

Underground and Semi Underground Passive Cooling Strategies in Hot Climate of Iran

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Abstract

Climate change is one of the most significant threats facing the world today. Buildings are one of the largest energy consuming sectors in the world. Most contemporary buildings are highly dependent on air conditioning systems and electricity, reliant on fossil fuels and increasingly unable to adapt to a warming climate. Iran's hot and cold climatic regions are vast, and significant amount of energy is consumed in these areas for heating, cooling, and ventilation.

However, in the same climatic conditions in the past, numerous effective strategies had been used in vernacular residences to confront the harsh circumstances. Traditional buildings in Iran have employed some ingenious passive techniques especially in hot regions in order to restore thermal comfort and coordinate with the local environment and climate. A comprehensive overview of Iranian vernacular architecture principles, in addition to comparative analysis of its elements, shows the dominant effects of natural environmental factors. It is important to note that Climatic issues considered as the most significant factors in designing and have an important influence on the formation of Iran's architecture.

This clearly proves that traditional buildings in Iran have employed some creative passive techniques especially in hot regions in order to restore thermal comfort and coordinate with the local environment and climate. These strategies have a high potential for getting reused and revived in a way that the fossil energy used in contemporary architecture is decreased. The main purpose of this research is describing and analyzing the principal and methods of vernacular architectural designs in Shavadan and Shabestan and also sunken garden which are kind of underground and semi-undergrounding building in dry and hot area that is one of the unique geographical and cultural regions of Iran. As the conclusion of analyzing mentioned strategies in three case studies in this paper, could give environment designers more awareness to utilize climatic strategies in more appropriate way in contemporary architecture.