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Application of Eco- Revelatory Design for Qanats

Hamidreza Nikfarjam^{*1}, Mehran Alalhesabi²

1. M. A. Student in Urban design, Iran University of Science and Technology, Tehran, Iran.

2. Associated Professor, Iran University of Science and Technology, Tehran, Iran.

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Abstract

Statement of problem: Qanats, the masterpieces of Iranian engineering, have long played a key role in rural development and urban expansion. In recent decades, these underground structures have received less attention. Such negligence is mirrored by leaving domestic, hospital and industrial wastewater running into qanats. It is exacerbated by the lack of awareness of the inhabitants of the traditional textures and the new parts of the city. The decline in the use of the qanat systems in Iran has also affected urban and especially traditional textures. Therefore, the restoring and updating the technology of qanats as a potential solution in the cities is necessary. In this context, urban spaces as a platform for social events can play a significant role in educating and raising awareness of the citizens.

Purpose of the study and Research Methodology: This study employs Eco-revelatory design to identify those parts of the natural and cultural phenomena and processes that are overlooked by a community. This approach and its tools attempt to raise the awareness of society about its environment and its events. To this end, we first identify the principles of this approach by examining and analyzing the specialized texts and then develop them for qanats in accordance with the urban design qualities. In doing so, we attempt to address the three main goals of Eco-revelatory design in urban space.


Conclusion: This paper draws upon the principles of Eco-revelatory design, a) to arouse public interest in qanats, b) to encourage the citizens to attend well-designed spaces and, c) to raise their awareness about this significant bio-social phenomenon and its related issues.

Keywords: *Eco-revelatory design, Qanat, Urban design, Public space.*

Introduction and Statement of the Problem

Over the past decades, neglecting the natural environments by modern humans and disrupting

the ecosystem order have brought a marked change in attitude towards technology and industry. Among the changes in the present era, adaptation to the natural environment has become one of the most important achievements of each technology.

 * Corresponding author: +989131593998,
h.r.nikfarjam@gmail.com

The Brentland Conference in 1987 could be a turning point in this regard. It is worth mentioning that cities, the environment for habitation and human activities, can turn to the platform for the most dangerous intervention by the humans in its surroundings. Population growth and, consequently, the rapid urban expansion without considering the features of the ecosystem have raised many problems for humans and other living organisms. Nowadays, the international community is much concerned about the adverse effects of human interventions on nature. To address this concern, we argue that the city and urban spaces as different platforms for social events can promote eco- friendly living.

Eco revelatory design, one of the approaches in environmental design, attempts to seek strategies for protecting and restoring the authenticity of the natural environment. Eco-revelatory design highlights the phenomena and natural processes which are invisible or overlooked by the community and draws the attention of people towards them. In fact, Eco-revelatory design attempts to make the society more sensitive to the natural environment and the ecosystem in which is located.

Through interaction with the site and sharing their practical experience with each other, the audiences can have a great opportunity to learn about the nature-associated concepts. They can also develop their knowledge about the ecological and cultural values in the urban context.

The approach attempts to institutionalize different ecological, cultural and social values and encourage people to hold onto them. In fact, this bottom-up approach informs the people and society about the nature and motivates them to step up their demands for immediate local government action. One of the issues that this approach emphasizes is water in the city. The rivers, streams, ponds and etc are among the most important natural sites and water streams in cities. The formation of cities in the vicinity of water and the impact of them on the shape and morphology of cities has been the concern of many researchers. A large part of Iran is in the arid and hot zone of the desert.

Most of the cities in this region lack the permanent rivers, and in fact, their growth and development have been made possible through the use of qanat technology. Qanats, a century-long achievement of inhabitants of the land, are virtually a stable system transferring gravity-driven groundwater to the surface. This system can control over-exploitation of the aquifers. Regardless of these advantages, the qanat system was gradually replaced by water pipes and new water supply systems in the cities. All the authorities in charge of the administrative system have mainly focused on new systems. The consequences of disrupted ecosystems, which are caused by human interferences or overexploitation, necessitate adopting sustainable technologies. Replacing the qanat system with different water supply systems will have severe consequences. Qanats as the urban infrastructures have long played an important role in the formation of urban and rural texture over the centuries. They can also promote different culture-associated customs. Maintenance and sustainability of qanats are closely linked with the awareness of people. Therefore, concepts associated with this phenomenon should be passed on to the citizens by familiarizing and engaging them with qanats in a city environment. Drawing upon Eco revelatory design, we have attempted to show how encouraging citizens to attend or participate in urban spaces can provide an opportunity for teaching concepts and fostering values related to qanats.

