water supply network. Through Muslims, this method of water supply was also used in Morocco and was called “Ain”, or it is called “Khatara.” (Zangari and Rahmati, 2012) To store water, wide and rectangular cisterns were used, a pattern like the one in Iran. The cistern of the women’s courtyard in the Alhambra Palace, the cistern of the Beheira Palace in the south of Spain, and the cistern of the Minara Garden in Morocco are examples. Some of these patterns are water storage. (Mehrabani Golzar, 2019)



Menara garden, morocco



خوب می نماید خیلی باغ خوبی طرح شده و در ظرف خوب

اکوه سفید نیکمار واقع شده در میان کهنه روشن



درختهای انار هم هست کردا که در حوض تمام به برقرار

بانی عن باغ همین است در وقت زرد شدن بار بجا

Babur is supervising the works in the garden
 Babur nama, Victoria and Albert Museum, London

عمل بشوند اس چیده نامی نامها

1.2.4 | The Persian Garden in art and literature

The Persian Garden has been directly associated with many cultural developments, reflected in literature, poetry, carpets, miniatures, music, architectural decorations, etc. The Persian Garden has been in direct, tangible connection with the Iranians' events, traditions, beliefs, and artistic and literary masterpieces. It has been the materialization of poetic spirit and joyful life in the glorious history of Iranian literature. Poetical spirit is, in fact, an interwoven characteristic of all Iranians, and the Iranian scientists, architects, and artisans are thus all poets. They thought of infinity and considered it in their interpretations, designs, and constructions. When an Iranian artist designed a carpet, it was as if he composed its poem. It was also true about the designs of traditional Iranian architects. Thus, the Persian Garden can be defined as a lyric made of terms such as water, wisdom, plants, and light. Therefore, there are countless examples of praise of gardens in both Persian verse and poetry. Avesta, the holy book of the Zoroastrians, has placed great emphasis on the sanctity of inhabitation of places, cultivation of plants, and construction of gardens. Like so many other holy books, in Quran, too, Paradise is described as a garden. As the Persian Garden was defined based on spiritual insights and symbolic expressions before Islam, the report provided in Quran from Paradise

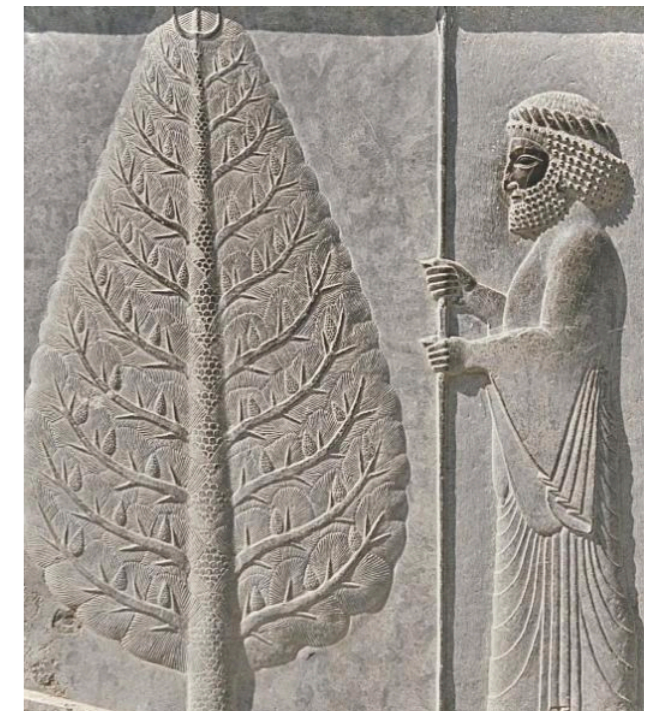
corresponds to the description of one such garden. This has been of significant influence in the spiritual life of the Iranians as other artistic genres such as poetry and literature, carpet, miniature, music, and architectural decorations also reflect it. This same great interest is also evident in the choice of names of Iranian songs and pieces of music during the rule of the Sassanids: "the pleasant garden, "Shahryar's (the king's) garden", "Ardeshir's garden", "Bagh-e Siyawooshan [Siyawooshan garden]", "path of flowers", "the triple cedar", and "the garden of Nowrooz" are known as the old musical sets of ancient Iran. This same interest and reverence are also reflected in Iranian literature, where a significant part of verses and poems are dedicated to descriptions and praises of gardens. The description of gardens is evident in the works of many poets. The spiritual concept of the garden is so tangible in the minds of the Iranians that significant parts of the literary works of prominent poets are linked to depictions of gardens. More significant still, in Ferdowsi's Shah Nameh, the whole land of Iran is referred to as one large garden. Sa'adi has named two of his poetry books Golestan and Boostan, which are indeed other terms to refer to the Persian garden. Patterns and themes of gardens, and particularly sacred trees such as cedar, have always been popular with Iranians for tile works, plaster works,

and stone reliefs or carvings. Patterns of cedars at the Persepolis and the symbolic expression of the holy place are both examples of the significance of the garden in the Iranian experience. The significance of the concepts of the Persian Garden lies in the provision of an environment suitable for reflecting on things, discussing, and composing poems, where one can receive the inspirations of the spiritual world and reflect them in the mundane world. Persian gardens as a representation of Paradise on Earth. Such tradition in illustration and painting has even been applied in the illustration of manuscripts. The most obvious example, however, is found in the patterns of Iranian carpets, as most carpets are portrayed



Cypress the national symbol of Iran and the tree of life, Safavid period

as gardens and plants, and some are even clear depictions of the Four Garden pattern.



Pine Tree & Persian Soldier Wall of Persepolis, Iran

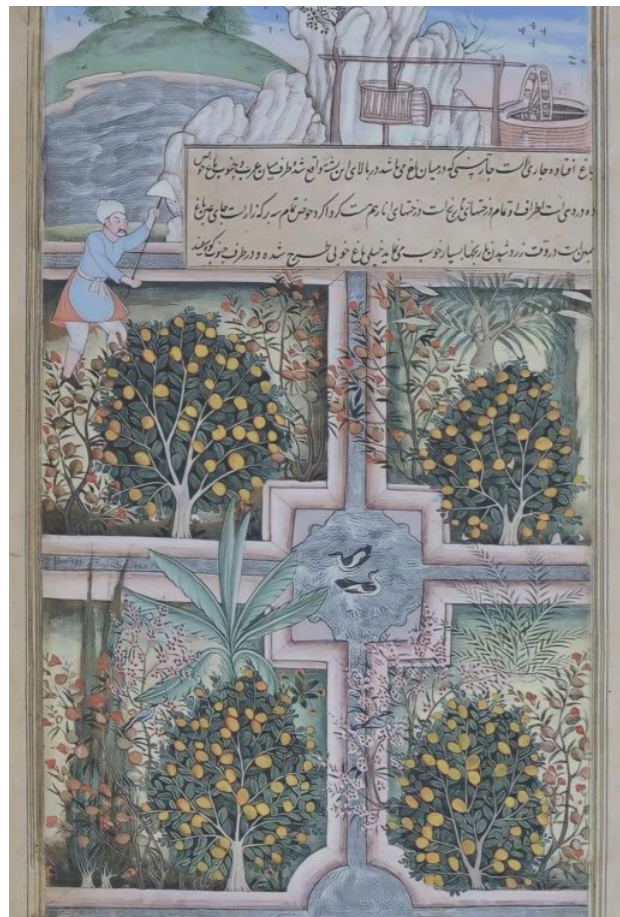
Thus, the tradition of gardens and garden design in Iran, with its model and concepts, has significantly influenced other cultural elements. It has resulted in the parallel development of gardens and such elements, which still live as vividly present and influential Iranian traditions. Iranian carpet is the best embodiment of the garden, after its architectural embodiment in Iranian culture: the garden is the subject of many carpet patterns. The carpet is Iranian to the extent that Arthur Pope writes about it:

The garden is the most important theme that Iranians love. It appears in almost all Iranian carpets in a glorious and lively way.

The Iranian carpet is more like a garden than a carpet; next to the central ponds, the trees are beautifully planted and decorated with flowers.

In the Iranian mind, the metaphorical

garden is a fragment of paradise and is far from the outside world, bringing comfort to the body and peace to the soul. (Shahcheraghi, 2018)



Persian garden in miniature, babumama, 1598-1600



Persian carpet with garden design

1.3 | Structure

1.3.1 | Garden geometrical structure

Charbagh (four gardens)

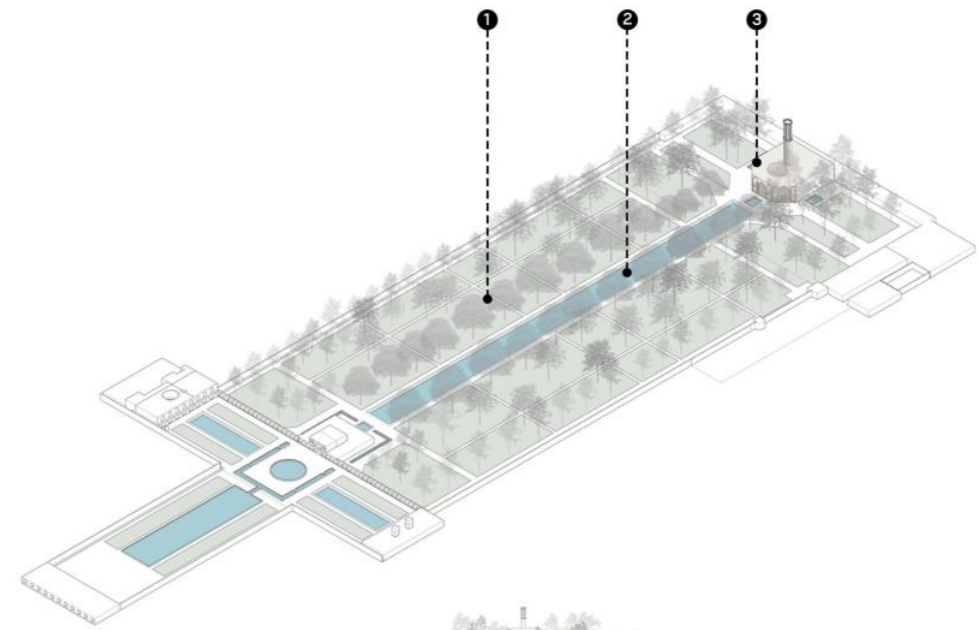
A careful review of Persian gardens reveals that despite the minor differences, gardens mostly follow the same structure in their location of components.

Structurally, the Iranian garden has three unique structures and designs:

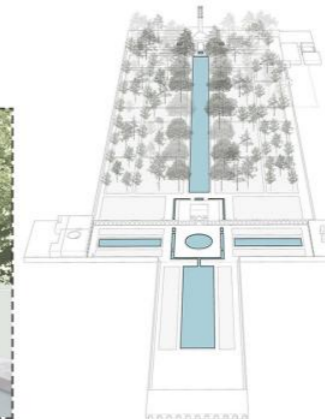
- It is in the passage of water.
- High walls surround it.

-There is a summer mansion and a water pond inside the garden

Also, the body of all historical gardens is formed from three systems of planting (plants), water, and buildings (architectural arrangement), which is known as a geometric structure, combining natural and artificial garden elements. (Shahcheraghi, 2018:65)



1 plant



2 water



3 pavilion

Three unique signatures of Persian gardens (Water + trees + Pavilion)

Geometrically, most gardens have rectangular plans and have been divided into square or pseudo-square shapes, possibly, for the ease of determining the distance between garden components and the exact placement of greeneries. Unlike western gardens, the geometric structure of Persian gardens does not follow the perspective principles; instead, they were primarily based on creating unity and integrity. (ICHHTO, The Office of Cultural Heritage of Iranian Cultural Heritage, 2010).

Persian gardens usually made use of pools and axial canals and especially pavilions which appears to have been divided into four equal plots by a watercourse and a path that later became known as a Charbagh (four garden) that may have contributed further to the design of earthly garden crossed by canals to imitate four rivers in the paradise. This is also where the application of symmetry, the Charbagh, and the use of defining water courses, avenues, and the closure of vistas, terraces, and pavilion originated. The rectangular shape might slightly change in response to different climatic situations and regarding the sites' opportunities and limitations. The plan of Shahzadeh-Mahan Garden (in Kerman) is an extended example of the Charbagh pattern in the shape of an elongated enclosed rectangle in which the pavilion is in the centre of the main water channels

defining the north-south axis.

The structure of the Fin Garden (in Kashan) is also an extended form of Charbagh in a series of squares and rectangles with a pavilion and square basin in the centre (Hobhouse, 2003) The water axes defining the Charbagh include the main one, which leads the user from the entrance gateway to the central pavilion. In the Persian garden, the definite border between the inside and outside of the garden is defined based on the geometric shape of a square or rectangle. However, this geometric proportion is also the basis for determining the outer limits of the garden and the basis for dividing the internal spaces.

In fact, in the Persian garden, the square shape makes the distance between the garden elements simple, clearly showing that it was of particular importance. The available space inside the garden is divided into smaller spaces by perpendicular lines according to its geometric structure. Mainly, two axes perpendicular to each other divide the entire garden space into four parts, and they built the booth in the garden according to the space divided into different parts. For example, sometimes the main building was in the middle of the garden and could be seen from all four sides, and the secondary buildings and entrance gates were around, or the main building of the garden was on one side, and the secondary

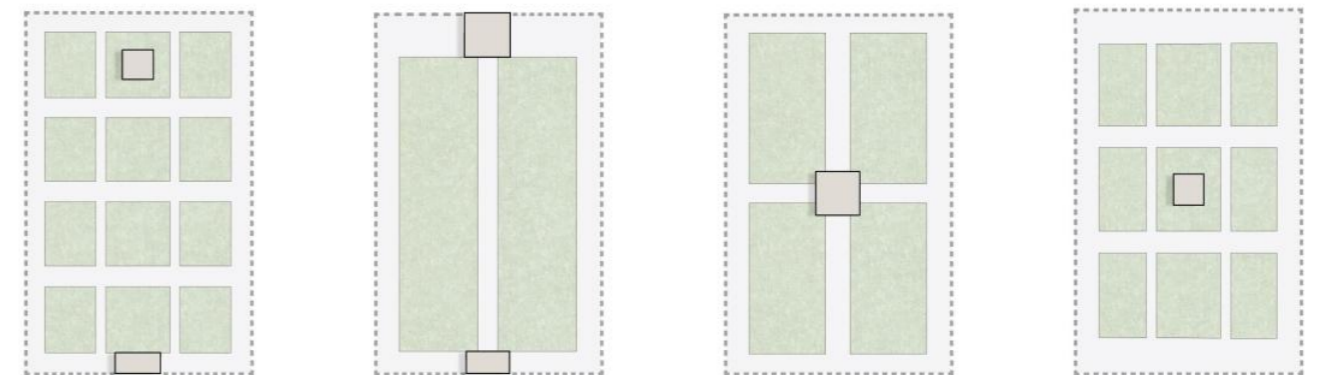
buildings were around. The booth was proportioned to one-third along the longitudinal axis in some gardens. However, in all these gardens, in front of the building, there must have been a courtyard or a rectangular space as a fountain. There were narrow paths and water streams on the sides between the plots, and next to them were gardens that were divided into plots by perpendicular lines. Briefly, the two most essential principles in the geometry of the Persian garden are:

1. three long extensive axes beside each other
2. Divide the garden into square parts. The history of these principles goes back to thousand years ago. Even in agriculture, square-form planting has been customary, and the ground has been divided into squares via water

streams. (Diba & Ansari, 1995)

The concept and ideology of the Charbagh pattern in the geometric division of the Iranian garden are generally attributed to the following four concepts:

- The four elements that make up the world (wind-soil-water-fire)
- Four heavenly streams
- The four main geographical directions of the world (North-South-East-West)
- Four seasons (spring-summer-autumn-winter)
- Four natural conditions (cold-hot-dry-humid)
- The four main elements (solid matter - plant - animal - human)
- The four main Iranian musical instruments (Chahargah - Shur - Mahoor - Humayun). (Barati and others 2016)



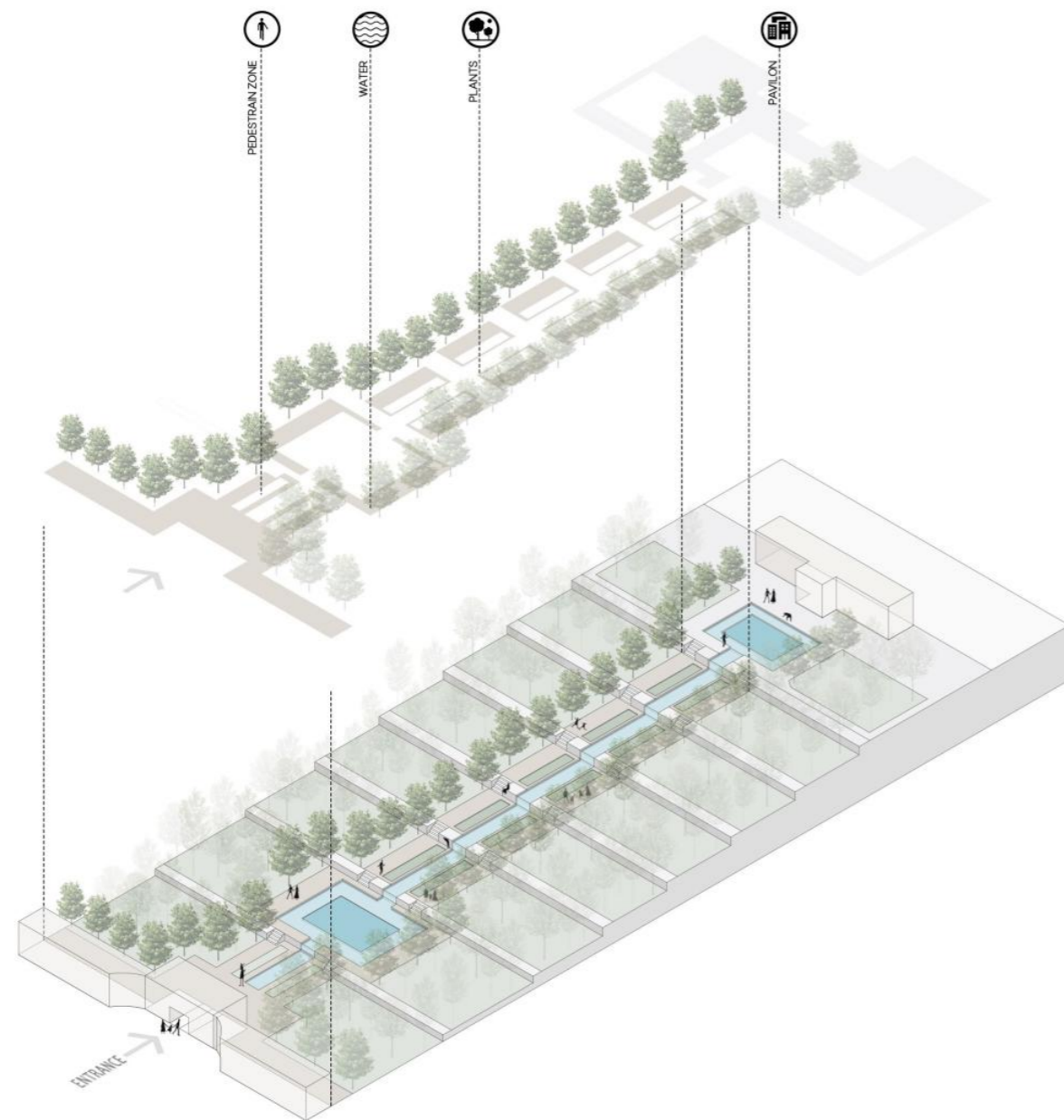
Different geometric types of four garden

1.3.2 | Persian garden design principles

Persian garden design can be summarised in the following roots:

- **The Entrance:** It is in line with the concept of introversion as an Iranian and Islamic approach to designing gardens surrounded by non-transparent walls.

Through this inaccessible surface or boundary, defining the point of entrance becomes essential. Usually, the entrance has a lintel, sometimes in the form of a building or viewpoint.



The entrance of the Shazdeh Mahan Garden in Kerman province

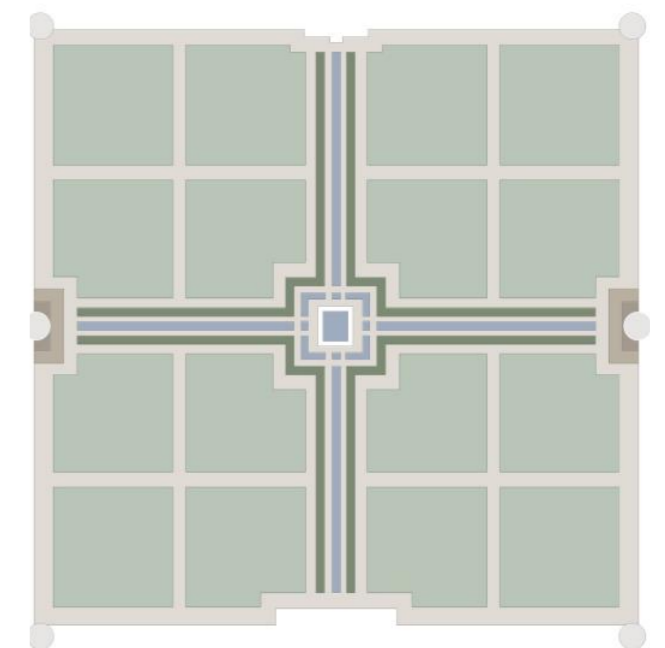
The entrance is usually close to one of the axes, which connects the entrance to the edifice.

For instance, one of the most famous and beautiful examples of a Persian garden is the Shahzadeh Mahan Garden, which in its entrance it has beautifully framed the pavilion and the main water channel in the center of the garden, guiding the user from the entrance to the pavilion. The lintel buildings could also be used as a reception space for guests alongside defining the entrance. In some gardens the entrance building had a latticed wall, which would not let the outsider have a glimpse of inside and the entrance was located on the minor axis (Borazjani, Javadi, 2004).

