

Effect of Stream Distance on Landslide

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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 distance from drainage on the landslide was investigated. For this purpose, 64 of the 1 / 25.000 scale and 2945 landslide sheet 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. As a result, it is tried to determine the distance to the stream to landslide areas. It was revealed that landslides were formed in class ranges.

Keywords – Landslide, susceptibility, stream, parameter, lineament

I. INTRODUCTION

In general, the potential of the landslides increases as the distance to the rivers decreases, because the river can erode the slopes or saturate the lower part of the material, resulting in increased water levels, which may adversely affect stability [1]. “Drainage networks form valleys in regions of steep slopes and form sensitive areas for mass movements. As water passes through an area, it ruptures the rough material on the surface. Next to the lateral pressure, the water wants to penetrate the fine-grained material. As a result of this penetration, the entire process may cause a crash. The presence of water has an inverse relationship to the shear strength of a substance, because as the percentage of water increases, the shear force of the material tends to fall by half an exponential behavior. According to this fact, high deposition of drainage channels will result in greater water penetration and consequently decrease of shear strength of the formation” [2]. An important parameter that controls the stability of a slope is the degree of saturation of the slope material. The proximity of the slope to drainage structures is another important factor in terms of stability [3]. The creeks may adversely affect the stability by eroding the slopes or saturating the lower part of the material until the water level rises [4-8]. The river is an important factor controlling landslide formation; the effect on landslide sensitivity is in two ways. The first one is that the discontinuity surfaces on the sloped slope of the Equilibrium fail to withstand the effects of gravity and thus facilitate ground motions. Latter; the degree of saturation of the slope material. With the increase of the proximity to the drainage network, the effects of groundwater and surface waters increase. The

streams can adversely affect stability by eroding the slopes or saturating the bottom of the material until the water level rises. Therefore, the proximity of the slope to drainage structures is an important factor for stability.

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 were calculated. For this purpose, main and minor stream 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 stream 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 1 and Figure 1-2 were obtained when analyzed from the selected 64 sheet to 50 layouts related to the path. Stream parameter has not given the expected effect on landslide formation until fault and road. The main reason is that the land should be done without work. Seasonal drainage isn't processed on maps

IV. DISCUSSION

Table 1. Landslide area and distance from stream

Distance	Total (km ²)	Total (%)
0-50	13.16834	1
50-100	13.20888	1
100-150	14.21551	1
150-250	31.44061	2
250-500	83.29748	6
500-750	80.38386	6
500-1000	79.42016	5
1000-1500	152.1185	10
1500-2000	134.4716	9
2000>	983.2129	59
Toplam	1584.938	100

It is one of the parameters that gives one of the most distant results in the data of a study where many parameters are questioned. the main reason is that the seasonal rivers are not processed on the map. detailed data collection is required in the study areas.

Fig. 1 Landslide area and distance from stream (km²)

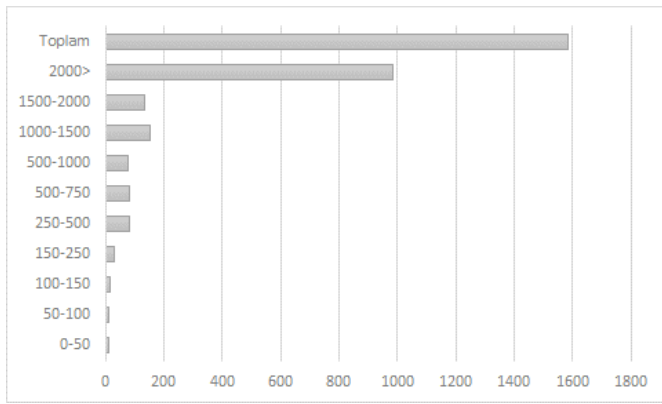
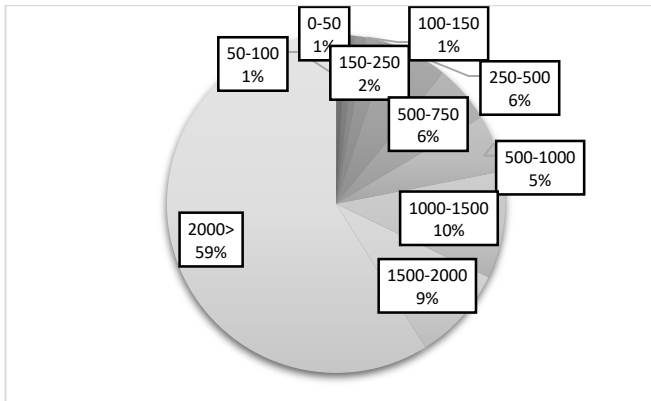


