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Investigating the Effect of Climate on Warm and Humid Architecture A Review of the Contextualism Approach in Native Architecture of Bandar Abbas and Bushehr Regions

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***Abstract*:- The southern margin of Iran has one of the most critical climates in the world. Considering the climatic factors in the design process of houses in this region, it can provide a basic insight into the design of native homes, as well as the use of patterns of the functional spaces of native homes in the design of contemporary architecture of each The city can improve comfort. The present article, while extracting and introducing the patterns of functional spaces in the houses of warm and humid Iran through the application of the data theory of the foundation and adaptation of the features of these spaces to the warm and humid climate, seeks to answer the question of how relevant the patterns are. And affected by the climate. The ability of context-oriented architecture to meet human needs in a variety of ways can be considered as one of the important indicators in the field-oriented architecture study. Achieving a sustainable pattern and using the Earth's mass in warm and humid areas in terms of energy consumption is one of the objectives of this research, because in these areas, due to the warming of spaces, the use of abnormal energy has a high consumption level that can be correlated with the relationship The bed and natural energies reduced this amount. Therefore, adaptation to the environment and ecosystems and the provision of native architecture on the Earth's surface, as well as the recognition of the design of the architecture of native hot and humid areas, can lead to a sustainable pattern of contemporary architecture.**

Key words: Context-oriented architecture, Warm and humid climate, Architectural design, Naturalism

1. INTRODUCTION

The architecture of hot and humid areas, which is derived from the body and climate of those areas, is endangered in the path of world and human growth and the need for housing, this is the danger of using energy. Energies that will end one day, the idea of using climate architecture in the development of physical contextualism is a way to conserve energy resources in these areas. Contextualism is one of the methods of developing architectural design in the heart of climate and ecology, which according to physical and climatic values can be done cost-effective design in terms of energy consumption. Many studies have been done in relation to climate, each of which has emphasized the attitude and attention to climatic conditions in the construction of buildings and the creation of buildings in harmony with the climate. Some of these researches are: Tahbaz (2011) Principles of climate-friendly architecture design in Iran with an approach to mosque architecture, Memarian (2006) Introduction of Iranian residential architecture. Also, research has been done in the field of context-oriented architecture and shelter spaces in the direction of sustainable architecture. Including: Brolin (2004) Context-oriented Architecture, Carmody and Sterling (2009) Underground Space Design, Azizian (2011) The impact of underground spaces in optimizing energy consumption with sustainable development approach [1,2,3,4,5].

2. SUBJECT IMPORTANCE

Soil-shelter architecture is one of the lesser known human beings today. Because man has always thought about the earth and development on it, but in the depths of the earth and taking into account the temperature difference between day and night in the depths of the earth, it is possible to develop affordable housing in hot and dry areas by enjoying the land mass.

3. RESEARCH BACKGROUND

The history of the soil-shelter architecture of human settlements inside the rocks, which overlook the mountains on one side and the outside on the other, has been discussed in the world. Such as: Shushtar in Iran (spaces called Kat), Meymand underground village in Kerman (caves dug in the heart of the mountains), China underground courtyards in southwestern Tunisia and western Libya, underground dwellings in Cappadocia, Turkey, conical dwellings in the heart of the cliffs.
The books that have been written on this subject, including: John Carmody in his book entitled "Design of underground spaces" has analyzed the case studies implemented worldwide and the benefits of using the underground. The book "Context-oriented Architecture" written by Brent C. Brolin examines the context and body and its effects on the building and the impact of

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contemporary architecture on the environment, recognizing the climatic elements and using them in the body and contemporary architecture can be a way to sustainable architecture and energy saving and applied studies in this field.

4. RESEARCH LITERATURE

4.1. Concepts of contextualism in climate and framework

Attention to context in architecture was formed in the postmodern era. Architects of the time, who saw modern-style buildings, criticized the style and sought to address the shortcomings of the style.