- **Straight network:** Persian gardens' streets or footpath networks were always perpendicular straight lines and coincident with the garden axes. The intersection of these main footpaths usually defines the placement of the pavilion and pool, which were located on the central longitudinal axis of the garden. These straight networks, surrounded by tall trees, provided a desirable perspective, defining the path from the entrance to the pavilion. These networks also facilitated access to the plots of vegetation. The word straight means the right path and the straight path in the religious sense, emphasizing that the

straightforward design of the street leads people to the right path. (Matini, 1982)

- **Pavilion:** Pavilions in Persian gardens are extroverted structures usually located at the intersection of axes with several garden viewpoints. Pavilions are the edifices where the residents or visitors live and enjoy the garden. A pathway usually guides the user from the entrance to the pavilion. The pavilion's location could split the garden into two to four directions. The location of pavilions could vary in different gardens. It could be in the center of the garden, or mostly it appeared in one-third of the longitudinal axis, but it was always located at the intersection of the axes. (Hanachi, 2011)

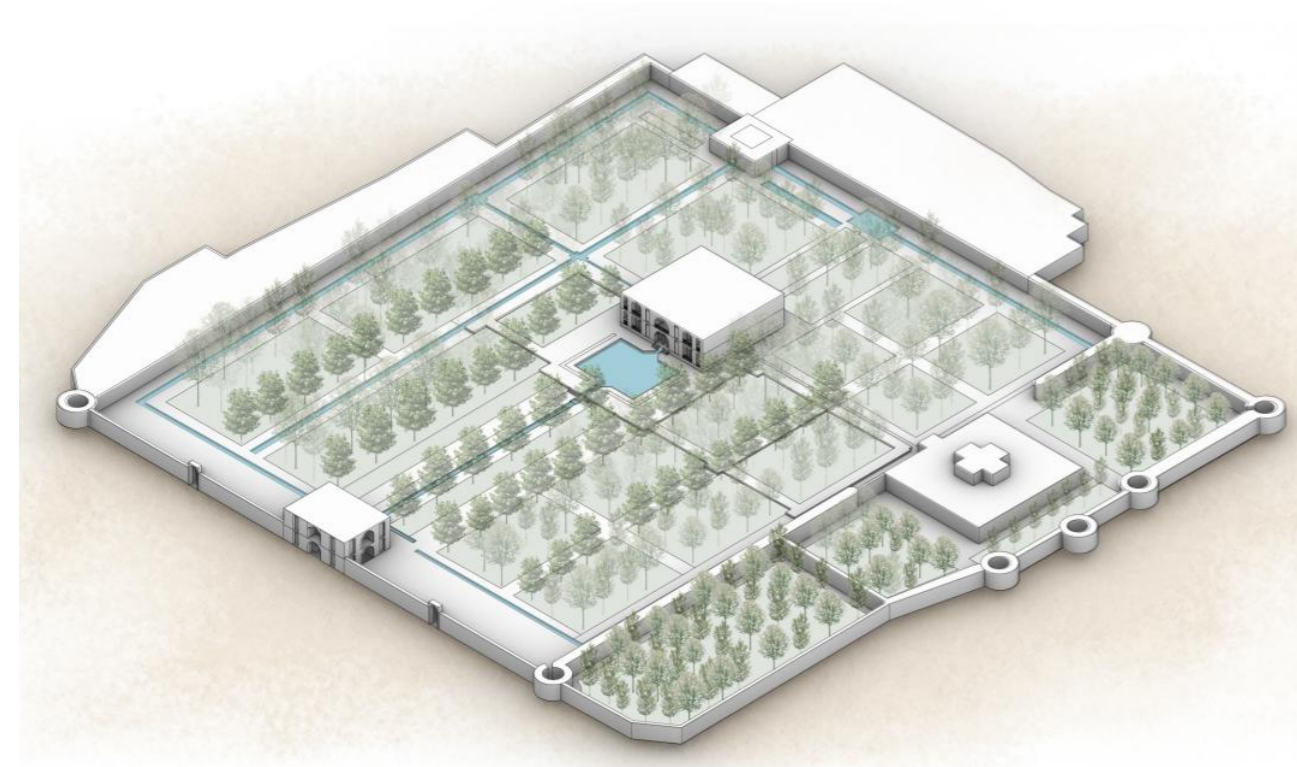


Common form of Persian garden
(Location of the Pavilion in the intersection of the garden)

- **Hierarchy:** based on this principle, different spaces and elements are placed together based on importance, functional value, and many other factors. This principle is completely visible to seen in the design of most Persian gardens. The hierarchy of the gardens starts from the entrance or sometimes the square and fountain which is located outside the garden and after passing the vestibule (Hashti) and the main axis, it reaches the garden pavilion (Koushk). This principle can be also found in the height, colour, and size of another element in the garden. (Nataj, 2001)
The hierarchy is clearly related to the concept of "privacy": from the entrance

to the vestibule and indirect corridors and from there to the back of the mesh walls and finally standing in front of the main path of the booth and passing through time until reaching the interior space of the booth.

- **Being enclosed:** One of the unique features of Persian gardens is being fenced or walled around its perimeter. Introversion has been rooted in Persian beliefs and culture and it is evident in almost every feature of Iranian architecture. In this sense, the whole plan and structure of Persian gardens had been enclosed within walls to provide the image of an internal paradise in the heart



The enclosure of secrecy and delimitation in the Persian gardens

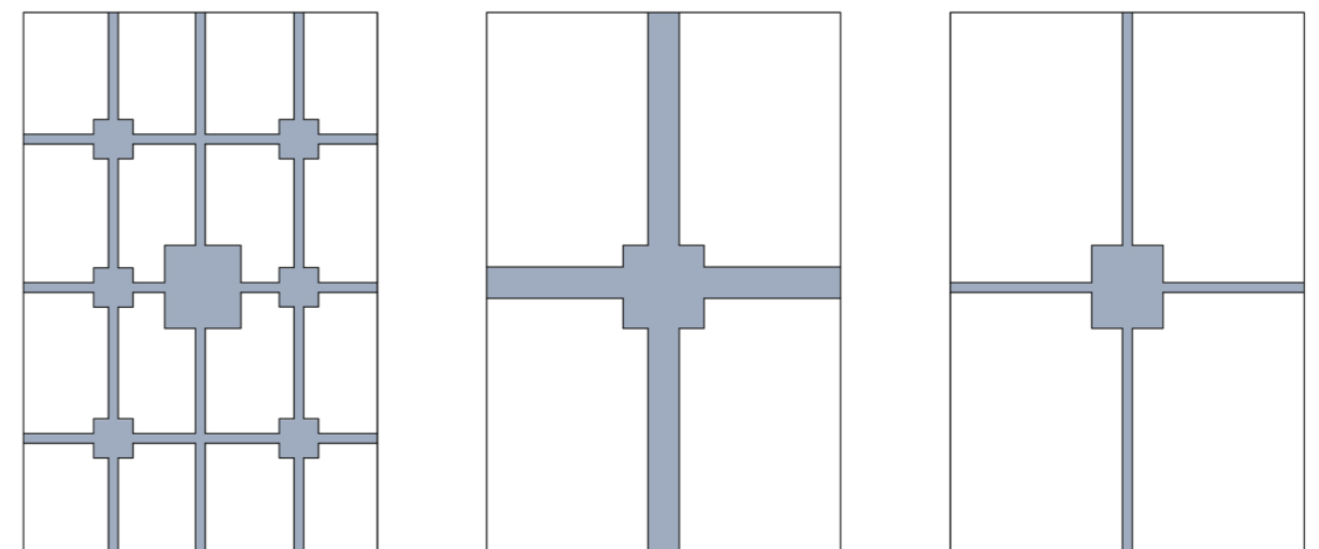
of deserts guarded against the eyes of strangers. The function of these walls was not only to create a boundary, but also to act as an interface between the dry hot outer area and the green, shady, and semi-paradise inner area (Massoudi, 2009).

- **Rhythm:** It means simple or complex rhythmic repetition of an element or phenomenon in a work of art. Here complex rhythmic repetition means the repetition of several elements or sets to understand the relationships and poetry of the things that require being careful and having a profound observation. In the Persian garden, this rhythm can be seen on the border walls of the garden, the panelling walls of sloping lands, and even in the flooring.

- **Centrality:** It is one of the essential

matters in combining and organizing elements in many architectural spaces and is often used to emphasize the most crucial part of the complex. The principle of centrality is mostly seen in the garden pavilions (Koushk), especially the garden pavilions (Koushk) with the design of the eight heavens or vestibule (Hashti). This principle had the most value in the square plan with the presence of the garden pavilion (Koushk) at the intersection of the axes. (Nataj, 2001)

- **Symmetry:** symmetry is one of the tenets of design which was used in most of public and religious buildings in ancient times. The principle of symmetry can be considered the most perfect form of balance, which has always been considered in terms of stability in addition to aesthetic aspects.



The Symmetry in the Persian garden design

This property has been used abundantly in Persian gardens. The garden pavilion (Koushk) is always symmetrical and located on the axis or in the centre of symmetry. The obvious point of comparison can be seen in the main axes. In the main axis, even trees, shrubs and flowers are also planted in indication. Depending on the location of the garden pavilion (Koushk), the rectangular gardens have one or two axes of symmetry, and the square plans often have four axes of symmetry in their plans.

- Independence and specification of spaces: In Iranian architecture, all spaces are independent and distinct, and there is no negative space or residual space from another room. This feature, which sometimes seems to conflict with functional realities, is one of the principles observed in valuable examples of Iranian architecture. In the Persian garden, all the spaces, whether built or not, display their own identity in anyway. It means even the distance between two independent spaces is considered as a complete field that has independent definition, identity, and function. (Nataj, 2001)

- Diversity in unity, unity in diversity: The Persian Garden has a unique spatial diversity while being unified in general lines, geometry, and implementation materials. The spatial diversity of the garden is

manifested by defining independent spaces through limiting, adjusting the viewing distance, using complete geometric shapes, planting plans, different combinations of plant species, spatial functions of water, and using materials. The main axes, sub-axes, plots, all kinds of ponds, and built spaces with many different types show order and unification inside the garden.

- Naturalism and utilization of the visage: Iranian culture does not see man apart from nature but sees him together with other elements of nature and in the process of surrendering to the nature and using natural landscapes and having the signs of God. Therefore, Iranian architecture and art are strongly naturalistic, so this principle caused to the creation of semi-open spaces such as patio and garden pavilion (Koushk) in Persian gardens, which is the boundary between the natural space and built spaces. The presence of a cosy places and taking a specific corner of nature, is a rule in the Persian garden, so it is considered as a mystical and poetic space for contemplation. The existence of deep and open perspectives in the axes and main paths of the garden, absence of visual obstacles and purposefulness of these routes, supports being more naturalism. Eventually, the common characteristics of Persian gardens can

be counted like below:

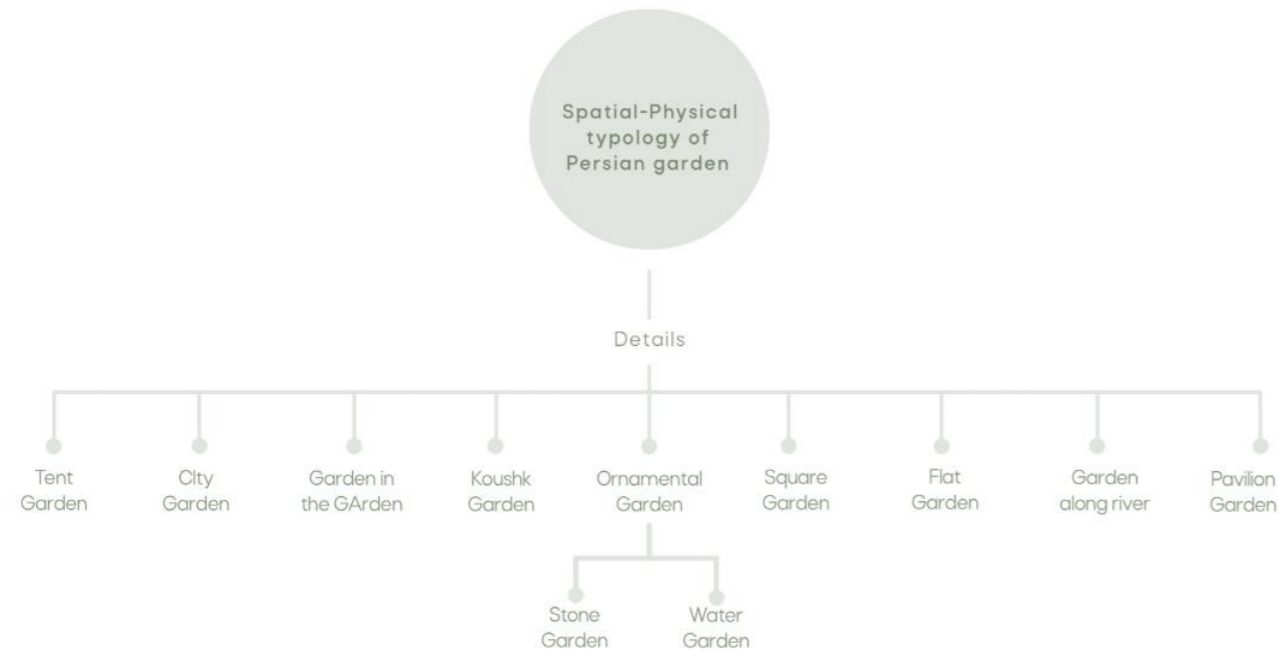
- The garden usually divided into four parts.
- Using straight lines in design.
- The existence of a pavilion or a building in the centre or at the highest point of the garden.
- Using a mainstream.
- The use of large pools as a mirror and the beauty of the landscape in front of the garden pavilion (Koushk).
- Close relationship with nature.
- Planting fruit trees in the large part of the garden.
- Lack of useless green space (Nataj, 2001)

1.3.3 | Garden types

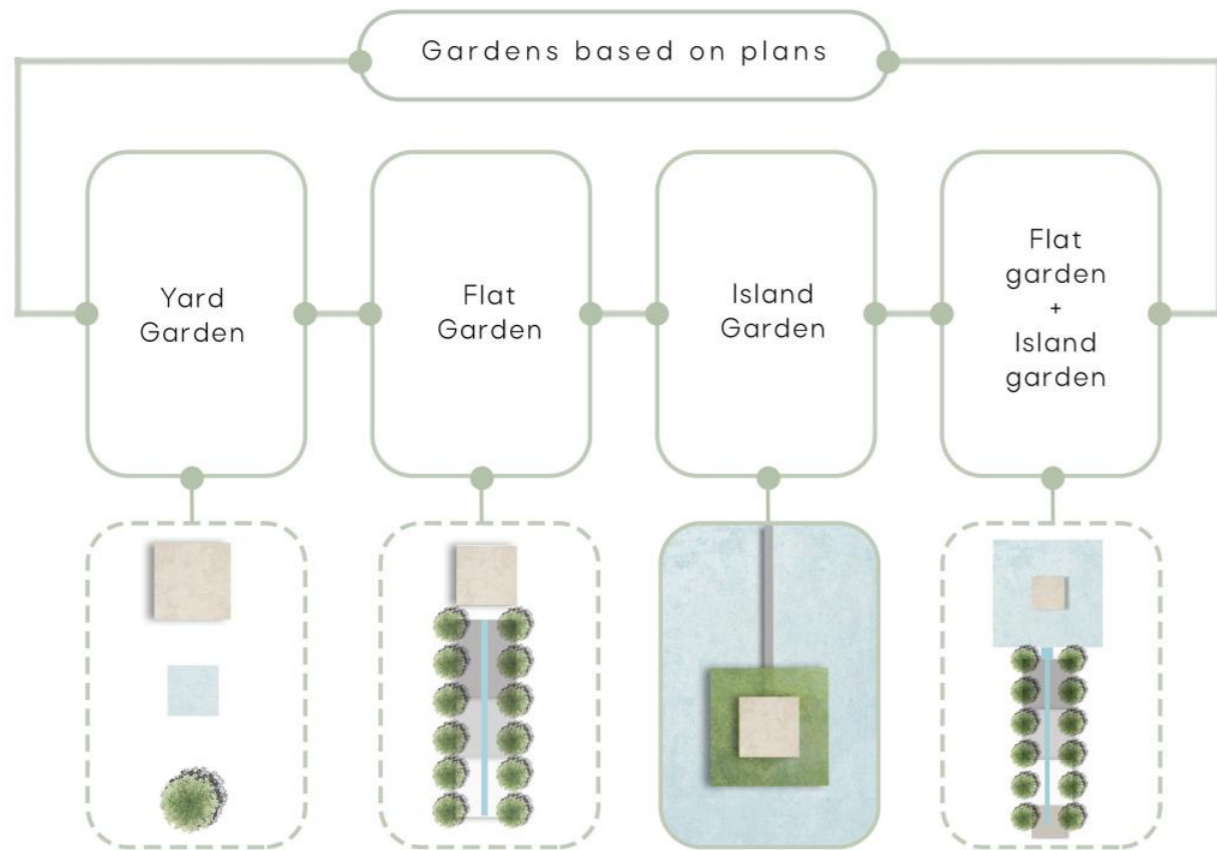
In Iran, the existence of green and date gardens has always been considered as a cool and peaceful place for comfort, pleasure, and recreation. The presence of water, land and suitable scenery makes it possible to create a garden. But in addition to these, the reasons for creating Iranian gardens are some basic and important factors, some factors such as economic

reasons and interest in cultivation and beautifying the environment are common factors in the formation of gardens; The most important of which are religious, political, governmental and entertainment reasons. This set of factors has created gardens with different uses and names in and outside the cities of Iran according to the climatic, physical and location conditions of the cities. (Motedayen, 2010) Based on the role of three factors: building, garden, and environment, in the formation of the Iranian garden and according to their changes, sixteen types of gardens can be mentioned; But this does not mean that in one of these types, the shape that every Iranian garden takes is entirely different from other types, but every Iranian garden can include a combination of these types. These sixteen types of gardens are city garden, pavilion garden, courtyard garden, tomb garden, garden in the garden, tent garden (covered), castle garden, Tajir Garden (with mesh wall), flat garden, zoo, hunting garden, Water Garden, National Garden, Takiyeh garden, Botanical Garden and Besheh garden. (Ansari, 2013)





physical typology of Persian gardens



Different plans in Persian garden

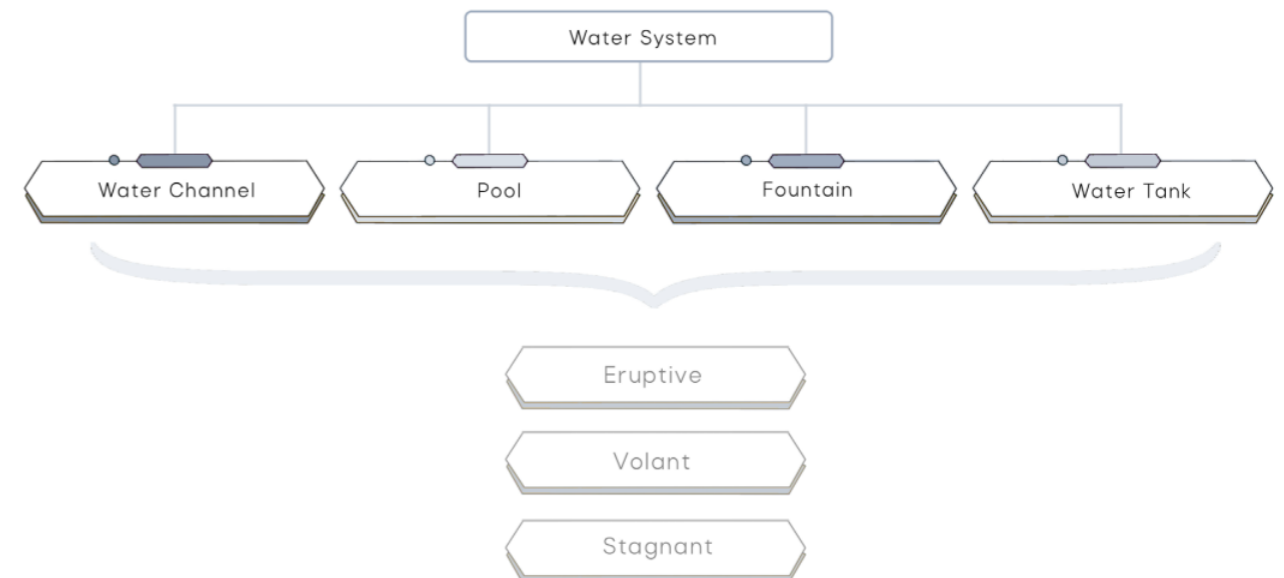
1.3.4 | The Water

The geometry of the Iranian gardens plan is determined according to the streets, rows of plants, and water features. Among the three elements of the garden division, the element of water is more important. (Khansari, 1998)

Due to the unique climatic conditions, gardening in Iran is mainly influenced by the construction systems, especially the irrigation system. Iranians' particular climatic features and exceptional spirit have made them functional in architecture and gardening. In gardening, this functionalism is evident in the systematization of the Persian garden. The water supply system in the Iranian plateau is based on aqueducts. The aqueduct is one of the oldest and, at the same time, the most specialized techniques for extracting water from the depths of the earth. This method is a

suitable water transfer system. This water transfer system is suitable for lands where water is directed from the foothills to arable lowlands.

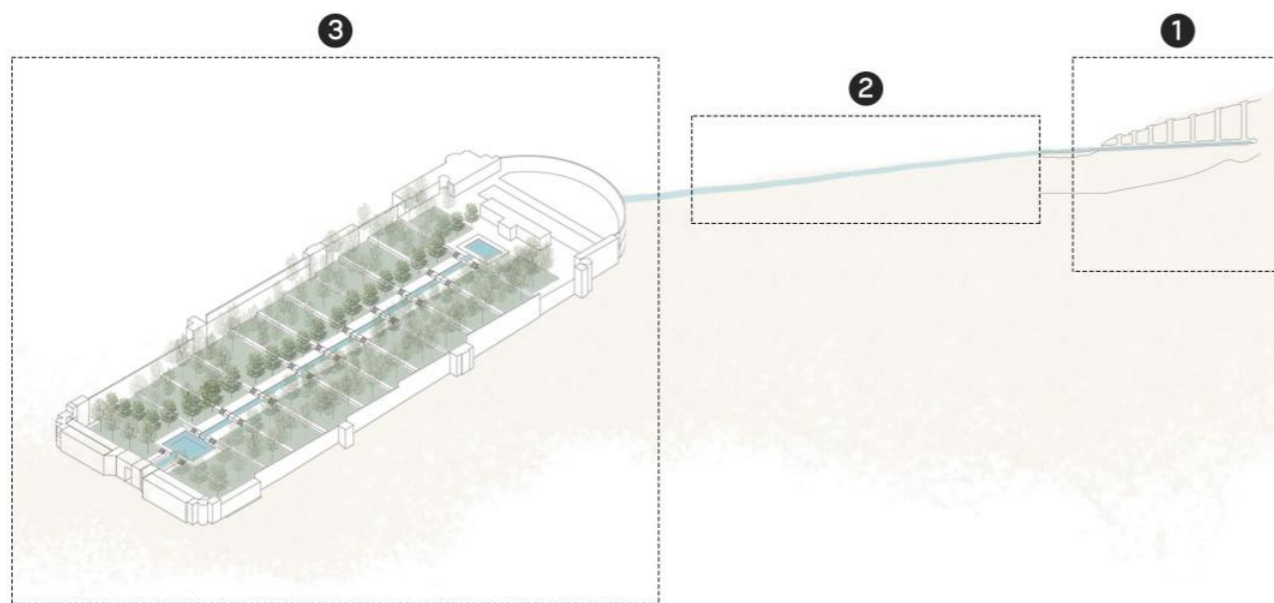
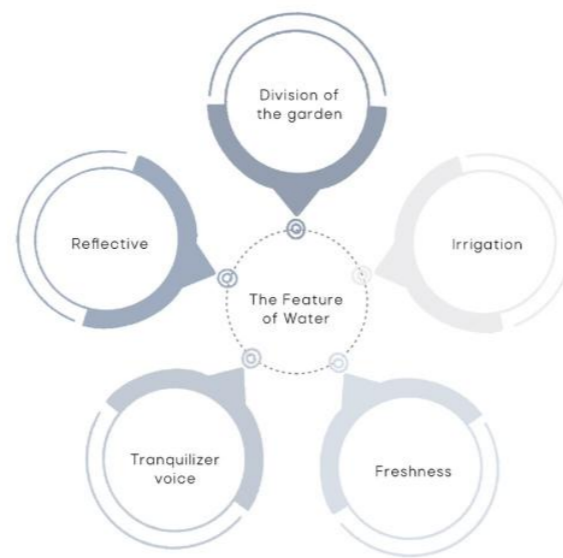
Despite the diversity of climates, there is no garden without the element of water. In the water-rich climates of the north, water in the garden has the most significant quantity compared to other elements. In dry and desert climates, this lack of quantity is compensated by various and numerous games of design, shape, and sound. A pond, a pool, and a fountain are among the forms of using water, and flow, stagnation, and splashing are among the modes of displaying this element in an Iranian garden. Also, the phenomenon of stagnant water reflection in the pool and pools located in front of the pavilion helps to create a view for the viewer.