History and Background of Eco revelatory Design

In recent decades, urban expansion and rapid urbanization have disassociated the urban community from its natural environment. The disintegration of an urban resident from nature sometimes have resulted in the separation of humans from natural processes. This also has made them negligent of those processes. For this reason, they might not realize how his activities can threaten nature and ecosystem. Variety of factors have impeded humans from having interactions with ecosystems and gaining

direct experience, especially in urban environments. Some of the factors are : human-made infrastructure networks, the allocation of different urban functions to different land plots, or the practice of different actions by designers, urban planners, and engineers Eisenstein, 2005: 17).

Eco-revelatory design highlights natural processes, and even makes them visible and observable. In doing so, it attempts to raise the awareness of the community of such a process. Using a shared language proposed by Eco-revelatory design will help us accept our new responsibilities for what we are dealing with (Robert & Thayer, 1998: 129).

Eco-revelatory design was first introduced in landscape design. Given its goals, it can be categorized under ecological design and sustainability issues. “Ecological design in its general sense refers to any form of designs that minimize the destructive impacts by integrating itself with living processes” (Van der Ryn & Cowan, 2007: 33). Such designs present a way for integrating the goals of humanity with the patterns, processes, and the flows of

nature. In other words, Ecological design serves as a catalyst for understanding cultural processes associated with sustainability. Ecological design can be conceptualized as follows: ecological design, consider not only environmental issues but also a dynamic equilibrium within organisms in relation to their environment (BJB, TJH, & DMJ, 1998: x).

Eco-revelatory design is one of the ecological design concepts in the field of landscape design that seeks to promote the quality of the ecosystem by revealing the phenomena, processes and ecological and cultural relationships influencing the site (Mokhles & Nematimehr, 2014). The impetus behind eco-revelatory landscapes is to inform the community about the processes that have been forgotten by society due to the advancement of technology and rapid urbanization (Fig. 1).

The initial idea of approach dates back to August 1997 when a group of landscape architects began to compile and organize a series of activities for an exhibition to present the idea of landscape design called” Eco-revelatory landscapes” (Liverman, 2001: 1-3). This group of architects later published their ideas in the Landscape Journal (Fig. 2).

The focus of the exhibition was on the work that fell between the rigorous analysis of the “Ecological design” approach and the “Avant-garde” approach. They realized that eco-revelatory design was a solution to bring these two aspects of the landscape design closer and hoped that the eco-revelatory design could be placed in the middle of the two. This view was able to take the advantages of the expressive and imaginative language used by avant-garde designers, and environmental awareness, which was the focus of ecological designers. Eco-revelatory design is capable of highlighting the aspects of the site which are hidden in its normal state or ignored by designers and the people. Its purpose is to revive this designed environment and make people aware of its environmental complexity (Liverman, 2001: 1-3). In fact, Eco-revelatory design falls between these two landscapes design approaches (avant-garde design and ecological design) and benefits from



Fig.1. The cover of Landscape Journal – 1997. Photo: Alalheshabi, Mehran, 2017.



Fig. 2. The status of Eco-revelatory design in relation to other landscape design approaches. Source: authors.

the capabilities of the two to achieve its goals. By describing the abilities of the design in highlighting, emphasizing, revealing and attracting the attention of the public, the organizers of the exhibition hoped that eco-revelatory design would make people more sensitive about the complexity of nature and unveil the relationship between people and that event, or a system of environmental or cultural value (Ibid: 1-3). Each eco-revelatory landscape has a mission to solve the problems associated with cultural and environmental phenomena and make them visible to its audiences and educate them about those phenomena (Gortz-Reaves, 2010: 7). In so doing, the landscape can serve as a moderator between ecology science and ecological design and enhance environmental sustainability (Nassauer, 2012: 223). According to Nassauer, to achieve this goal, two principles should be taken into consideration. First, the landscape should be integrated with natural processes, and second, the landscape should be visible.

