

Optimal Location of Temporary Housing After Floods with an Indigenous Architecture Approach: A Case Study of Khorramabad¹

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Detailed abstract

Introduction

Iran ranks among the world's top 10 most crisis-prone countries and sixth in natural disaster occurrence. Due to mountainous terrain, poor vegetation, and irregular rainfall, Iran faces flood risks in all seasons. In Khorramabad, the southern area is highly vulnerable to flooding, while northern parts show lower vulnerability. Flood risk factors include the city's location in a syncline, reduced land permeability from asphalt coverage, inadequate drainage channels, small bridge diameters, and lack of dredging maintenance. A flood occurs when the water flow in rivers exceeds the natural capacity of the channel, causing damage to residential areas. Due to the presence of flat and fertile land and easy access to water, people have traditionally settled along rivers, but these areas are always at risk of flooding. In Iran, flooding is not limited to a specific region and occurs with varying intensities across the country. This phenomenon usually happens during heavy rainfall or snowmelt and can lead to the changing of river courses and destruction of facilities. In terms of human casualties and financial losses, floods are considered one of the most destructive natural disasters. Identifying the factors influencing floods is the first step in managing them. The most important of these factors include climatic conditions, topography, soil type, vegetation cover, and land use. Rainfall is the most important climatic factor; if rainfall is intense and prolonged, the soil becomes saturated and surface runoff increases.

Theoretical Foundations of Temporary Settlement and Shelter

Research on post-disaster shelter is relatively new, and there is often disagreement regarding definitions and concepts. Temporary settlement is considered a major challenge for managers and planners, and it is important to distinguish between simply providing a place for accommodation and creating a space for living. Temporary settlement refers to housing that is provided between the occurrence of a disaster and the acquisition of permanent housing, bridging the gap between immediate relief and long-term reconstruction. One of the key challenges in disaster management is identifying a safe and appropriate location for the settlement of affected individuals. The severity of floods depends on factors such as

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rainfall, soil type, land cover, and land use. The Central United States Earthquake Consortium has distinguished four types of shelter: immediate shelter (first 72 hours), emergency shelter (first two months), temporary settlement (one year or more), and permanent shelter (long-term solutions). In Iran, there are also discussions about the existence of temporary settlement as an intermediate phase.

Vernacular Architecture

Vernacular architecture is a type of architecture that emerges from within communities and adjusts itself to social, climatic, and technological conditions over time. This architecture is closely tied to the values, economy, and lifestyles of the cultures that create it. In essence, vernacular architecture is architecture created by the people, for the people, and of the people.

Characteristics of vernacular architecture include the expression of individual personality, anonymity, and a lack of a specific production date. Similar to local dialects, this architecture represents a specific group and human society. Vernacular architecture is the legacy of past generations who, without formal training, designed spaces that enhanced people's connection to a place.

Study Area
Khorramabad, the capital of Lorestan province in western Iran, with a population of 373,416 people, is located at an altitude of 1147 meters in the Zagros valleys. This city has strategic importance due to its location on the Tehran-south route. Studies show that 82% of the city's watershed is located at altitudes between 1400 and 2000 meters, resulting in high slopes and high potential for surface runoff. Failure to observe river boundaries and lack of proper channels have intensified flooding. The northern, eastern and northwestern slopes of the city experience the highest amount of flooding. The Asadabadi, and Kourosh neighborhoods, with marginalized houses built in floodplains, are directly at risk. After the devastating flood of 1986, a 1700-meter canal was constructed, but the Khorramabad riverbed and the southern part of the city remain the most high-risk areas, as confirmed by the floods of 2016 and 2019.

Materials and Methods

This research uses a mixed quantitative and qualitative method and is applied research, meaning its results can be used in urban crisis management planning. Library and documentary methods were used to collect theoretical literature and extract criteria for temporary settlement zoning. Required data including urban land use, road network, and fault locations were obtained from relevant organizations such as the municipality and mapping organization. Since data were collected from different sources, initial preprocessing was necessary. ArcGIS 10.1 software was used for data preparation and analysis. Preparation stages included georeferencing, defining a unified coordinate system, drawing and editing features, and map transformations. All inputs were converted to the required format according to model needs and research topology.

Discussion and conclusion

The criteria for selecting suitable locations for temporary settlement were determined based on expert opinions, interviews with specialists in this field, and local and field studies. These criteria are derived from previous research and the experiences of experts in crisis management. The criteria used for temporary settlement zoning are as follows:

Land location in terms of slope, soil type, and flood-prone potential of the site

Land use

Population density

Access to medical centers

Access to fire stations

Access to road networks

Distance from industries

Effective Indicators in Khorramabad City

The effective indicators in Khorramabad city were determined based on their compatibility with the climate and culture of the city's residents. ARC GIS software was utilized for selecting temporary settlement sites in Khorramabad. ARC GIS is a Geographic Information System (GIS) used for analyzing and creating geographical maps, as well as preparing information. The tools within this platform allow for mapping, exploration, and sharing of information with precise locations. This software was initially introduced in 1999 by Esri, with its latest version (ARC GIS 10.5) being released in December.

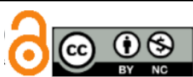
Key parameters in this field were categorized following research conducted by previous scholars. These parameters were identified through a review of existing research literature, and are. After preparing the required maps for the raster calculator in site selection and integrating the layers, the effective layers (criteria) in site selection must be standardized. This means that the layers should be converted to a scale using decision-making rules so that they can be integrated with each other. For this purpose, the Analytic Hierarchy Process (AHP) method has been used. Therefore, first, each of the examined criteria was compared, and the relative importance of each pair was entered into a matrix based on their value and importance in locating a temporary shelter site. In ArcGIS software, pairwise comparison, hierarchy generation, calculation of layer weights, and the inconsistency rate in the hierarchical process were performed using the relevant tool. The pairwise comparison was conducted with the help of reviewing articles in the field of urban design and planning.

Findings

Based on physiographic studies, flood risk zoning, and field studies in Khorramabad, it can be concluded that the southern part of the city faces the highest flood risk. This is due to its location in the path of surface flows, narrow passages, lack of proper drainage network, and proximity to the Khorram River bed. The occurrence of severe floods in 2016 and 2019 further confirms this issue. On the other hand, the northern areas of the city, with higher elevation, a suitable natural slope for runoff drainage, and distance from the river bed, are relatively safer. Therefore, for temporary settlement or construction of emergency infrastructure, the northern areas of Khorramabad are a more suitable and safer option compared to the southern part. The results of this research highlight the effectiveness of multi-criteria

decision-making methods and Geographic Information Systems in identifying areas suitable for temporary settlement. Emergency camps play a crucial role in natural and human crisis management, helping to overcome the initial critical phase and providing basic services to maintain human security and dignity. They also serve as a platform for initiating social and psychological reconstruction in affected communities

Keywords: Temporary shelter, Khorramabad, flood, vernacular architecture, crisis management, GIS, AHP Declarations



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