

Review Article

# Biophilic Development Paradigm for Mountainous Areas of Kurdistan

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## Abstract

**Aims:** The foundation of the biophilic development paradigm is based on constructive interaction between humans and nature and how to properly exploit it for mental health. We have focused on the mountainous nature of Kurdistan, and aimed to investigate how its inhabitants interact with nature in the context of time. Particularly, we have noticed a deep gap caused by the effects of the industrial revolution and the modern era, which calls for immediate response. Thus, the main goal of our project is to remove this gap from the path of excellence and growing architecture and urban development in the Kurdistan region.

**Methods:** In our historical investigations, in addition to the way residents interact with nature, their characteristic actions that caused biological values in their culture and architecture was identified. Then, in our data analysis, we confirmed it to the principles of biophilic architecture. Finally, we present our findings in the form of residential building designs for the mountainous areas in Kurdistan.

**Findings:** Human is in contact with nature through his five senses as well as his power of thinking and reasoning. For example, the first prominent human sense, which is sight, and opening the eyes in front of the wide view of nature, which creates a relationship between human and nature that brings peace and comfort. Due to its mountainous nature, Kurdistan has lows and highs that are spread regularly and successively with irregular heights in the land bed. This mountainous climate creates a dynamic landscape from the observer's point of view that generates unique features, which humans can benefit from with the capacity of all their senses. Therefore, by identifying the main elements in the architecture of the past and adapting it to scientific and updated methods in the present era, we present our findings in the form of 14 principles that we applied in the design of buildings in mountainous and sloping areas, which bring the beautiful and pristine nature of the environment into the architecture.

**Conclusion:** By testing the research findings in the form of a design algorithm for architecture in the mountainous regions of Kurdistan, we realized the necessity for the presence of nature in the architecture and urban planning in Kurdistan. The peace and comfort of the residents in man-made environments with modern architecture and urban development depends substantially on returning to the lap of nature. Therefore, the land of Kurdistan with its vastness and high capacity can remain as a prominent example in the direction of achieving this goal, just like its position in history as the cradle of civilization.

**Keywords:** Biophilic Development; Kurdistan Nature; Systematic Approach; Stable Landscape

## Introduction

Kurdistan, encompasses an extended area of Mesopotamia including Zagros, South and Southeast Anatolia with regular lows and heights caused by orogeny of the third geological period. Despite the prevalence of wide flatlands in Kurdistan, it is the source of the big and roaring rivers such as Tigris and Euphrates, Zarinee River and Sefid River, Karun, Karkheh, Dez and Simreh. Moreover, according to Ralph Solecki, no cave can be identified as older than the Shanidar Cave in Kurdistan until this point in time, which contains the works of modern humans 65,000 years ago [1]. Shanidar Cave in Iraqi Kurdistan near the Tigris is one of the hundreds of caves, which were human habitats in the period between 35,000 and 40,000 BC. Extensive studies about the Shanidar Cave indicate that the early inhabitants and the main owners of modern human civilization in that part of the mountain, are the ancestors of today's Kurdish-speaking residents in that area, who were mainly cultivating the seeds of plants. They were the first users of flowers, who used to shower the dead with flowers, which is one of the indications for the beginning of modern human civilization [1].

These caves, appeared in the third geological period mostly in the form of karst on the chest of the rocks. They exist both in full and empty form and are placed organically in the geography of rock masses, and so are camouflaged within their beautiful environment. This feature has created a safe environment for the growth and upbringing of its residents over time. The entrance of the caves, which generally has a wide view of the surrounding flatlands, in addition to being scenic, it has served as a suitable observation point for the cave dwellers to control the entry and exit of their prey or to protect themselves from their enemies. These natural shelters in the vicinity of flatlands, surrounded frequently by fruitful trees, flowers and plants, are the main secrets underlying the survival of the Kurdish ancestors. These caves accommodate mineral springs and beautiful rivers flowing inside due to the melting of mountain snows. The heat inside the caves had brought the cave dwellers a safe house in the winter, while they could still enjoy a cool atmosphere in the summer. With the growth of the modern human population, the cave dwellers spread throughout the caves of Zagros and Anatolia in search of similar places. It seems that the fear of the desert and being trapped in the open environment prevented them from moving towards the central plains of Iran and present-day Iraq. Therefore, after several millennia of living in the heart of caves and mountains, they again used the same natural model in building castles. They thus built their architecture and urban development on the hills by using available local stone materials. The castles of the Urarti, Hoti, Goti, Lulobi, Mananai, Sami and Scythian kingdoms were built on the hills over a period of time.