According to Robert Stern, architect and author, postmodernists share a common theme:

1. Contextualism: the possibility of developing a building in the future and the desire to make a connection between the building and its surroundings,
2. Hints and allusions: refers to the history of architecture in such a way that it goes beyond the choice and reaches an ambiguous category that is said (communication, form, form and concepts that have taken shape over time),
3. Tendency to arrays: A simple pleasure of building layout [3].

In general, the contextualism can be divided into three categories:

1. Physical contextualism which is called the pre-existing form.
2. Historical contextualism, to the extent and order and relationship of city components over time.
3. Socio-cultural contextualism is called common meanings, values and goals [6].

Context-oriented architecture neither emphasizes imitation nor hinders innovation and creativity. Its message is the need to pay attention to the physical environment around the work and shows that this attention can be both a positive and reinforcing factor for the architectural work itself and for the context. Context-oriented architecture is an attempt to show the ability to create a favorable visual environment on a larger scale than architecture. Meanwhile, the artist architect can play a decisive role in considering the context by creating a new work in the existing urban space.

Preserving resources and respecting to them, adjusting environmental conditions using natural energies and consuming minimal fossil energy and coexisting with natural and climatic conditions is one of the sustainable patterns in architecture and a step towards achieving sustainable architecture and ultimately sustainable development. Due to the background climate and climatic factors in which we architect can be a way to sustainable architecture. Due to this problem opens the way for the use of natural forces such as the sun, wind, water, etc. and minimizes the use of fossil resources [3].

Climatic zoning of Iran

In the latest land research, Iran is divided into 8 major climatic zones:

1. Caspian climate 2. Mountainous climate 3. Climate of high foothills 4. Climate of low-lying foothills 5. Plain climate 6. Desert climate 7. Climate of Khuzestan and Jaz Murian plains 8. Climate of ports and islands of the Oman Sea and the Persian Gulf

This zoning is classified according to 4 criteria [1]:

1. The criterion of Olgi bioclimatic comfort (In order to provide comfort in open spaces)
2. The criterion of Mahani comfort (residential space design)
3. The bioclimatic criterion of Givani building (thermal needs of interior spaces of the building)
4. The criterion of Pen Warden texture comfort (to determine the conditions of human comfort in the open space)

Table 1- Classification of spaces based on the climatic needs of humans and Iranian housing [1]

Classification of spaces based on the climatic needs of humans and housing			
Spaces	Kind of spaces	Being enclosed by the absence of spaces	Names of spaces
Spaces related to open air	Open	No roof with several walls Lower than ground level Ground level or on the floors	Roof top Yard Garden pit
	Semi-open	Roofed but without one or more walls Lower than ground level Ground level or on the floors	Porch Sofe Balcony
	Closed	Roofed Four walls below ground level Ground level or on the floors	Room Hall Underground Spring house

4.2. Warm and humid climate

In general, climate is the influence of physical and atmospheric factors of an environment that determines the geographical characteristics of a place. Climatology identifies and explains the climate [7]. Architectural design in hot and humid climates is a way to maintain or minimize the cost required to maintain optimal conditions and comfort indoors. Maintaining thermal comfort results from the balance of temperature between the body and the environment [8].

The architecture of this climate is the link between the two types of introverted architecture of warm and humid region and the extroverted architecture of temperate and humid region because it has the characteristics of introverted and extroverted architecture in the same way. On this shore, most of the buildings are semi-introverted and the rooms are located around a central courtyard. The main difference between these central courtyard buildings and similar buildings in the central plateau regions of Iran is that although these buildings are introverted, their connection with the outside space is not completely closed.

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4.3. Soil-shelter architecture

Underground spaces, spaces that have been used from the distant past to the present for various climatic, security, economic, protective, etc. purposes, all or part of which are underground. Underground buildings perform very well in obtaining and conserving energy. The term underground spaces have been used in various texts and countries with different titles and definitions, some of which are mentioned below:

Underground space: It is used to describe spaces that have been used from the distant past to the present for various climatic, security, economic and protection purposes, so that all or part of them are in the underground.