In fact, the goal of Eco-revelatory design is to make people aware of the delicacies and complexity of their surrounding nature to appreciate them. By developing the sensitivity of the community to the environment, this design helps the member of community make

wiser decisions about the environment.

Methodology

First, the pertinent literature, documents and the specialized texts were reviewed and examined. Then the data related to Eco-revelatory design and urban design qualities were collected and the goals and principles of Eco-revelatory design were extracted. The relationship between Eco-revelatory design and urban design qualities was analyzed using the Delphi technique. Finally, using the logic inference method, these principles were explained in accordance with the urban design qualities and the three main goals of this approach in relation to qanats were explained.

Theoretical foundation

●Eco-Revelatory Design and Perceptual Processes

Eco-revelatory design attempts to develop the residents' environmental identity. The importance of this issue is that the audience's sense of attachment to the environment can arouse his sensitivity and attention to its milieu and encourage him to make efforts in understanding its environment and promoting its quality.

To develop such an identity, revealing the phenomena cannot be enough. In fact, while the landscape designer artistically revealing natural processes and making them more sensible to its audiences, he tries to turn the "space" to a "place" for them. This makes the audience feel more attached to space and develop his environmental identity. Edward Relph, a prolific theorist in this field, introduces the three major components of the place as follows: a physical setting, activities, and meanings. Relph emphasizes that places can only be understood by means of meanings. The meaning of places may be rooted in the physical settings, objects, and activities. However, the meanings are not specific features of the elements and the identity of the place is associated with humans' intentions and experiences (Pakzad, 2010: 206-207).

Transferring the concepts through the creation of a direct experience is what Eco-revelatory design

offers. In this regard, Merchant defines Eco-revelatory design as a partnership between the society and nature. According to him, in this design whose results depend on “training” and conscious “direct experience” of the residents, the ecosystem is not just a guide (Merchant, 1998: 69). In other words, the revelation is guiding the audience through the ecological narratives over time and encouraging them to uncover the concealed secrets of the natural environments (Gortz-Reaves, 2010: 33).

Knowing how natural processes occur or evolve can influence the ways the processes are perceived by its audiences. Eco-revelatory approach would promote human life optimally only if its ultimate designing goal is to focus on the “experience” than “appearance” or “process” than the “form.” In other words, in processing the cognitive ecology models related to human perception, the possibility of having a deep contact with hidden processes and their interpretation should be promoted through hands-on experiences.

The new emphasis on “communication,” “change,” and “process,” create a new perspective in the academic and professional fields of the landscape. This is in contradiction with the former formalist traditions and highlights the aesthetics of experience rather than the aesthetics of form (Barati & S-Berenji, 2011). The emphasis on creating a direct experience with the environment can develop a sense of attachment in the audience. Through the direct experience with the environment, the audiences get closely connected with it, identify themselves with it and make memories of it. Memories are actually the same meanings that turn space into a place. Through such a process in the urban environment, the people

will find common ground and make a sense of spaces. Following this process, the people develop a sense of attachment to the space and become more sensitive to the events and incidents that can occur (which can enhance or reduce the quality of space). Even they attempt to maintain and enhance the quality of the space. In Eco-revelatory design, this process is called the direct experience.

This approach does not show only the beautiful and high quality of the spaces. In some cases, it even presents the ugly and unfavorable aspect of space. In so doing, it attempts to raise the awareness of community about the consequences of destructive interventions. Emphasizing the devastating effects of the humans on the ecosystem makes the passive members of the community active and demanding. Citizens’ request for environmental identity is a bottom-up process which has been emphasized in recent decades (Fig. 3).