Water stream in Persian gardens

The presence of water in the garden is not only responsible for the separation of the garden plan, but it also irrigates the trees and green space, adjusts the air temperature in hot seasons, and creates a relaxing atmosphere by making the sound of the water flow in the canal. Usually, the water supply to the gardens of the dry plateau of Iran has been in such a way that the underground water or the water from the springs of the foothills has been directed towards the cities using aqueducts or clay pipes and with the help of the slope of the land, and near the desired places in the form of water storage or water retention ponds. It was stored. The water used in this part was directed into the desired environments, such as gardens in the form of mud pipes

or open streams. Garden builders utilized the slope of the land for running the water within channels, sometimes in the form of small waterfalls, which could perform aesthetically and function as an acoustic element throughout the garden. (Taghvaei, 2011)



The starting point of the Persian Gardens

1.3.5 | The plants

Trees not only produce fruits and yields but also provide shade, freshness, and coolness. This freshness is desirable and pleasurable in the hot arid lands of Persia. Trees' shades make the severe, hot, and



What a tree do in Persian garden

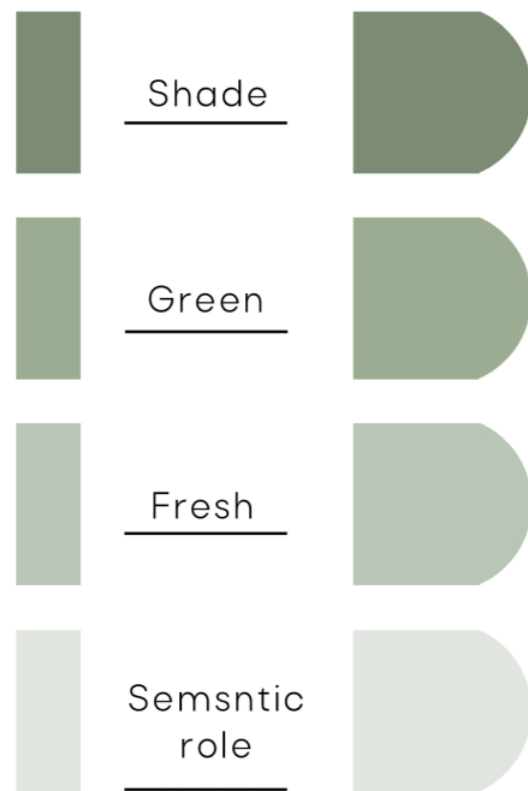
dry territories of Iran tolerable and even desirable, like a paradise, and this can intensify the Iranians' respect for trees and plants. (Moynihan, 1980) The greenness of the Persian garden, which contrasted with the dryness of the surroundings, is one of the recurring themes in the history of Iran's ecology. For example, unlike the traditional form of gardens in Japan, whose main purpose is to create a naturalistic point of view, the Persian garden is a symbol of human domination in a dry and harsh environment. The Persian Garden was a part of the Iranian settled civilization, and it was different from the plains where the Turkic and Mongol tribes lived and the desert animal husbandry communities

that lived in the suburbs of the cities or coexisted or complemented the settled societies. (Subtelney, 2017) Preservation of the natural landscape of trees, shrubs, and bushes is one of the essential characteristics of garden design in Iran. Like Europeans, the Iranian gardener never confines free nature to straight lines and does not present trees, boxwoods, and bushes in the form of geometric volumes, and does not present an artificial order to the soft and well-composed twists and turns of the branches). (Sackville-West, 1957)

Gardening, composition, and order of planting trees, flowers, and plants in Iranian gardens are subject to relationships and rules and monitor efficiency, dynamics, dealing with environmental incompatibilities, favorable weather and harvesting, beauty, and eye-catching in different seasons of the year. (Abolghasemi, 2011) Plants are planted in the Iranian garden to create shade, harvest, and decoration.

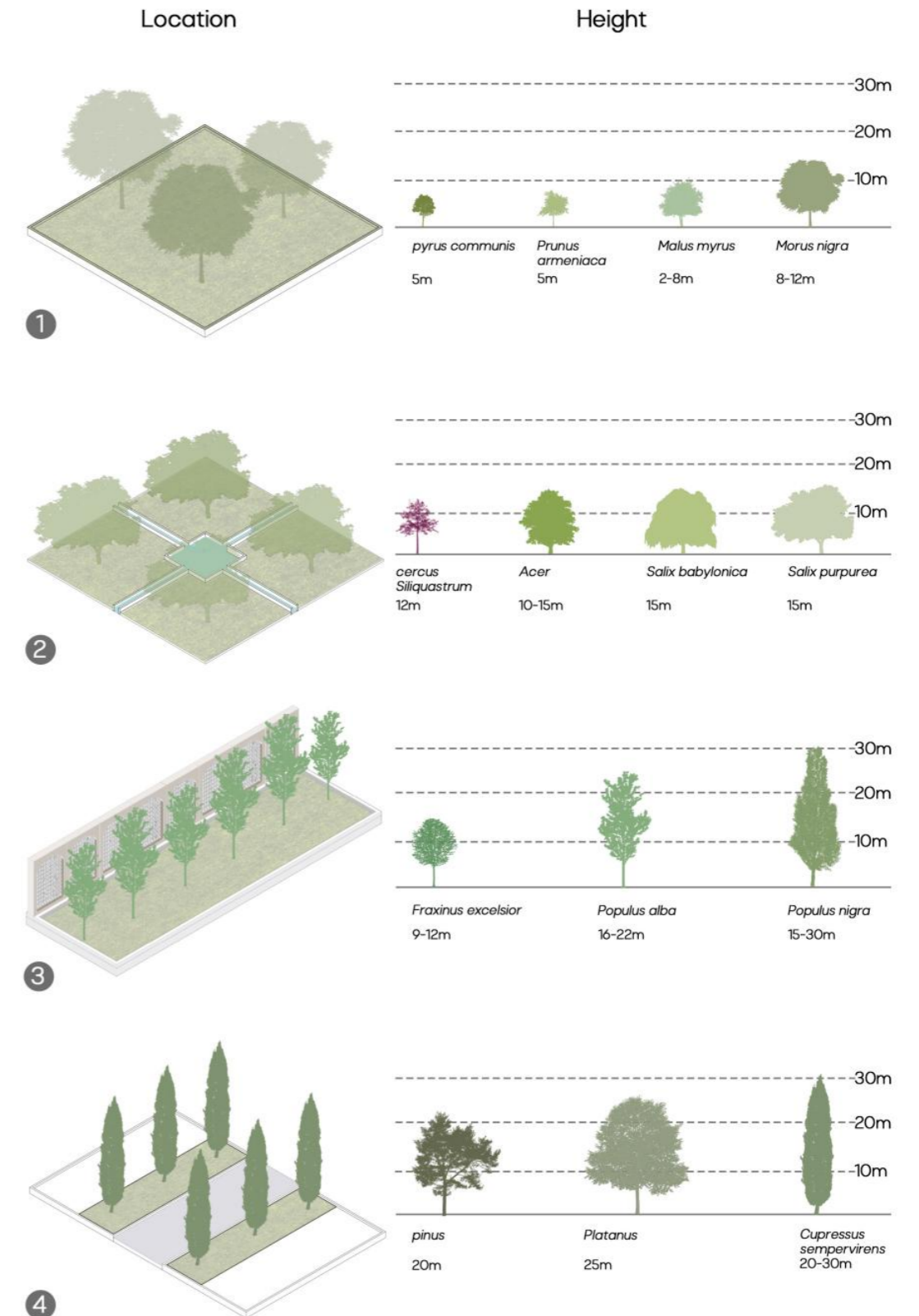
The main volume of plants is towards shady and productive trees, and flowers and decorative plants are less in the gardens. (Massoudi, 2009) Plants in the garden can be divided into three groups: trees, bushes, and decorative (seasonal) flowers. Also, each place in the garden is dedicated to a particular type of plant and tree that Iranians have acquired through centuries of experience.

Additionally, the shade of trees prevents the excessive evaporation of the water flowing in channels. The surrounding trees define the axis and emphasize it in an aesthetical way. Trees are not only designed and planted in the Persian gardens but also crafted and utilized in the architecture and ornaments of Persian gardens' pavilions. Archimedean art is filled with different types of trees of life. Fruit trees are very important because of making the change in the garden during different seasons. (Levinson, 2015) The essential characteristics of trees and plants in the garden are mentioned below:

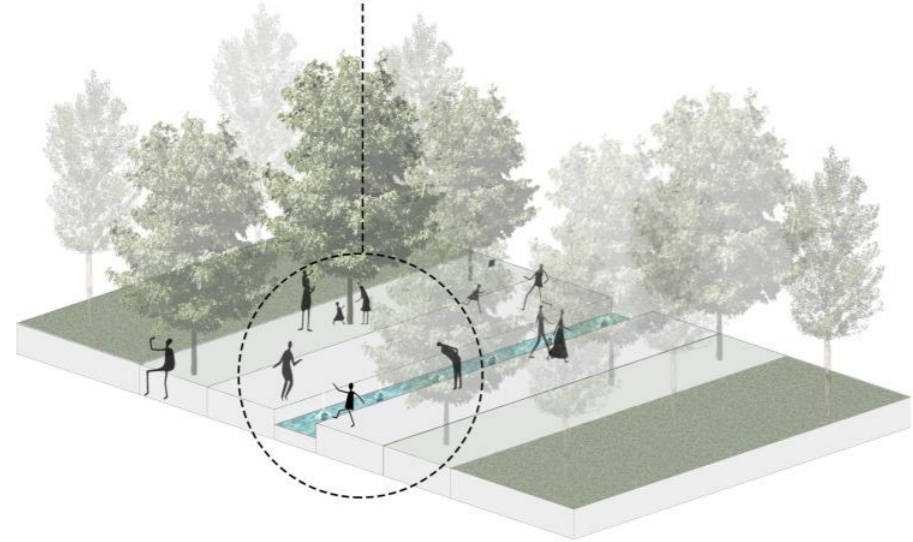
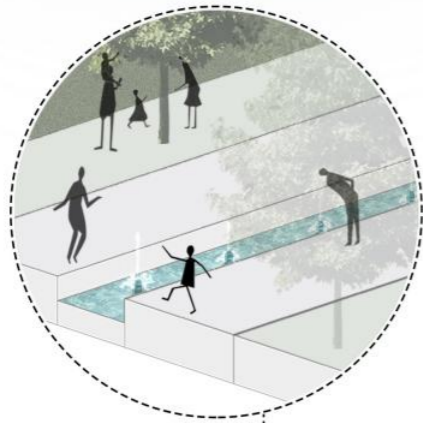


The presence of ever-green trees

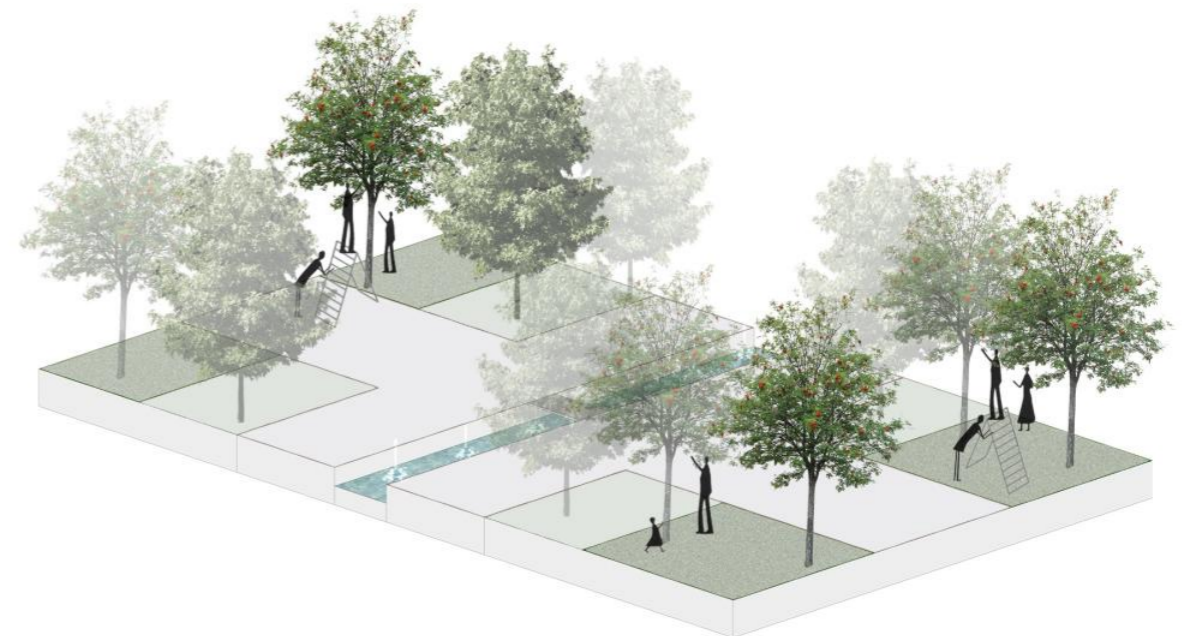
- Creating shade by shade trees such as willow, plantain, and elm; creating comfort and coolness; functional quality; as material and adequate cause
 - The use of rows of cypress and plantain trees in the central axes of the garden and, in many cases, one in between; Color variation and climatic reasons; as the active cause
 -The central axis of the rest of the garden procedures; gardens full of fruit trees regularly; production; as the active cause
 - Instead of planting trees and tall bushes between the plots to cover the view of the building, spats were used: as material and active cause



Types of trees in the Iranian garden according to use



Title: different kinds of planets and greeneries in Persian garden (Act as fences, decorative planets, fruit trees, evergreen trees, etc)



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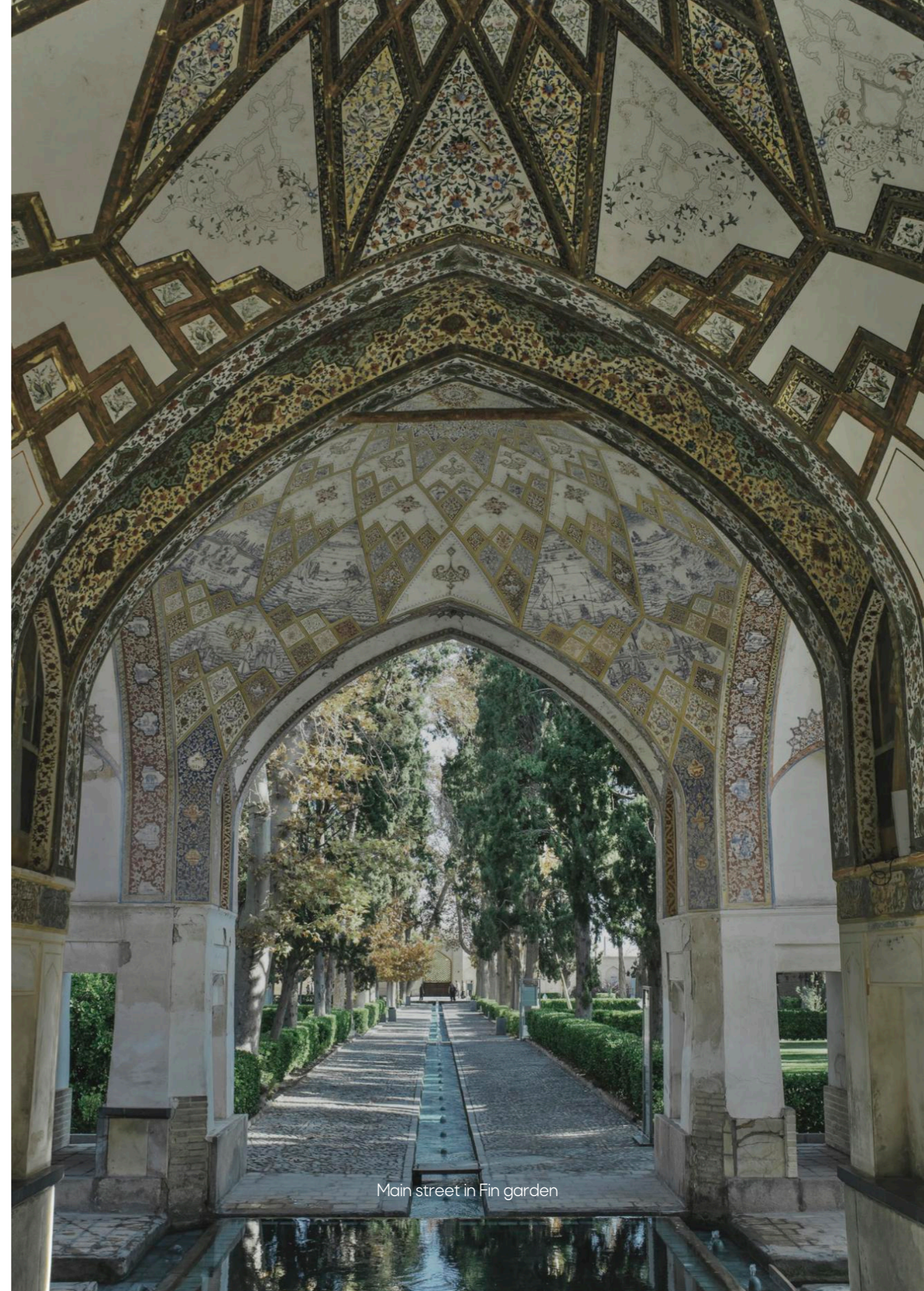
02-Case studies

2.1 | Fin garden

Kashan- Iran

Kashan is a region on the edge of the desert (the distance between the mountains and the desert) that has been inhabited since the distant past due to its geographical and climatic features, from the period of settlement in the villages and the beginning of settlement (the ancient site of Silk) until now. It is located on one side facing the desert and on the other side facing the mountains. It has special characteristics. These unique characteristics caused the formation of the city on a series of gardens, the origin of which are aqueducts and water paths from the mountains, fertile lands, etc. This complete structure, over time, expresses the close relationship between the cultural and natural contexts and depicts the adaptation and alignment of the needs of man and nature. (Heydari, 2015) The area where the Fin Garden is located is known as Small Fin, and its location is in the southwest of Kashan city. The historic Fin Garden is located at the southeast end of Fin Road in Kashan city and adjacent to the historical Suleiman Spring. In the past, there was a system of gardens in the Finn

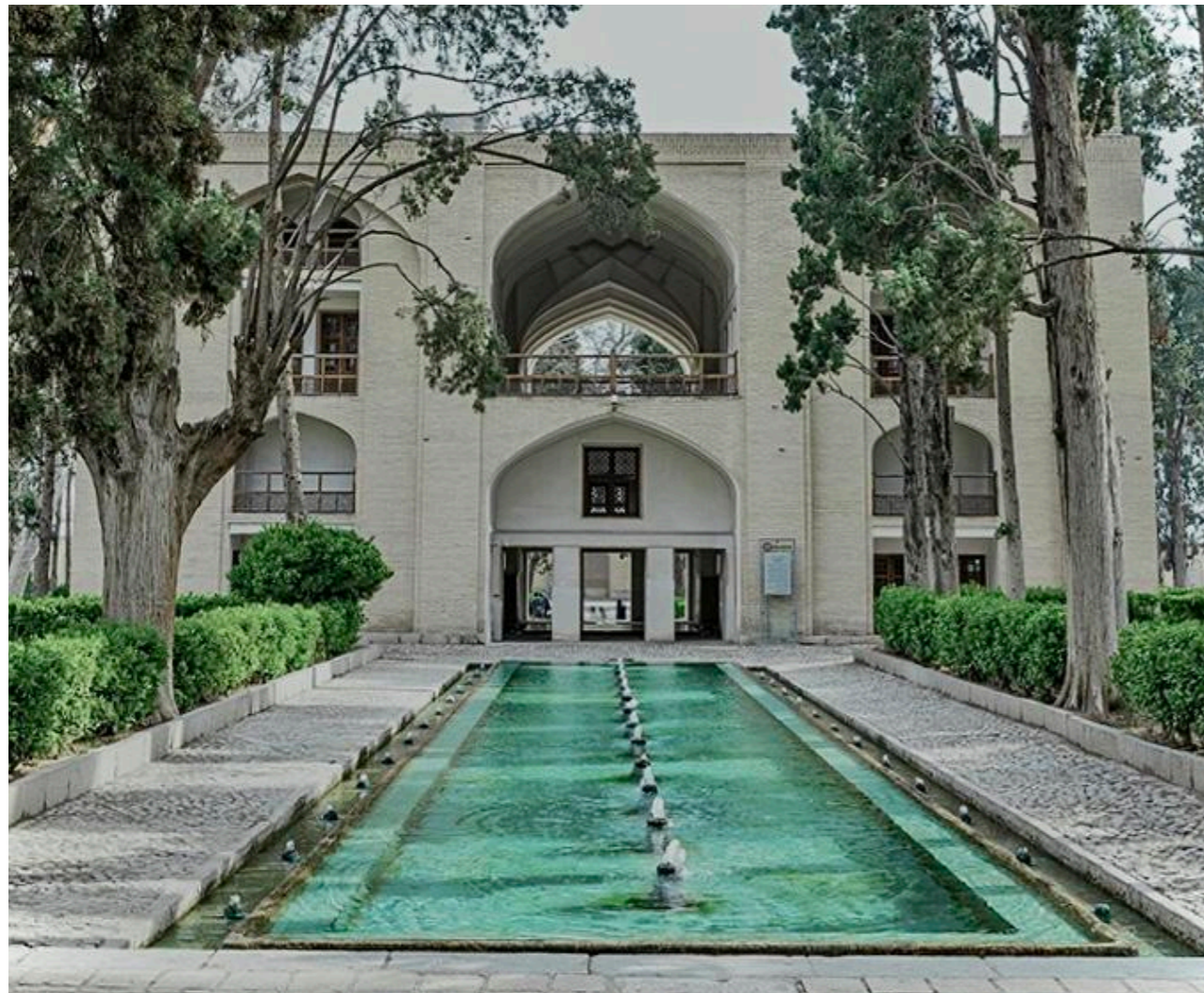
district, of which the Finn garden was the most important. (Kaveh Bukani, 2014) The historical record of this garden can be attributed to a garden that, according to historical texts, has existed since the early Islamic centuries after the earthquake of 982 AH, Kashan faced destruction, and its place is now known as the old garden. The current garden was built by order of Shah Abbas I of Safavi, who was very interested in Kashan, around the year 1000 A.H. and in a place above the old garden and close to it, in the vicinity of Sulaymaniyah spring. During the following periods, many mansions were added to it. One of the sad events in this garden is the killing of Amir Kabir by order of Naseruddin Shah. Amir Kabir, the first Prime Minister of Iran during the time of Naseruddin Shah, has done many services for Iran. Although the killing of Amir Kabir in Bagh Fin Kashan is a bitter incident, it is considered one of the critical historical events. This historical event has made this garden more famous.



