
Analysis of Key Factors Affecting the Promotion of Resilience of Rural Settlements against Environmental Hazards (Case Study: Rural Settlements of Fariman City)

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1. Introduction

There are dramatic changes in attitudes toward risk today; thus, the prevailing view has shifted from focusing solely on reducing "vulnerability" to increasing "resilience" to disasters. Resilience is a kind of futurism emerging due to the dynamic response of society to risks which can have an impact on expanding policy choices to deal with uncertainty and changes. Accordingly, on a global scale, in a situation where risks and uncertainties are rising, efficient natural disaster planning and management strategies are highly required. As a result, human societies can reduce vulnerability at different levels, especially at the local level. Accordingly, one of the most effective approaches in risk management, planning, and increasing the resilience of rural settlements is the futuristic approach., uncertainties in the planning process can be detected and managed by analyzing the main factors and drivers of development.

2. Study Area

The study area in this research is the rural settlements of Fariman. Fariman is one of the cities of Khorasan Razavi. In 2016, it had a population of 99001 people and consisted of two central parts of Qalandarabad and five villages named Fariman, Sang Bast, Balaband, Sefid Sang, and Qalandarabad. It has a total of 177 inhabited villages. Fariman Sangbast, Qalandarabad, Kalateh Minar, and Barashk rivers flow to this region while it is located on an active fault. The studied villages include 29 villages in Qalandarabad district who have suffered human and financial losses due to floods and earthquakes. According to the city governor's office, in villages where the earthquake occurred, about 40 to 100 percent has been destroyed. Besides, according to the city housing foundation, 285 rural housing units and 324 livestock places have been damaged due to the flood for about 10 to 100 percent. More importantly, 200 hectares of wheat and saffron fields in Fariman have been damaged due to flood. In general, about 15 billion tomans of the damage has been caused by floods to farms, livestock, and roads in Qalandarabad, Fariman.

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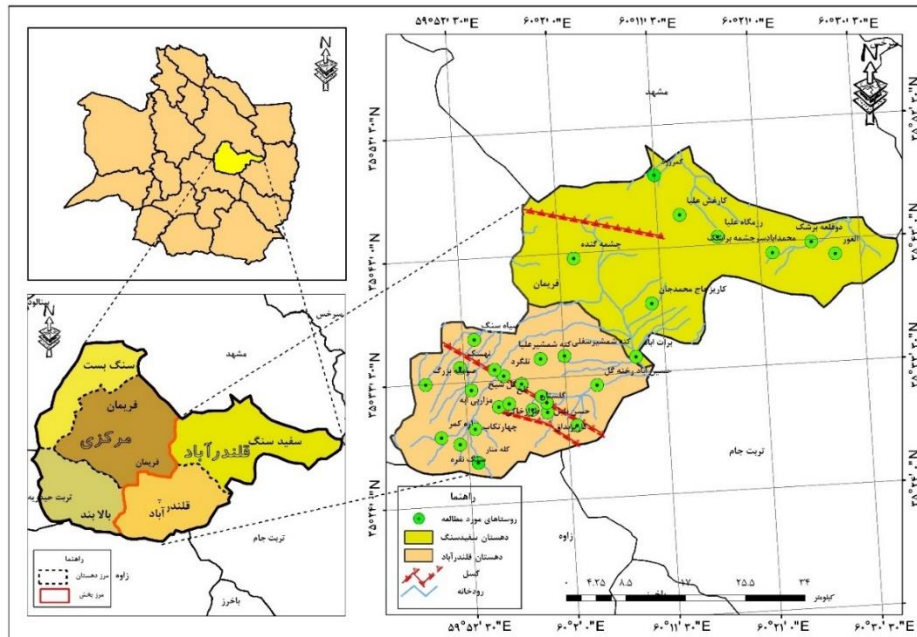


Figure 1. Introduction of the Study Area

3. Materials and Methods

The present research is an applied one in terms of purpose and nature which is conducted using new methods of futures studies, analytical, and structural ones. It is a mixed methods approach using a combination of both quantitative and qualitative models. The present study identifies the most important factors affecting the promotion of resilience of rural settlements against environmental hazards in Fariman. To this end, Delphi technique has been applied to identify variables and indicators. In this regard, first, to collect the variables, published scientific-research articles on the factors affecting the increase of resilience against environmental hazards were used. Then, a semi-structured questionnaire was designed and distributed using selected Delphi method in several stages among selected experts - experts in the field of research and rural managers. In order to consciously select the participants, purposive sampling method was used. The statistical population of the present study is 50 people including 29 villagers and members of Islamic councils of the studied villages while 21 others involved 8 university professors, 7 doctoral students and specialists in the study area, 3 experts of the housing foundation of the Islamic Revolution of Khorasan Razavi, and 3 experts of the city governors. The applied futuristic method of the study is used for cross-impact analysis. This method is an expert-centered method through which a few results are obtained. The method is based on the analysis of interactions in the matrix. In crossover effects analysis, events along with events and trends are considered as independent variables and the probabilities of the phenomenon in the future are plotted by examining the output (in pairs) of the effective variables or drivers (in the column row). This method uses Mick Mac software.

4. Results and Discussion

Based on the results of the number of variables, the dimensions of the 47×47 matrix are set in six different domains. The results show that the number of repetitions is double and the degree of matrix filling is 75.73%. The results indicate that the number of high-intensity relationships accounted for a higher percentage. How variables are distributed on the scatter plot determines the stability and instability of the system. The status of distribution and the dispersion of variables affecting the promotion of resilience of rural settlements against environmental hazards in the distribution plate indicates that the status of the system is unstable. So, the most variables are scattered around the diagonal axis of the plane. To analyze the system environment and finally to identify the drivers and key effective factors, the impact plan and the variability of variables are examined along with the ranking and displacement of variables. Due to the instability of the system, five types of variables including effective variables, two-dimensional variables, regulatory variables, affective variables, and independent variables were identified. Moreover, the system shows the sum of influential variables and their interactional effect. Among the research variables, social variables had the highest impact on increasing the resilience of rural settlements and environmental hazards while environmental-physical variables had the lowest impact. Comparing the results of direct and indirect effects analysis, the key factors affecting the promotion of resilience of rural settlements against environmental hazards were detected. According to the results, the key driving forces in terms of the impact on the 16 key factors are more important, both in direct and indirect effects. Finally, the key factors affecting the increase in resilience were ranked from highest to lowest.

5. Conclusion

In the present study, 16 factors were selected as the most prominent ones including the increase in people's cooperation and convergence in times of danger, accountability of government organizations and local institutions, partnership between communities, the private sector and local authorities, taking the necessary measures to protect the village from hazards by local management, strong buildings for use in times of danger, granting credit and loans to victims, coordination between different institutions and timely supervision to provide assistance, increasing non-agricultural incomes of villagers, use of GIS in natural hazard management by relevant organizations, informing people about ways to deal with accidents, rehabilitation of residential units with the advice of local architects and engineers, use of information tools by relevant institutions, access to organizations for post-accident management, training people to build durable structures, creating insurance coverage in various aspects, and training and maneuvering by government agencies. The problems regarding the crisis management can be solved and the effects of natural disasters in the city of Fariman will be reduced if only these factors are well taken into account.

Keywords: Environmental risk management, Resilience, Rural settlements, Awareness and participation, Futures studies

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