Goals and Principles of Eco-revelatory Design

In the book, “Advances in Landscape Architecture,” Arisoy argues that the interpretation of ecological processes is associated with the ability of the plan in revealing ecological processes. The process can be successful only if the built environment is visible, observable, legible and able to arouse the curiosity of the audience to understand the complexity of the landscape. Accordingly, he describes the general principles of Eco-revelatory design as follows: visibility, sustainability, naturalness, observability, multi-functionality, legibility, ability to arouse curiosity (Arisoy, 2013).

Garrett Reaves (2010) states that any landscape design, in addition to addressing environmental and

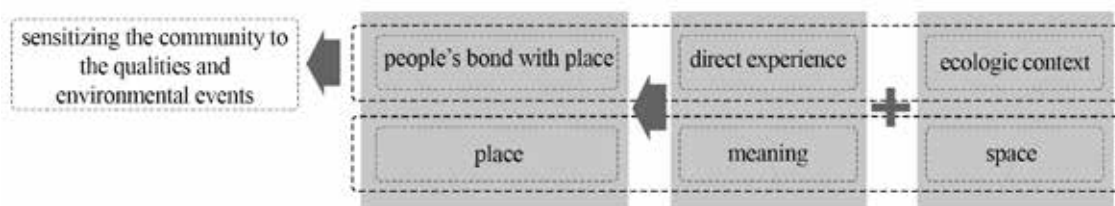


Fig. 3. Eco-revelatory and understanding process. Source: authors.

cultural challenges, attempts to educate people and make them aware of their surroundings. The emphasis on teaching and making people more sensitive to natural context is one of the major principles of Eco-revelatory design

The organizers of the exhibition highlighted the direct experience of their audience. They believed that an experience created by the design can be more effective in teaching ecological and cultural concepts. In other words, this approach theorizes and embodies a new link between education and ecology (Phillips, 1998: 110).

Merchant argues that Eco-revelatory design is a partnership between the people and nature. In this design, raising the awareness of the residents has been emphasized and the ecosystem is no longer a guide. Its concepts are conveyed through training and become accessible through direct experience. In fact, Eco-revelatory design uses education and direct experience as key tools used to accomplish its goals. In an article published in the Landscape Journal, the exhibitors argued that an appropriate attitude towards abstract designs or symbols can encourage people to preserve and improve their environment. In addition, abstract design cannot create any restrictions. Regarding what has been discussed, the most important goals of Eco-revelatory design can be summarized as follows:

- Exposing natural processes and making them more sensible for society
- Increasing the awareness of citizens and educating them about their natural processes and how they have been influenced by human activities
- Sensitizing the community to the environment and its changes
- Raising the awareness of the community about the environment to make wise decisions
- Creating experience and an active interaction between society and the natural environments

The objectives mentioned can be summarized under three headlines directions: Ecological conservation, exposing or revealing and educating. The policies

and strategies proposed by this approach vary from one context to another due to the conditions of each site and its socio-cultural features.

Based on the literature, the most important principles of Eco-revelatory design are aligned with the three main goals of exposing or revealing, ecological conservation and training. These goals can be summarized as follows:

The role of water in the city is among the issues which have been extensively examined in the light of Eco-revelatory design. In this regard, Eco-revelatory design approach attempts to expose the waters that are hidden from the viewpoint of the people due to physical development and the transmission of water and sewage. In fact, by exposing water structures and creating dynamic urban spaces, this approach highlights the significance and role of the water structures and their function for the citizens.

In Iran whose large part of which is located in hot and arid region, urban and rural textures have been influenced by seasonal rivers and streams. Qanats, underground rivers, are the backbone of these textures. For this reason, these water structures can be investigated in the framework of Eco-revelatory design (Fig. 4).

•Qanats and their Role in the Structure of the City

One issue that has been extensively discussed in the light of Eco-revelatory approach is water in the city and human habitats. The rivers, streams, and waterfalls in the cities are the most important factors which have encouraged people to settle in the city.



Fig. 4. Goals and Principles of Eco-revelatory Design. Source: authors.

This approach emphasizes the importance of water. It is because almost all human habitats, including the city or village, are formed in relation with water and the effect of water on shaping the structure and morphology of cities is quite visible.