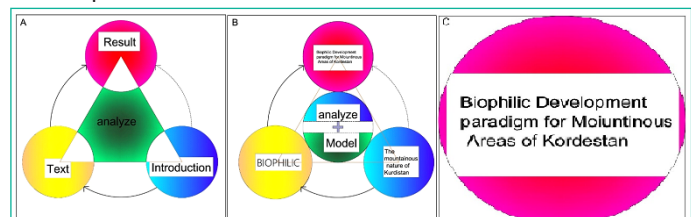
In addition to having natural values, caves and hills have been used as residences, hideouts, places of worship, or places to keep domestic animals. Moreover, humans have sometimes manipulated caves and added human elements to them by creating Stone inscriptions and petroglyphs. Therefore, nowadays, many researchers in various scientific fields, including geology, biology, archeology and anthropology, refer to caves as windows to the past, which have attracted various research efforts. For example, detailed studies of Dr. Dalley at Oxford University have shown that in the third millennium BC, the rulers and kings of the region created hanging gardens [2]. Moreover, it was also proven that these gardens, which were among the seven wonders and masterpieces of the gardening art, belong

to the ancestors of the Kurdistan residents in the third millennium BC. The secret of all this beauty remained a mystery to the visitors for thousands of years until Dr. Dalley revealed it by using stone reliefs and careful study of inscriptions. In addition to that, the existence of the legend of Samiratis of Shah Dokht, one of the rulers of the Zagros region of Mananai, located in the present-day Ziviyah of Saqqez, who became the wife of one of the descendants of the Assyrian kings located west of the Tigris between Mosul and modern-day Erbil, is indicated in the continuation of this story. Shah Dokht's distance from the natural beauties of Eastern Kurdistan makes him feel homesick and depressed. For the joy and relief of boredom and depression of this Shah Dokht, hanging gardens were created to remind the beauty of the mountains with roaring waters and dense masses of trees on the heights of the mountains. Therefore, the ancient story can be a 5000-year-old model to prove the theory of biophilic development paradigm in the distant past in the studied area. Therefore, the coexistence of the residents of Kurdistan with the pristine nature in the time frame of 65,000 years can be a proof of the richness of nature, which has nurtured its residents like a kind mother.

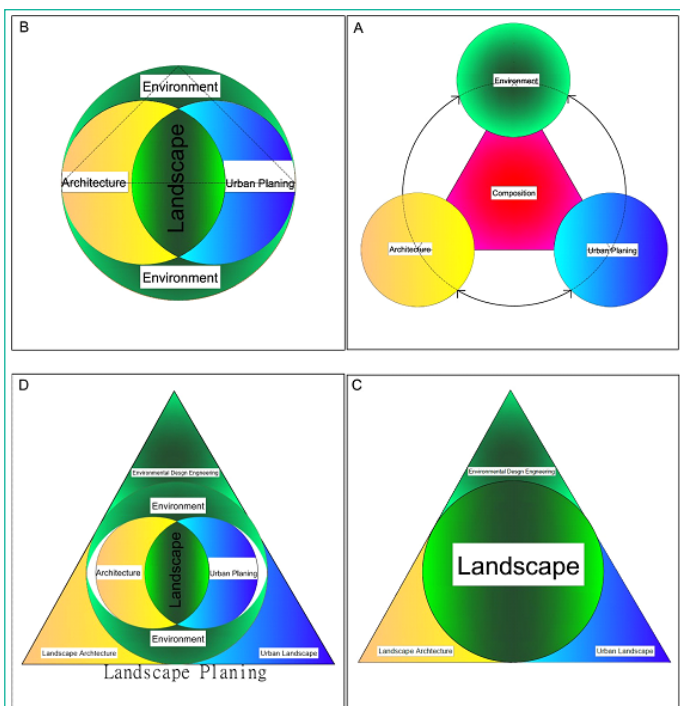
This peaceful way of human life in the beautiful nature of Kurdistan, while creating a rich and ancient culture of the Kurds in this region of the world, and maintaining and evolving it over time, continued its very natural process until the modern era during the past century, with the arrival of today's modern artefacts and the change of architectural and urban planning patterns and the accelerated use of fossil fuels, which have crushed the natural cycle of the urban life. The thing to consider is that if this trend is not curbed by landscape architects and creative urban planners and designers, in addition to the severity of environmental problems in the world community, it will destroy the rich culture and civilization of the region. Therefore, the authors of this research, after a brief overview of the history of the coexistence of the residents of Kurdistan in the Zagros and Anatolian mountains, by using the 14 principles of biophilic design, try to provide a framework suitable for the nature of Kurdistan according to the model presented in Figure 1.

## Biophilic Architecture

Biophilic architecture is based on the claim that humans have an inherent connection with nature, which should be expressed in their daily lives, especially in the architecture of houses and in the space of cities. According to figure 1, we discuss the purpose and framework of the research topic. Then, we define landscape architecture and its relationship with architecture, urban design and environmental design engineering. Furthermore, according to figure 2A below, we express the position of landscape architecture and its orientation towards each of the



**Figure 1:** Panel A shows the introduction, the text with its analysis and finally reaching the conclusion. The general structure and framework of the research was formed based on this. In panel B, the nature of mountainous areas in Kurdistan, was placed instead of the introduction, and in the same way, it biophilic was placed instead of the subject text. Finally, after combining and analyzing, the topic of the article was extracted in the result section and the topic of the article was mentioned in general in the panel C.