Main street in Fin garden

Fin Garden, which has an area of about 2,300 square meters, is surrounded by a tower and a strong rampart, along with a magnificent mansion and a two-story entrance gate. The green space inside the garden is divided into four sections or four gardens, with paths of water streams, beautiful small fountains embedded in them, tall and towering cedar trees with a lifespan of several hundred years, and a

precise and unique water supply system. The way to regulate the fountains and streams are among the prominent and essential features of this garden. This garden was registered in the list of national monuments in 1935 with number 238, and in 2011 with eight other historical gardens under the title "Persian garden," it was placed in the world heritage list with number 1372. (Khiabani,2011)

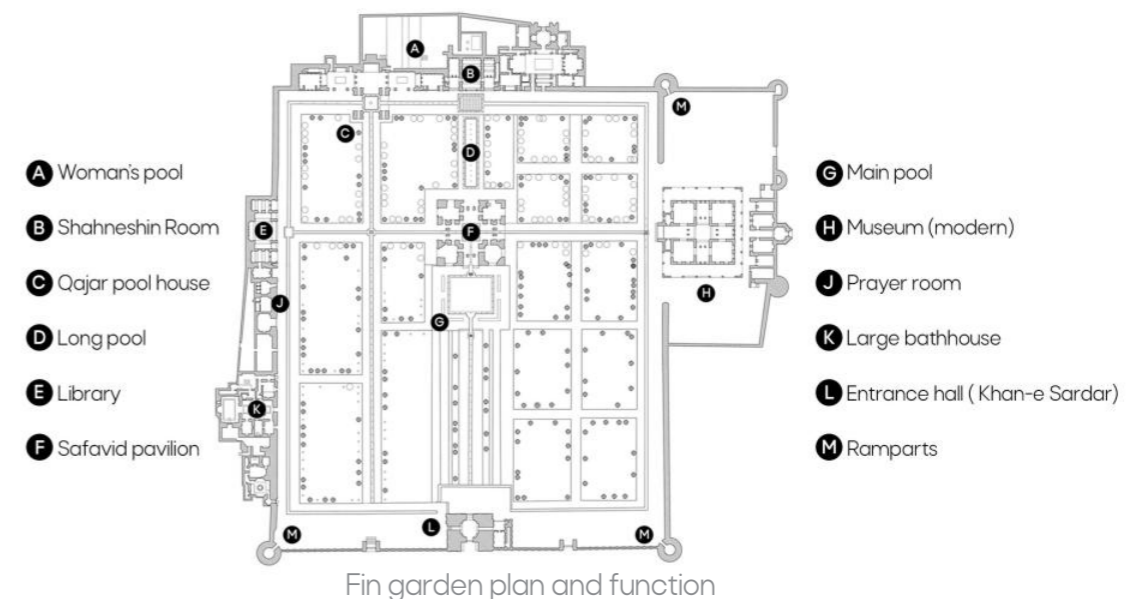


Water transfer streams, Fin garden

2.1.1 | Garden structure

The garden's general framework and primary structure is a geometric and pure space. At a point in the middle of it, there is a pavilion called the Safavid throat camel*, and it is the meeting point of the principal axes of the garden. The courtyard itself is composed of components. Among these components, we can mention plots, access axes, fountains, pavilions, etc. Fin Garden is divided into four parts by two perpendicular blue axes. The public spaces inside the garden were also divided into smaller areas according to the geometric structure and perpendicular lines. In the beginning, this garden was wholly geometric and symmetrical, so it can be said that Fin Garden has the geometry

of four Iranian gardens. But over time, due to various reasons, the most important of which is the intervention of kings and government issues, the garden has gone out of its geometric state and complete symmetry. The main pavilion is one-third along the longitudinal axis of the garden. In this way, the primary landscape is elongated along the longitudinal axis of the garden. (Tabasi, Gurbanzadeh, 1387) In general, there are different architectural part including: Safavid Pavilion, Twelve Fountains Pool, Karim Khani Backyard, boiling pool, royal hall, Qajar Pavilion, Royal Bath, Safavid Bath, library and kashan museum



* A camel throat is a traditional water structure that carries water from one place to another so that if there are obstacles in the way of water, such as roads, rivers, etc., the barrier level is lower. It is possible to transport water easily by building a camel's mouth. The function of camels in traditional water structures is like the role of reverse siphons in modern water structures. In the past, to ensure the security of the gardens and houses located in the water path of the aqueducts and springs, the entrance and exit of the water were designed so that no living creature could enter. For this purpose, under the wall of the house, they built a channel in the shape of an obtuse angle so that the water goes down from one side at a suitable height and rises from the other side according to the base of the related containers. Since the shape of these channels is like the neck and throat of a camel, such a structure was called «camel throat.»

2.1.2 | axes

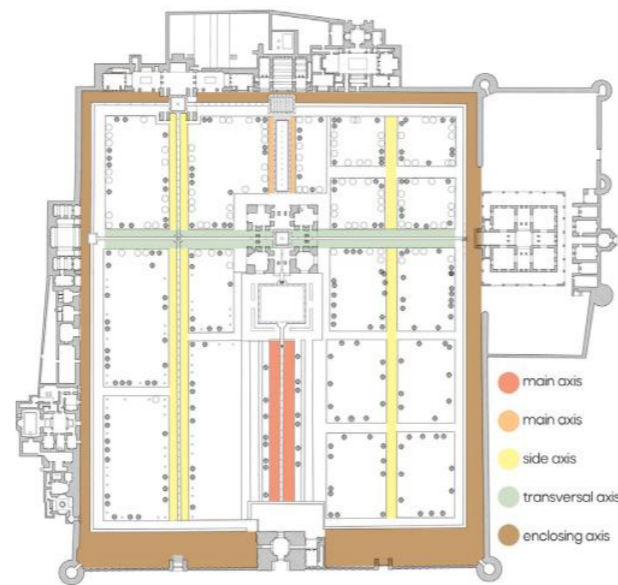
The central axis is a street that ends from the door (the designated space for entering the garden) to the royal hall, and the main pavilion of the garden is in the middle of this space. The row of trees on this street, along with the atmosphere between it and the age of some trees lining the current lane, confirm the current shape of this street. Because this axis is more expansive than other axes and the main view of the garden is located along it, this axis is considered the central axis of the Fin Garden.

Along the main street and on the other side of the pavilion, an open space can be seen, which is the extension of the main street in terms of the spatial structure of the garden. This street has been given a new shape regarding the presence of water and visual effects. The boiling water pool and the twelve fountains pool are in it, and the royal hall is at the end. (Jihani, Omrani, 2007)

The other axes of the garden are the two streets parallel to the main street; the street in front of Fath Ali Shah's hut became wider during the Qajar era and caused asymmetry in the plan of the garden, thus becoming an essential element in the spatial structure of the garden.

The garden also has a central transversal axis, where the garden pavilion is built at its intersection with the central axis. At one end of this transverse axis, the library

is located, and on the other side, the museum building is located outside the main fence of the garden. (Tariveh, 2018) And finally, the side streets of the garden, which are enclosed on one side by the garden fence, complete the spatial structure of the garden. These streets are the last boundary of the garden.



Axis and streets map

2.1.3 | Terrace and Trees

The plots are units for building the garden's central space, and there are systematic and shade-extending trees on their margins. In the main area of the garden, there are currently 17 plots and four narrow gardens. (Jihani, Omrani, 2007) There are many trees in Fin Kashan Garden, the most important of which is 579 cypress trees and 11 plantain trees. The age of most garden trees is between 100 and 470 years. Considering the age of trees, it seems that the large and beautiful cedar tree has a significant and critical role in the garden's design and planting a few plantain trees was probably done to increase the visual quality.

The vital principle in the initial design of the garden was to maintain symmetry, but over time, due to the intervention of different kings, this symmetry decreased.



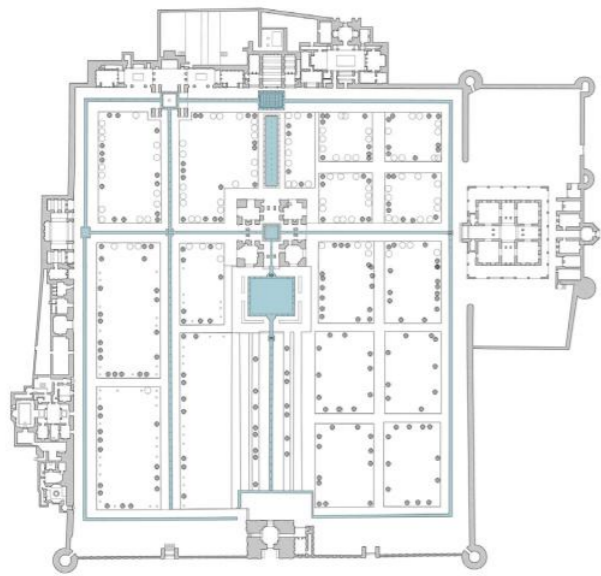
Green spaces and four garden structure

2.1.4 | Fountain and water supply system

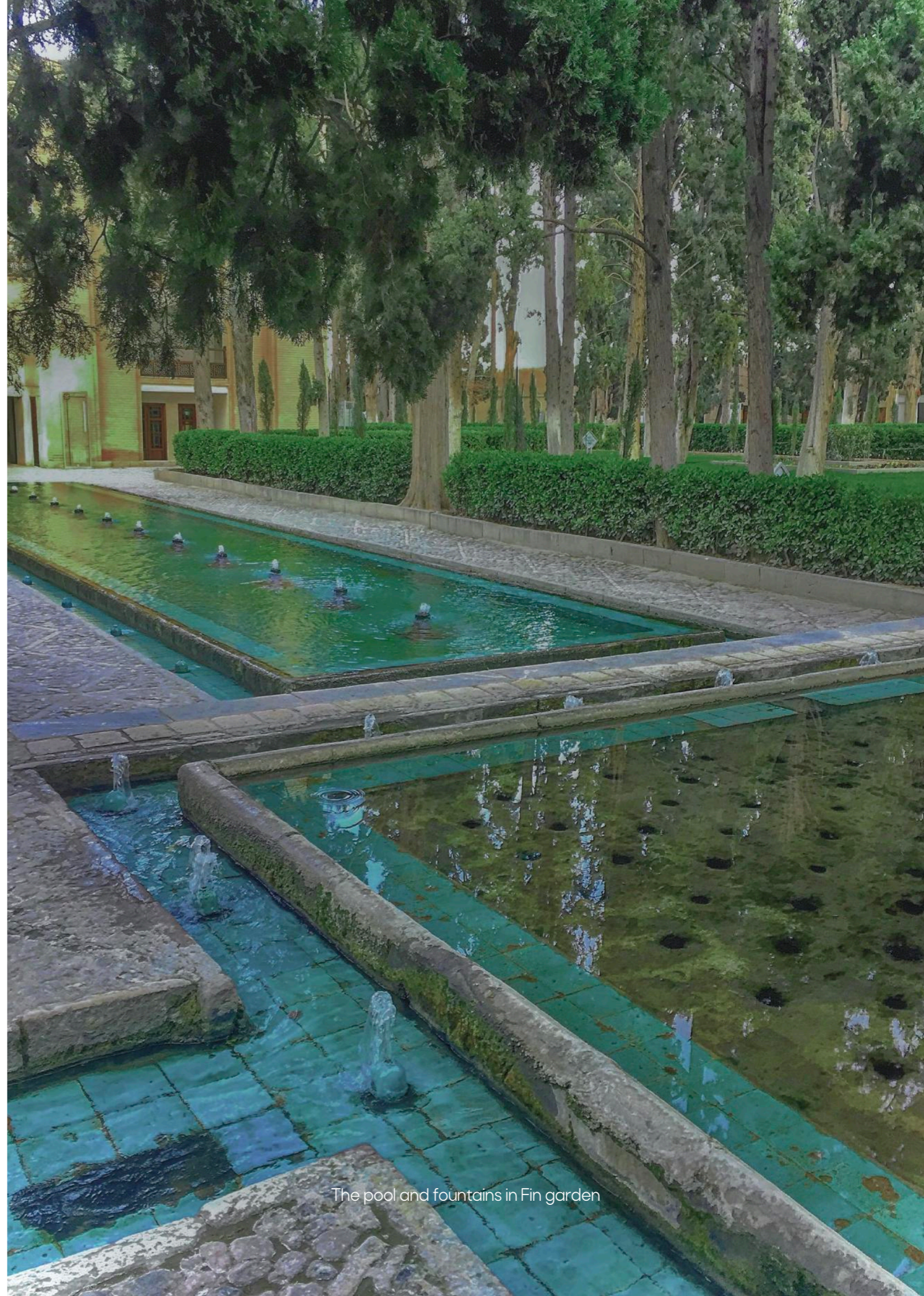
The most important feature of the garden is the water supply system and its unique garden design. The garden's water is supplied by a spring called Sulaymaniyah, seven thousand years old. One of the characteristics of spring water is its amount, which does not depend on the annual rainfall and the rainy season and the low rainy season, and the water flow is always constant; even in drought years, this amount does not change. The second feature of the water is its temperature, which is steady at 25 degrees throughout the year. In winter, when the environment is cold, the water seems warm; in the summer, when the climate is hot, the water appears cool.

The system designer is the famous mathematician of the 10th century and the Safavid era, Ghiyasuddin Jamshid Kashani. Two hundred years before Pascal, he used the law of surface difference and took advantage of the natural slope of the earth. But about the fountains, it can be said that under all the streams and around all the ponds, at a depth of one meter of the ground, there are pipes called "Tabusheh" that are made of clay, which are connected to the main ponds on one side and the other side. The end of the atmosphere is blocked. Water enters from one side, and because the end of the pipe is blocked, the water comes out of the fountains.

Because the earth's surface is sloping, the diameter of the line is different to divide the pressure. The beginning of the tube is thicker than the end, so the force is divided, and the water comes out of the fountain at the same rate.



Water ways map in Fin Gardens



The pool and fountains in Fin garden

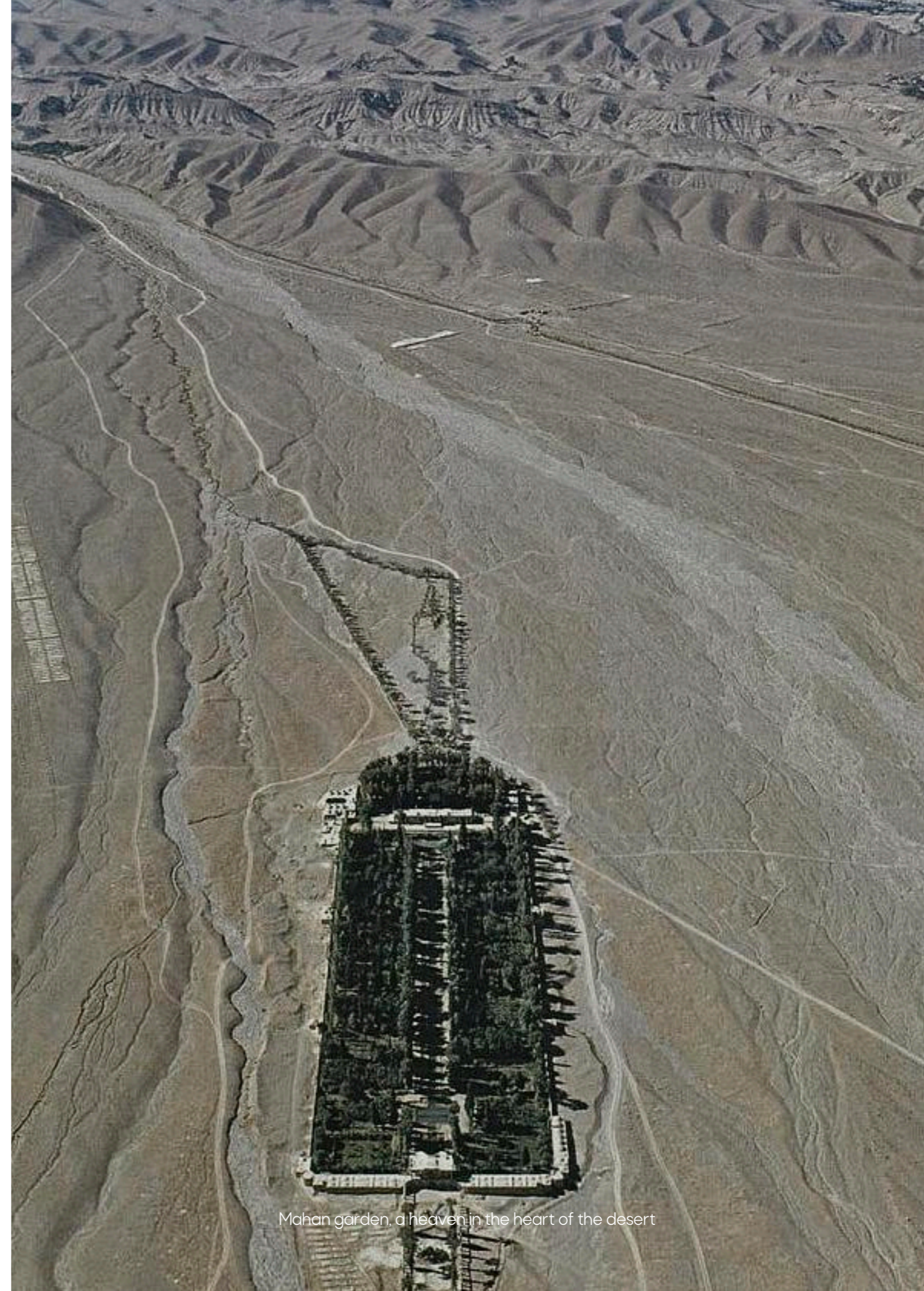
2.2 | Mahan garden

Kerman-Iran

Bagh-e Shahzadeh (Prince Garden) is located 35km southeast of Kerman City and 6 km from Mahan Town. It stands on the Kerman-Bam roadway near Jupar Highlands. This garden was used as a temporary residence for the ruler of Kerman and Baluchistan (Mirza Naseroldoleh Farmanfarma) and was possibly used for large reception ceremonies. Among its design characteristics is its location upon the plain slope resulting in an elevation difference of 325m between the garden's highest point and the frontispiece house. Bagh-e Shahzadeh is quite distinct from its surrounding terrain. It shows the intricacy and significance of Persian Gardens in the desert and highlights the difference between them and other world gardens. (WHC, 2011: 439)

The significant temperature difference between day and night is one of the climatic features of this area. Bagh-e Takht-e Shahzadeh (Prince's throne or flat garden) is 5.5 hectares, rectangular, with an approximately 4.6% slope. The garden stands on a vast, open terrain encircled by far-off mountains on two sides and a high fence separates it from the harsh environment surrounding it. In particular, the high mountains provide an eye-catching background landscape for the garden. Compared to other gardens, the great length of this garden intensifies

visual excitement by deepening the perspective. Among other outstanding features of the garden are its sonant fountains which make a water symphony in a Baroque-like Garden, as well as the architecture of its entrance. (Idem: 217) The existence of fertile soil, necessary sunshine, gentle wind, and breeze, and finally access to water (Tigran Aqueduct) has miraculously made it possible to create a garden of that scale in the dry and waterless expanses of grass. Materials used in garden buildings are primarily sun-dried bricks or mud bricks with plaster of Kahgel and gypsum, which Narreh tiles have adorned at spots such as the frontispiece house. Generally, decorations related to architecture are observed in the frontispiece house. Plants arrangement system has been based on the shadow-casting pattern of the garden so that along the garden's central axis, a shaded section is seen on one side of the route at all hours of the day. (WHC, 2011: 439)



Mahan garden, a heaven in the heart of the desert

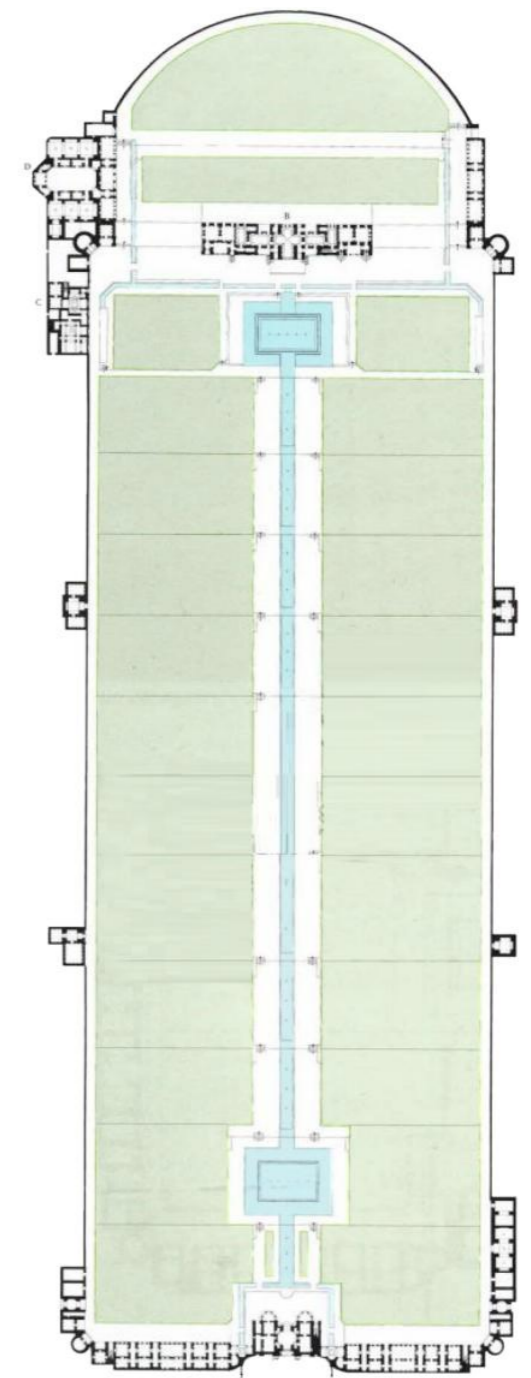
2.2.1 | Garden structure

The main shape of Prince's garden is rectangular, with an approximate ratio of four to one. The overall length of the garden is 407 meters, and its width is 122 meters. The overall division of the garden can be identified as a longitudinal axis and two focal points (the main building of the garden in the upper part and the entrance area in the lower part). The secondary axes are horizontal and Perpendicular to the central axis; at the border of the difference in levels, they created the plots, whose number is eight on each side. (Naima, 2015)

The garden buildings are divided into three categories: the main building is located on the highest part. The main building of the house is in the entrance part, and other service buildings are tangent to the leading wall and outside it.