Since the large part of Iran is located in deserts and arid areas, some cities and villages lack a permanent river. There are different assumptions about the history of these cities in literature. For instance, some argue that the climate change of these cities is a factor explaining why they are located in the middle of the desert. Geographic changes occur throughout the world, and the conditions of many regions in the world are similar to the cities located in Iranian deserts. But the point here is that on the edge of the deserts of Iran, there are big and important cities and communities portraying different environmental experiences of their inhabitants about “water?”. Such experiences can be investigated in the light of behavioral geography theory. This theory argues that humans are under the influence of weather and environmental conditions, and the effect of this factor is inevitable. But the strategies and tool that humans employ to adapt to specific climatic and

environmental conditions are associated with their perceptions of natural phenomena. These tools and methods include production methods, and even spells and beliefs. Therefore, these effects on the whole, shape the basis of human culture (Papoli yazdi & Labaf khanaki, 2009: 170)

Both national and international researchers have defined the term qanat differently. Among the definitions, Dr. Papeli Yazdi’s one is simple though complete and comprehensive. He describes qanats as follows: the tunnels dug into alluvial fans to drain underground water and bring it to the surface without any other means. To define qanats, it is better to say that they consists of several wells and kiln, with a slope less than the earth’s surface, lead the water collected in the aquifers of different areas to the lower surface with the help of gravity (a natural flow) and without the use of pulling force or electrical or thermal energy. In other words, qanats can be considered as a kind of underground drainage that brings the collected water to the ground to be used for irrigation or drinking (Ibid, 2009: 14-15); (Fig. 5).

The formation of desert settlements and the life in

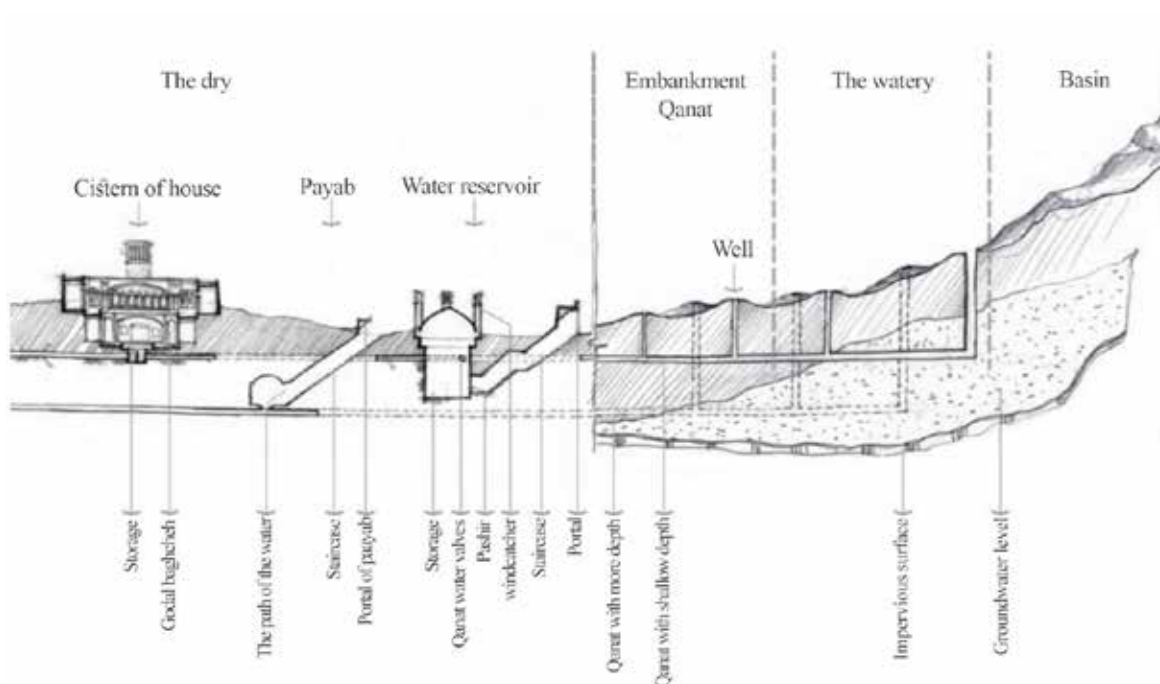


Fig. 5. Schematic section of the qanat and its relationship with the city’s building – adapted from the global registration of Iranian qanats at UNESCO. Source: Iranian Cultural Heritage, Handicrafts and Tourism Organization, 2016.

them much depends on the water provided by qanats. Therefore, it is important to investigate the effects of qanats on different aspects of the residents' life in these areas. The construction, restoration and maintenance of qanats, as well as their systems, have been so important that it has also affected many social and economic behaviors.

