SETSCI Conference Proceedings,
4 (1): 252-259, 2019

ISAS 2019
3rd International Symposium on Innovative Approaches in Scientific Studies
Section: Engineering and Natural Sciences
April 19 – 21, 2019, Ankara, Turkey

Effect of Fault Distance on Landslide

Seda Çellek[1*]

[1] Geology Engineering Department, Kırşehir Ahi Evran University, Kırşehir, Turkey
*Corresponding author: sedacellek@ahievran.edu.tr
+Speaker: sedacellek@ahievran.edu.tr
Presentation/Paper Type: Oral / Full Paper

Abstract – For many years, the biggest problem in the preparation of landslide susceptibility maps has been experienced in the selection of parameters. Each parameter gives different results in different fields. Some of these parameters can be generally evaluated while others reflect the characteristics of the areas. In this study, the effect of linear distance to the fault on the landslide was investigated. For this purpose, 64 of the 1 / 25.000 scale and 2945 landslide area prepared by MTA (Mineral Research and Exploration) were selected. Among these, the maps with landslides were chosen. The cell size was digitized with ArcGis 10.4 by setting to 28 pixels. Landslide inventory maps are prepared and overlapped with the parameter map for each area. After the reclassification, the maps were analyzed. For each parameter, landslide areas are determined by class ranges. Class ranges were chosen in accordance with the literature. Scatter graphs are prepared in% of the areas and it is determined that landslides occur between the values. The compatibility of the parameters with the literature was checked. Since it’s encountered in every area, it isn’t generally preferred in the literature. Although it is easy to prepare, the researchers avoid this parameter because they are evaluated together with other parameters.
As a result, it is tried to determine the distance to the fault distance to landslide areas. It was revealed that landslides were formed in class ranges.

Keywords – Landslide, susceptibility, fault, parameter, lineament

I. Introduction

One of the most important issues in the preparation of landslide susceptibility maps is the selection of the parameter. The proximity to the main faults is one of the structural features evaluated within the geological parameters. Therefore, the parameter is prepared with the help of geological maps. It is a frequently used parameter for the preparation of landslide susceptibility maps, especially in the areas that are important for seismic activity. The parameter is particularly effective in mountainous areas and high areas. Most of the researchers considered the main faults in the mapping area as structural elements and considered the proximity to the faults. As they moved away from the fault zones, there was a decrease in the landslides and the areas close to the faults were more affected by the lands. They stated that being close to the faults would cause disintegration in the rocks and this would adversely affect the stability of the slopes. The point that all researchers who use this parameter in landslide susceptibility analysis is in a consensus is that there is a decrease in the number of landslides occurring as they move away from the faults. These studies show that the proximity parameter to the main faults can be used in the studies to prepare landslide susceptibility maps in regions with high seismicity. For this purpose, buffer zones are created in the region and the effect of the fault on the landslide is investigated [1-3].

II. Materials and Method

Different buffer areas were formed within the study area in order to determine the degree to which the parameters affect the slopes. The percentage of landslides in each buffer zone was calculated. For this purpose, active and passive faults, on a 1 / 25.000 scaled topography map were digitized and transferred to the ArcGIS 10.4 database. From the General Command of Mapping, 1 / 25.000 scaled digitized topographic maps were provided, where the height curves belonging to the selected landslide zones pass 10 m. 1 / 25.000 scale landslide layouts prepared by MTA (Mineral Research and Exploration) were digitized by setting cell size to 28 pixels. After converting the fault data to the raster format in vector format, an intimate map of their belonging is produced. In this, buffer zones were formed in 10 classes, 0-50, 50-100, 100-150, 150-250, 250-500, 500-750, 750-1000, 1000-1500, 1500-2000 and 2000>. These were analyzed with inventory maps.

The results of Table 2 and Figure 1 were reached when analyzed from the selected 64 sheet to the 50 pafs related to the fault. Similar results were obtained with the benefit of proximity to streams. Although the effect is less in the selected areas, the effect is higher than the stream.

Table 1. Landslide area and distance from faults

Maps	Total (km^2)	Total (%)
0-50	13.17	2
50-100	13.21	2
100-150	14.22	2
150-250	31.44	3
250-500	83.3	7
500-750	80.38	6
500-1000	79.42	6
1000-1500	152.1	10
1500-2000	134.5	9
2000>	983.2	55
Total	1585	100

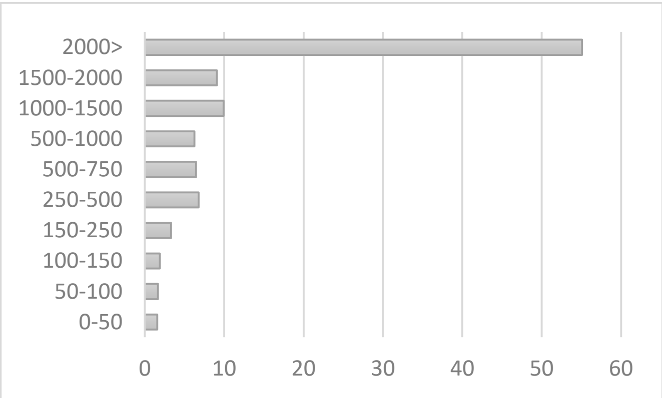


Fig. 1 Landslide area and distance from faults (km 2)