**Figure 2:** Visual definition of the landscape and how it relates to architecture, urban planning and the environment.

factors that create it including its basis and proximity with natural design or biophilic.

To express the issue in the figure above, if we schematically show the architecture with a yellow circle and urban design with a blue circle, by putting them together, a landscape will be created, which is shown in green color (Figure 2B). In the same way, if we place the obtained set in the larger circle of the environment and combine all of them, the relationships between them in the side triangle (Figure 2C) will be obtained. If the landscape, which is in the form of a green circle in the middle of the triangle, tends to the right side of the corner of the triangle, which is shown in blue color, the urban landscape architecture is obtained. On the contrary, if the inclination of the landscape is to the left side of the image, which is marked with yellow color, it will be a sign of landscape architecture.

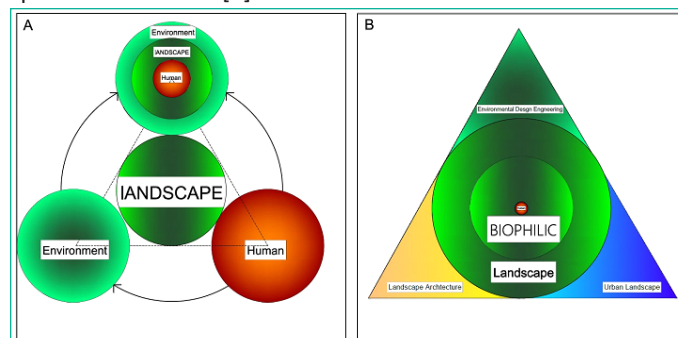
Similarly, if its attention is focused only on solving engineering problems in the environment, the result will be environmental design engineering (Figure 2D). As a result, our assumption in this writing is Biophilic concentration in the center of the circle in the landscape area. In order to clarify the issue, we will look at the emergence and different definitions of Biophilic Design (sections 3 and 4). Afterwards, in order to understand the nature of Kurdistan based on the principles of J. Lagro, in his "Site Recognition and Analysis" book, we will explore the nature of Kurdistan from three angles namely, physical, cultural, and biological (sections 5 and 6). Finally, by analyzing and combining the two circular diagrams mentioned above, the final results are obtained. which we have referred to as the principles of biophilic design in the nature of Kurdistan (section 7).

### The Emergence of Biophilic Design

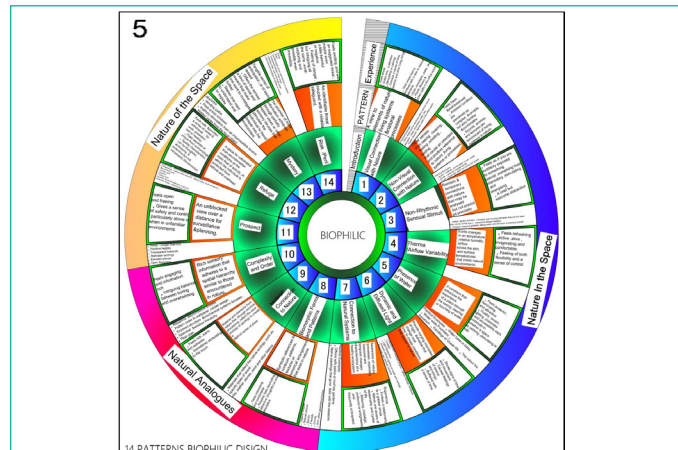
Biophilia was a term first brought to life by the Fromm, the psychoanalyst, in his exploration of "The Human Essence", which defines humanity [3]. He saw that people's awareness of their "being" and their mortality, separates them from nature and induces deep anxiety and conflict. In an effort to overcome this anxiety, one can take two paths: either the regression path of narcissism, incestuous coexistence, violence and necrophilia,

or the progressive path of altruism, freedom and bio-friendliness (i.e., "Biophilia"), which was defined as the love for life and life processes. [3].

The human concept of biophilia was then explored and popularized in 1984 by the social biologist Wilson in the book Biophilia. Wilson defined biophilia as "an innate tendency to focus on real life and processes" [4]. He coined the term "biophilia" to describe his deep feelings of connection with nature during his period of exploration and immersion in the natural world. Wilson's unique insight was that this biophilic tendency was developed as part of evolutionary survival and, therefore, includes certain characteristics that remain for humans even in modern cities. He believed that the love of life is an innate human tendency and "exploration and dependence on life is a deep and complex process in mental development" [4]. Scholars from different fields came together a decade later to collaborate with their thoughts and discuss the concepts presented by Wilson. From this collection of intellectuals, the book "Biophilia Hypothesis" emerged. Wilson and Kellert, another ecologist, hypothesized that nurturing this innate love and connection with nature is essential to the well-being of modern urban humans, and goes far beyond a basic sustenance of life. They proposed that humans are biologically designed to respond positively to connect with nature, and as Fromm first hypothesized, this attachment can contribute to human intellectual, emotional, and spiritual fulfillment [5].



