An Investigation on the Effect of Geometric Features of Basins in Forming the Alluvial Fans of Southern slopes of Alborz in Semnan Province, Using correlation and AHP Method

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Extended Abstract

Introduction

Alluvial fans are considered as one of the arid and semi-arid geomorphic effects, which are the result of intense flow water performance in the past and present. Therefore, alluvial fans can be considered as legacies of quaternary climate. Dryv (1873) used alluvial fan terminology for the first time. The US geographical organization conducted a study focusing on alluvial fans in the second half of the nineteenth century. In the early 1960s, some quantitative studies focused on research examining the process and control development of alluvial fans.

Alluvial fans have generally provided suitable conditions and good situations for living settlements in many parts of the world since prehistoric time. The human settlement developments are related to neither prehistory nor ancient time, but many of populated districts with different application on human activities and developments formed on alluvial fans. In Iran where many of rural and urban settlements and its activities are placed in alluvial fans, more studies should be done on the recognition of alluvial fans, especially on southern slopes of Alborz in Semnan which existed many different alluvial. Thus, this study attempts to consider a large number of water basins associated with alluvial fans, which have little relationships with ten geometric features of water basins with the size of its alluvial fans on the southern slopes of Alborze in Semnan.

Research Methodology

This study is located on the southern slopes of Alborze in Semnan and is limited to a rage from 34 degrees 13 minutes to 37 degrees 20 minutes North latitude and 51 degrees 51 minutes to 57 degrees 3 minutes east longitude from Greenwich prime meridian. This study is comprised of a large number of adjacent alluvial fans with 44 identifiable alluvial fans along with 44 water basins are chosen on the southern slopes of the Alborz.

This study has used (AHP) which is a part of multi-criteria of decision-making model and investigated the process and prioritizing effect of geometric features. To achieve the purpose of this study, the researcher has used alluvial fans range using 1:25000 aerial photographs combined with field visits. The process of AHP method from the most versatile multi-criteria decision-making models by Iraqi-born man named Thomas L Saati was proposed in 1980s. In this method, at first, the priority of various factors and turning them to small amounts of oral judgments (expert opinion) is used. .

In this study, correlation was used to evaluate the correct weight and compare them with each factor. The correlation coefficient is a statistical tool to identify the type and degree of relationship between the quantitative variables. This method is one of the criteria to identify the correlation and coefficient of two variables. The correlation coefficient shows the intensity of relationship as well as the direct and inverse relationship of variables. This ratio is between +1 to -1 and if there is no relationship between the two variables it equals zero.

Results and Discussion

Some studies focusing on alluvial fans show that the relations between alluvial fans and the geometric characteristics of watersheds are affected by the hydrological behavior. The main reason is that the basin geometry characteristics determine the size of the alluvial fans and their evolution play a very important role. The results from the relations between area of alluvial fans on the southern slopes of Alborz in Semnan with the basin water geometric features showed that criterion of Weight 10-Tions of area, slope, form factor, height, perimeter, basin length, drainage density, channel length, main channel slope and length of the basin were 0.337, 0.190, 0.134, 0.091, 0.075, 0.055, 0.043, 0.032, 0.024, 0.018, respectively. Therefore, the result shows that the effect of basin area in the formation of alluvial fan was more effective than other geometric features of the basin's water and the length of the basin had minimal impact on the formation and development of alluvial fans in this area.

Conclusion

The results showed that the correlation between the basin characteristics and alluvial fan in the region were significantly different. So that some of the correlations are high and some are too low.
Effective factors, such as area, the total length of waterways, basin perimeter, main channel length, basin length, basin height, main channel slope, basin slope, drainage density with coefficient of 0.969, 0.935, 0.927, 0.913, 0.891, 0.465, 0.299, 0.197, 0.176 and 0.061, respectively contribute to form alluvial fan of region which are significantly important in area. The basin area has the most influence on the size of alluvial fans in this region.

Keywords: Alluvial fans, Watershed, Alborz, Analytical hierarchical analysis, the correlation coefficient.