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RESEARCH ARTICLE

Effects of vernacular architecture structure on urban sustainability case study: Qeshm Island, Iran

Hamed Mohammadi Mazraeh[a], **Mahdieh Pazhouhanfar**[b,*]

[a]*Department of Architecture, Bandar Abbas Branch, Islamic Azad University, Bandar Abbas, Iran*
[b]*Department of Architecture, Faculty of Engineering, Golestan University, Gorgan, Golestan, Iran*

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Abstract
The architecture of Qeshm Island includes the specific architectural style of a warm and wet area, which previously had a functional use aimed to reach a sustainable architecture and development. However, few studies on the identification of the characteristics of vernacular architecture and their roles in island stability have been performed. Thus, to understand the vernacular architecture of the island as a sustainable pattern, we discussed it separately in three aspects, namely, urban fabric, one-based architecture, and architectural details. To address our study, a part of the old fabric of the city with its existing buildings (42 buildings of 70 years of age) was selected and evaluated in a qualitative study. Results showed that in the scale of the urban fabric, factors, such as the structures of the buildings, the frame of the neighborhood spaces, and in terms of the architectural details, factors, such as bars, thickness of the walls, and the openings, are among the vernacular features of the area, playing an important role in the stability of Qeshm Island. In general, studies showed that vernacular architecture of the island has focused on developing an orientation between the climate of the region and a good understanding of the construction.

1. Introduction

The most important issue in today's world in which man has a critical role is the reduction of energy consumption (Maleki, 2011). Clearly, approximately 40% of the global energy is consumed in the construction sector (Sisson et al.,

*Corresponding author.
E-mail addresses: m.pazhouhanfar@gmail.com, m.pazhouhanfar@gu.ac.ir (M. Pazhouhanfar).
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2009). The role of buildings in energy consumption due to population growth, increasing urbanization, and improved living standards is specifically highlighted, wherein the use of energy resources has significantly increased mainly because of climate changes; thus, the present world is in need of being positioned in the path of sustainable urban development (Allegrini et al., 2016). The sustainability concept of a building has focused on issues, such as limited resources, especially of energy, and possible ways to reduce its effect on the natural environment. In this regard, development of sustainable buildings can be regarded as a useful tool for protecting natural resources using energy efficiency parameters to minimize energy consumption (Bahadori, 1978).

The Iranian vernacular architects argue in applying a traditional model that can be useful to inform people of the best ways to deal with local weather conditions, wherein the role of vernacular architecture in reducing energy consumption will increase the sustainability of the cities (Maleki, 2011; Shahin and Takapoomanesh, 2014). Previous studies showed that vernacular architecture is an important parameter for achieving sustainability in modern architecture. It is an umbrella term used to classify construction method that uses locally available resources to address the needs of area residents (Preusser et al., 2003). Analyzing such architecture can provide a proper method of achieving sustainability for the new generation of designers (Sharifi and Murayama, 2013). In the past, Qeshm Island is one of the major islands in the hot and humid regions of Iran, which has important architectural elements and played a functional role in its urban development and sustainable architecture. Based on the fact that, by far, few studies have been performed on this issue, the present study was performed to prove the role of sustainability in the vernacular architecture of the region addressing the concern of whether the vernacular architecture of Qeshm Island can respond to the issue of sustainability appropriately".

2. Study area

2.1. Introduction to ecosystems of Qeshm Island

Qeshm Island, as the largest island in the Strait of Hormuz and the Persian Gulf, is one of the most densely populated islands of Iran. Qeshm Island has an area of 1491 km^2, i.e., approximately 5.2 times larger than the second largest island in the Persian Gulf, Bahrain. By analyzing the meteorological data of Qeshm station in early April to early October, most days experience weather conditions within ranges above the thermal comfort standard. Even on some days, the $<80\%$ relative humidity and $<30^{\circ}$ temperatures were recorded (Figure 1). Moreover, temperature variation during different months was observed, and their results were analyzed based on Baker index as follows (Table 1).

Table 1 shows that in April, November, and December, mild pleasant weather is easily available, whereas in January, February, and March, mild pleasant conditions exist. Meanwhile, in the remaining months, unpleasant weather is prevailing.

2.2. Living conditions on Qeshm Island

By studying the structure and the way the tropics develop, the abovementioned climate displays a significant effect on its shape and composition. Therefore, paying attention to climatic profile is of great significance while recognizing and offering appropriate plans in coordination with climate. Given its sea adjacency, very high air humidity occurs in Qeshm Island. However, due to lack of rainfall, it has no dense vegetation, except for limited fields and palm groves in the suburbs. Most parts of the region are barren without any water and grass. However, in some areas, a few bushes (*Sisyphus* and *Prosopis*) can be observed. In terms of regional summer and winter divisions of the country, the island is

Figure 1 Geographical location map of Qeshm Island.

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