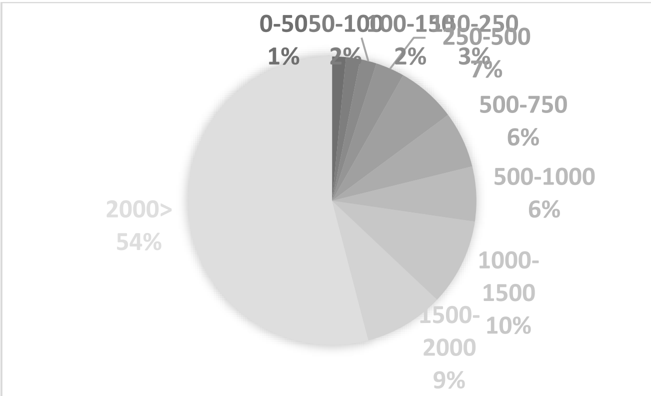


Fig. 2 Landslide area and distance from faults (%)

Some of the maps prepared in the study are given in Figure 3.

III. Results

15% of landslides occurred near the fault (0-250 m). As the distance increases, the relationship with the fault decreases. Almost half of the landslides occurred at a distance of 2 km.

IV. Discussion

The aim of this study is to investigate the effect of the parameters in the literature. Therefore, maps prepared in computer environment are used instead of field studies. This study once again emphasizes the importance of field studies. The selection of class ranges is very important, so generalization is made in the classes of the study area. Each field needs its own classification. According to the literature, a fixed and appropriate classification method was chosen. As can be seen from the tables and figures, the largest class range covers areas that are less than 2 km. almost half of the landslides occurred in areas smaller than 2 km. The presence of more faults can be determined by detailed field studies. In this way the effect of the fault can be more remarkable