The architectural system is closely related to the garden's spatial and geometrical system of the garden. A long and complex wall surrounds the area of the garden. This wall separates the garden from the outside environment, with the buildings inside or occupying a part of the garden's outer area. The landscaping of the garden and its layering through the levels of the plots exposes the surface of the garden. Therefore, the simple relationship between the observer and the ground becomes richer. The flow of water, especially the ponds, in addition to emphasizing the axes and the national

waterscape in the form of waterfalls, has provided transparent surfaces on the ground to reflect other elements. (Almasi far, 2009)



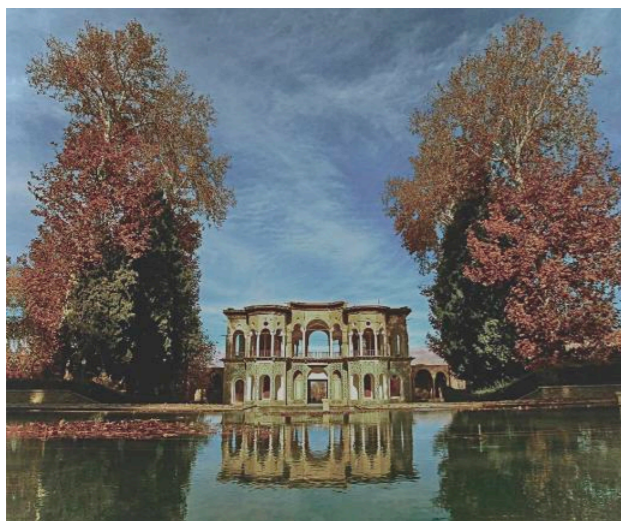
Mahanadi garden plan



Steps and main axis in Mahan garden

2.2.2 | Architecture

The garden buildings include the main hut, which means the owner's permanent or seasonal residence, located at the upper end of the garden. The front door at the garden's entrance occupies the front of the entrance in the form of linear masonry and is built on two floors. The upper floor has rooms designed for living and entertaining. Other service buildings of the garden have used the leading fence and have accommodated various service buildings in suitable places in the form of compound walls. The side entrances of the garden are also provided on two longitudinal sides. The design of the Shahzdeh garden has made the best use of the garden's landscape, which is the main feature of the beds. The view of the long sides of the garden from the main pavilion to other parts of the garden and vice versa from the front of the house gives a unique



The main entrance of Mahan garden

richness to the life in the garden. (Saeedian, 2010) The exterior views of the garden, which can be seen from inside or outside, show the contrast between the two environmental qualities of the outside garden and the garden, which is a rare and unique example of the Shahzdeh garden. The appropriate shade or coloring in different garden seasons defines exceptional values for it. (Almasi far, 2009)

2.2.3 | water supply system

Prince Garden was built on the Tigran River, one of the leading irrigation networks of Mahan city, which passes through the garden. Before entering the garden, the water is divided into two parts. Part of it is poured into a significant source about 200 meters away from the garden, and from there, it reaches the central fountains of the garden through an underground path. The other part of the water comes through streams. It enters the garden directly and flows in it. Before reaching the garden, this part of the water passes through the divider above the garden, and the water distribution system for downstream consumers is organized in this divider.

On the other hand, part of the water that goes to the source above the garden enters the fountains of the ponds through underground pipes, and due to the height difference of about 15 meters compared to the main pond, these fountains become very high. On the other hand, we should also mention the water that enters the garden through the atmosphere. After entering the garden, this water is divided into two parts. The first part has a decorative function and enters the main axis of the central street.

This water includes two ponds at the beginning and end of the path and a series of waterfalls organized in a linear axis. The other part also flows in two streams on the edge of the central axis or individual streams on the edge of the wall. At the end of the path, all the water enters a pond, and from there, it is directed to another large pond outside the garden through an underground road. Furthermore, it is directed again in its typical path toward the divider of Tigran. (Masoudi, 2008)



Mahan garden water ways



2.3 | Mughal Gardens

Shalimar Gardens

Lahore- Pakistan

Historical Background of Mughal Gardens

Mughal gardens are a type of garden built by the Mongols. This style was influenced by Iranian gardens, especially the Chaharbagh structure, which was intended to create a representation of an earthly utopia where humans coexist in perfect harmony with all elements of nature. (Penelope Hobhouse, 2004) Considerable use of rectangular arrangements is made inside walled areas. Some typical features include pools, fountains, and canals within the gardens. Afghanistan, Bangladesh,

India, and Pakistan have several Mughal gardens that differ from their Central Asian predecessors in their “highly regular geometry.”

From the beginning of the Mughal Empire, making gardens was a popular imperial pastime. Babur, the first Mughal conqueror king, built gardens in Lahore and Zholpur. His son, Humayun, does not seem to have had much time to build—he was busy recovering and expanding territory—but he is known to have spent much time in his father’s gardens. Akbar built several

gardens, first in Delhi, then in Agra, Akbar’s new capital. These gardens were more like riverside gardens than castle gardens built by his predecessors. The construction of riverside gardens instead of castle gardens significantly influenced later Mughal Garden architecture.

When Islam arose in Arab Peninsula, Arabs had no tradition of gardens. When Islam expanded to its neighboring territories and Persia was conquered by the Muslims in 651, they found lush green gardens there, and created gardens according to their religious ideology. At that time, the concept of Chaharbagh (four Gardens) blended into Islamic Garden design, and a new Islamic pattern of Persian Gardens evolved and spread to the

rest of the Muslim world. (Seemi, 2017) During the Mughal period, particularly during the Akbar, Jehangir, and Shah Jehan reigns, gardens became an essential part of the spatial organization and landscape, with many gardens laid out along the waterfront and en route to the Mughal centers. The genre of Mughal gardens included tomb gardens, palace gardens, fort gardens, and pleasure gardens, reaching the level of sophistication of the Shalimar Gardens. The Mughal elements of garden design, inspired by the Koranic description of paradise and comprising of the primordial elements of water, trees, and resting places, were used to engineer an exquisite water display and flowing water

reminiscent of the Mughal's Central Asian abode through the use of fountains, channels, chadars (waterfalls), main tanks; complimented with the formal layout of the charabagh, planted with a variety of trees chosen for their scents, fruits and beauty, and the structures of baradaris, hamans and pavilions all enclosed within a high perimeter wall reached its zenith with the laying of the Shalimar Gardens in 1642. (Unesco, 2006)

The project was completed in a brief period of one year, five months, and four days. Shalimar garden is considered one of the Shahjahan's finest achievements after the Taj Mahal, and it is indeed a landmark in the history of Mughal Garden architecture. In the opinion of many historians, the Shalimar Garden is one of the most elegant achievements of Mughal culture and is at its peak. (Nath, 1982)

Shalimar Lahore is located seven kilometers from the center of Lahore, next to the road from Lahore to the east. Its building was built by Ali Murad Khan, the ruler of Kandahar and one of the Iranian nobles. Due to his ability to engineer and dig wells and aqueducts, he was commissioned by the king to dig tunnels to bring water from the Ravi River to the royal gardens. This garden has an elongated parallelogram, or a diagonal rectangle surrounded by long brick walls. The garden dimensions include 658

meters from north to south and 4-5 meters different from the other.

Upper terrace: Farah Bakhsh means pleasure and happiness.

Middle terrace: Feiz Bakhsh means goodness, forgiveness.

Lower terrace: life-giving. (Karbala Hosseini, 2013)

2.3.1 | Structure

The garden's layout is an adaptation of another Islamic Garden layout known as the Persian gardens. This garden is built on flat land on a square plan with four radiating arms from a central location as the water source. It needed to be modified to suit the hilly terrain and availability of a well, which could be diverted from a higher elevation to the planned gardens. Modifications involved the central channel running through the garden axially from the top to the lowest point. This central channel, known as the Shah Nahar, is the garden's central axis. It runs through three terraces. This layout left out the radial arms, and the shape became rectangular instead of the square plan of the Chahar Bagh. The garden, as finally laid out, covers an area of 12.4 hectares built with a size of 587 meters (1,926 ft) length on the central axis channel and with a total width of 251 meters (823 ft). The garden has three terraces fitted with fountains and

sycamore tree-lined vistas. The royal channel is the main feeder channel to all the terraces. Each one of the three terraces has a specific role.

The lowest terrace, called Hayat Baksh (Bestower of Life), was the only one with a public entrance. It was open to the court's noblemen and permitted limited access to the public at times. A small black marble throne was installed over the waterfall in this hall.

The middle terrace, Faiz Baksh (Bestower of Goodness), was engaged by the emperor himself. The second terrace garden along the axial canal, slightly broader, has two shallow terraces. The Private Audience Hall, accessible only to the noblemen or guests of the court, now derelict, is in its center. The royal bathrooms are located on the northwest boundary of this enclosure. The fountain pools of the Private Audience Hall, the public audience, and the women's terrace are supplied in succession. It has 410 fountains.

The highest terrace is called Farah Baksh (Bestower of Pleasure). It is partly concealed from view; it is believed that monarchical women primarily used it because of its privacy. On the third terrace, the axial water channel flows through the women's garden, flanked by the private Audience Hall. At the entrance to this terrace, two small pavilions or guard rooms are the restricted and controlled

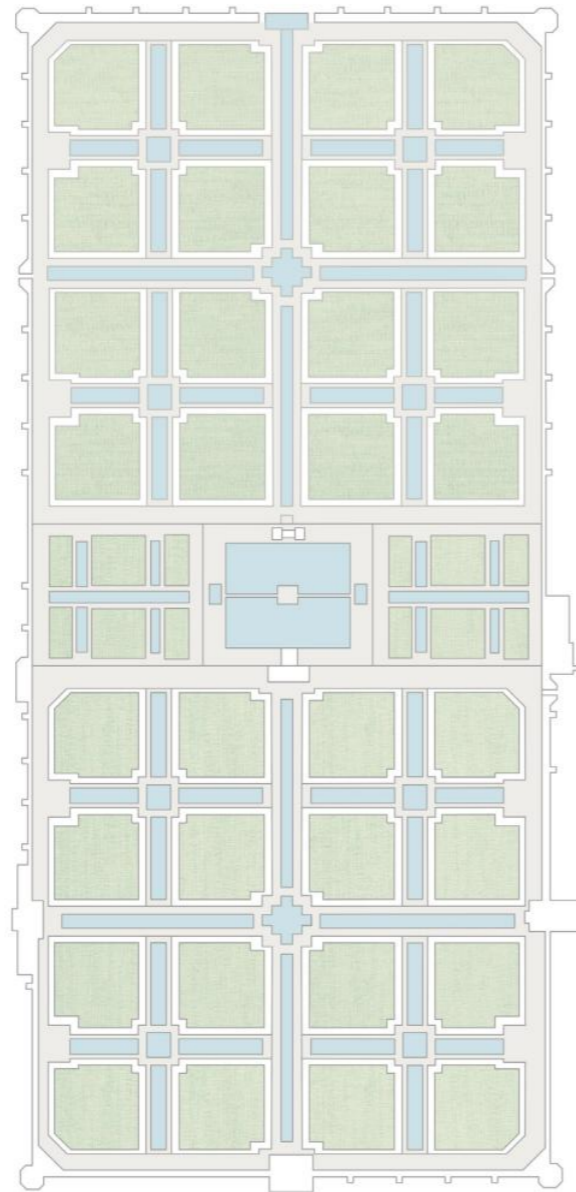
entry zone of the royal harem.

Shahjahan built a Black Pavilion in the women's garden. It is encircled by a fountain pool that receives its supply from a higher terrace. A double cascade falls against a low wall carved with small niches (chini khana) behind the pavilion. Two smaller, secondary water canals lead from the Black Pavilion to a small pavilion. Above the third level, two octagonal pavilions define the end wall of the garden. The pavilion has a lovely backdrop of the snow mountains, considered a befitting setting for the Bagh.

The rising hierarchy of the terraces is significant in symbolizing the respective social classes in the court.

2.3.2 | Architecture

The garden contains many buildings. These charming buildings include summer pavilions, the private and public audience Hall, sleeping chambers, a bathhouse, elegant gateways, and towers. The buildings were constructed for different purposes that served the Royal family and the visitors of the time. The upper terrace alone has eight buildings, four in the middle of the sides and four in the corners. The building in the middle of the southern side was the resting chambers. Comprising three rooms, it is fronted with a deep verandah having three cusped arched openings in the front and one on each side. Originally the building was decorated with frescoes. As a result of the change in the alignment of the Grand Trunk Road, the "Aramgah" now serves as the main entrance. The upper terrace, which is 15 feet higher than the middle, terminates on a brick wall. The northern face of the wall, in the central part of the mid-terrace, is embellished with cusped arched panels in red sandstone and white marble. Two red sandstone staircases through the wall, one each on the east and west. Moreover, the west of the "Aiwan" provides access to the central part of the middle terrace. Beyond the staircases, two ramps paved with bricks on the edge lead to the middle of the terrace's eastern and western parts. In the middle of the eastern side was the



Shalimar garden plan

original building of the Balcony of the Hall of Private and Public Audience". In front of the Balcony, on the outside, there was a hall having a separate enclosure of its own. This enclosure is also commonly known as the House of Drums. Opposite the Balcony on the western side of the terrace is a similar building known as the

sleeping chambers of the empress or the residence of Princess Jahan Ara, the eldest daughter of Emperor Shah Jahan. The arcaded building in the middle of the northern side, overlooking the great marble cascade and the two lower terraces, is the Grand Hall. Originally it was also embellished with exquisite frescoes. The walls have marble dadoes. The mirrored ceiling in various bays is reminiscent of Sikh repairs. This hall was used for ceremonial purposes. (Sikander, 1986) Close to the "Aiwan," on its southeast, is a small, simple building with an underground cellar. Each corner of this terrace is occupied by a tower comprising an octagonal chamber surmounted by a red sandstone octagonal pavilion. On the eastern wall of the middle terrace, near its southeast corner, is located the bath suite comprising a cold bath and a larger dressing room. On the eastern and western fringes of the great tank are two pavilions initially built in red sandstone. In the center of the great tank, approached from the pavilions by red sandstone causeways, is a raised platform called "mahtabi" or "of the moon" since it was used for sitting out of doors to enjoy the moonlight. Originally the "mahtabi" was paved with marble and had marble railings. Between the great cascade below the "Aiwan" and the tank is a royal marble throne with skillfully perforated railings. It was

this throne that the emperor used on important occasions. On two sides of the northern side, two pavilions stand, which initially were built in marble but now are lime plastered. In between the pavilions lies a deep tank. Its three marble-faced walls have "chini-khana" or "small niches" in which golden flower vases were placed in the daytime and camphorated wax candles at night. The fourth side of the tank, the northern side, is open. The candles make an endless chain of shimmering light and create color reflections on the water sheet in front of the niches. This is called a Chain of lights. The lowest terrace also contains an arched pavilion in the middle of the northern side. This was the Hall of Private Audience. The middle of this hall was a fountain like a foaming spring. The gateways are the only structures in the garden where tile mosaic decoration has been used. (Sikander, 1986)

2.3.3 | Water system

The canal water from the river Ravi at Rajpur, about one hundred miles northeast of Lahore, entered the gardens from the south. Flowing underneath the "Aramgah" building in the middle of the southern side of the upper terrace, it reappeared in the main canal, filling the central tank at the intersection of the canals and overflowing into side canals.

Crossing the upper terrace and passing underneath the building in the middle of its northern side, it rippled over the marble cascade and discharged into the main tank on the middle terrace. This tank served as a storage reservoir to supply water to the fountains on the lower terrace. After filling the tank, the canal water split into two small cascades on the eastern

and the western sides and flowing over the "Sawan Bhadun" it passed into the lower terrace canals. Eventually, it flowed out of the northern side of the Shalimar Gardens. The canal water was also used to irrigate grassy plots and trees. Canal waters did not feed the fountains on the upper terrace and the bath suites. Independent arrangements included

wells and elevated large reservoirs outside the gardens. An earthen Colaba line of 12' dia. supplied the water to the fountains. Another similar line of 7 1/2" dia. Served the "Hammam." About one foot underneath, two feet on the sides, and four and a half feet above the collabs, bricks were laid in lime mortar to protect the Colaba line.



The pool and water ways in Shalimar Garden



2.4 | Spanish gardens

Alhambra Granada- Spain

A traditional Spanish Garden is a style of garden or designed landscape developed in historic Spain, incorporating principles and elements of garden design from precedents in ancient Persian gardens, Roman gardens, and Islamic gardens, and the wonderful Moorish gardens of the Al-Andalus era on the Iberian Peninsula. In the 20th and 21st centuries, a 'Spanish Garden,' or new gardens in Spain, have continued, interpreted, abstracted, or departed from these traditional planning and aesthetic motifs. (Correcher, 1993) The purpose of building the Andalusian gardens was to create a pleasant space

for the rulers to rest and have fun, beautify the palace, adjust the air temperature, and show the power of the government in different periods. Among the famous gardens are Medina Al-Zahra Gardens, Al-Hambra Gardens, Al-Kazar Gardens in Seville, Al-Jaafari Gardens, Al-Caraba Gardens in Malaga, and Al-Madail. These gardens are organized according to a specific pattern, and the same theme can be considered for all of them. This design is very similar to the Iranian garden sustainability system and its four garden patterns. Considering the age of the Iranian garden, this similarity can be

attributed to the influence of Iranian culture in the Andalusian Gardens system during the Islamic period. (Okhovat and zamani, 2011) Alhambra Gardens are an excellent example of Islamic gardening in Andalusia. The main feature of Alhambra in the field of gardening is the garden within the garden of this complex; the halls of the Alhambra complex open to the green gardens and allow the relationship of the adjacent gardens to enter. In the palaces left by the descendants of the Umayyads in Spain and North Africa, the effects of perpendicular axes and square divisions of Iranian gardens are evident so that the

examination of the system governing the Islamic gardens of Andalusia shows that the basis of the design of these gardens is very similar to the Iranian garden model and is in harmony with its spatial organization. (Okhovat and zamani, 2011) Granada is considered one of the critical and historical cities of Andalusia and the last base of Islam in Spain, and the essential remaining work is Alhambra. The name Alhambra appeared before the third century, maybe a little before that. The original building was built on the remains of the Iberians and Romans. This name was used for a small fortress in

which the Arabs took refuge during the rebellion. The area's name is probably a distortion of the name of a part of it, i.e., Alhambra Castle or the Red Castle, which is taken from the color of the tower that encloses it. (Chalungar and Abbasi, 2008)

2.4.1 | structure

A system of relationships between volumes and spaces in Alhambra Garden construction, under the influence of a holistic vision, has led to the creation of the overall shape of the garden. So that their formation is under the influence of a wholly organic and gradual view, and, at the same time, it is entirely systematic. This approach ultimately leads to the concept of spatial hierarchy and the diversity of spaces on a macro and micro scale. It can be stated that gardens, in their macro form, are contextual collections. They take their general shape and structure from the earth and have an organic appearance. They do not have a unique geometry system. However, with the use of spaces, the role of geometry and completely square and rectangular geometric shapes with remarkable proportions become colorful in the formation of the space. Nevertheless, Iranian gardens have perfect geometry in their general form. (Barrucand and Bednorz, 1992) In the Alhambra collection, this issue

is found in following the topography and characteristics of the hills, and the structure and shape of the collection can be seen as a whole consisting of members sewn together.

In the general shape of the collection, regular geometry is not visible, and the overall shape of the garden is affected by factors such as the substrate and urban textures.

However, in examining the small spaces of the garden, we come across a complete and regular geometry that has created coherence and balance in the gardens. These spaces include the courtyard and surrounding space, which follow square and rectangular shapes with specific proportions. The overall shape of the garden cannot be understood by placing it in any of the spaces.

What makes the overall perception of the garden is the coherence in the principles of landscaping and understanding the concept of space.