**Figure 3:** This figure was designed according to an introduction to the emergence of the biophilic field and the results obtained from Figure 2. In panel A, by placing human in the place of the introduction and environment instead of the text and placing the landscape in the relationship between human and nature, as a result, the connection between human and landscape in environment will be created. In panel B, which places human as the center of attention with regards to biophilic in the landscape, and hence human will be directly connected to architecture, urban planning and environmental design.



**Figure 4:** In this figure, based on Browning's point of view, the 15 principles of Biophilic Design have been summarized and categorized and explained in the form of diagrams along with case examples.

Finally, in 2006, a conference was held in Rhode Island in the United States that brought together interested participants from academia, industry, government, finance, and civil society to further discuss the biophilia hypothesis. The focus of this conference was more on the practical implementation of the benefits of biophilia in urban design and architecture. Another book, *Biophilic Design: The Theory, Science, and Practice of Bringing Buildings to Life*, emerged from the conference, which laid the interdisciplinary foundations for a biophilic design approach to the urban and rural built environment [6,7]. In the figure 3 below, we have depicted the connection between human and Biophilic landscape.

### Features of Biophilic Design

Architectural design is an extension of the biophilic link with nature, which will include the ability to influence the physiological and psychological states of people. As mentioned in the introduction, the expression of this connection through biophilic design in architecture has occurred throughout history, though not consciously, but as an inherent quality in humans. Nature can be described by using patterns, forms, materials, symbols, and so we can recreate spaces that reflect and imitate the characteristics and beauty of nature in the direction of positive responses and energies that are found in nature. Alexander recognized this in his seminal book entitled *A pattern language*. Although he did not use the term biophilia, he expressed similar insights: "*Many of the patterns here are archetypal—so deeply rooted in their nature that it seems patterns are part of nature's response to humans*". Like the Biophilic Design theory, Alexander believed that the language of the pattern of the nature of objects in the environment "*can give people a sense of aliveness and humanity*" [8]. When people can't surround themselves with nature, then architecture and landscapes that contain some elements of natural archetypes must appear in urban design and architecture. This corroborates the Appleton's statement, which implies that human aesthetic responses to landscape and architecture are "*partially innate*" and thus, people cannot stray too far from natural patterns before destroying their "*aesthetic experience*" [9]. He also stated that humans should seek to recreate something from the original connection with nature in order to maintain an experience of well-being. The perspective-shelter theory developed by Appleton suggests that people feel good when they are in a safe haven, a feeling that is enhanced when they have a window overlooking life and the events around them. This reflects the inherent protective need to examine risks from a safe place [9]. Also, Wilson states that the landscape and features of the shelter contribute to positive human emotions [4]. A shelter with a view contributes to the feelings of comfort and well-being, which Appleton stated are the two most attractive feelings together.

Proponents of biophilic design have elaborated these design concepts and found their validity through experience, intuitive knowledge, and historical examples [10-12]. Based on the theory of the contributors in the book, *Biophilic Design: The Science and Practice of Bringing Buildings to Life*, they recognized the need to define the dimensions of biophilic architecture as the beginning of a toolbox for architects and urban developers [6]. Herwagen and Gregory categorized seven main features [10], while Kellert listed six elements with seventy design features. [7] Also, Ryan et al refined these biophilic design elements with supporting qualitative and quantitative research in both physiological and psychological aspects [13]. Accordingly, Browning recognized that earlier lists of design features were difficult and

potentially confusing for designers and consolidated the design features into fourteen patterns in three categories [14]. In our present work, we use these 14 models as the basis of our research and we propose these principles (Figure 4) with the architecture and nature of Kurdistan.

### The Necessity of Biophilic Design in Kurdistan

Industrialization has had undeniable impact on the quality of everyday life of human in the modern era. The indiscriminate use of natural resources for the construction and mass production of huge industrial and sports buildings in cities and the development and distribution of vast networks of roads, tunnels and bridges have interrupted the development of natural ecosystems. Consequently, the excessive acceleration of urbanization has dramatically impacted the behavior of humans in the modern era. This change in urban and suburban public transportation systems has caused the people of the last century to live in a noisy urban environment with heavy traffics and pollution. Needless to say, this stressful condition can cause substantial disruption of the normal functioning and health of every individual, and hence has resulted in increased incidence of a wide variety of physical and mental illnesses. Unfortunately, the cities in Kurdistan are not exempt from this trend, and so, they are no longer able to provide suitable ecology-friendly services. Therefore, the authors believe that the principles of Biophilic Architecture can lead the way. We believe that the Biophilic Design principles must be adapted to the existing and ancient landscapes in the nature of Kurdistan. Therefore, in the following section we will have a closer look at the natural landscapes of Kurdistan, and subsequently in section 7, we will present the 14 principles of Biophilic Design tailored for the nature of Kurdistan.



