Zoning Flood Risk in the Shahar Chai Watershed in Miyaneh Using Vikor Model

Mohammad Hossein Rezaei Moghamddam[*1], Davood Mokhtari[2], Majid Shafiei Mehr[3]

1- Professor, Geomorphology, Faculty of Planning and Environmental Sciences, University of Tabriz, Tabriz, Iran
2- Professor, Geomorphology, Faculty of Planning and Environmental Sciences, University of Tabriz, Tabriz, Iran
3- PhD student, Geomorphology, Faculty of Planning and Environmental Sciences, University of Tabriz, Tabriz, Iran

1-Introduction

Flooding is a natural phenomenon that human societies have accepted as an inevitable event. However, the event, the size, and the flood recurrence are due to several factors that vary depending on the climatic, natural, and geographical conditions of each region. In this regard, the relationship between rainfall and runoff is significantly different from one watershed to another (Omidvar et al., 2010: 73; Abedini & Beheshti, 2016: 293). On the other hand, the inappropriate temporal and spatial distribution of precipitation in arid and semi-arid regions, as essential parts of the country, causes destructive floods, leading to significant loss of life and property. It should be noted that Iran is ranked seventh in the world in terms of flooding. Multiple pieces of research have been conducted in different parts of the world to reduce the risks of floods, which can be found in the studies of Philip et al., 2006; Vojtek, & Vojteková, 2019; cited. However, In Iran, many studies have been conducted in flood zoning and watershed management using different models, which can be referred to as the work of Asghari et al. (2015) and Goodarzi et al. (2019).

2-Methodology

The study area is part of the Ghezel Ozan River watershed located in the northwest of the watershed. The following materials and methods have been used to achieve the objectives of the research:

- Study and review the theoretical foundations of research through the study of library documents.

Preparation of information layer of 10-meter-high digital elevation model for providing maps of elevation, slope, and aspect; preparation of lithological information layer using the geological map; preparation of soil map by Natural Resources and Watershed Management Organization of East Azerbaijan Province; preparation of information layer

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* Corresponding author; **E-mail:** rezmogh@tabrizu.ac.ir

of the hydrography network to develop the river density map and the distance from the river; using satellite images to prepare the land use map and vegetation; preparation of rainfall map of the study area using data from synoptic stations.

- Use ENVI5.3, ARC GIS10.5, and Expert choice software.

- Finally, flooding potential flood risk in the Shahar Chai watershed using the Vikor model.

3-Results and Discussion

Different layers such as slope, aspect, elevation, distance from the river, river density, land use, vegetation, lithology, rainfall, and soil were used to implement this model. Standardization was performed using the fuzzy method in the Arc Map software environment. The results of the flood classification map in the Shahar Chai watershed of Miyaneh showed 1123.7, 393.2, 278.7, 225.8, and 130.09 square kilometers are in very low risk, low risk, medium risk, high risk, and very high-risk areas, respectively.

4-Conclusions

The results showed that rainfall, slope, distance from the river, and the aspect with a weight of 0.18, 0.169, 0.123, and 0.105 have the highest impact coefficient; however, land use and soil have the lowest impact coefficient in the occurrence of floods in this watershed. The analysis of flood potential zoning map in this basin shows that dangerous and very dangerous areas are mainly located along the main river and mountainous in the steep logic, respectively. Due to the high slope and height of the region, it plays an effective role in the amount of runoff and flow peak floods. Furthermore, in the catchment

area of Miyaneh Chai city, 1123.7, 393.3, 278.7, 225.8, and 130.09 square kilometers are in very low risk, low risk, medium risk, high risk, and very high-risk areas, respectively.

Keywords: Flood, Zoning, Shahar Chai, Vikor model, Northwest of Iran

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