In an era when sustainability and ecological conservation are the major concern of all international communities, recognizing a sustainable technology and applying it in today's life seems essential. Promoting the use of qanats in the city has resulted in the construction of the related structures and affected the neighborhoods and structures of the neighborhoods. The decline in the use of the system has created many problems for these textures. The loss of environmental quality in the textures has expedited the emigration of the inhabitants and led to the disintegration of its social and physical textures. Probably, the primary motivation for reconstructing historical textures can be generated by restoring these infrastructures on which once the life of the whole city had been dependent. Therefore, promoting the use of qanats, evaluating and updating its technology need to be more emphasized in the metropolitan and regional programs.

To this end, the idea of using qanats should be promoted. Preserving and restoring this thought and culture can link our past to our future. Qanats as technology masterpieces reflect the culture whose magnitude cannot be displayed in the museums. In this regard, urban space can play an important role in conveying these concepts. By revealing the phenomenon, Eco-revelatory approach seeks to transfer its value to the audience, to draw the attention of the community to what is considered insignificant.

Results and Discussion

As it was discussed earlier, Eco-revelatory approach seeks to reveal cultural and environmental phenomena in order to highlight the significance of these phenomena for the community. One of the concerns of this approach is making water structures

such as urban rivers, surface waters and run-off visible. The reason is that in developed countries the water structures have been virtually eliminated from the urban landscape since they were directed to sewage disposal networks. The structures have been forgotten by the community. Accordingly, this approach is of particular interest to urban water issues. Therefore, the topic of water structures such as qanats falls in the scope of Eco-revelatory design (Fig. 6).

In recent decades, qanats, underground structures, have received less attention since they are invisible and their role in the present urban life has been faded and forgotten. The decline in the use of qanats which play a key role in forming urban textures may cause

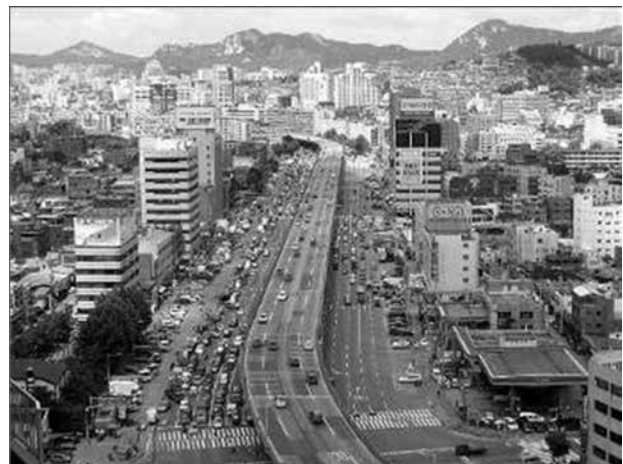


Fig. 6. An example of Eco-revelatory approach, Seoul, South Korea, the Changi Chung River, before and after being brought to the surface (Revelation). Source: <https://lacreekfreak.wordpress.com/2009/04/24/daylighting-in-the-heart-of-seoul-the-cheong-gye-cheon-project/>

some problems for the textures. Therefore, this study is an attempt to draw upon the principles and goals of Eco-revelatory design and reveal these water structures in the landscape. In doing so, we hope to raise the awareness of society about qanats and address the problems associated with its absence. The purpose of this study is to reveal qanats in urban textures. Therefore, attention to the quality of urban space is also necessary. As it was mentioned before, Eco-revelatory approach creates a “place” to provide its visitors with direct experience. The construction of the place in urban spaces is only possible after examining the various dimensions of urban design. In this regard, after reviewing the opinions of the experts on the construction quality of urban spaces and places, we selected the qualities on which most of the experts agreed. These qualities are as follows: Permeability, vitality, legibility, safety, security, sensory richness, meaning, flexibility, climatic comfort and ecological sustainability.