**Figure 5:** Shanidar Cave. The opening of the cave from the surrounding view and the access point of the cave are shown [15].



**Figure 6:** From the inside of the cave faces the wide Bistoon plain, the view and landscape around the cave are shown. This image was extracted from the website of the Kermanshah Cultural Heritage Organization.

## A Closer look at the Ancient Landscapes in the Nature of Kurdistan

Shanidar cave, which is located with latitude and longitude: (36°50' N, 44°13' E) in the Zagros mountain range with an altitude of 740 above sea level, is one of the prominent landscapes in the Kurdistan part of Iraq (Figure 5). In Paleolithic archeology with the exploration of Ralph Solecki between 1952 and 1960 and 1963 to 1971 has been described as the first courtship of today's modern human with an age of more than 65,000 years [15,16]. This discovery led to the publication of the book "*Kurds, the first breeding of flower feeders*" by Ralph Solecki in 1960, and it became the best-selling book of the year in America. Also, in 2011, he was invited by the Kurdistan Regional Government for further studies by Graeme Barker, which was stopped due to the ISIS attack. Nevertheless, two samples from Oxford University were obtained with the permission of Ralph Solecki, and using radiocarbon tracing their age was estimated to be between 45,000 and 65,000 years, which have confirmed all the findings of Ralph Solecki. Afterwards, Ralph Solecki continues his research by using the soil sample of Shanidar Cave and states that so far he has not found any cave in connection with the collection of pollen and seeds of flowers and plants that is comparable to Shanidar one [15,16].

The second notable landscape of Kurdistan is the *Anar Cave*, which is located in the middle of the Bistoon wall (Figure 6). In this cave, the remains of modern humans and animals such as mountain goats can be observed, and in the lower part of this cave there are petroglyphs and the Palace of Bistoon Gardens, which belonged to Khosrow Parviz, one of the Sassanid kings in 600 AD.

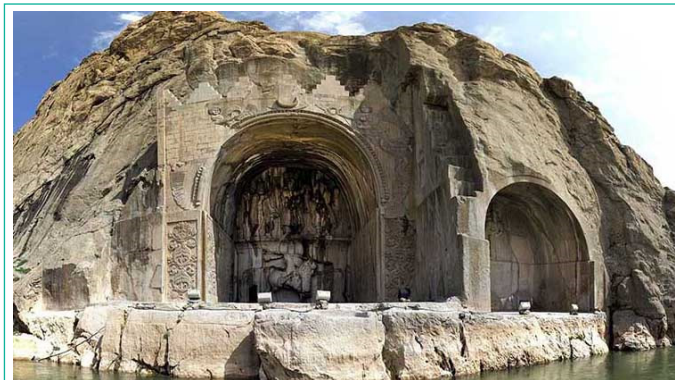
Another prominent natural landscape of Kurdistan is the Taq-Bostan, which is located in the northeast of the city of Kermanshah (Figures 7-9). A huge collection of petroglyphs and exquisite inscriptions by the Sassanid, Parthian, Achaemenid and Medes kings stand out in this treasure. The existence of beautiful limestone mountains and surrounding springs has made a small lake flowing on the slopes of the mountains, which has caused the connection between humans in the context of history and its nature. This is the interweaving of natural beauty along with works of art that are layered in the context of time.

Furthermore, it is important to mention *Dokan Davood*, which is a historical burial vault that belongs to the period of the Medes (Figures 10-11). The ancient art of petroglyphs, which is more than 3000 years old in this place, manifests the relationship of human with nature and the beginning of domination over it. At that time, nature in this region of the land was still the mother and shelter of its inhabitants, even though he is holding an ax in his hand and performing on the stone face of his mother.

Furthermore, Dr Dalley in her research performed at the University of Oxford, talked about the Hanging Gardens of Babylon, which is considered as one of the seven wonders of the world (Figure 12). She proved that these gardens did not belong to the Babylonians, but to the Assyrians in the land of today's Kurdistan in the north of today's Iraq, between the western Kurdistan of Syria and Turkey. In addition, it has been attributed to 3000 BC. With this discovery, the fact that the waters were diverted from the Tigris River and flowed up the hills by means of stone aqueducts has been revealed, which implies that the history of aqueducts in Kurdistan regions is older than the Roman ones. Her findings further indicate that the Assyrians by



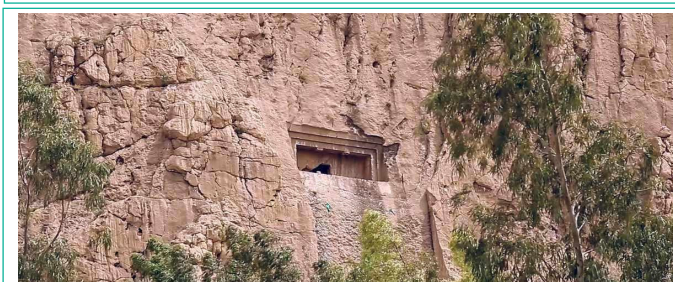
**Figure 7:** The petroglyphs of the Taq Bostan royal hunting ground in the natural bed of the mountains and a small lake created by karst springs have created a beautiful natural landscape, which is depicted with petroglyphs and inscriptions, which is considered the first stone painting in the world that complies with the rules and principles of painting. Is These works belong to different time layers in different historical periods in Kermanshah. This image was extracted from the website of the Kermanshah Cultural Heritage Organization.