Fig. 2 Landslide area and distance from stream (%)



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

III. RESULTS

The proximity to the stream is thought to be effective in landslide formation. The effect of the parameter is not the same for each area. 5% of the selected 50 sheet shows its effect on the formation of landslide (0-250 m). In the distance up to 1 km, 32% of landslides were encountered. Although there are several reasons for this, field work for the area should be evaluated in other small and seasonal streams present in the area.

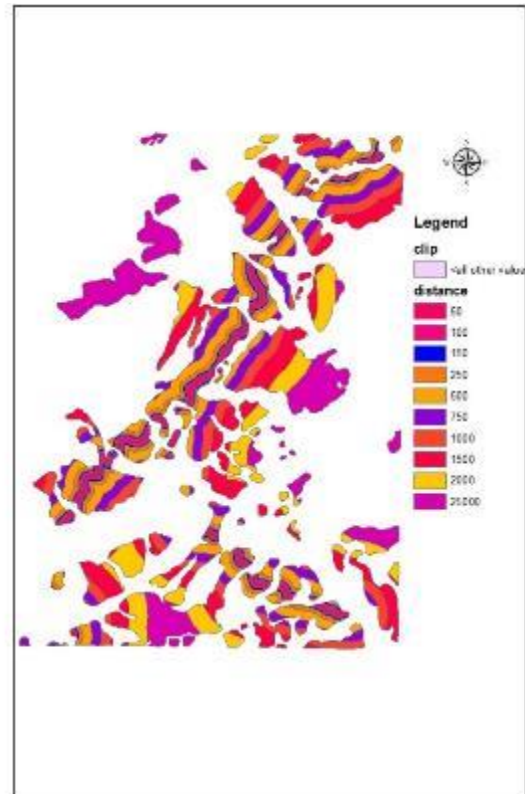
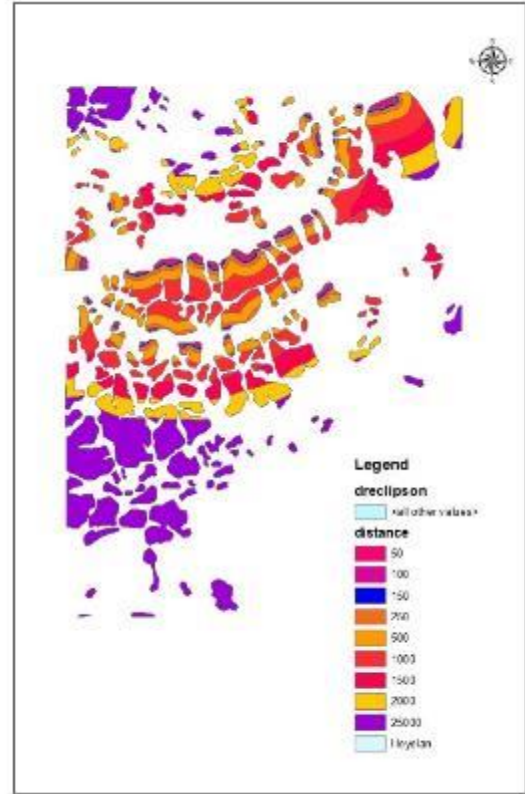
