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## Learning from Vernacular Architecture: Ecological Solutions in Traditional Erzurum Houses

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### Abstract

Vernacular architecture has been an inspiration for innovations in environmental and socio-economically sustainable design and planning. Especially in traditional housing, the intended climatic and environmental solutions within sustainable design have already been achieved by local implementations. In this sense, as the important examples on vernacular architecture, traditional Erzurum houses are examined in the scope of this work. Thus, ecological design clues in local examples are explored by drawing attention to natural materials, traditional construction techniques, ingenious design and spatial organization strategies required for comfort, satisfaction, and well-being of building occupants.

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### 1. Introduction

As the world has been threatened by the effects of global warming, the increase of the concentration of the greenhouse gases and the depletion of the natural reserves led people to consider about using resources, and to take precautions against climate changes. Thus, the concept of sustainability came into the architectural agenda in order to diminish the negative environmental impact of the buildings. Sustainable design methods raised as solutions for the current problems of the world, so several works started to emerge in various academic fields. However, the idea

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of the sustainability in architecture, and also its tactical goals are not new. Since the beginning of the architecture, based on local knowledge and experiences, vernacular architecture has already been trying to obtain the harmony between nature and buildings.

Vernacular architecture also known as local or regional architecture is defined as the unconscious “realization” and “embodiment” of the culture of the society with the requirements of the people in nature (Glassie, 1990). In the traditional housing patterns, all buildings are compatible with the climate and the geography. Besides, along with the shared culture, using similar materials and forms create a habitual harmony and integrity between buildings. In other words, vernacular architecture has already achieved the ecologic solutions required for living comfort; moreover current ecological discourses in sustainable housing have already been adopted in the typology of the traditional dwellings.

In Turkish civil architecture, ‘Turkish houses’<sup>2</sup>, traditional houses in all over the Turkey, are the significant examples of vernacular architecture. Turkish houses were formed according to the culture and traditions in Anatolia, also compatible with the regional requires. Despite common characteristics, Turkish houses in each region develop according to the local climate and geography, and differentiate among themselves by forms, scale and size of the buildings, usage of the materials, and most importantly by plan types. Cold and heavy weather conditions and alluvial filling that constitutes the ground of the city are the main factors of the differentiation of Erzurum houses from Turkish houses. Erzurum houses have unique architectural design character in all Turkish houses.

This study aims to analyse traditional Erzurum houses, and to reveal their sustainable characteristics. In the scope of the work, the traditional Erzurum houses around citadel are examined in terms of ecological design principles. In the framework of the study, archived five traditional Erzurum houses, built in different time periods, (Dursun Akal House, Semih Bey House, Hanağasgil House, Kabazagiller House, Ali Bayram House) are analyzed and presented in a table according to five criteria; types of planning, orientation, spatial layout, buildings elements, architectural elements (doors and windows). These principles are defined in relation to the works of Haşim Karpuz, Turkish and Islamic Art Historian, who has pioneer works on traditional Erzurum Houses (Karpuz, 1984a). Thus, local implementations against climatic and geographic difficulties are researched. As a result, this study points out the ecological solutions which are already existed in traditional Erzurum houses, and creates new design proposals that can be applied into the new constructions.

Before explaining more about the obtained solutions within traditional Erzurum houses, in order to present a better understanding to the work, the following part of the study continues with the explanations of the general information about Erzurum city, and main characteristics of the traditional Erzurum houses.

## 2. Erzurum City and Traditional Erzurum Houses

Erzurum, one of the cities of Turkey's Eastern Anatolia Region, is located in 39 ° - 55 north latitude and 41-16 longitude. Approximately, the city remains under snow in 113,1 days in a year The annual average temperature of the city is 11°, while 79.7 days are mostly clear, 200,8 days are cloudy, 84.7 days are closed (Url 2). The cold and heavy weather conditions affect the city in several aspects such as; architecture, technology, agriculture, commerce, tourism, and also social life and human relations.

The oldest information about the traditional houses relies on the observations of the travellers (Tozlu, Küçükuğurlu, 2002). According to the archives, in between 14<sup>th</sup> – 17<sup>th</sup> century Erzurum was a green city where everywhere full of trees, and houses had gardens (Tozlu, Küçükuğurlu, 2002). Later, in 19<sup>th</sup> century, Erzurum houses were described like “rabbit holes”, as embedded in the ground (Tozlu, Küçükuğurlu, 2002). Besides, on the top of the buildings which roofs were covered with grass and bushes animals; sheep, lambs and veal grazed (Tozlu, Küçükuğurlu, 2002). However, as a result of the alluvial filling ground and Erzurum to be in the earthquake zone changed that housing typology called as "rabbit hole" or "molehill". The earthquake in 1859 became a turning point in the architectural characteristics of Erzurum houses and Erzurum city in general. Over than %65 percent of the

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<sup>2</sup> See further information about Turkish Houses: Eldem, S., H. (1968), *Türk Evi Plan Tipleri*, İstanbul: İTÜ Faculty of Architecture Publications. Sedat Hakkı Eldem is a Turkish architect and academician who has several works on traditional houses.

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