**Figure 8:** The big arch and the small arch that contain petroglyphs with regular geometrical principles. This image was extracted from the website of the Kermanshah Cultural Heritage Organization.



**Figure 9:** The Achaemenid inscription that dates back to the 6<sup>th</sup> century BC. This image was extracted from the website of the Kermanshah Cultural Heritage Organization.



**Figure 10:** The crypt tomb of Dokan Davood, which is carved on a height in an orderly frame based on geometry and observing the golden ratio, is depicted. This image was extracted from the website of the Kermanshah Cultural Heritage Organization.

plotting and aligning the hills managed to plant different types of trees, shrubs, flowers, plants, and creeping flowers. And in the same way, the resulting trenches were restrained by stone walls. Their surface was covered with floating flowers. By creating this huge amount of landscape planting spaces with green walls, they tried to create gardens that seemed to be suspended from the observer's view. Its creation remained a mystery for several thousand years. This discovery has been proved by Dr. Dalley using stone inscriptions and written works in the paintings on the pottery of the region and historical works and writings, which has a place to be included in the review of the history of art and architecture of the world.

Moreover, based on the archeological findings by Andre Goudard in Ziviy Castle and other castles studied in Kurdistan, it can be concluded that the people of this part of the world were inspired by the natural patterns of the caves. In the context of the times after the cave-dwelling, they initially built their own urban societies on the forts built on the high hills, which created a unique landscape that enabled observing the beauty of the surrounding nature but also help them to remain prepared and safe against the enemies and the attack of predatory animals.

Oraman is one of such nature-oriented cities of Kurdistan, which remains as an archetypical example of an ancient city (Figures 13-14). According to archeological research, the people of Oraman are the oldest inhabitants of Kurdistan. Their ancestors were called Kurdo or Cardo in 8000 BC, who had a livelihood based on animal husbandry and a nomadic life that they gradually settled and built the first city in Oraman. Their famous ancient city was called Atovar, which was burned by the Assyrians about three thousand years ago. This city is now buried under a pile of dirt, and was located in an area called Aturgeh, which is the old name of a place in the vicinity of Paveh today.

Finally, to further elaborate on the ancient landscapes in the nature of Kurdistan, and to appreciate their diversity, we have catalogued around 150 caves in Kurdistan. We have noticed that only a limited number of them have been subjected to archeological research. We have mentioned and introduced the most important ones in the Supplementary Materials, section A, which we recommend for further investigation.

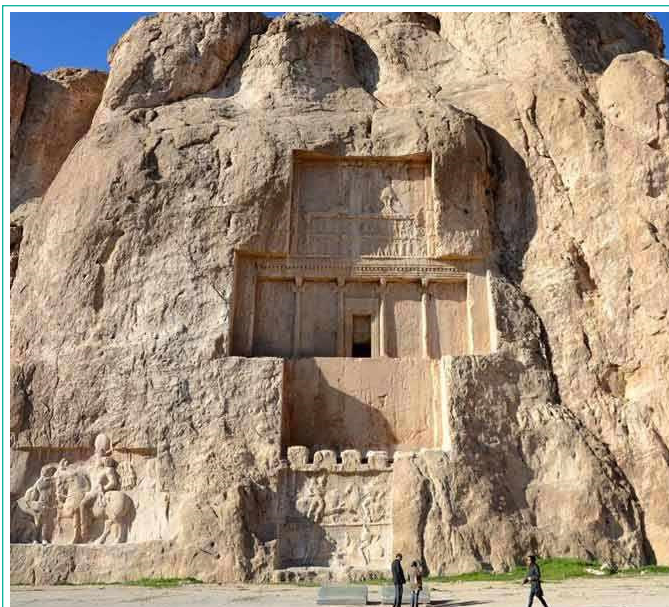
These ample examples, attest to the fact the appearance of the Kurdistan is the consequence of an attitude of harmony and compatibility in the relationship between human and nature in the context of history, which is thus of inherent talent for implementing and comprehensively studying the principles of Biophilic design. Accordingly, in our approach we aim to integrate the contents of Figure 15 and 16, which presents our proposed model and principles of Biophilic Design in Kurdistan.