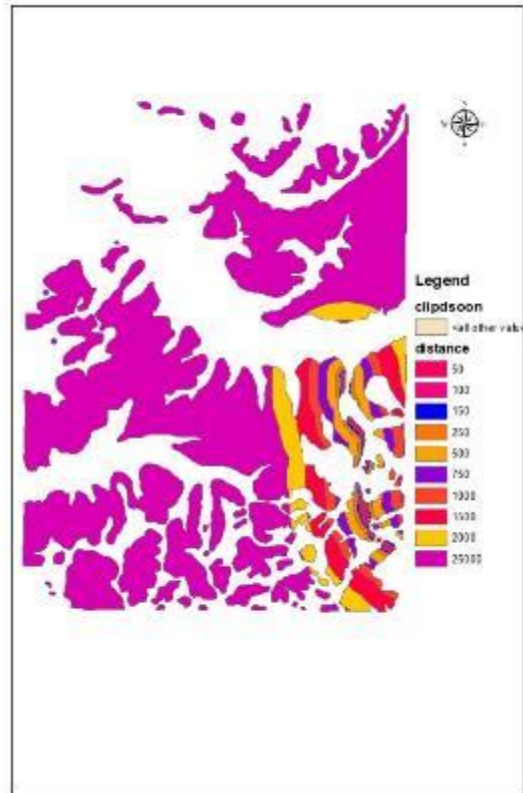
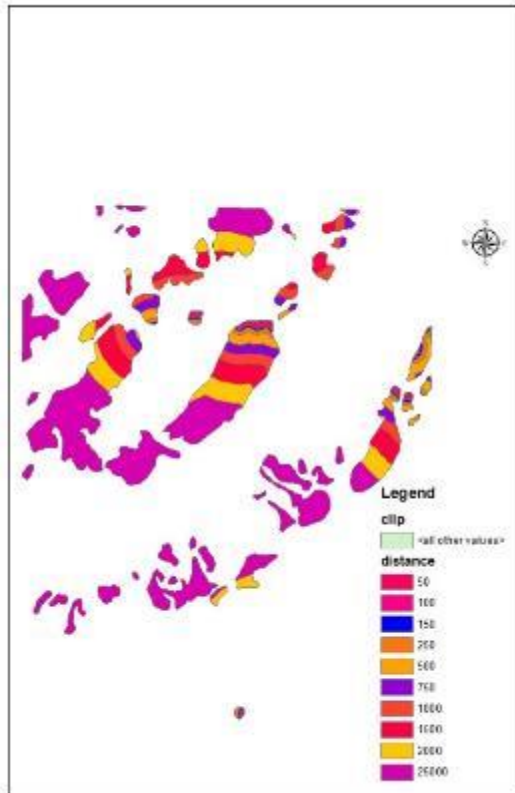
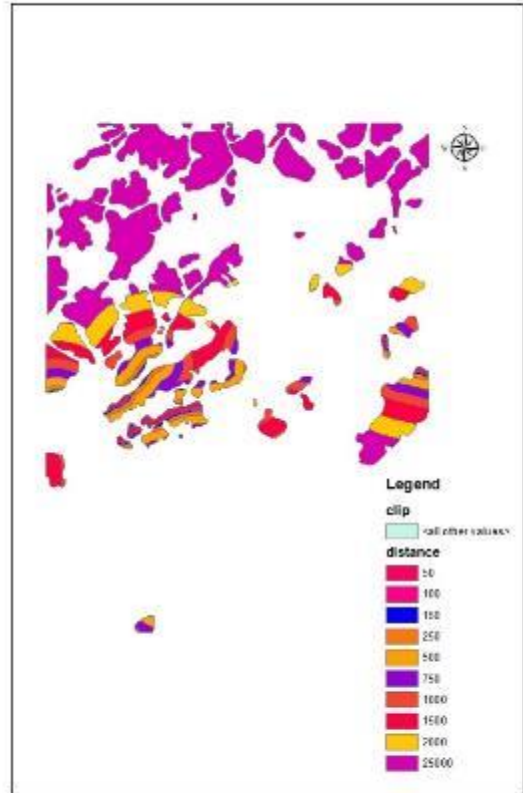
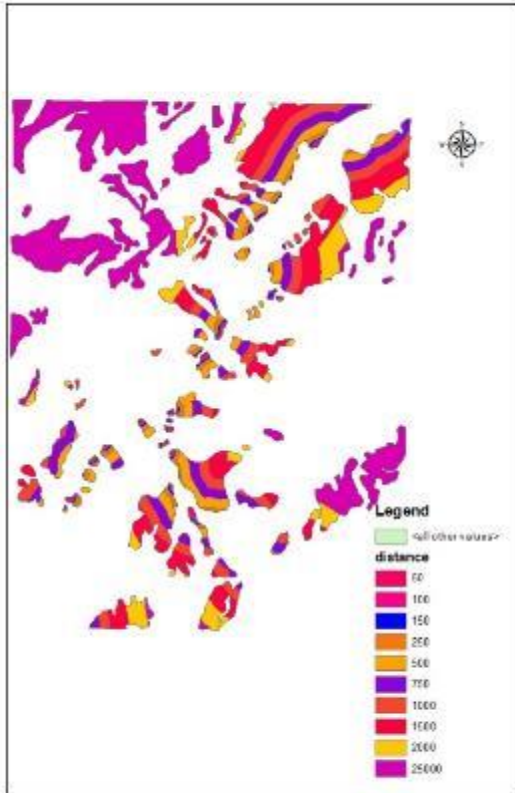
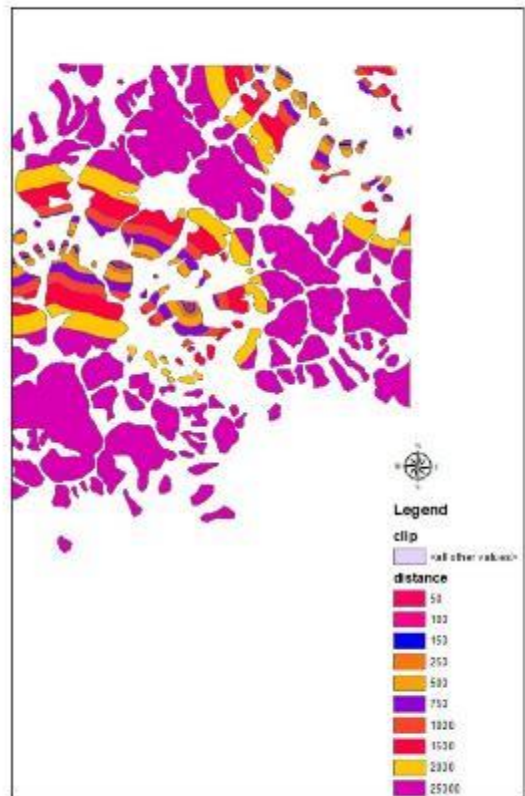
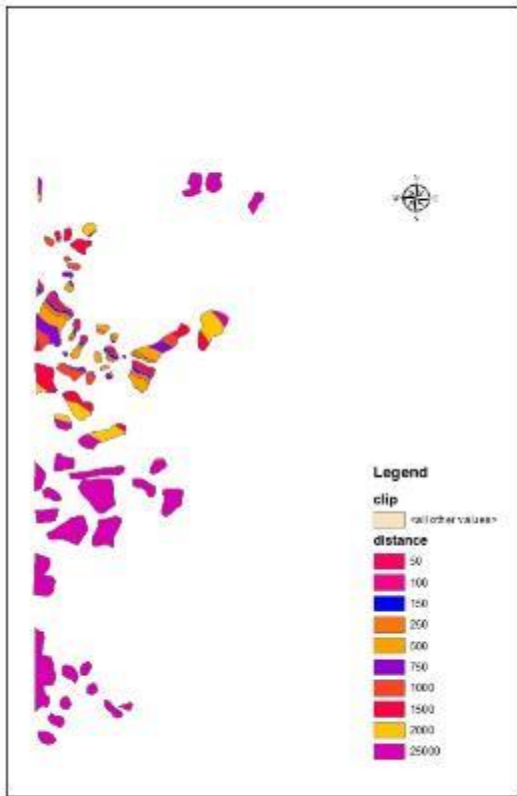
