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## Harmonization between climate and architecture in vernacular heritage: a case study in Yazd, Iran

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### Abstract

In every country, heritage plays a significant role in achieving sustainable development. Iran is a vast country with different climatic zones, and, in the past, traditional builders have presented several logical climatic solutions in order to enhance human comfort. In fact, this emphasis has been one of the most important and fundamental features of Iranian architecture. To a significant extent, Iranian architecture has been based on climate, geography, available materials, and cultural beliefs. Therefore, traditional Iranian masons and builders had to devise various techniques to enhance architectural sustainability through the use of natural materials, and they had to do so in the absence of modern technologies. This paper describes the principals and methods of vernacular architectural designs in Yazd, Iran, which is located in a dry and hot area that is one of the unique geographical and cultural regions of Iran. Design and technological considerations, such as sustainable performance of natural materials, optimum usage of available materials, and the use of wind and solar power, were studied in order to provide effective eco-architectural designs for this region. The goal of this paper is to provide the architectural criteria, issues, and insights that had to be addressed in order to provide acceptable levels of human comfort in this arid area. The architectural principals that were developed and used in this extreme climate zone will be beneficial to other architects in the design of architectural structures that provide human comfort in adverse climatic conditions.

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### Introduction

Iran is a high plateau that is located at latitudes in the range of 25°-40° in an arid zone in the northern hemisphere of the Earth. The dry deserts of northern Africa and Saudi Arabia extend from the Atlantic

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Ocean in western Africa across Iran and finally end in Afghanistan and Turkmenistan.

After extensive studies, Iranian environmental professors have proposed four climatic categories from an architectural perspective:

- 1. Hot-dry climate (central plateau of Iran)
- 2. Mountainous cold climate (mountainous parts of western Iran)
- 3. Humid and moderate climate (southern borders of the Caspian Sea)

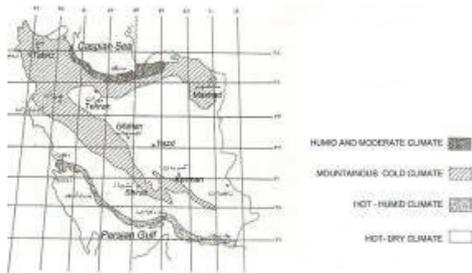


Fig.1. climatic zone of Iran

- 4. Hot-humid climate (northern borders of the Persian Gulf and the Oman Sea)

The weather in most of Iran's central plateau is hot and arid (Fig. 1), and many historical cities that have valuable architectural designs are located in this hot and arid region. The origins of some of these cities, such as Yazd and Naeen, can be traced back to pre-Islamic era. The different characteristics of the four climatic regions of Iran have had significant effects on the architectural designs and building materials used in cities of the regions. For the most part, the people in these areas have developed and used effective solutions over the centuries in order to create architectural compatibility with the climate in the area. Amazingly, these solutions have controlled the annoying aspects of the oppressive climatic conditions and even created some useful and favorable environmental aspects that the people enjoy.

Generally, structures in this region have been logically integrated with nature, and, as a result, the traditional buildings in Iran, unlike most modern buildings, are compatible with and have a harmonious relationship to the natural conditions. The world's most oppressive deserts are located in the center of the large and closed cradle of Iran's plateau, at the center of Yazd Province. In fact, Yazd Province is surrounded by large deserts, such as Loot and Dashte Kavir. The city of Yazd is known as the desert capital, and, since Yazd is in the desert, the architecture in the city closely resembles the architecture used in various desert locations. [2](Kasmaee,1984) The purpose of this article is to evaluate the effect of climatic factors on construction and the local architecture in hot-arid regions, with a special focus on Yazd City.

## 1. ABOUT THE REGION

### 1.1. Geographical position of Yazd Province:

Yazd Province is located in central Iran, between geographical latitude of 29°48' to 33°30' north and longitude of 52°45' to 56°30' east of the meridian origin. The area of Yazd Province is approximately 72,000 square kilometers, or more than four percent of the total area of the country.[2] (Kasmaee,1984)

## 2. Logical formation of architectural texture in Yazd City in accordance with climatic issues

In examining the architecture of cities and villages in hot and arid areas, climate is an important logical factor that must be considered in the architecture of urban areas, and it has always had a major effect on

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