### Principles of Biophilic Design in the Nature of Kurdistan

Below, we have briefly listed the 14 principles of biophilic design in Kurdistan (for more elaborated explanations and the accompanying pictures, please see Supplementary Material, part B):

#### Visual Communication with Nature

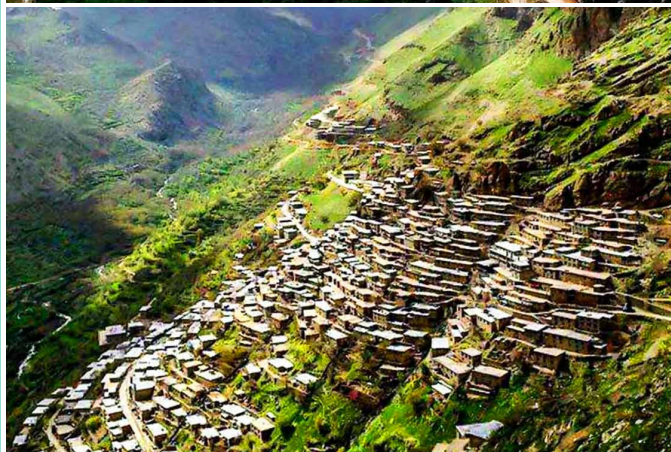
One of the important characteristics of the five human senses is sight. Opening the eyes to the wide view of nature creates a unique relationship between human and nature. According to this description, due to its mountainous nature, Kurdistan has lowlands and heights that are regularly and successively spread in the land bed. In addition to creating a mountainous climate,



**Figure 11:** Several different petroglyphs in a beautiful form are depicted, which is an expression of the Urartian architecture. This image was extracted from the website of the Kermanshah Cultural Heritage Organization.



**Figure 12:** The above two images are obtained by computer reconstruction of the Hanging Gardens of Babylon built by the Assyrian King Shanakhrib. Some historians believe that these gardens were only an unattainable and very beautiful dream for the people of the ancient world. According to the stories and legends of the ancient world, one of Sennacherib's wives was a princess from the land of the Medes (Mananai in Zivye Saqqez), who after marrying the Assyrian king Sennacherib and moving to Nineveh, which was located in Iraqi Kurdistan, became ill due to not being used to the climate of the middle of the river. To cure her illness, the king ordered the construction of hanging gardens on the northern hills of the northern Nineveh. It is also said that these gardens were located on different floors of a magnificent palace and were considered one of the engineering masterpieces of its time. The images are obtained from <https://blog.rahbal.com/hanging-gardens-babylon/>.



**Figure 13:** Beautiful images of Oraman regions, which have preserved the architecture compatible with nature in 8000 BC, have been depicted in a modern way. In addition to showing the slope in the mountainous areas, the residential context is beautifully depicted in the vicinity of the river in the beautiful nature of Kurdistan. The images are obtained from <https://en.wikipedia.org/wiki/Avroman>.



**Figure 14:** The native dress of the inhabitants of this region is depicted on the slopes of the young mountains. The images are obtained from <https://en.wikipedia.org/wiki/Avroman>.

this feature creates dynamic landscapes from the observer's point of view. In Kurdistan, there are ample opportunities to enjoy the unique experience of observing the elements of nature, including mountains, rocks, waterfalls, and rivers, along with living systems including trees, plants, native animals and birds and their relationship with natural processes of the ecological cycle and temporal phenomena in the seasons and climate changes.

#### **Non-Visual Communication with Nature**

In addition to seeing, other human senses such as hearing, smelling, tasting and touching in relation to nature, can create further feelings of pleasure for the human observer in the lap of nature.

#### **Sensory Stimuli (non-rhythmic)**

The abundance of unique landscapes in the mountainous regions of Kurdistan, the presence of rare birds and animals in the region, will cause the appearance of rare scenes on the path of a walking observer, which can create unique feelings.

#### **Variability of Airflow**

Subtle changes in air temperature, relative humidity, air flow across the skin, and surface temperature that mimics natural environments are all good ideas. Accordingly, in Kurdistan, from the top of the mountain with the experience of touching the mist under your feet to landing on the slopes of the mountains, with the abundance of streams and roaring waterfalls, in the mountains of Kurdistan, you will experience different sequences of the connection of your skin with water. Therefore, by creating beautiful sub-climates which can capture fresh, moist and Dalleycate air and by filling it with your skin, it is possible to achieve creating special spaces in the design.

#### **Presence of Water**

By seeing, hearing or touching water, the experience of a water place is enhanced.

#### **Dynamics of Scattered Light**

By providing different intensities of light and shadow will enable revealing the beautiful flashes of nature over time. When the sunlight shines through the trees with the gentle swaying of the leaves, or the reflection of water on the surrounding stones, each brings to mind a pleasant effect of light and shadow.

#### **Connection to Natural Systems**

Knowledge of natural processes, especially seasonal and temporal changes, enhances the characteristics of a healthy ecosystem. Because the mountainous regions of Zagros and Anatolia have very cold and snowy winters, green and beautiful springs, hot and humid summers, and pleasantly yellow autumn, each season has its own beautiful and unique effects.

#### **Biomorphic Shapes and Patterns**

Organic shapes and natural colors, spirals, fractals, curves and other geometric shapes.

#### **The Connection of Materials with Nature**

Materials that reflect the local ecology, such as certain types of wood, clay, leather, stone, wool and other fabrics.