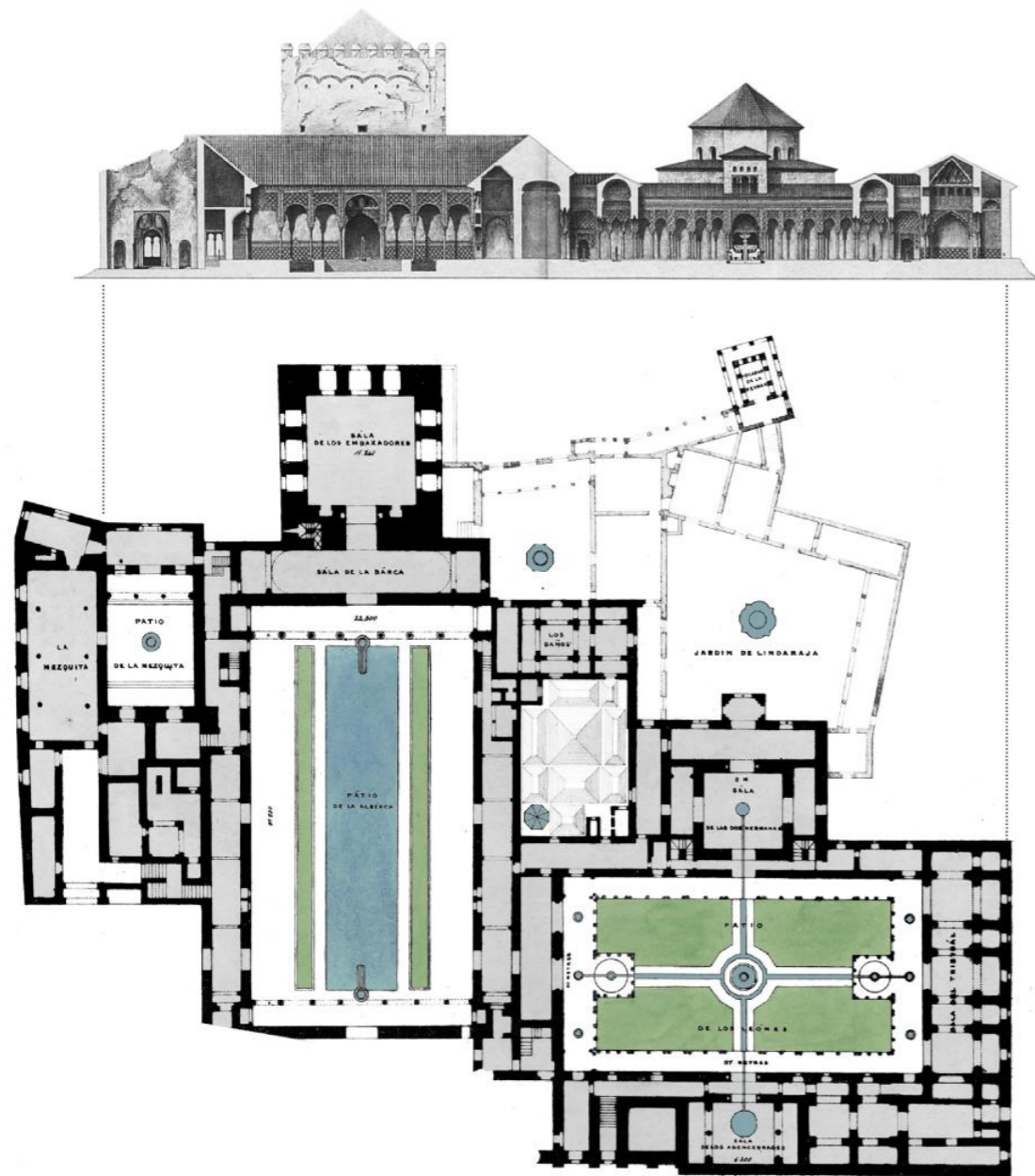
The existence of geometry that can be understood from within the space and the application of this order in the organization of open spaces in the scale of the irregular totality of the collections originates from the model of the Iranian urban complex. The Iranian Garden has appropriated a rectangle of land wherever possible and has applied its aesthetics without paying attention to the shape of the environment and its

requirements. However, the geometric system in the micro-space system in Andalusia is present in all the small and large samples visited in the field study, which is considered one of the general principles of this style. (Soltani, 2013)

2.4.2 | Architecture

Alhambra is a collection of buildings, of which the three palaces are only a part of this collection. Although the original building is from the 3rd century or earlier, the central part of this collection is related to the era of Bani Nasr. The rulers of this dynasty each added a building to this collection. This small Islamic state, which benefited from commercial, agricultural, and industrial wealth, built many buildings on the hill overlooking the city of Granada. Also, the Christians dominated this city after the Muslims. The complex of Alhambra is layers of the royal residence. In its final form, it can be described as a western acropolis or a self-sufficient royal city that has functioned as a government headquarters, a decoration of booths in the middle of gardens and parks. Moreover, many animals were kept in; in short, it was a vast campus. (Brand Helen, 2010) The annexes of fortresses and palaces include government offices, organizations, mints, barracks for guards, places for palace servants and several

great men, and in short, all the necessary administrative organs for everyday urban life, such as workshops, shops, a large mosque, and the bathrooms have been done. The complex has three parts: fortresses, palaces, and the royal city. The central core of the Alhambra complex is its group of palaces, which follows a three-part plan. A part of the palaces includes the lobby of the public bar and the court and the guards' rooms, stables, and a prayer room. The second element is the divan, which includes the rooms of court employees arranged around the courtyard. This divan itself leads to Salam hall - ambassadors hall - which is covered by a bastion. The third part is the shrine, the center of which is court of the lions. The Haram includes the residential and private part of the Sultan himself, which is completed with two large halls - the foyer of the two sisters and Ibn Siraj - smaller rooms, and a small prayer house and gardens. (Chalungar and Abbasi, 2008).



Alhambra garden plan and section

2.4.3 | Water

The most critical space-creating element in the gardens of this complex is the element of water. So, different types of ponds and pools are used in the courtyards of this complex. The ponds in this garden are primarily rectangular and

sometimes circular. Often, freshwater falls into the lower pond from a shallow round container. The presence of water can also be seen in the halls and reception rooms in such a way that in the hall of Bani Siraj and the hall of the two sisters,

the streams of the court of the lions have extended into the rooms, and there they flow slowly into the ponds inside the room. The extension of these axes shows the four main directions. This landscape reminds us of the paradise mentioned in the Qur'an and shows the motivation of Muslim architects to create the Islamic complex concerning the eternal values of the eternal paradise. (Barrucand and Bednorz, 1992) Alhambra Palace of Granada, built on the hills, supplies the necessary water for the site through a canal from the Darro River. The beginning of the garden was associated with the creation of this canal by Muhammad I in 1238 AD. The yards were made with smaller dimensions and got a unique

quality due to the presence of water. In some of these yards, the water is directed in precise and completely linear paths from the center to the four sides and moves accordingly in open spaces. In some others, a rectangular pool with a wide and mirror-like water area is placed in the center of the yard. Round and vase-like stone basins in Al-Hamra Palace, where water is boiled and directed to the pool, are considered unique components of the gardens of this region. In addition to the practical and psychological aspects in the design of Iranian and Andalusian gardens, the conceptual aspect is another issue that has significantly impacted the design of Iranian and Islamic gardens in Andalusia. (Okhovat and zamani, 2011)



Waterways in Alhambra



Arial photo of Abbas Abad site

03-Background

3.1 | The description of properties Abbas Abad Garden

The custom of Iranian kings to move from cool to warm places depending on the seasons, hunting along the way, as well as the need to have different residences in different provinces for political reasons has led to the creation of a network of gardens in all the provinces and along the main communication roads. (Alemi, 2007) The Mazandaran region has been the focus of rulers throughout history due to its favorable climatic conditions. Especially during the era of Shah Abbas Safavi, which was chosen as his recreation capital in contrast to the political capital Isfahan. (Nattaj, 2019:29) 'Abbas I's interest in Mazandaran can be understood in many ways. Pietro Della Valle (italian globe trotter) mentions the Shah's sentimental attachment to his mother's birthplace, but more practical reasons might have prevailed; the region is still a resort appreciated by Iranians. Lodged between the Caspian Sea to the north and the Alborz mountains to the south, Mazandaran benefits from this position in Iran. Humidity from the

Caspian yields regular rainfall. This climate favoured extensive forests along the Alborz foothills and the emergence of rich agriculture in the coastal plains. In 'Abbas's time, the region was known to be rich in game. These reasons were foremost in the king's choice. (Brignoli, 2015:47) In the years 1020-21 lunar AH, Shah Abbas founded the town of Ashrafolbalad after his mother whose name was Ashraf in the present province of Mazandaran. This town was not much bigger than a village until the period of Safavids rule and during the time of Reza Pahlavi was renamed As Behshahr. (WHC, 2011: 209) These valuable gardens and buildings were built for the royal family to travel to in the summer for their hometown. At this time, an insightful measure was taken. The Persian Garden was separated from its desert origin because it was built within the green northern coastline of Iran, which is a manifestation of paradise and changed the usual function of the Persian garden in this area. Among the gardens which were built in

the north of Iran, however, a fundamental opposition between these different residences. While the better-known palaces of Farah Abad and Ashraf had been developed with an urban project 'Abbas Abad was only designed to be a summer and hunting residence, not far from an urban center, but isolated in the forest. (Brignoli, 2015:47). A garden with exotic elements with a four-arched building among seemingly stagnant pool water which appears two different figures in hot and cold seasons; such a way that during pool dewatering; it completely submerges and is seen as an island in the middle of water and at other times appears as a two-story building with a quiet and sedate appearance. This weird building that had been the resort of Safavid Kings has had an exciting application in maintaining and activating the pool set, a logical application with precision and calculative engineering. Form and function beauty with stunning geometry in the middle of the pool is associated with engineering application in the field of the dam and its protection, and accurate calculation of water motion and flow penetration. (Moradi and others, 2012:1357) Currently, the gardens of Behshahr can be divided into main categories. 1- The collection of Ashraf gardens inside the city, including seven gardens together 2- Bagh Homayoun Tepe in the north of Behshahr on the road leading to the sea.

3- Abbasabad complex as the resort of Shah Abbas, which is the purpose of this article. (Nattaj, 2019:31).

3.1.1 | Location of Geographical

The historical complex of Abbas Abad is located 9 km south-east of Behshahr next to Ali Tappeh (Al- Tappeh) village inside a dense forest of Alborz highlands. To the north of this garden are Al-Tappeh and Saro villages, west of it are Ali Tappeh agricultural fields as well as jungles, and south of it are Jahanmora highlands and Behshahr Hezarjarib village which is a summer residence. Access to the complex is currently possible through the asphalt road branching off from the main road of Gorgan city, which reaches the said area after passing through the village of Al Teppe; The historical access to this complex has been a paved road, a part of which has been found in recent excavations, which is considered a difficult road in both ways considering the steep slope of the area. The general slope of the area is from south to north. Accordingly, the Safavids architecture has been created compatible with this gradient as well as the geological composition of the region. (WHC, 2011: 199)

Country: IRAN
 State of province or region: MAZANDARAN (Behshahr)
 Name of Property: Bagh-e Abas Abad
 Exact location on map and indication of geographical co-ordinates:
 36° 39' 50"; N: 53° 35' 38"



3.1.2| Gardening in Abbas Abad Garden

Among Shah Abbas I's palaces in Mazandaran, the Abbas Abad estate is outstanding by its original features: it linked an informal garden, the elements of which are loosely assembled around an artificial lake to a formal space, on higher grounds, with a geometrical outlay, more common in the art of Persian gardens. The coexistence of these juxtaposed parts and the close relation of the residence with the surrounding forest, the lack of outside walls customary in Persian gardens, hint at an original relation of some Safavid gardens with the natural landscape i.e., a will to "reproduce" or

"preserve" nature in its wilder aspects, with the intent, not of building a great Royal Garden, but rather, a simple hunting residence. (Brignoli, 2015:46) Abbas Abad Behshahr Historical Garden is built on top of natural hills so that the engineers of the Safavid era created a terraced garden by cutting down the mountain, creating stairs and fences, and building a mansion on the highest part of the hill. The constructions are towards the Qibla so that, based on available evidence, sunrise and sunset were visible in the garden. (Moradi and others, 2012:1357)



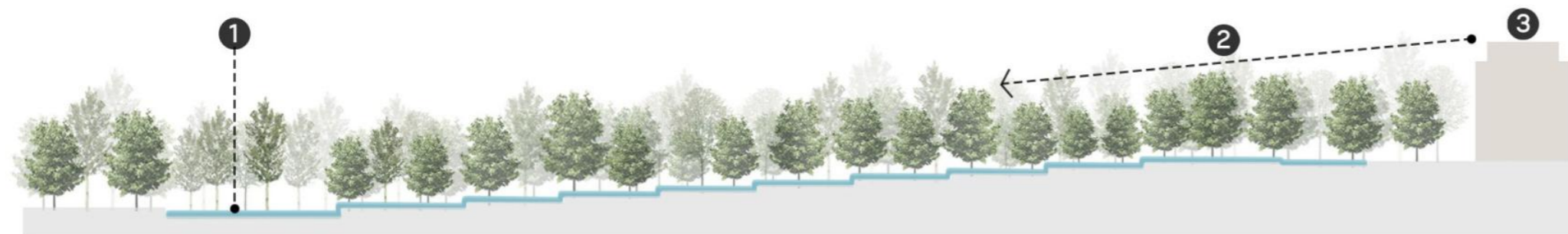
Main place and main garden

In addition to the mentioned building, in the central terrace, they built a large pond in the center and smaller ponds around it. Engineers and architects of the Safavid period also created blue music in the garden by using sloping surfaces and clay pipes in addition to beauty, which relaxes the people living in the garden. The garden's construction in the forest's entirely natural background, the extensive presence of water, and two-way visibility through the two-way slope are unique features of the garden that make this garden stand out from other gardens. (Nattaj, 2019:29) This complex includes the Abbas Abad dam, reservoir and Dam Lake, Gulbagh, palace, bathroom, water mill, and two

brick towers, nearly 550 hectares. The lake dam, with a 600 thousand cubic meters capacity, is a reservoir type, and the dam wall is made of Saroj. This dam has been listed among the historical and cultural monuments of Iran by the Cultural Heritage Organization with the number 540. Abbas Abad's natural lake has more than 15 hectares and a mansion in its center. When the lake is filled with water, the mansion, with a height of 8 meters, sinks in the water, and only its roof is visible, along with some shrubs. And in the seasons of low rainfall, the lake's water is used to irrigate the surrounding agricultural lands, and the lake is empty of water, and the said building is evident. (Musavi nasab, 2006:64)

3.1.3 | Features existing in the garden

1. Water
2. Architecture
3. vision



Features existing in the garden

3.1.4 | Water

The existence of abundant water sources in the region and the advantage of the natural and topographical situation to create a lake have made this garden in the form of a water garden and a garden-island of sorts. Like many gardens of this period, where the presence of a building or an island in the middle of the lake was one of the aesthetic principles of the garden, especially in flooded areas, in the middle of this lake, there was a building known as Chartagi, which was accessed by a boat or a wooden bridge. Water in the Abbas Abad Garden in Behshahr is shown in three forms: stagnant, flowing, and eruptive, each of which evokes a particular concept. Each of these three ways of presentation uses special tools and facilities to present the designer's intention. In this collection, with the help of the laws of physics and the benefit of clay tubs, water was directed from the springs of the southern highlands to the central row and the smaller quadruple ponds on the sides. (Nattaj, 2019:32)

3.1.5 | Water supplies

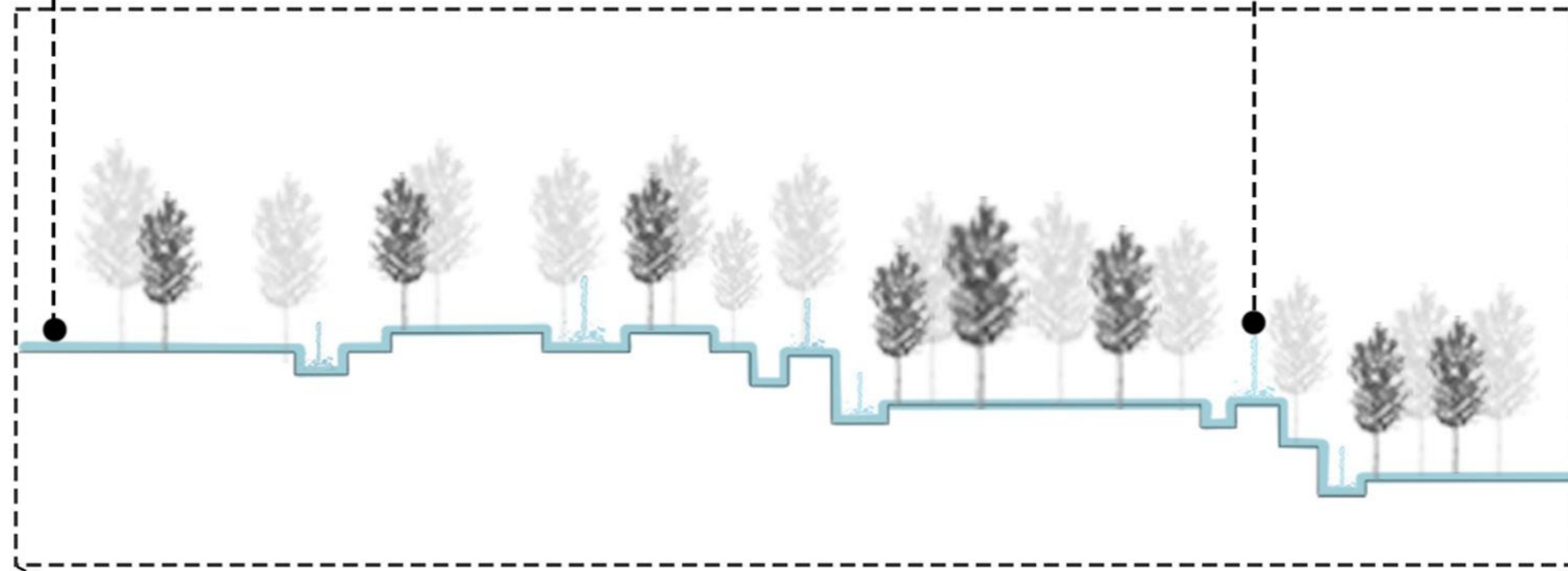
There are numerous springs in southern, south-western, and south-eastern highlands of the forest region of Abas Abad. Two of these springs are of more importance namely: Sarcheshmeh and Qari-cheshmeh which are described below:

Sarcheshmeh Spring is located about 3500meter South-west of the historical garden of Behshahr. What is significant about it (which was probably also important in the past) is that it currently supplies the reservoir of Abas Abad dam with water in winter. In addition, during early spring, its flow joins that of the dam and makes a river that irrigates rice fields downstream of the Abbas Abad region. Also, the drinking water consumed by visitors and tourists in the historical and touristy part of Abas Abad is supplied by this river.

Qari or Quri Cheshmeh: Because the water comes out of this spring in a bubbling fashion, it is known as Qari or Quri Cheshmeh, which in Farsi is the noise made this way. The spring is located about two km southeast of the Abbas Abad complex and has less output than the Sarcheshmeh spring but more than similar springs inside Abas Abad. It serves as the only source of supplying water to Saro village north of Abas Abad complex, which valid documents have also verified. (WHC, 2011: 201)

1 flowing

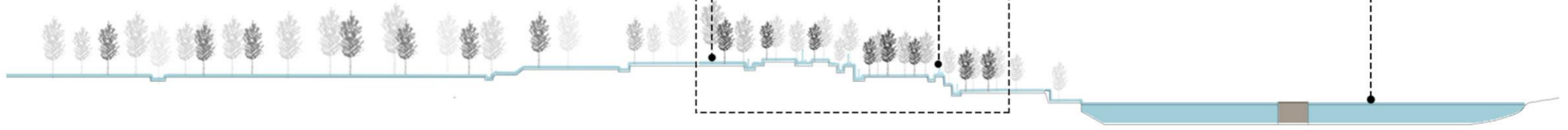
2 eruptive



1 flowing

2 eruptive

3 stagnant



Different types of water flowing through garden

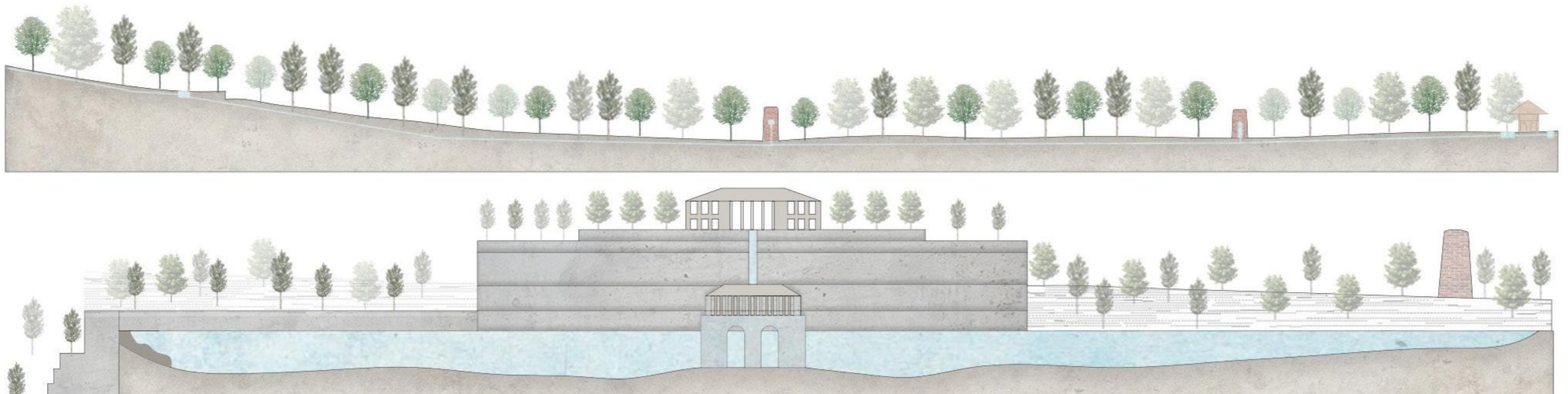
3.1.6 | Water distribution

The garden space is divided into two parts: four gardens (Chahar Bagh) space and the main garden space. The role of the four-garden area was to distribute water to the main garden space so that, in the Safavids period, the Sarcheshmeh spring water was probably directed and delivered into Chahar Bagh compound through an open canal or interconnected ceramic pipes called Tanbusheh. Seventy meters before the compound, a brick basin sized: 2.40 by 1.90 by 1.00 meters was filled with spring water which was, in fact, the onset of the irrigation system for the historical Abas Abad Garden. According to existing evidence and investigations, the water entered the Chahar Bagh compound from this point either as a waterfall or water view or as a Tanbusheh system and then was

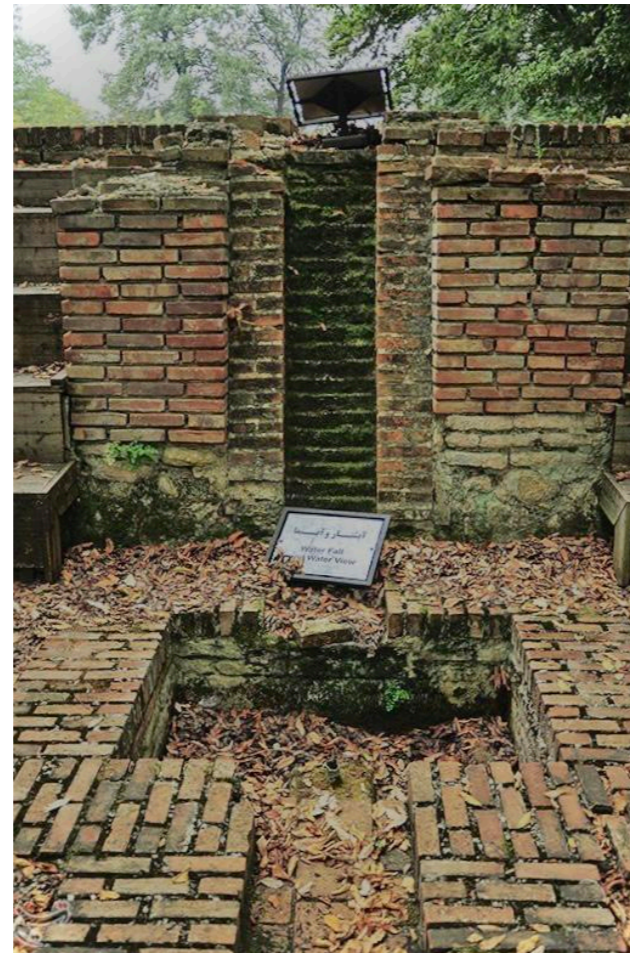
distributed for diverse consumption requirements. (Musavi nasab, 2006:41) After inter-connected ceramic pipes delivered the water to the central basin of the garden, Then the excess water was provided to side basins in the eastern, western, northern, and southern parts by other ceramic pipes connected to the main one (the entry pipe). These pipes went into all four sides of the central platform basin. The eastern basin water was used for irrigating the eastside flower bed opposite the main platform. As the architecture of Abas Abad is symmetrical, the function of the western basin was like the eastern one, with the difference that the western basin, in addition to irrigating the western flower bed of the central platform also supplied the water of the Hammam (bath) located about

sixty meters west of it. (WHC, 2011: 204) The waterworks in the garden's northern and southern parts differed from their eastern and western regions. In the north part, the water went through ceramic pipes (Tanbusheh), then flowed into the stone canal (downspout-like) and, after coming out of this canal, poured into the first basin, which was gradually filled. Its overflow flowed northward through an open channel. After passing about 50m through the ceramic pipes, the water enters the second basin of the second floor (downstream) either by cascading or absorbing, which eventually flows into another ceramic tube and, after making a water jet, enters the second basin of the second floor. After the second basin is filled, its overflow goes into another open canal about 50m long and is connected

to a ceramic pipe inserted beneath the existing architecture. Due to the high gradient of this pipe, the water falls into the third basin, and later after filling it, the overflow flows into yet another open canal with a length of 100m leading to the fourth basin. Overflow of the fourth basin is directed to outside via ceramic pipes inserted at basin floor. The water supply in the southern part of the garden is like the north: After the first basin is filled, its overflow is entered as water jets into the second basin by cascading or absorbing in a ceramic pipe. The second basin is also filled with water, and its overflow flows into a 50m open canal leading to the third basin. Then water enters in a cascading or absorbing fashion inside the pipe inserted in the wall and fills the lower trace basin in the form of jet water.



