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Bioclimatic architecture and Traditional Houses in Diyarbakir

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COMFORT TO BE INFORMED FROM TRADITIONAL BUILDINGS: TRADITIONAL DIYARBAKIR HOUSES.

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Abstract

Today although a contemporary house or apartment is built with new materials according to technology and regulations to provide a satisfactory microclimate within the building, it is difficult to say they are successful comparing with a house that is constructed with traditional methods and materials even built by a non-architect. Microclimatic element these are used in a traditional house is natural. For example the use of water, stone (even in roofs), wood etc. is very important in traditional way. The main aim of this way is to decrease the stress of the climate. So these make all old settlements seems more successful and architecturally more interesting.

Traditional Diyarbakir houses that are constructed in a castle (the second biggest city wall in the world) are courtyard type. They are inward looking and their sizes and complexities are different according to owner's power, social status, building site, privacy with five different plan typology. In this paper, microclimatic elements of traditional Diyarbakir houses are determined systematically comparing with the typology, design features that makes a house sustainable, ecological and environmental influence.

Keywords: Residential, architecture, culture, ecological issues, spatial behavior.

1. Introduction

User requirements, desire, personality and habits are connected with socioeconomic and socio-cultural values. Social experiences, visions, beliefs, ethical principles those are sourced from nature and living styles have affected the traditional Diyarbakır housing architecture. The reflections of the culture and civilization with the integration of environment and material in physical space can be seen in traditional Diyarbakır houses. Climatic conditions and social structure has been played an important role in the shaping of the interior and exterior spaces of the traditional Diyarbakır houses.

In this paper microclimatic elements of traditional Diyarbakır houses are determined systemically comparing with the typology, design features that makes a house sustainable, ecological and environmental influence.

2. Climate and Vernacular Architecture

With the exception of some technological advances, the strategies of energy-efficient design have existed for many centuries. Vernacular architecture provides many lessons in designing for specific climates. The igloo for example, utilizes the most available (and only) building material, snow and ice, and configures the architecture into the most heat-efficient shape, the spherical dome. This vernacular form of architecture was developed thousands of years ago by the Inuit as a matter of survival in the harsh climate of the arctic. Solar orientation, to take advantage of passive heating and cooling, as well as natural day lighting,

3. Diyarbakır Settlement

Diyarbakır, that takes place in the Southeast of Turkey, is like a closed city with its walls (figure 1) and the history of the city reaches to 3000 BC. The traditional houses of Diyarbakır had been planned with a courtyard and so near to each other because of the climate and city walls.



Figure 1: Diyarbakır Castle and Settlement

The old city itself is monotonous with narrow streets, high courtyard walls, but the Kabaltı, Cumba (figure 2, 3) entrance doors, narrowed and widened streets get into motion. The mentioned places are exterior spaces of Diyarbakır people's life.



Figure 2: Kabaltı



Figure 3: Cumba

4. Diyarbakır Houses

When you enter from the courtyard this components leave to pool, Eyvan, decorated rooms, and cultivated stone stairs, water pump and well. Houses those are constructed with traditional and materials even built by a non architect. Microclimatic elements these are used in traditional house are natural, for example the use of stone or wood that designates the size of the house. Climatic conditions have been played an important role in the shaping of the interior and exterior spaces of the traditional Diyarbakır houses. There are spaces that can be named as open, (courtyard) semi-open (Eyvan) (figure 4) and closed (room, main room, back room, kitchen, box-room, and pantry) according to user requirements and desire in traditional Diyarbakır houses.

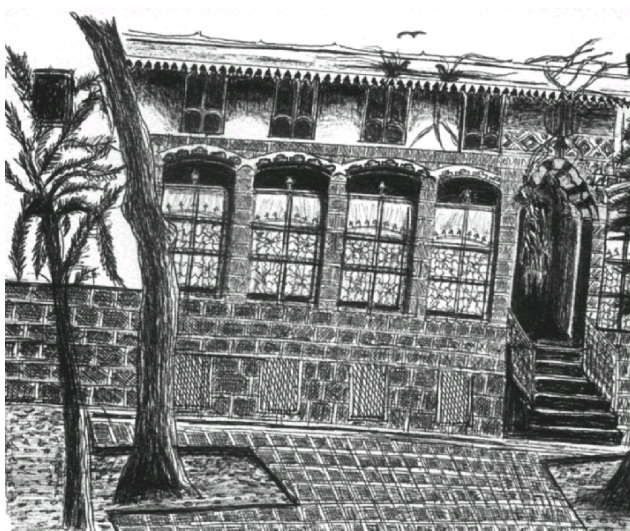


Figure 4: A view from courtyard

The requirements according to environmental conditions have an impact at the design of the open, semi-open and closed spaces. They have five different plan typologies (figure 5) and are inward looking and their sizes and complexities are different according to owner's power, social status, and building site, design features that makes a house sustainable sound bioclimatic, ecological and environmental influence.