#### **Complexity and Order (Repetitive and Symmetrical Shapes)**

The complexity in the organic system can cause a beauti-

Conclusion

The impressive growth of the population and the expansion of cities, and the parallel development of industries and construction technologies, have led to exploitation of natural resources. Therefore, taking into account the limited resources, the Biophilic Paradigm Model has been proposed in order to respond to the needs of the users in a safe environment, where the mental health and life satisfaction of the citizens are prioritized. Hence, in our study, we have evaluated the 14 principles of site design and architectural plan in order to propose and tailor these principles for the mountainous areas of Kurdistan. Therefore, while respecting the beauty of the surrounding nature and inviting it, we will use these principles to create man-made urban and rural spaces. In order to achieve this Biophilic goal, we proposed this method with the help of modern technologies, in sync with the forces of nature, not against it. The final implication of our proposed method is that the peace and comfort of the residents in man-made environments with modern architecture and urban planning is contingent on returning to the lap of nature. Kurdistan, with its vastness and high capacity, can always be a suitable platform for achieving this goal, just like the long history of its civilization, which has been named by scientists as the cradle of civilization. Therefore, we aim to encourage the local architects and urban planners make the most of these design patterns in their future designs.

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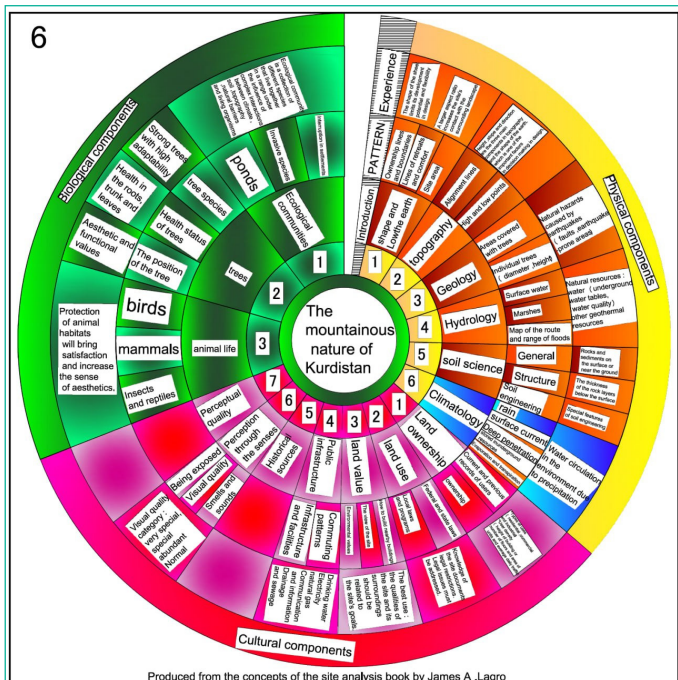


Figure 15: Based on the opinion of J. Lagro, we have divided the analysis of Kurdistan's nature site into three general layers (i.e., A: Biological layer B: Physical layer C: Cultural layer), each of which is later divided into other layers:

A: Biological Components: A.1 Ecological communities, A.2 trees, and A.3 animal life

B: physical components: B.1 shape and Lowthe Earth, B.2- topography, B.3 Geology, B.4 Hydrology, B.5 science, and B.6 climatology

C: Cultural Components: C.1 Land ownership, C.2 Land use, C.3 land value, C.4 public infrastructure, C.5 Historical Sourses, C.6 pre-pencipatin therug the senses, and C.7 perceptual quality

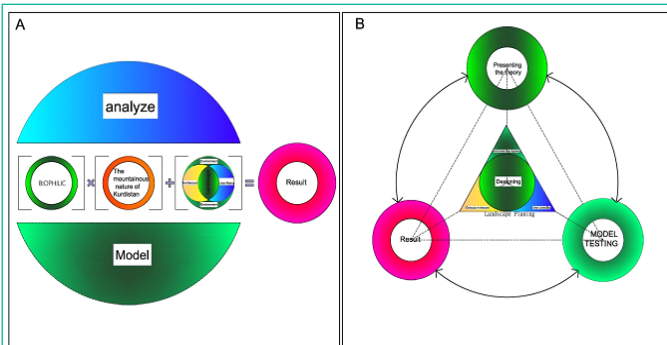


Figure 16: By combining Figure 4 with Figure 15 and the 15 principles of biophilic design, in this figure, we have obtained a model of Biophilic Design in mountainous areas in Kurdistan.

ful order, which can also be manifested as the repeated forms within the layers of stones.

Perspective

Experience of the pattern of an unobstructed view is essential for monitoring and planning remotely

Shelters

A place to withdraw from environmental conditions or mainstream activity, where the person is protected from the back and overhead.

Winding Paths or Different Labyrinths and Auditory Mobility to Understand the Environment

Risk or Danger

The gravity of the earth at high altitudes, and the presence of water and relative humidity indeed create special conditions.



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