Possibly, after some other phases, the southern section of water runs into the dam, and such process was probably one of the supplying sources of the dam. Due to a shortage of archaeological excavations in the southern section, no more information is available. But studying Bagh-e Abas Abad waterworks during the Safavids time shows that aside from enjoying the surrounding jungle scenery, the architectural structure for water direction was also intended to create a kind of water melody to soothe the nerves. (WHC, 2011: 206)



Water transfer stream inside the garden

Water transfer Streams from the mountain to the main garden



The clay water pipes(tanbusheh)

3.1.7 | Architectural Feature

The architectural buildings on the site included Historical Palace, Bathhouse, Dam, Chartaqi (four arches), Brick Towers

- 1 Historical Palace
- 2 Dam
- 3 Chartaqi (four arches)
- 4 Bathhouse
- 5 Brick Towers
- 6 Golbagh(water distribution)

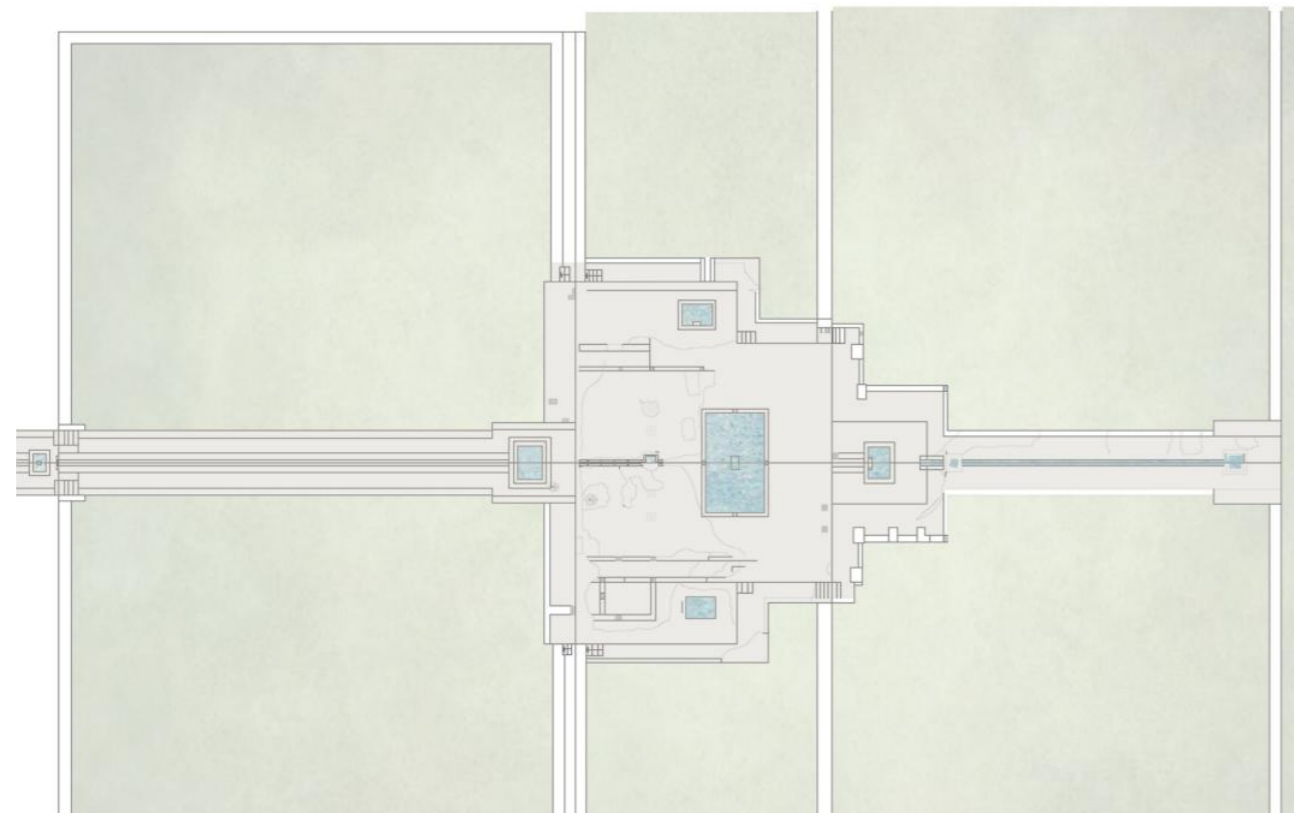
Historical Palace

Archeological evidence shows that north of the central basin and at about two meters from it, a structure made of local building materials such as wood existed which gradually wore down. But during explorations, plenty of its iron nails and ceramic pieces of roof cover were discovered. All that remains from its architecture are five stone pedestals and a brick floor.

Three factors likely contributed to the importance of the building, which is as follows:

1- The picture of the structure is reflected in the central basin, which adds to its beauty.

2- The northern building opposite the central basin possibly had two floors that overlooked the Chahar Taqi inside the dam structure.
 3- From the point of view of provincial natural resources experts, garden terrace vegetation has an age of fewer than one hundred years. Now, suppose the garden compound vegetation is supposedly removed. In that case, a person standing inside the southern part of the central building not only has a full view of the structure inside the dam but also could watch the traffic of boats coming from and going into the Miankaleh peninsula in the Caspian Sea. (Musavi nasab, 2006:45)



Main garden plan

Bathhouse (Hammam)

This historic building, with an area of 160 square meters, is at 60m from the central platform (of the main building) upon a flat surface 5m lower than the platform. Access to the bathhouse is made via steps located at the end of the brick-paved path between the central platform and the northern yard of the bath. Abas Abad bath house is made of the following constituents:
 1- The bath house entrance
 2- Dressing room (Sarbineh, Bath head)
 3- Miandar (The room opposite Sarbineh)
 4- Main court (Hot chamber)
 5- Heating system (Air ducts, chimneys, firebox) (Idem:45)

Dam

The dam was constructed in a deep valley. It has a foundation width of 20m,

a length of 10m, and a height of 10m. After the construction of its foundation, two arms were added to either side of its foundation, increasing the foundation strength and enhancing the water intake of its reservoir. Overall, the arm length of the dam was 70m, and its width at its crown was 7m. Behind the dam wall, a backstay was built. In addition to strengthening the barrier against the potential energy of water, it also served as the control center of dam water discharge. The total Lake area is 98,000 square meters, and the Total water intake capacity is 600,000 cubic meters. Reservoir water is discharged via dam valves for agricultural purposes of villages located to its north such as: Shah-kileh, Al-Tappeh and Saro. (WHC, 2011: 206)



Water supply dam of garden

Chartaqi (four arches)

In the center of the artificial lake of Abbas Abad Behshahr, there is a four-arched brick building where the upper surface formed building ground with wood and pottery ceiling for a while. The four-arched submerged during dam dewatering, and only its upper surface is out of the water like an island. Basis of the four-arched was built on eight piers surrounding and a pair in the center. Piers's dimensions are almost 4m×4m which are placed on a platform; what seems essential is the lack of brick stairs in the building and around the four-arched; it is possible that the building was first constructed to retrofit the dam and then, according to dam dehydration was provided with recreational use. Based on repeated field studies that have been conducted, it can be said that the water of two important springs, Ghuri Cheshmeh and Sar Cheshmeh, from the upper part, based on the ramp and using related conduit containers which were protected by a brick wall, drove water to the upper. (Moradi and others, 2012:1360) Probably based on the height difference of the two springs to the four arched and the law of related containers, water conduit was filled as the fountain of the central pool, and then water overflow was divided into other pools through waterways, and then the surplus was poured from the four arched to the pool. Water falling into the pool caused water

music sound or murmuring in the pool, and the basis of AbbasAbad architecture is based on the same issue. According to what was stated, recreational use of the mansion inside the pool is proven. For accessing the recreational use of the building inside the pool, a deck-like wood bridge was established in the north of the building. But in addition to the recreational use of the mansion, it has had other technical and scientific applications in dam construction. The mansion had eight piers in the surrounding and one pair in the center. The central pier has a related network pore which has operated as a valve if necessary; this way that after closing the dam valves and dehydrating its reservoir, if the dam was under pressure or if it moved slightly; dam structure engineers didn't empty water from dam valves, but water draining was done through central dam reservoir. For example, if water draining was done during when emergency through a dam valve; pressure and influx of water for draining was important in accelerating dam destruction; to prevent dam destruction in an emergency after dewatering, the presence of the four-arched with related lattice piers seems necessary. Thus, building the four-arched and lattice piers in the middle of the dam prevented dam destruction, such a way that water was sucked from the reservoir

center through the central lattice piers of four-arched and then driven downward through canals under the dam to about 200 m to reduce water pressure on the dam span. (Musavi nasab, 2006:65-66)



The pillars of the pavilion inside the lake
The holes inside can control the water stream

Brick Towers

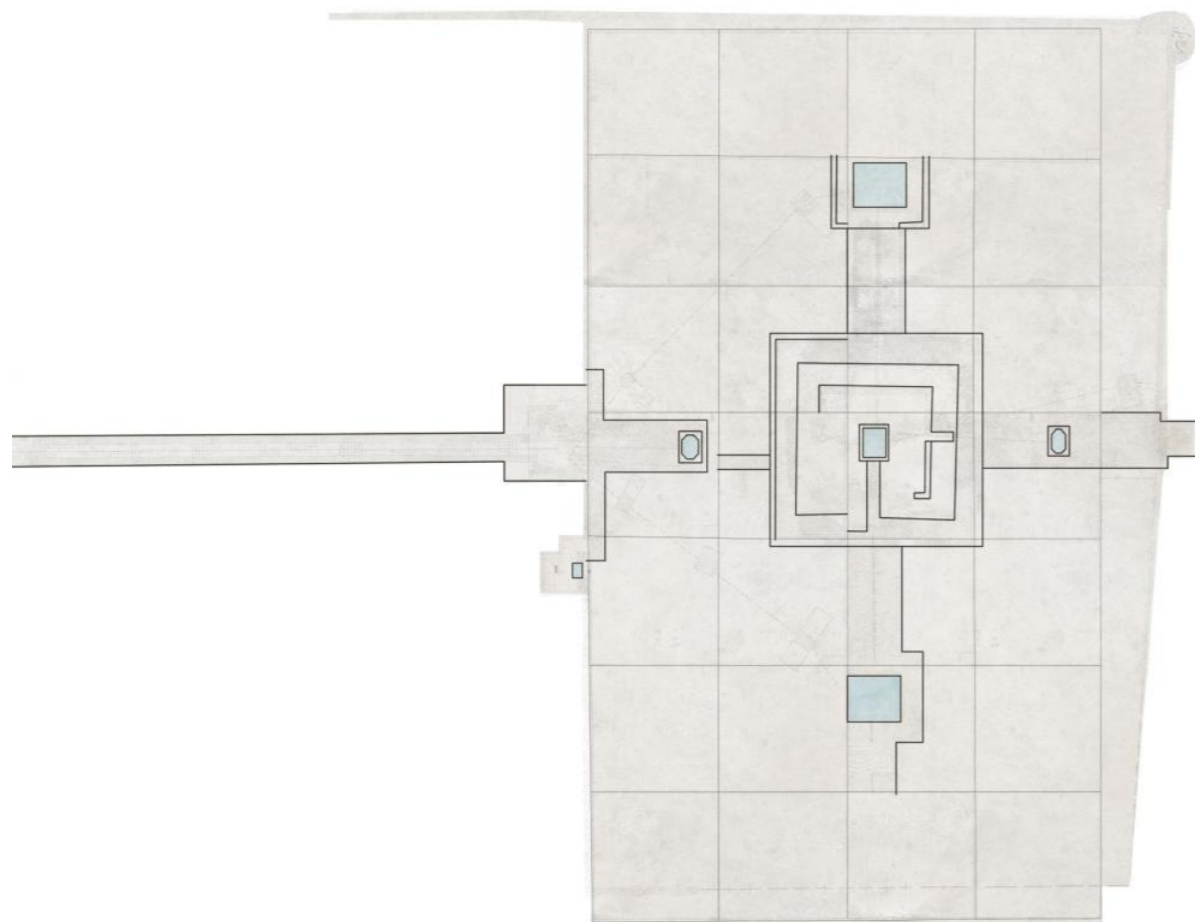
In the northeast of the lake, there are two brick towers, 186m from the garden and 156m apart. The building materials of the two brick towers are bricks with a size of 25 by 25 by 5cm using Sarooj mortar. The diameter of each of them is 7 meters, the height of one is ten, and the

other is fourteen meters. These towers do not have windows; their only opening is their entrance doors, which were closed between 1988-1989 to stop unauthorized entry and damage to the doors. There are water tanks in the upper part of the towers, which are supplied with water through water pipes, and access to them is possible through the spiral staircase placed inside the towers. (WHC, 2011: 212) Like some of the gardens of the Safavid period, these towers are not defensive and observational elements but in service. In Abbas Abad, these towers have daily functions and are used as drainage tanks to reduce the water pressure on the terracotta pots. In addition, the northern tower is also responsible for providing the force needed to make the fountains of the garden flow. Between the two towers, there are no traces of foundations that suggest the possibility of a connection between the two. Although these towers do not have a defensive role, their form is reminiscent of barrier structures, in the sense that although walls do not enclose the informal surroundings of the garden, these towers “psychologically” separate the boundaries of the garden from the surrounding forest and are a representation of the entry element of the royal boundary. Are. On the other hand, this spatial arrangement can express the intimate relationship of the complex with the surrounding nature. (Brignoli, 2015:48)

Chahar Bagh (four Gardens)

The compound has an area of about 3200 square meters and is located at 600 m southeast of the historical garden on the southeastern slope of the mountain overlooking the dam. During the Safavids rule, the slope was scraped and turned into a flat surface with an area of 46 by 72m. Because of the gradient, there is a

level difference of 15 meters between the compound and the garden, which is why the compound has been chosen as the water distribution point. But it must be mentioned that aside from this function, it also served as a recreational point and a garden-making station in the Safavids era



Water distribution spot



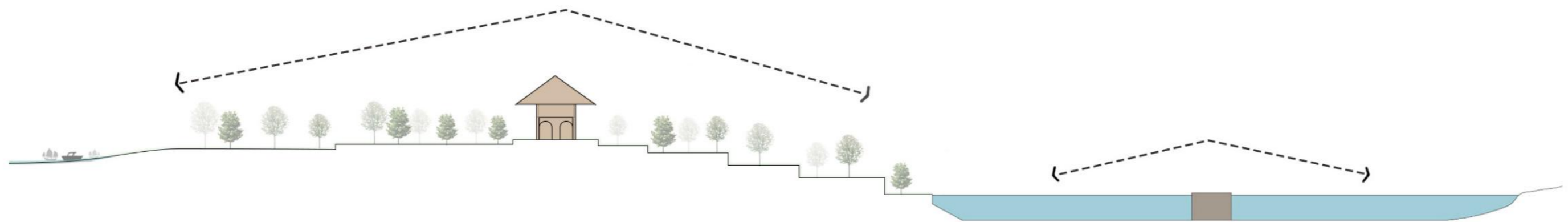
3.1.8 | view and landscape

The height difference of about 400 meters with the Behshahr plain in a very short horizontal distance, along with the topographic shape in the hills of Abbas Abad, has provided an excellent position for creating a garden to take advantage of the expansive view. The existence of many rows in the southern part of the garden and the northern part of the pool with stone walls to create a broader view and landscape is a reminder of the features of pre-Islamic gardening; The ideas that have been raised in Iranian culture due to the creation of spaces such as row and platform and the construction of buildings. These rows form the central row on the highest floor. The elevation of this section is such that it overlooks the pool from the south and the Mazandaran Sea and the Miankaleh peninsula from the north. On the central side, traces of a large basin in the center

and four small basins can be seen in four directions. The traces left in the north direction of the central pool, such as the foundations of the stone columns and the paths of the walls, and the large volume of pottery found, indicate the palace that had been destroyed. (Nattaj, 2019:34) The structure of Iranian gardens is usually in two ways: a vast garden with the location of the main building in the center of the garden or a garden on a one-sided sloping ground with the construction of the building at the highest point to create a better view; But the exciting thing to pay attention to in Abbas Abad garden is the slope of the land on both sides and having two beautiful views that cannot be seen in other gardens. The first is the view of the lake south of the garden, and the other is the distant view of the Behshahr plain and Miankaleh.

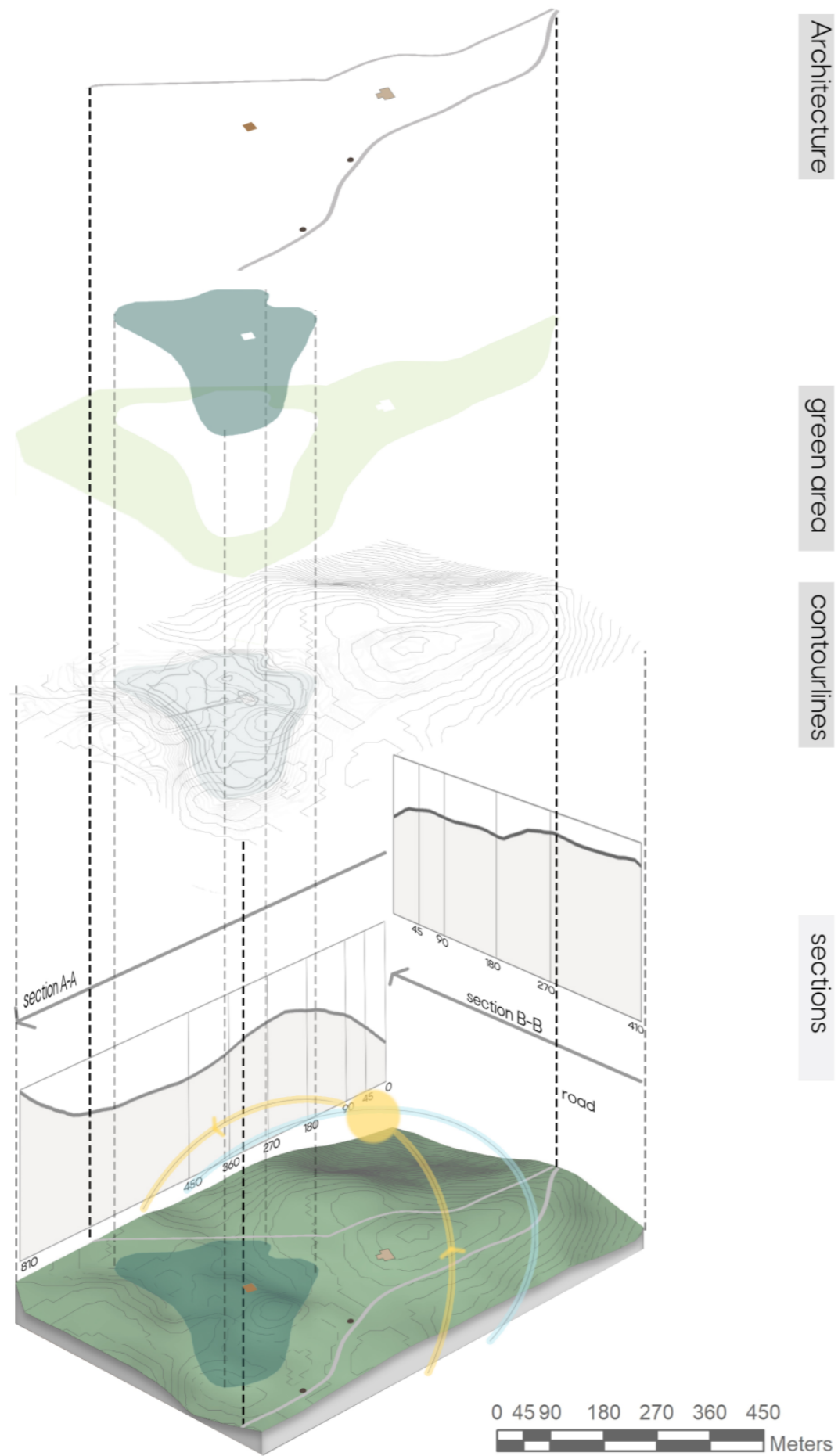
Southern platforms: These layering is created on a hill with a height of 30 meters from the lake floor and in the form of a staircase, which forms the central platform at the highest point. Considering the presence of stone columns, the infrastructure of the palace was made of wood, which has now disappeared. Streams with their movement on the layers and the formation of various waterfalls and ponds form original and eye-pleasing scenes. These platforms have provided a view of the lake.