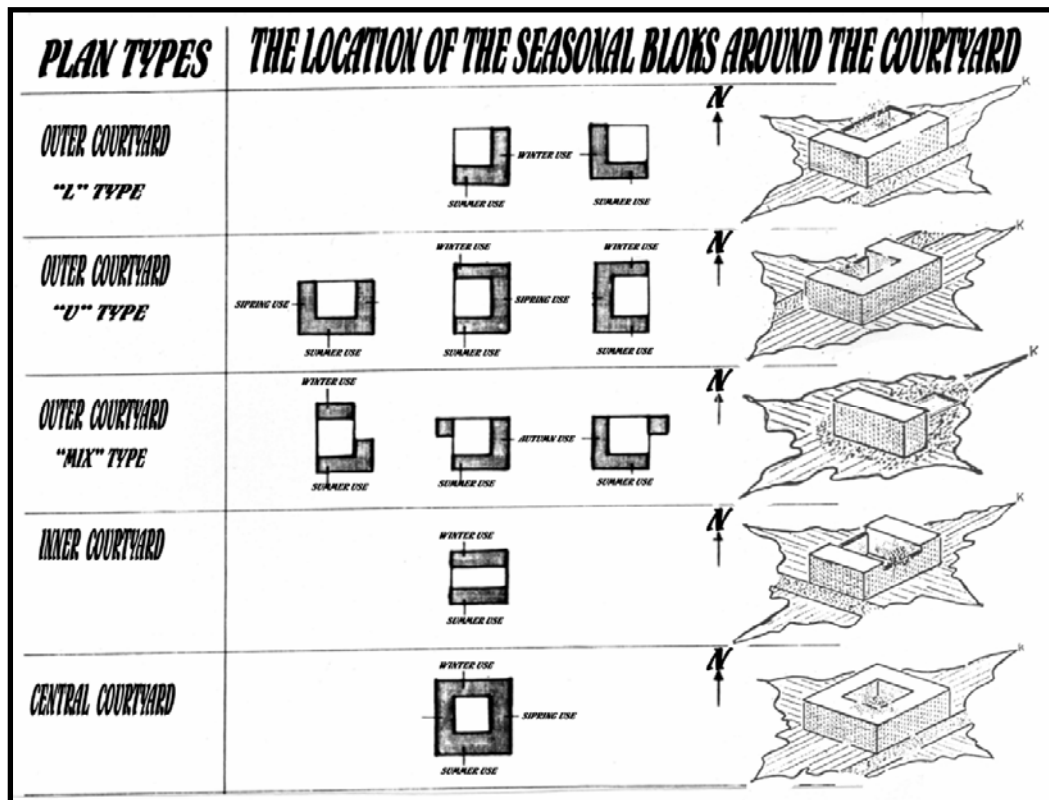


Figure 5: Five different plan typology


5. Bioclimatic architecture and Diyarbakır Houses


'Bioclimatic architecture'; in essence it is the acknowledgement that the interaction of solar and other climatic factors together with the building envelope will determine the basic internal environmental conditions and ultimately, the comfort level of the occupants. The adoption and exploitation of climate sensitive design recognizes the important impact which can be made by the following factors in building construction comparing with Diyarbakır Houses:


BIOCLIMATIC HOUSING


- design of appropriate building form that does not lead to unnecessary over shading of one building by another;
- utilization of suitable construction techniques (the relative positions and thicknesses of insulation materials etc.) to maximize beneficial heat gains or to exclude excess heat;
- adaptation of the internal layout to climate and building orientation so that rooms or spaces with specific functions are located adjacent to the most appropriate facades;
- division of buildings into thermal zones with buffer areas (such as balconies, verandas, atria, courtyards and arcades), - though divisions should avoid providing barriers to cross flow ventilation where this is required;
- choice and positioning of appropriate building materials within internal and external fabric, particularly where thermal mass effects can be used to dampen temperature fluctuations;
- location, size and type of openings in the building envelope chosen so as to exploit advantageous solar gain (facing south in northern latitudes is easier to shade);


DIYARBAKIR HOUSES


 The various spaces are arranged behind the facades taking seasonal climatic conditions into consideration with five different plan types



 Storing solar heat gain in the daytime and using this heat during evening hours can be achieved by using stone with a high thermal mass construction material.

 To minimize heat loss through the atrium facades to allow for daylight and sunlight control and to improve natural ventilation in the adjacent spaces to fine-tune the facades in response to solar orientation

 Using courtyard as a space to act as an thermal buffer

 To use stone as thermal mass to provide night-time cooling of the structure

 Room heights are high owing to warm climate, location and size of openings are changing regarding to location, even use of mirror for unwanted sun ray

- integration of the building design with the site design so that site obstructions, trees or noise problems are not exacerbated;  Suitable slope, trees in every house, pool and water pump in the courtyard
- Integration with occupant needs and expectations - generally occupants are prepared to accept less than ideal levels of comfort providing they have some degree of control and understanding of the environmental design.  User requirements and environmental design are dominant of design within the design concept.

6. RESULTS

As it can be seen from the comparison Diyarbakır houses are one of good examples for bioclimatic architecture. The user requirements and some planning criteria that were gained from the case study of these houses for the planning concepts of future are submitted. Vernacular architecture can be described as building new structures with old techniques, repeating dwelling types based on an old model with few technological changes. The vernacular includes attributes of tradition which are process and product distinct. Linking bioclimatic design with features of the local vernacular, it is hoped to create a design method for an appropriate domestic architecture for the popular suburban settlements of growing cities.

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