Underground spaces in the main groups are classified: 1. Functional (residential, non-residential, infrastructure, military) 2. Geometric (type of space, amount of openings, relationship with surface, depth, dimensions of the project scale) 3. Origin (natural, mineral, reuse after the end of a previous use) 4. Site characteristics (geography, climate, land use, land status, building communications) 5. Project features (project logic, design, construction, age) [4].

Golany (1996) classifies underground spaces into four categories as follows:

1. Earth-Sheltered habitat: This type of space is commonly used to describe a type of housing in the United States that is on the ground and is protected by a layer of soil about half a meter thick. This method is a response to the high energy consumption for cooling and heating, especially in adverse climates.

2. Semi belowground: It is a kind of underground housing, part of which is basement and part of which is on the ground. This type of housing is the most common form of housing used in villages in China, Japan and other historical places around the world. This form is still used in African villages. Examples of such spaces are homes in northern China and southern Tunisia and the Eskimo winter hut (igloo).

3. Subsurface house: This type of central courtyard house has a small depth between the ceiling and the ground level (about half a meter or less) and was used in ancient times by the Romans in the city of Bulla Regia in northern Tunisia.

4. Below Ground: This type of space has been the most common form of underground space used throughout history. The depth of these spaces was reasonable and appropriate (about 3 meters from the ceiling to the ground level) and therefore the underground space was created by cut-and-use method. A method in which no building materials are required.

5. Geo-Space: It is a title for contemporary underground spaces that is used by the Japanese to describe spaces that are completely deep in the earth and have a variety of commercial applications, transportation, etc. [9].

4.4. Soil-shelter architecture in Iranian native architecture

In Iran, there are very valuable examples of urban design and climate-friendly residential architecture, the most valuable and creative of which are in warm, dry, desert and warm-humid areas (due to the many environmental comfort constraints in these areas). In the meantime, very obviously, the connection with the ground and providing comfort conditions can be found in this type of buildings. Here we briefly introduce land-related spaces in Iranian architecture:

Underground: The most important space in the house during the hot and exhausting summer days is the underground. In houses that do not have a garden pit, all or part of the space below the ground floor is occupied underground. The small holes in the plinth of the ground floor are responsible for illuminating the underground.

Cellar: 1. There is an underground room where they spend the summer. 2. Windbreaker basement, in these basements, under the windbreak channel, the water well is separated, the wind enters the well and then reaches the water level from the horizontal channel and another well reaches the underground level [10].

Downstream: It is a very cool space in the lowest part of the house, the coolness of downstream is such that some types of food were placed in it so that it would not spoil in summer.

Garden pit: In desert and hot and dry areas, the yard was dug in order to access the required building as well as easy access to the aqueduct water or ease in mounting the incoming water to the gardens. In such a way that its great depth caused a difference in the height of the yard from the level of the alley. Such yards were called garden pits or garden pits [2].

4.5. Examples of traditional soil-shelter buildings

In the past architecture of Iran, there are spaces and buildings whose main purpose is to use the thermal energy of the earth. Some examples of these buildings that have been created for static cooling in the soil-shelter are:

- Underground houses
- Cistern
- Refrigerator

5. RESEARCH METHOD

The present study is an applied research and its purpose is to achieve the principles of reviewing the contextualism approach in the native architecture of Bandar Abbas and Bushehr regions based on hot and humid climate. Through library studies and interviews and observations in the field of case studies and analysis and interpretation of the results, this principle has been explored. At the beginning of the research, in order to identify the relevant factors under study, it has been extracted from texts related to fixed principles.