North platforms: This part is like the southern layering, but with a lower elevation. But what is clear is that in terms of their arrangement and elevation, this part never had the importance of the southern part, and its location, especially in the northernmost part of the garden, had turned it into a second-hand space. (Idem:45)



The view and landscape





Architecture

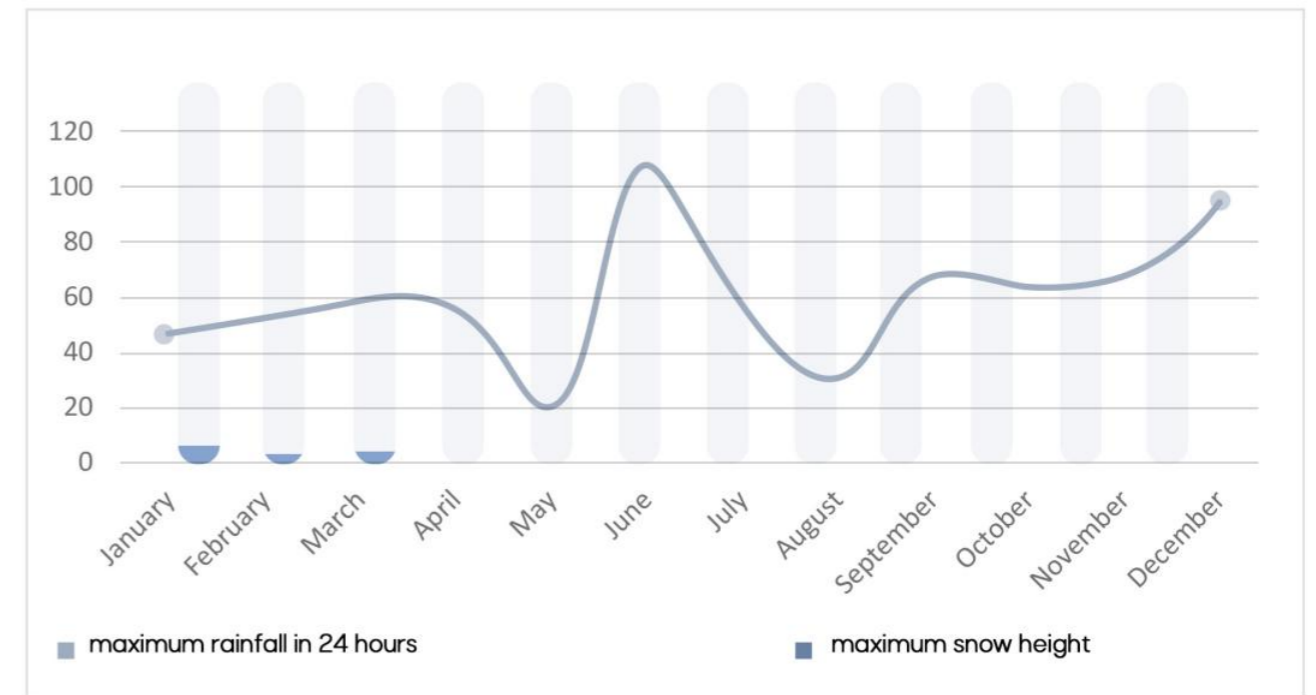
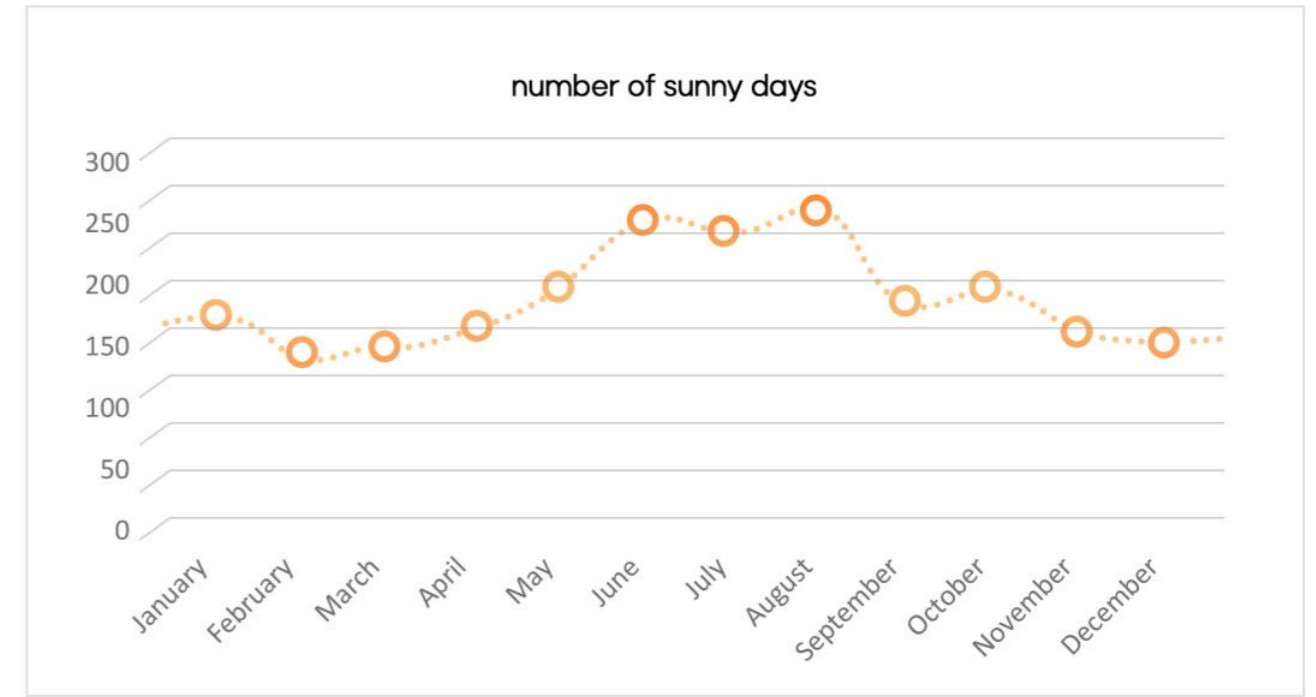
green area

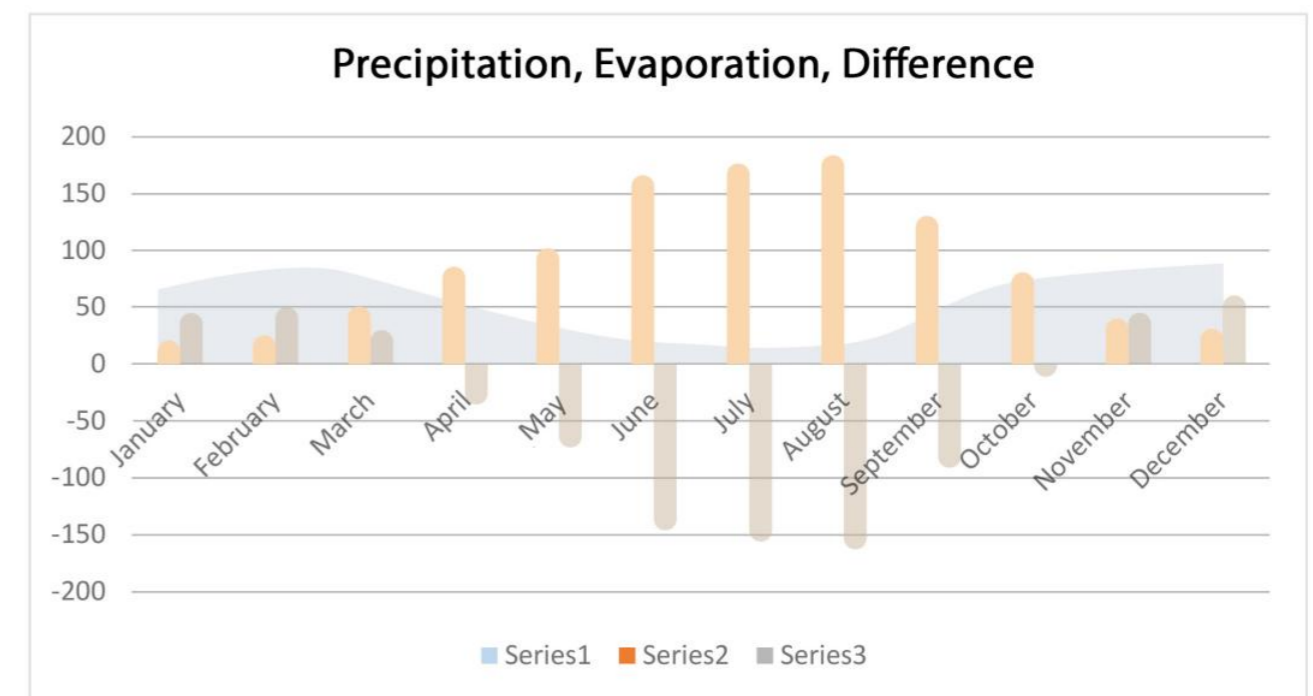
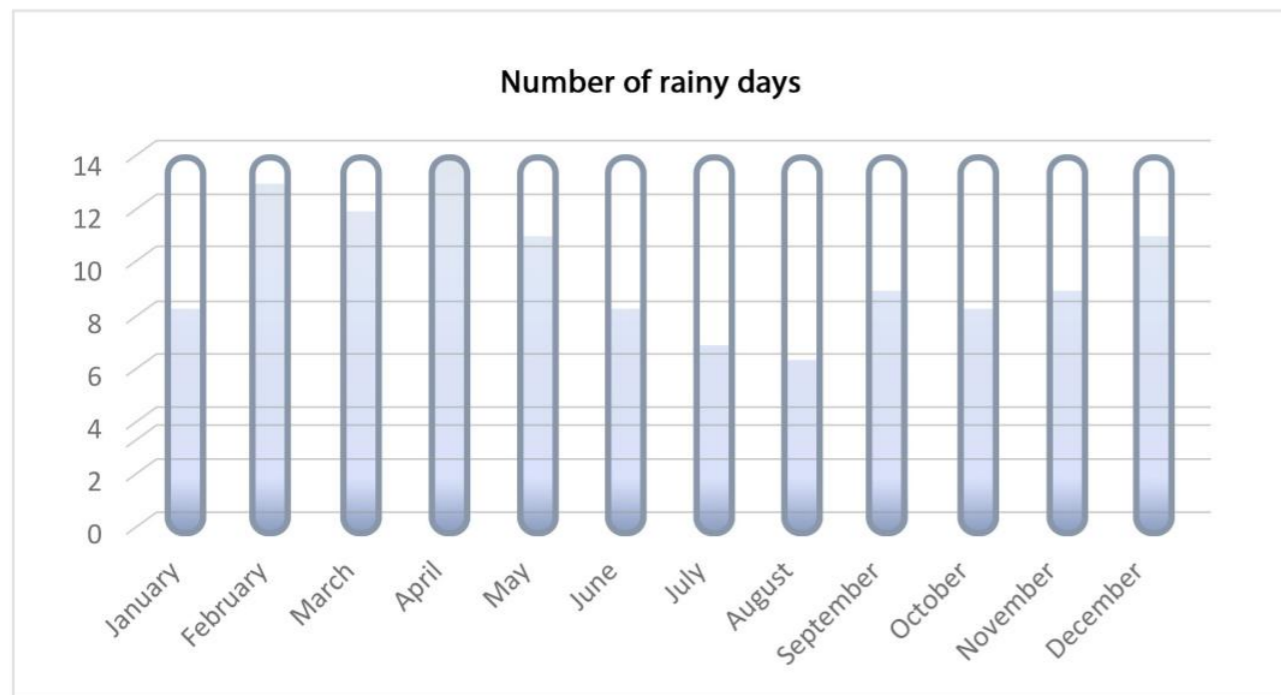
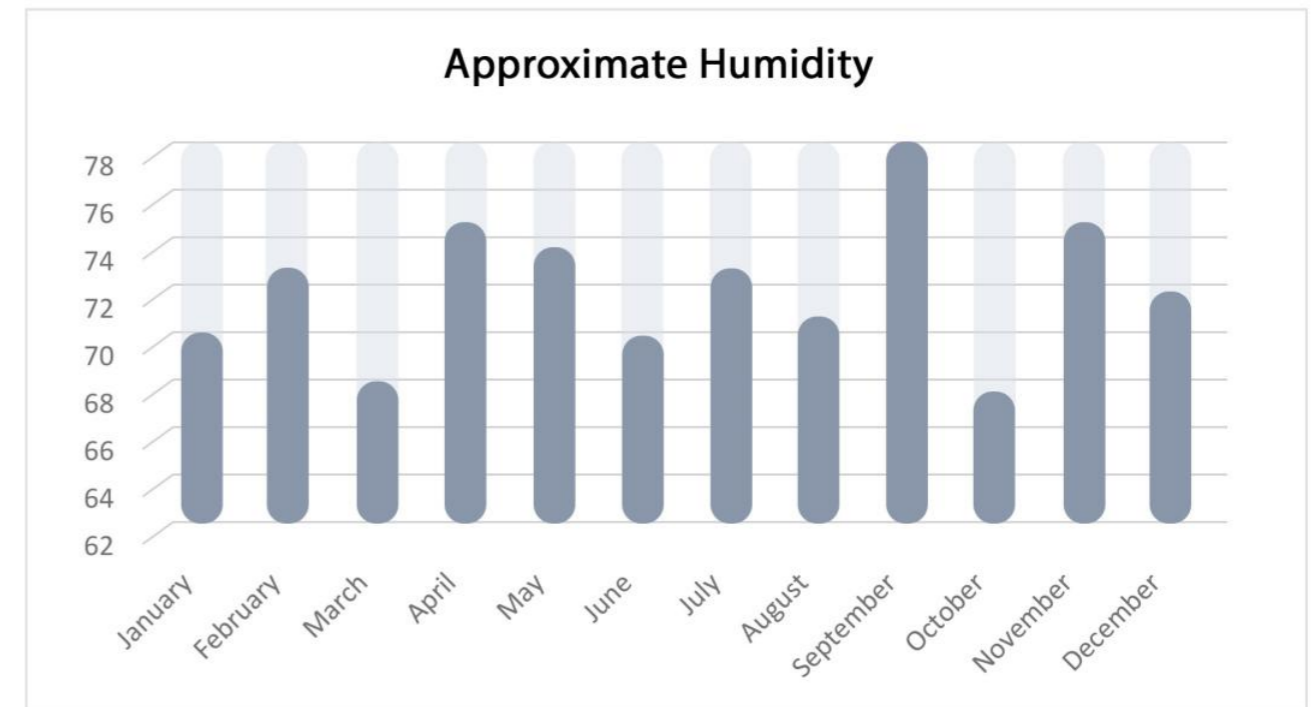
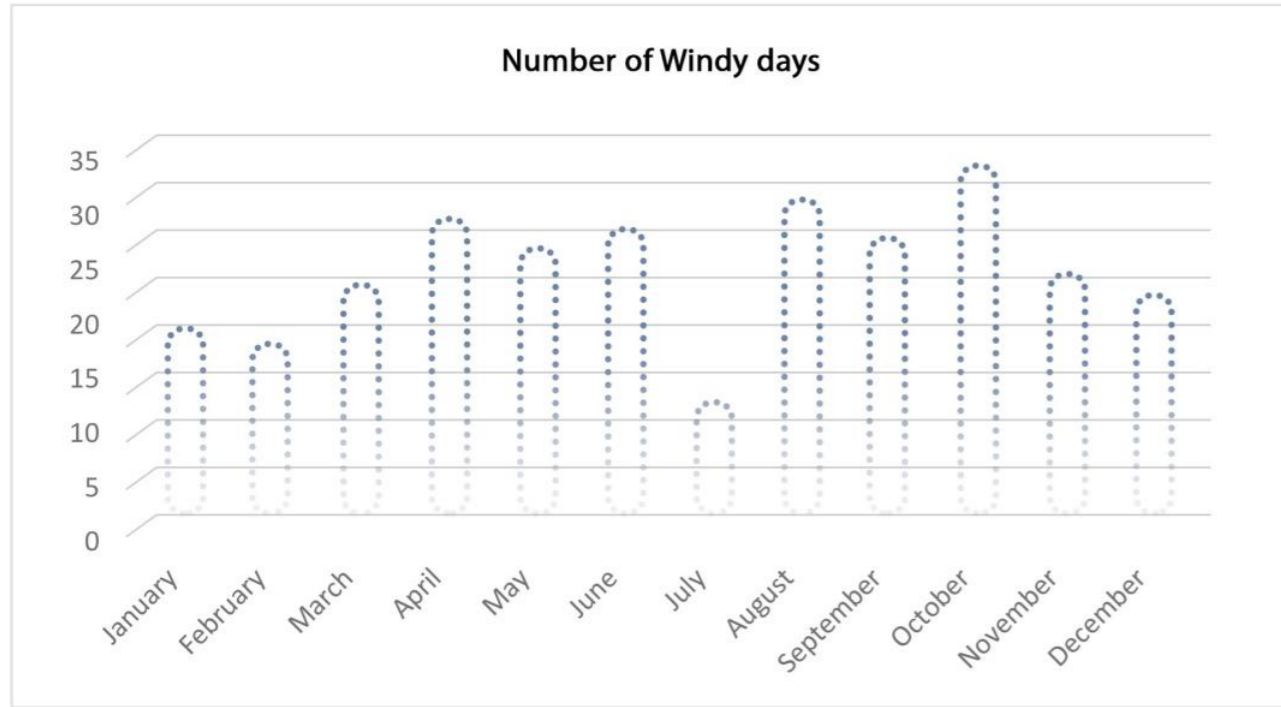
contourlines

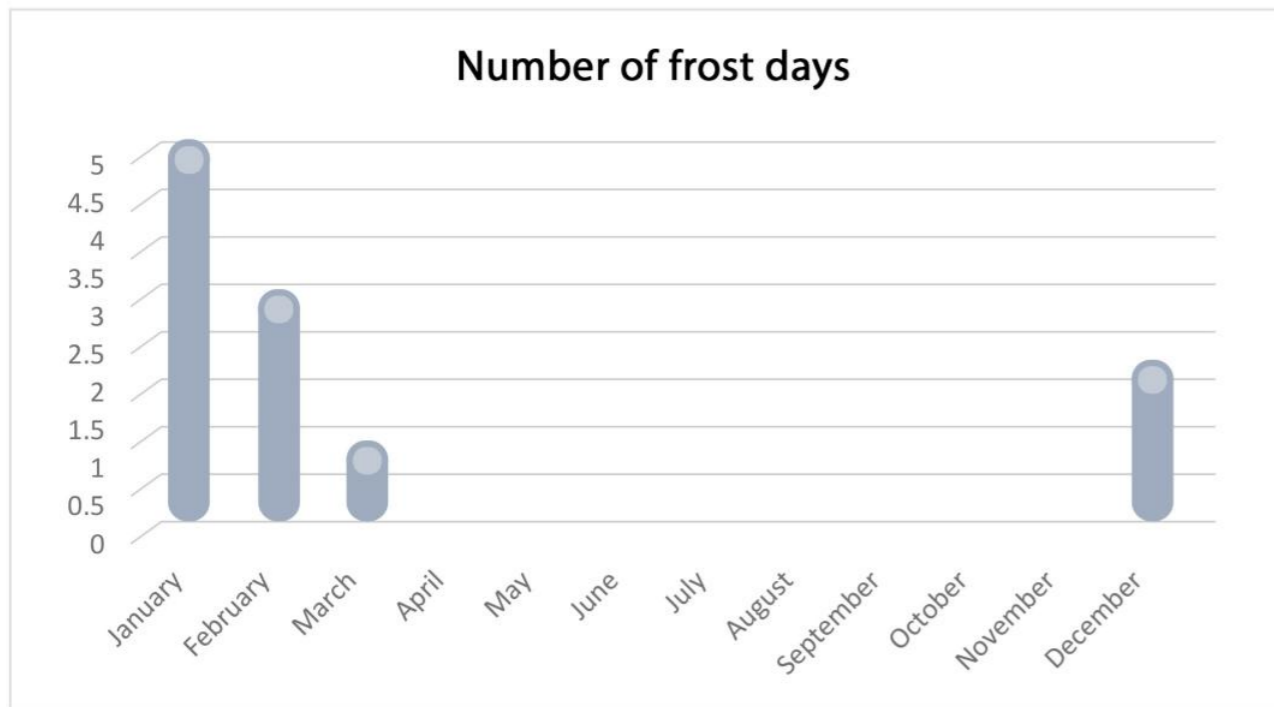
sections



Title







Study Sections

Environmental Studies

Possibilities
 1-abundance of water and no need for regular watering
 2-high level of under ground water
 3-different plant species according to the presence of fertile soil
 4-spawning places of fish and favorable spots for migratory birds

Limitations
 1-excessive growth of plants
 2-some species are not suitable for Iranian gardens
 3-the entry of the human factor brings destruction and pollution

Targets
 1-providing Iranian garden cover species for reviving gardens
 2-protection of native plant species and non native adapted species
 3-showing special natural effects of the region such as wetlands and migratory birds and native animal species
 4-containment of surface water for use

& Culture, Art Architecture Studies

Possibilities
 1-the cultural richness of the region, the background of the immigrant tribes and the proximity to the Turkmen tribes
 2-the special culture and customs of the native people of the region
 3-social ceremonies and local games
 4-beautiful traditional and native music of the region
 5-variety of crafts of the region and province
 6-the richness of local architecture and the availability of raw materials

Limitations
 1-the arrival of tourists with different cultural background and the impact of different aspects of the project on the culture of the region will give the possibility of cultural conflict

Targets
 1-preserving and displaying the special culture and costumes of the native people of the region
 2-using local architecture of the region and scenic and symbolic elements
 3-providing and displaying all kind of native arts including handicrafts music and other arts

Tourism Studies

Possibilities
 1-beautiful nature with special modes
 2-appropriate height of the site from the sea makes a good view
 3-natural attractions
 4-the existence of service facilities for tourists in the area, including hotels clinics, roads and telephones
 5-the existence of various historical, natural and anthropological attractions

Targets
 1-the development of culture through the introduction and recognition of the natural and historical capacities of the region
 2-preservation of existing historical monuments
 3-the prosperity of the environment economy through creating employment and attracting new activities to the region
 4-providing part of the recreational needs of the residents of the region and passing travelers

Restoration Studies

Possibilities
 1-the possibility of improving the brick dam in the middle of the pool as a real monor fountain
 2-the existence of evidences and works of historical technology of ways of conveying and displaying water in the main garden, water mill chartaghi and bath
 3-the main view axis of the garden, which overlooks chartaghi from one side and Caspian sea from the other side

Limitations
 1-destruction of buildings and mansions at the entrance of the garden
 2-lack of authentic historical documents for the reconstruction of the garden
 3-scattering of historical monuments in the scope of the plan and different parts of the forest
 4-permanent presence of natural erosive factors such as high humidity and rainfall and the growth of car plants
 5-tourists and managers and decision makers are not familiar with the cultural heritage values of the region

Targets
 1-planning to restore the historical vegetation of the garden
 2-evaluating the effects of climatic erosion and the presence of tourists on historical monuments
 3-repairing the water supply system and water circulation in different parts of the garden

ABBAS ABAD GARDEN- THE FORMAL PART

STRENGTHS

- The richness of local architecture and the availability of raw materials
- Beautiful nature with special modes
- Good location and General View around
- Natural and local material available

OPORTUNITIES

- Providing part of the recreational needs of the residents of the region and passing travelers
- Rivival of art and architecture of the past
- Becoming the tourism hub of the region

WEAKNESSES

- The entry of the human factor brings destruction and pollution
- Lack of authentic historical documents for the reconstruction of the garden

THREATS

- The process of destroying historical parts
- Decreasing environmental quality
- Lack of proper design to attract visitors.



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