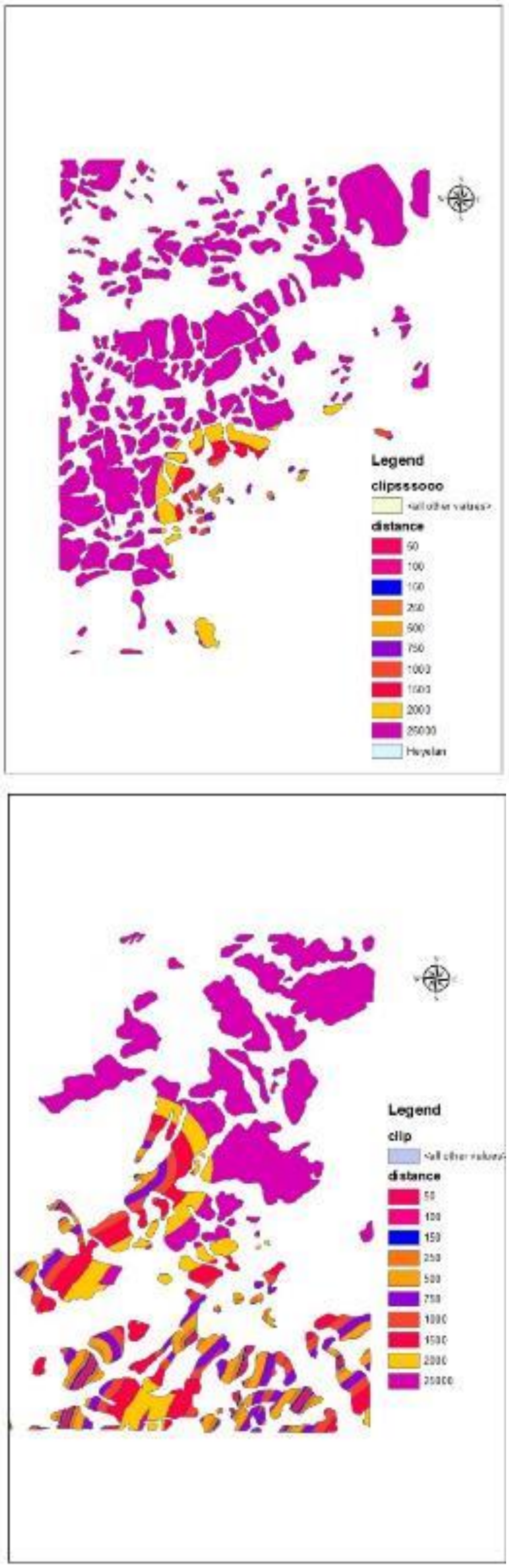
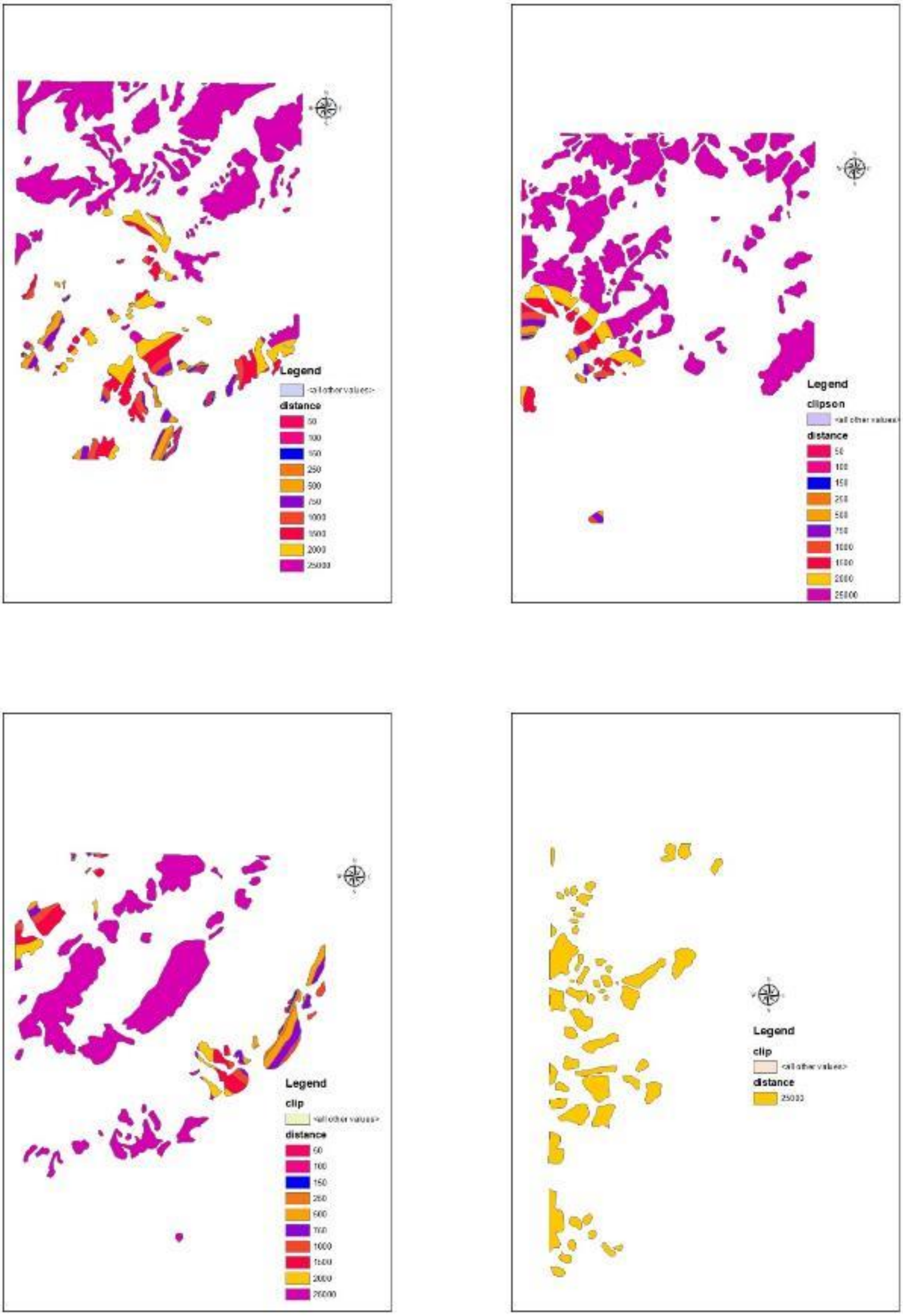
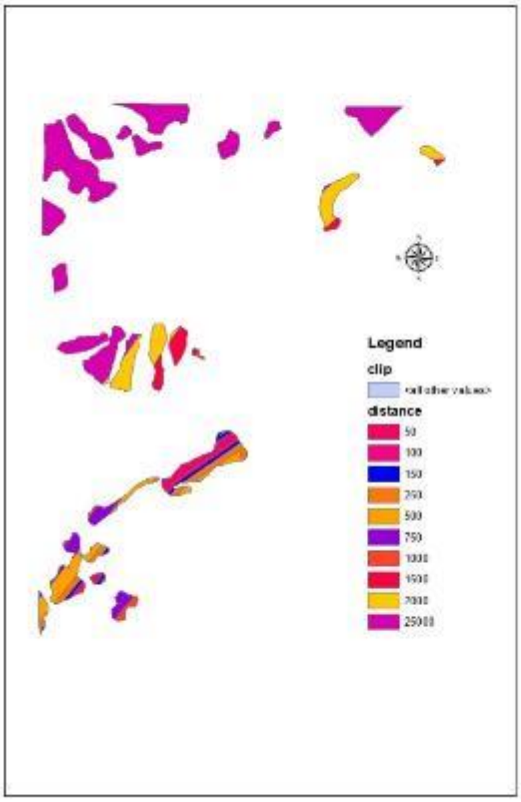
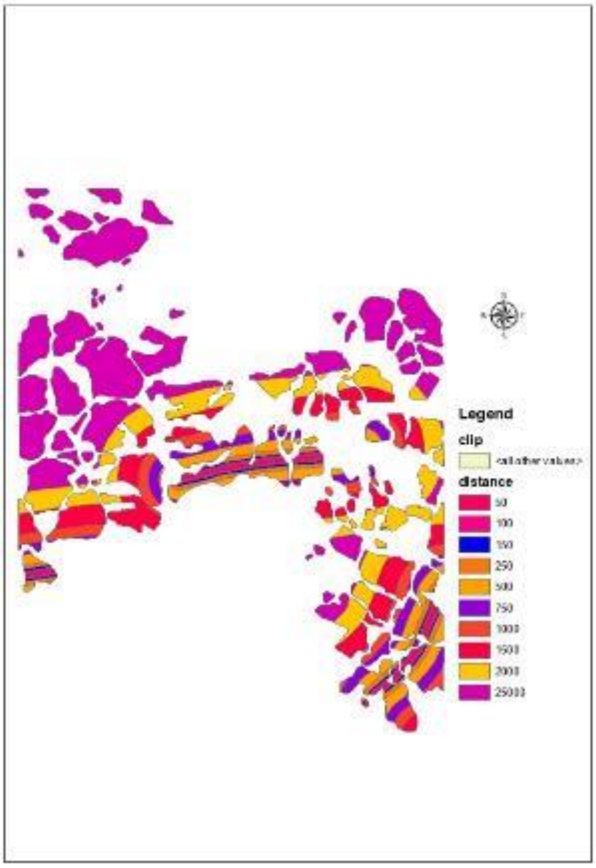