Qanats are essentially underground structures and they cannot be exposed as rivers and streams. But, based on the concepts of Eco-revelatory design and the physical and non-physical structures of qanats, it is possible to reveal them in urban spaces. Hence, for revealing qanats in traditional textures that is

influenced by the qanats and their related elements, the principles of Eco-revelatory design are measured by urban design qualities. At this stage, using the Delphi method, it became clear how the absence or presence of each principle of Eco-revelatory design can be assessed by urban design qualities. The results are summarized in the table below (Fig. 7).

In fact, by improving urban design qualities based on the goals and principles of Eco-revelatory design, one can expose qanats in urban spaces. According to the above table, we can say that the revelation goal can be achieved if two criteria of visibility and observability are met. Visibility can be evaluated by two design qualities, legibility and permeability. Observability that is similar to the quality of sensory richness can be investigated by examining the sensory stimuli of the environment. The purpose of educating is reflected by the principles of transparency of concepts, curiosity and experience, can be examined by the qualities of sensory richness, identity, flexibility, vitality, safety, security and climatic comfort.

The goal of ecological conservation, which is highlighted by three criteria of naturalness, bio-cultural diversity and human interaction with the environment, can be achieved through the quality of vitality and ecological sustainability.

			Principles of urban design											
			Permeability	flexibility	vitality	Legibility	safety	security	sensory richness	meaning(identity)	climatic comfort	maintaining and upgrading ecosystems		
Principles of Eco-Revelatory Design	Revealing	Visibility	■			■								
		Observability							■					
	Training	Legibility				■				■				
		Curiosity							■	■				
		Experiencing		■	■		■	■			■			
	Ecological conservation	Naturalness											■	
		Bio_cultural diversity			■									■
		Interaction between man & environment												■

Fig. 7. Criteria of Eco-revelatory design and its adaptation to the principles and qualities of urban design. Source: authors.

With this in mind, one can interpret each principle of Eco-revelatory design contributing to the revelation of qanats in urban spaces as follows:

Revealing

The principle of revealing which is the most important goal of this approach can be evaluated by two criteria of visibility and observability. These two criteria of urban design qualities can be described as follows:

●Visibility

One of the most important goals of this approach is to reveal cultural and natural phenomena. In the first place, the visibility of the phenomena is a major concern. In fact, this approach emphasizes the importance of understanding space and phenomena through the sense of sight. According to the proposed criteria, this principle is much closer to permeability; therefore, visual permeability and physical permeability (access) are the most important qualities that promote visibility.

Sometimes access to some buildings is impossible or the buildings are not easily visible. However, the role of the buildings in the life or mental images of the inhabitants is so important that they cannot be ignored. Therefore, in spite of the observability of qanats and its related elements, the role of these factors in the mental map of the inhabitants is also questionable. The five elements of Lynch's legibility are: paths, edges, nodes, districts, and landscapes that can be measured to determine whether qanats or its dependent elements are in the mental map of the people or no.

●Observability

Another principle of Eco-revelatory design is observability which refers to involving five senses with the environment to have a deeper understanding of phenomena. This principle can be linked to the quality of sensory richness in urban design. The visible aspects of qanats were studied separately in the previous section because of their importance. Arousing three senses, namely, touch, smell and hearing in relation to qanats, are also of particular importance and should be investigated.

Training

In line with the goal of educating audiences, three criteria were set: curiosity, legibility of concepts and experiencing a phenomenon. The criteria emphasize understanding the concepts and getting the audience engaged with the environment and natural and cultural phenomena. These criteria have been interpreted as follows:

●Legibility

In order to create and promote Eco revelatory culture, it is necessary to understand the concepts of naturalness and cultural phenomena and processes. In doing so, we would be able to raise the awareness and knowledge of audiences about environment. Therefore, the legibility of ecological concepts and the understanding of natural processes are among the most important issues that Eco-revelatory design puts an emphasis on. This research attempts to investigate the function of the elements related to qanats and examine their relationship with qanats and their surrounding textures.