6. RESEARCH FINDINGS

Based on the study of hot and humid climate, the research findings can be presented on the basis of the following models:

Use the Underground as a basic component of the house for habitation

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In general, in the architecture of warm-humid and hot-dry areas, the basement of the house, whether in the form of a stump or a building, has been of great importance. So that the underground has been detailed in most traditional houses, for the summer residence or cool space in the warm season of this area.

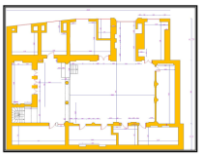
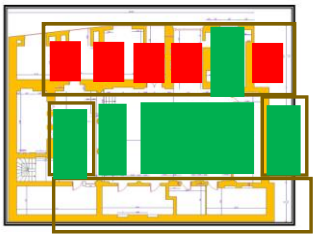
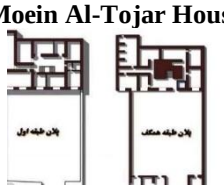
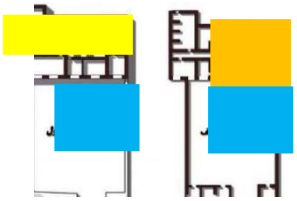
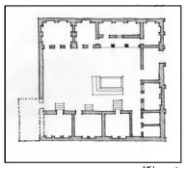
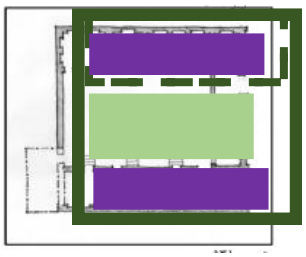
6.1. The role of soil-shelter architecture in energy saving

According to obtained studies, soil-shelter architecture has a direct relationship with energy savings due to the body and the way it communicates with the earth. Performance of this type of architecture works and its impact on energy consumption are:

Reduced energy consumption: In most parts of the world, soil and rock temperatures at depths less than 500 m show a moderate thermal environment compared to the maximum surface temperature difference. These medium temperatures and small temperature changes provide a wide range of energy storage and preservation facilities:

- In warm climates, heat absorption from the outer wall of the building is prevented due to direct sunlight as well as exposure to hot air.
- In hot climates, it is possible to cool down due to contact with the soil.
- The need for energy to moderate the temperature is reduced due to less air penetration into the building.
- The need for heating and artificial cooling in hot and cold seasons is greatly reduced due to the thermal inertia in this buildings.

Table 2- A study of houses in warm and humid climatic regions in terms of physical structure

House name	Plan		Descriptions
Dadras House  **(Ahwaz)**			Uniform repetition of spaces in the plan Coordination of spaces while unity in plan
			Satisfy functional needs based on the hierarchy and sequence of adjacent spaces
			Avoiding the integrity of spaces Creating a cohesive space with separate functions in the plan Use of the central courtyard and lobby
Moein Al-Tojar House  **(Bushehr)**			Using the yard as a centrist element Create transparency using glass and terrace
			Use glass and interface columns to link inside with outside
			Privacy by using introversion and creating balconies inside the house The interior of the house has no connection with the urban space outside
Fekri Historical House  **(Bandar Abbas)**			Orientation and balance in the symmetry of spaces in the plan
			Emphasis on the focus and centrality of space All the spaces in the plan are arranged around a yard
			Introversion and privacy

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Reduction of noise pollution: Underground spaces play a positive role in promoting peace and spiritual vitality and reducing anxiety by providing the desired ambient temperature. Minimizes visual and auditory confusion. According to research conducted by researchers in underground spaces, noise pollution is reduced by about 20%. In fact, soil acts as a sound insulator in spaces soil-shelter.
Reduction of visual pollution: Underground spaces also minimize the impact on the natural environment and bring visual by releasing surface spaces to create parks and green spaces and transfer audio uses. The existence of a safe, wide and separate pedestrian network with various uses is another advantage of underground spaces for the benefit of humans and the environment.
Sustainability in adverse weather conditions: Buildings with optimal design and covered with soil can be permanently protected from the effects of weather that cause destruction. Reducing the rate of demolition significantly reduces the energy required to supply the building [11].
According to the table above, climatic-physical zoning in the spaces between buildings can be divided into 3 groups:

1. Semi-private spaces: balconies or roofs of buildings that can be within the authority of the building, which has a clear border with other areas.
2. Semi-public spaces: They are the interface space between buildings, these spaces can have architectural elements and trees and plants and any kind of environmental element that makes it lively. In fact, in semi-public environments, one can engage in verbal, listening, meeting and recreational interactions, which are mainly transformed into an introverted space by using a central courtyard and a water basin for air blinds.
3. Public spaces: These spaces are actually located outside the interface of buildings, and are visually and socially transformed.

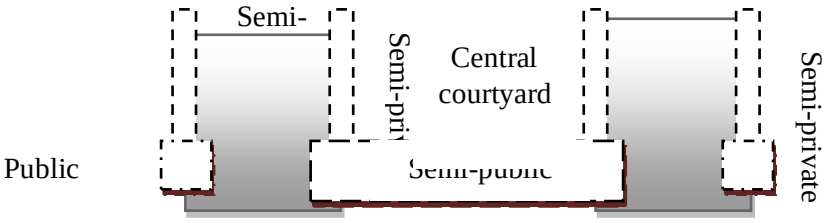

Figure 1- Climatic-physical zoning in the architecture of buildings in warm and humid areas

6.2. Climate design goals in warm and humid climates

- Reduction of indoor air temperature
- Protection of the building from sunlight by creating maximum shading
- Use of air flow to create natural ventilation.

The general characteristics of the climate of this region can be expressed as having a very warm summer and high and constant humidity in all seasons. A noteworthy point in this climate is the slight difference in day and night temperatures, as well as the presence of Saudi desert winds (inappropriate) and coastal winds (appropriate). This climatic zone is along a narrow and relatively long coastline that is more than two thousand kilometers long and starts from the mouth of the Arvand River in the southwest of Khuzestan province and ends at Gwadar Bay in the southeast of Sistan and Baluchestan province.

7. DISCUSSION AND CONCLUSION

Studies have shown that the patterns of functional spaces in the architecture of warm and humid regions are in accordance with the climatic and physical components of each of the cities in these regions. This means that climatic patterns are not only compatible with the general conditions of warm and humid regions but also with high temperatures and humidity but also with the components of the local climate, which according to the geographical location of the common physical patterns of the building in these regions.
These patterns include simple solutions of the correct form of open, semi-open and closed spaces and calculated combinations of them in level and height which follows the pattern of local winds and temperature and radiation and can be easily generalized and used in the patterns of houses and buildings today.
Due to the fact that in warm and humid areas, the wind blows most of the time of the year and from different directions; Patterns of functional spaces of native houses are mostly formed in order to meet the purpose of creating natural ventilation and according to the pattern of local winds and the open and semi-open spaces in these houses are continuous and act as a natural ventilation system according to the climatic components.
In fact, by expressing the characteristics of the earth's mass, it allows modern designs to create sustainable architecture. Soil shelters have high capabilities in saving energy, reducing noise pollution, reducing air pollution, reducing visual pollution and creating architectural spaces in terms of climate and physics. Soil-shelter spaces have high capabilities in saving energy, reducing noise pollution, reducing air pollution, reducing visual pollution and creating architectural spaces in terms of climate and physics. These spaces are located in the depths of the body and the background and help to keep the space cool in the summer, temperature stability and harmony with nature creates a biologically sustainable architecture.
Providing effective practical solutions in contemporary housing with regard to soil-shelter buildings in hot and humid climates:

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1. Building spaces from the house in the underground and sheltering the soil to create summer living spaces in today's house to moderate the air
2. Extension of the building in horizontal density and attitude to the underground surfaces for living
3. Lighting of the building from one side facing the surroundings and providing winter living spaces facing the sun.

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