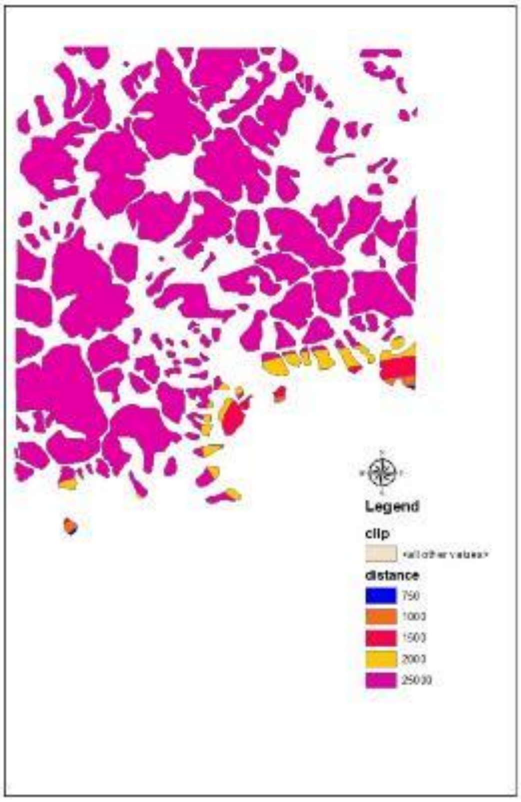
Fig.3 Some of the maps used in the study

