

Prioritizing Different Methods for Participation and Education of People to Predict and Warning Flood in Iran

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Abstract

Flood is considered as one of the most destructive natural hazards in the world that results in a lot of costs, especially in developed countries. Therefore, dealing with this hazard and its risk, two kinds of essential actions should be applied, including structural and non-structural methods. Forecasting and flood warning techniques are effective non-structural methods that developing them is related to different methods of people participating and their educating. In this paper, these methods are prioritized based on their effects on the development of forecasting and flood warning in Iran. First, alternatives (methods of people participating and their educating) and criteria are determined. Afterwards, experts' opinions about the situation of each alternative to each criterion are collected and an appropriate decision making method is applied to rank the alternatives. Finally, the method of holding meeting with people in flood plains is ranked as the first alternative. Creating observation markers from previous occurred floods is selected as the second alternative. Visiting plants and industrial sectors in flood plains and giving necessary warnings to industrial owners, installing signs to show flood potential on the public building, paper publication in newspapers, presenting flood instructions in the form of manual, brochures, etc., trial maneuvers, face-to-face interaction, methods for distributing flood information through manuals, brochures, etc., as well as awareness advertisements on the radio, and interviewing with flood managers are ranked third, fourth, fifth, sixth, seventh, eighth, ninth, and tenth, respectively.

Introduction

In this paper, different methods about participating and educating people are ranked based on their effects on flood forecasting and its warning. Managers, usually, consider different criteria in the process of their decision-making.

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Therefore, they should apply methods known as multi-criteria decision-making (MCDM) methods [1]. These methods are applied to identify and evaluate alternative and rank them. In this paper, an appropriate MCDM method is used to prioritize different methods of participating and educating people. Method with the least negative impact on the development of forecasting and flood warning system is selected as the best alternative [2].

Materials and methods

In this research, flood occurring in Iran, from 1989 to 2018, and 1959 to 1988 are studied by a statistical survey. Afterwards, flood statistics are compared in these two periods [3]. Considering the necessity of implementing suitable flood forecasting and warning systems, these different methods should be prioritized for the development of these systems. In this paper, a suitable MCDM approach (Shannon entropy and TOPSIS) are applied to rank these alternatives [4].

Discuss and Results

After confirming the validity and reliability of the questionnaire by 15 experts, from statistical population of water resource engineers, agricultural engineers, natural resources engineers, natural disasters engineers, urban engineers and urban planners, and geomorphologists, a valid and reliable decision matrix is distributed among experts to determine the status of each alternative relative to each criterion. Afterwards, an appropriate MCDM method based on Shannon entropy and TOPSIS is applied to prioritize alternatives. Finally, the method of holding meeting with people in flood plains is ranked as the first alternative. Creating observation markers from previous occurred floods is selected as the second alternative. Visiting plants and industrial sectors in flood plains and giving necessary warnings to industrial owners, installing signs to show flood potential on the public building, paper publication in newspapers, presenting flood instructions in the form of manual, brochures, etc., trial maneuvers, face-to-face interaction, methods for distributing flood information through manuals, brochures, etc., as well as awareness advertisements on the radio, and interviewing with flood managers are ranked third, fourth, fifth, sixth, seventh, eighth, ninth, and tenth, respectively.

Conclusion

Flood is known as one of the most destructive natural hazards in the world. Therefore, it is necessary to take appropriate actions against the flood, including structural and non-structural methods. Non-structural methods are more economical and environmental friendly. Forecasting and flood warning techniques as non-structural methods should be developed in Iran that is related to people participating and their training. Therefore, prioritizing these methods based on their effects on the development of flood forecasting and flood warning

in Iran. Ranking these methods is done by appropriate MCDM method based on Shannon entropy, and TOPSIS. By applying this method, the method of holding meeting with people in flood plains is ranked as the first alternative. Creating observation markers from previous occurred floods is selected as the second alternative. Visiting plants and industrial sectors in flood plains and giving necessary warnings to industrial owners, installing signs to show flood potential on the public building, paper publication in newspapers, presenting flood instructions in the form of manual, brochures, etc., trial maneuvers, face-to-face interaction, methods for distributing flood information through manuals, brochures, etc., as well as awareness advertisements on the radio, and interviewing with flood managers are ranked third, fourth, fifth, sixth, seventh, eighth, ninth, and tenth, respectively.

Keywords: Flood, Non-structural management, Flood forecast, Flood warning, TOPSIS.

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