●Curiosity

In order to get people engaged with nature and natural processes, the environment needs to be attractive enough to arouse the curiosity of its audience. The human interest in knowing and discovering is known as curiosity. In this regard, the sense of the curiosity is aroused, in fact, by the factors that stimulate the five senses. The human desires to know and discover the elements that are indexed or they are interested to learn about elements or their relationship with the context which they have been informed. Therefore, visibility and observability that are related to the senses of vision, hearing, smell and touch, are examined. Information boards, guide boards, brochures, etc. considered to examine elements related to qanats and the information they provide to the audience in relation to them in urban space.

●Experiencing

Understanding the natural phenomena through experience has been emphasized by Eco-revelatory design. Experiencing space is possible only when citizens and audiences attend the environment and

get engaged with natural phenomena to understand its concepts. The necessary condition for experience is the qualities promoting participation. The most important issues contribute to the availability of audiences are safety, security, climate, flexibility, and vitality. These are a prerequisite for ecological development.

Ecological Conservation

The third goal of Eco-revelatory design is ecological conservation and promotion. This is the main goal of this approach. Even two other goals are at the service of this goal. Taking advantages of environmental features, human interaction and the environment and bio-cultural diversity are three criteria that are proposed in relation to this goal and their realization requires the following qualities of urban space to be met.

•Naturalness

Naturalness in the theoretical foundations refers to the use of indigenous plants and local materials in design. In fact, native plants with more resistance and compatibility with the environment reduce maintenance costs and are more affordable. Moreover, their use in their natural context increases their exposure to the community and their recognition, which can be educational and promotional to the community. In a broader sense, one can interpret naturalness with the use of environmental capabilities. One of the obvious examples of this feature is the use of local material, which has a high profile in our architectural tradition.

•Interaction between humans and the environment

As part of the environment, humans need to communicate with other components of the environment. However, the consequences of the human interventions on his environment are under discussion. The widespread environmental interventions can cause some problems for creatures and humans. Therefore, interactions that are beneficial to humans and improve the living conditions for other beings have received much attention. Qanats can be

considered as one of the human interventions in the environment. Moreover, the relationship between the man and water as a natural element has always been a major concern. This relationship has been changing over the course of history. The qanat system can also be considered as a technology for water extraction. These two criteria can be analyzed by examining the quality of maintaining and upgrading the ecosystem in urban design.

•Bio-cultural diversity

Neighborhood and cohabitation of different social groups keep all at the equal distance to opportunities and results in "social justice". In addition to cultural and social diversity, the peaceful coexistence of humans with other living organisms of the environment also should be considered. Human beings and other creatures are part of the environment and ecosystem. Having an access to tools and learning how to use them have made humans more superior to animals. However, this superiority should not disrupt the lives of other creatures. Otherwise, the ecosystem will be disturbed, and this change will negatively influence all beings, including human beings. Therefore, preserving the plant and animal species in order to maintain ecosystems should be taken into consideration. This criterion can be examined through vitality and the maintenance and upgrading of the ecosystem. Liveliness in its implicit sense brings diversity. Therefore, in assessing this criterion, the quality of vitality is focused on.

Conclusion

This paper was an attempt to show how urban spaces can serve as a platform for raising the awareness of citizens or educating them about environmental and cultural values. We drew upon the principles of Eco-revelatory design to investigate how qanats, the most important infrastructure of desert cities, and its associated buildings can impact the structure of the neighborhoods and the city. Using the principles of Eco-revelatory design which is part of the urban design qualities, we can pursue the three goals of this approach in urban spaces and encourage our citizens

to attend the neighborhood or different parts of the city. In doing so, they would be able to develop a new perception of qanats, its values, and its complexity. Raising the awareness of citizens and encouraging them to reclaim their environmental identity from local and national authorities can be one of the first steps in preserving, reviving and improving qanats.

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