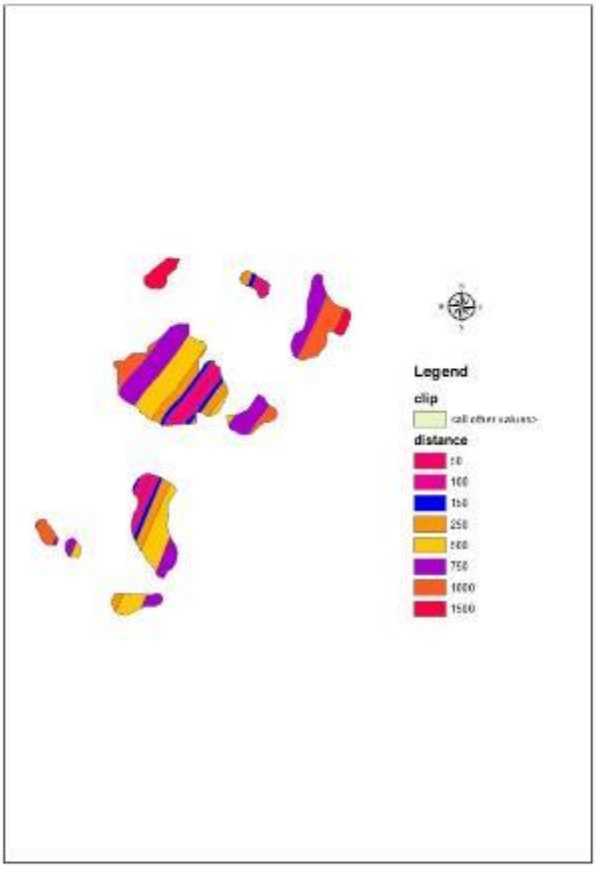
Continuation of figure 3

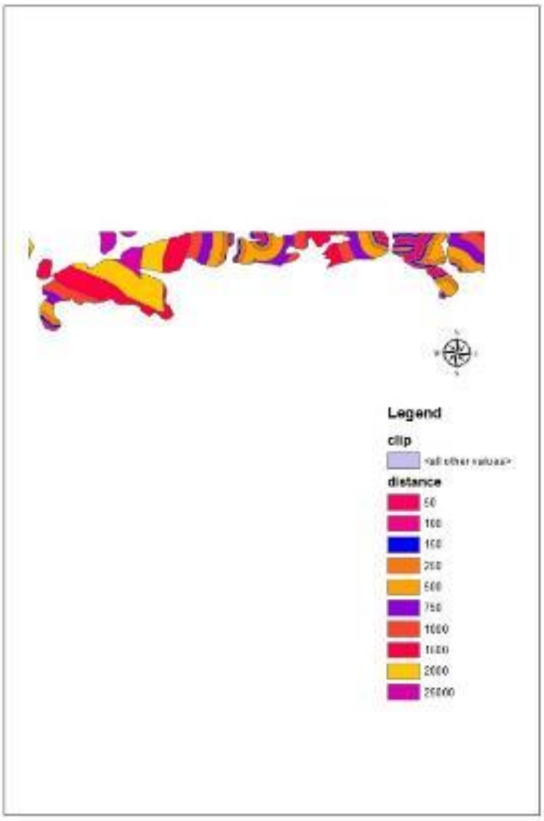


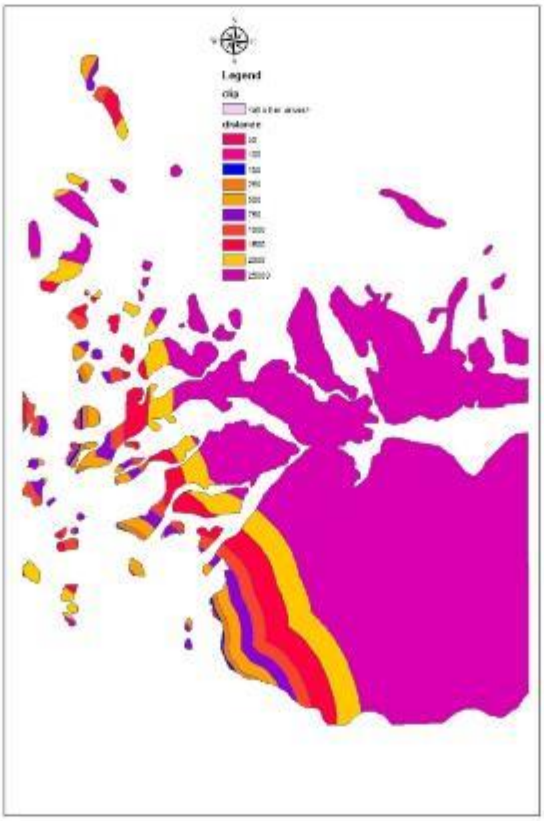

Legend
clip
<all other values>
distance
50
100
150
250
500
750
1000
1500
2000
25000

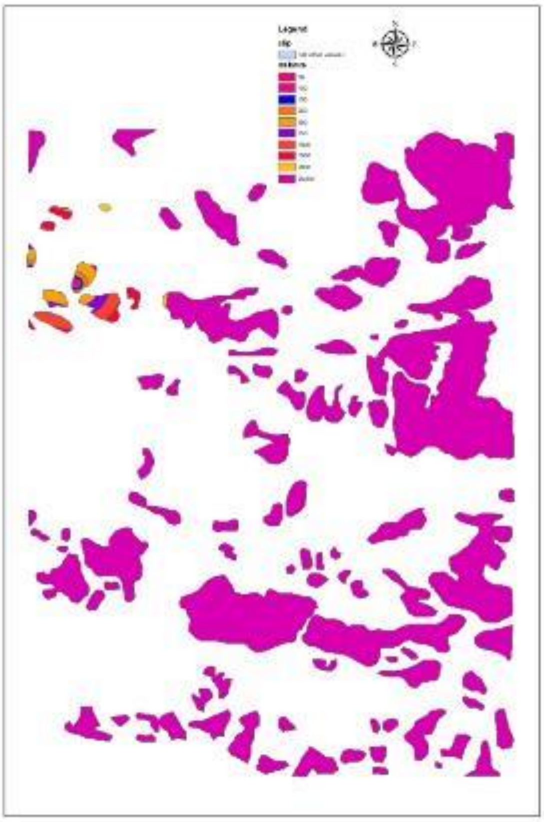

Legend
clip
<all other values>
distance
50
100
150
250
500
750
1000
1500
2000
25000

