

## Mapping Landslide Hazard Zonation in Great Karoon Aquifer Basin by Analytical Hierarchy Process (AHP) model in Geographic Information System (GIS) Environment

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### Extended abstract

#### 1- Introduction

We have done this research in order to study frequency and transmissivity on big and widespread landslides in Great Karoon aquifer basin due to establish Great Karoon no 1,2,3 dams Purpose of this research is mapping landslide hazard zonation in Conformity with the new area activities and changes after: 1. Dams establishment, 2. land cover changing due to irrigation, drainage, river branches and irrigation canals. 3. Topography change of the zone due to harvest, moving huge amounts of soil and excavation process.

In this research after considering previous researches and library studies we have found out 8 effective factors as essential items in occurring landslides: slope, altitude, rainfall, and distance from road, distance from fault, and distance from drainage basin, land cover and petrology. Then we made information layers of these factors by using Arc GIS9.3 softwares in GIS environment .after it we allocated classes' weight of every factor by using Analytical Hierarchy Process (AHP) method.

We made ultimate map by compounding the different layers, and then categorized it in 4 classes; extremely hazardous, fully hazardous, middle hazardous and less hazardous. The extremely hazardous zones are affected by area geology conditions and it's known as main factor in the landslide transmissivity, and other

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effective items are: the slope between 5% to 30% , the drainage more than 1250 mm, the height between 500 to 2000 m and the distance from drainage basin between 0 to 4 km. Most of the extremely hazardous zones are pastures and plains that villagers and immigrant tribes use them and their water for grazing live stocks and especially for water cultivation in the slope zones. Eventually we came to this conclusion that AHP method is more accurate and better than other methods because it contains more variables and principled classifications without any experts' direct ideas.

Landslides are vitally important and we know them as worldwide disasters, owing to cause gigantic compensations. Final goal of every mass process is mapping zonation and categorizing hazardous zones in to different scales for reducing any possible damage. Nowadays there are many different ways for earth mass processing movement. In regards to establishment of Great Karoon no1, 2, 3 dams, the frequency and transmissivity on big and widespread landslides in aquifer basin of Great Karoon are 219 times during 20 months (according to reports of Geology Organization 387, 68)

Purpose of carrying out this research is mapping landslide hazard zonation in conformity with produced changes after: 1. Dams establishment 2 land cover changing due to irrigation, drainage ,river branches and irrigation canals. 3. Topography change of the zone due to harvest and moving huge amounts of soil .In this research we

have applied the AHP method i.e. a method in according to expertise judgment.

Framework of Analytical Hierarchy Process (AHP) method was based on pair comparison. Generally in this method at first we use oral judgments (experts' opinion) for assigning different parameters and changing them to quantitative scales. We made a matrix for parameters and scored them ( $\sigma$ ), and then we multiplied every score to every class's weighting coefficient and they added to each other, finally this model was obtained: M is sensitivity parameter).

We made ultimate map by compounding the different layers, and then categorized it in 4 classes; extremely hazardous, fully hazardous, middle hazardous and less hazardous.

Land cover of the extremely hazardous and fully hazardous zones is often pastures and jungles. the road factor has obtained more weight and in happening landslides it's more effective when the roads are placed in high slope and high altitude (height). As final conclusion we can say that in comparison with other methods the AHP method is superior and more accurate, due to having more variables and principled classifications without involving the experts' directs ideas (by using the obtained weights of pair comparison parameters in standard matrix.

**Key Words:** zonation, landslide, Analytical Hierarchy Process (AHP) method Geographic Information System (GIS), Great Karoon aquifer basin

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