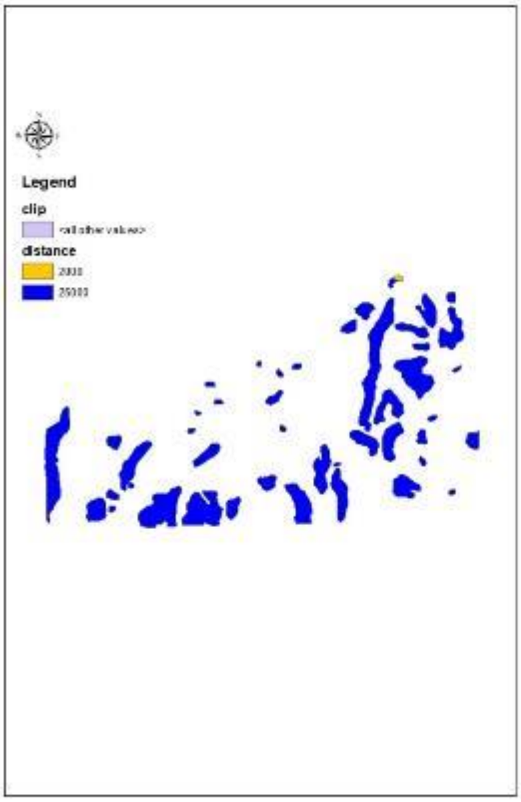

Legend
clip
<all other values>
distance
750
1000
1500
2000
25000

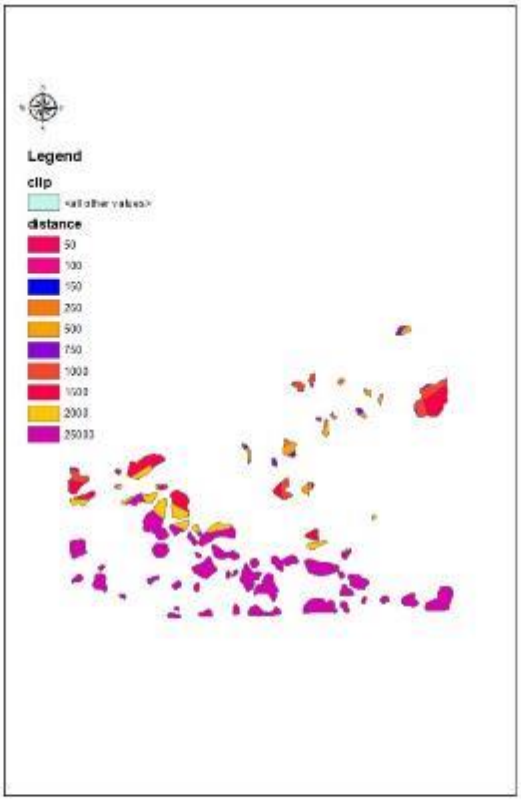

Legend
clip
<all other values>
distance
50
100
150
250
500
750
1000
1500

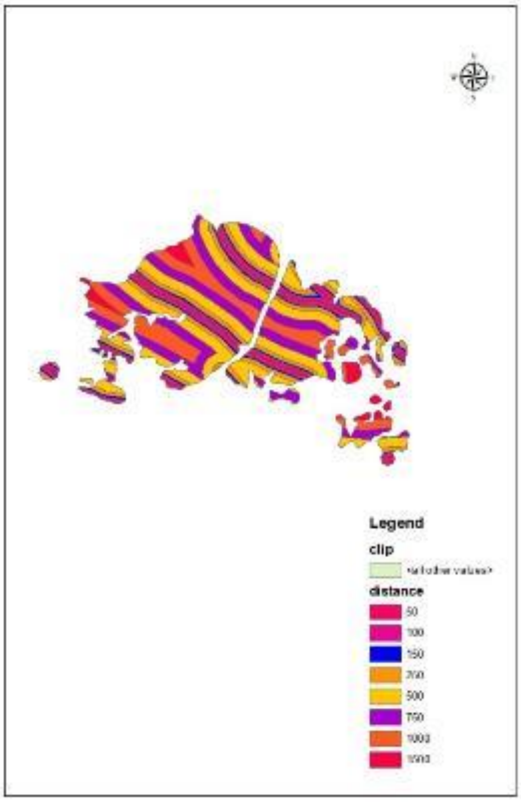

Legend
clip
<all other values>
distance

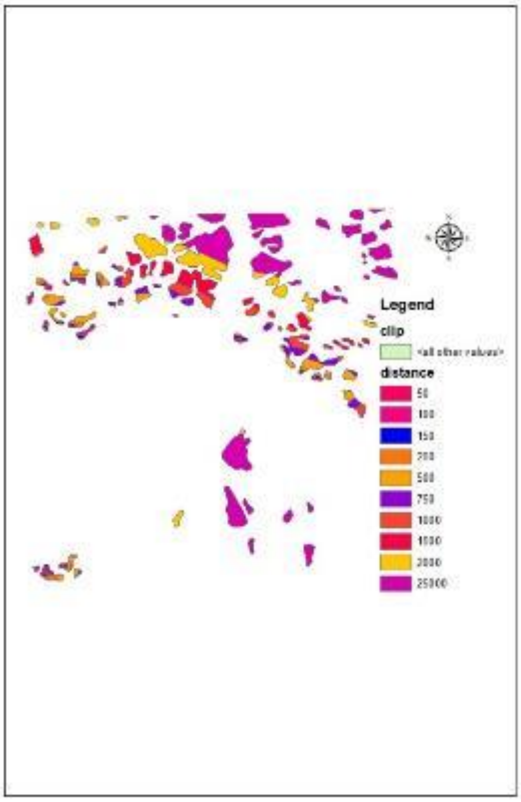

Legend
clip
distance

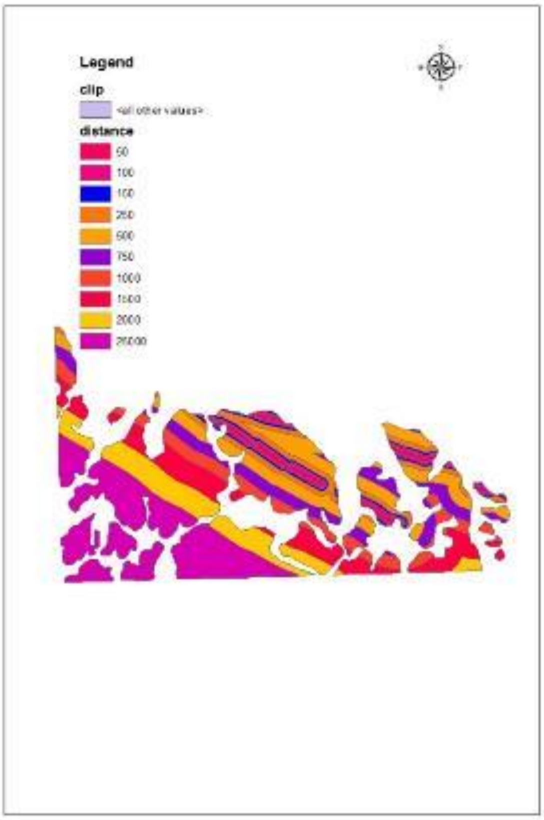


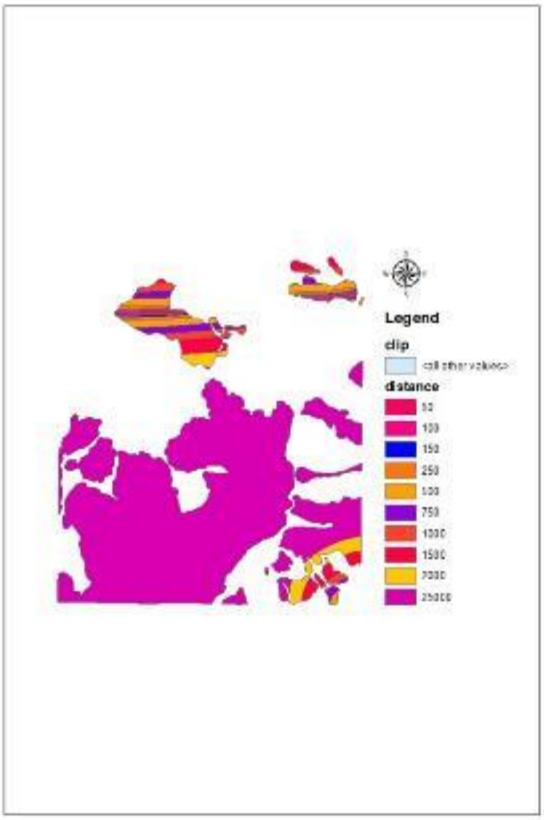

Legend
clip
<all other values>
distance

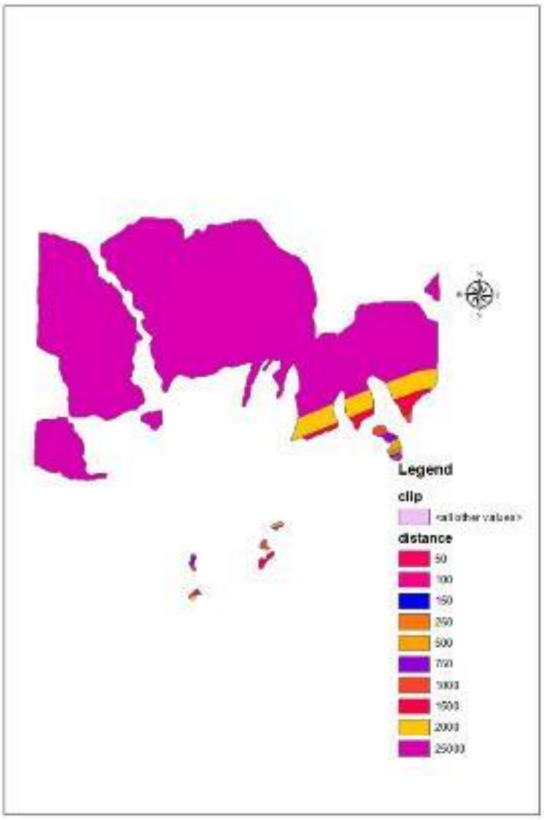

Legend
clip
<all other values>
distance
50
100
150
250
500
750
1000
1500
2000
25000

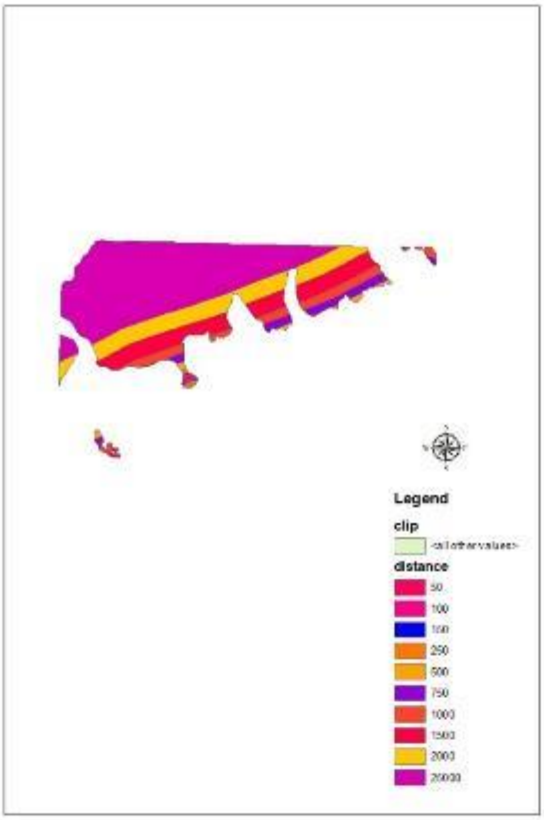

Legend
clip
<all other values>
distance
50
100
150
250
500
750
1000
1500

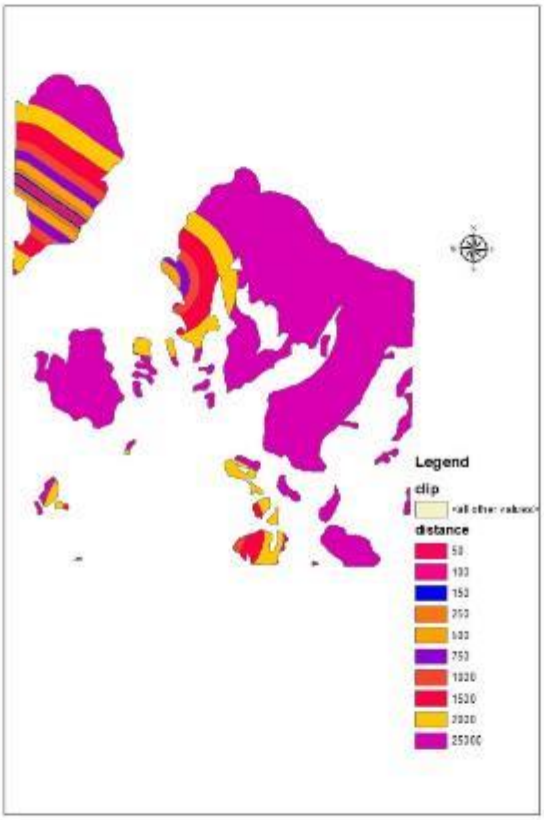

Legend
clip
<all other values>
distance
50
100
150
250
500
750
1000
1500
2000
25000

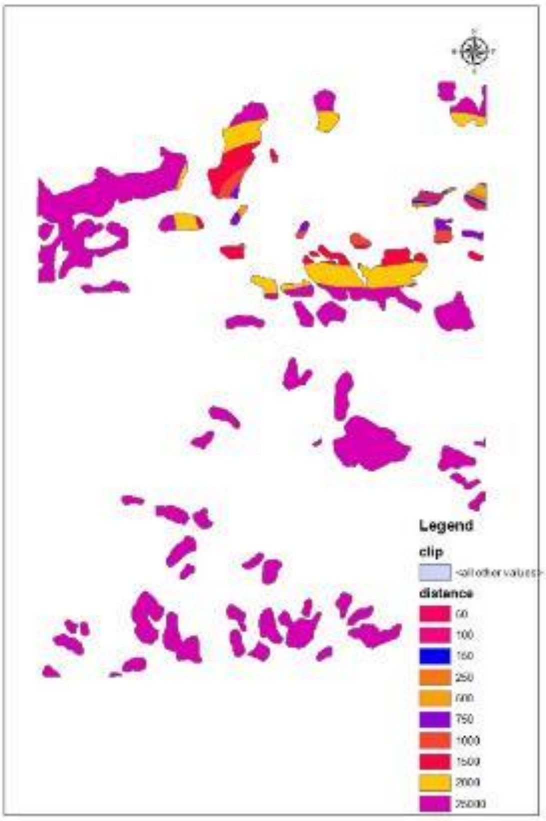

Legend
clip
<all other values>
distance
50
100
250
500
750
1000
1500
2000
25000


Legend
clip
<all other values>
distance
50
100
150
250
500
750
1000
1500
2000
25000


Legend
clip
<all other values>
distance
50
100
150
250
500
750
1000
1500
2000
25000


Legend
clip
<all other values>
distance
50
100
250
500
750
1000
1500
2000
25000


Legend
clip
<all other values>
distance
50
100
150
250
500
750
1000
1500
2000
25000



V. CONCLUSION

This study has once again shown that land surveys are a must for landslide studies. Result maps move away from reality.

ACKNOWLEDGMENT

This work has been prepared within the scope of the bap project named "Impact on the landslide of the morphology" (MMF.A4.18.017)."

REFERENCES

[1] B Pradhan., S. Lee and M., A Buchroithner, *Gıs-Based Back-Propagation Neural Network Model And İts Cross-Application And Validation For Landslide Susceptibility Analyses*, Computers, Environment And Urban Systems, 34, 216–235, 2010.

[2] S. Dağ, F. Bulut, S. Alemdağ, A. Kaya, Heyelan Duyarlılık Haritalarının Üretilmesinde Kullanılan Yöntem ve Parametrelere İlişkin Genel Bir Değerlendirme, GÜFBED/GUSTIJ 2011, 1 (2):151-176 Research/Araştırma.

[3] M. R. Z. Daneshvar, Landslide susceptibility zonation using analytical hierarchy process and GIS for the Bojnurd region, northeast of Iran, Landslides, 2014, 11:1079–1091M. Wegmuller, J. P. von der Weid, P. Oberson, and N. Gisin, "High resolution fiber distributed measurements