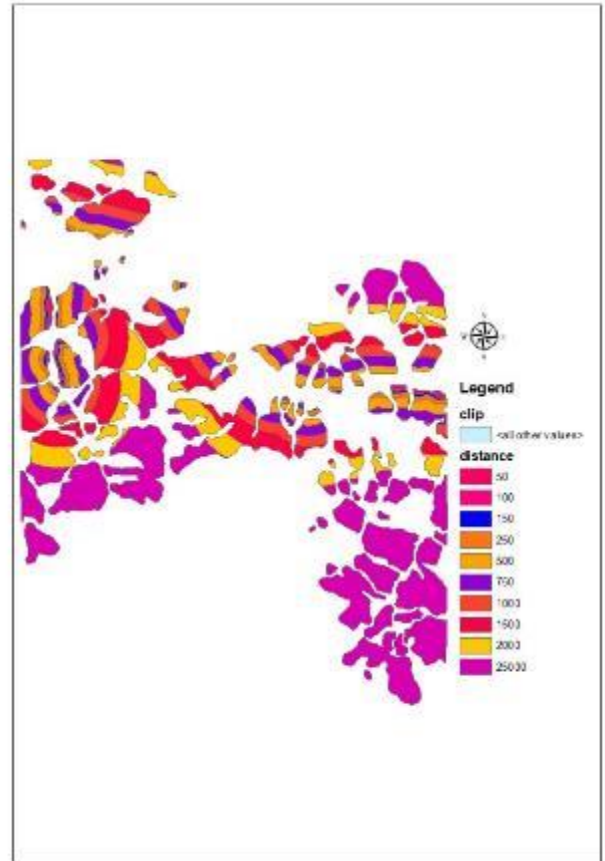
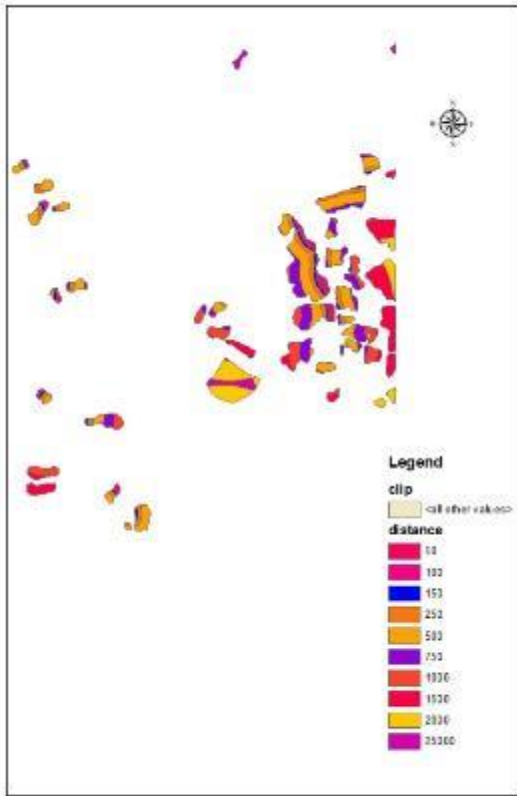
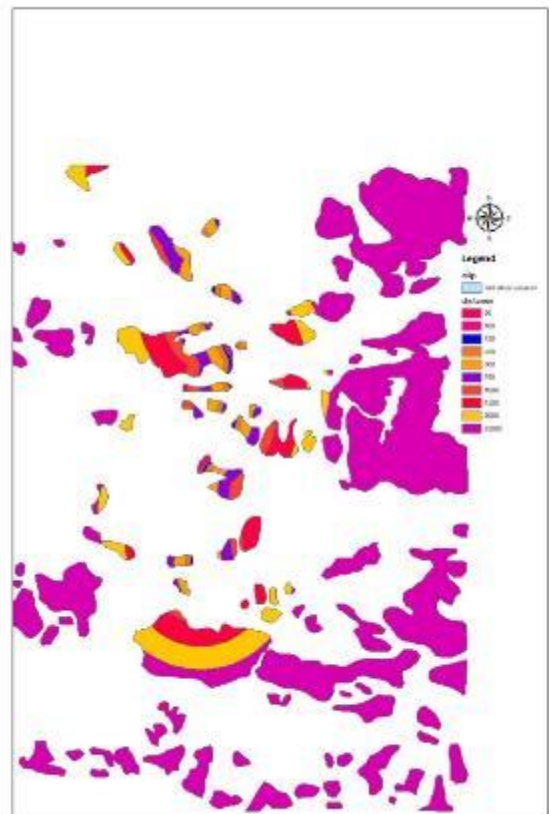
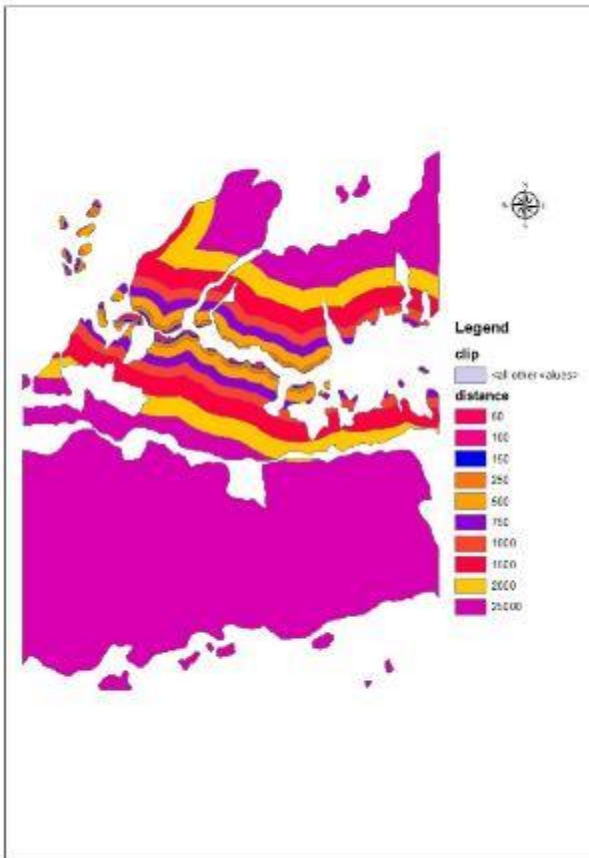
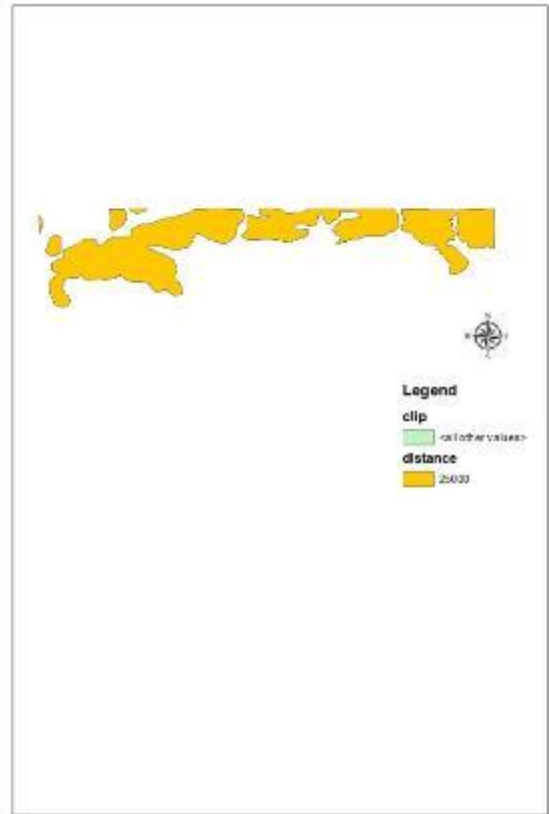
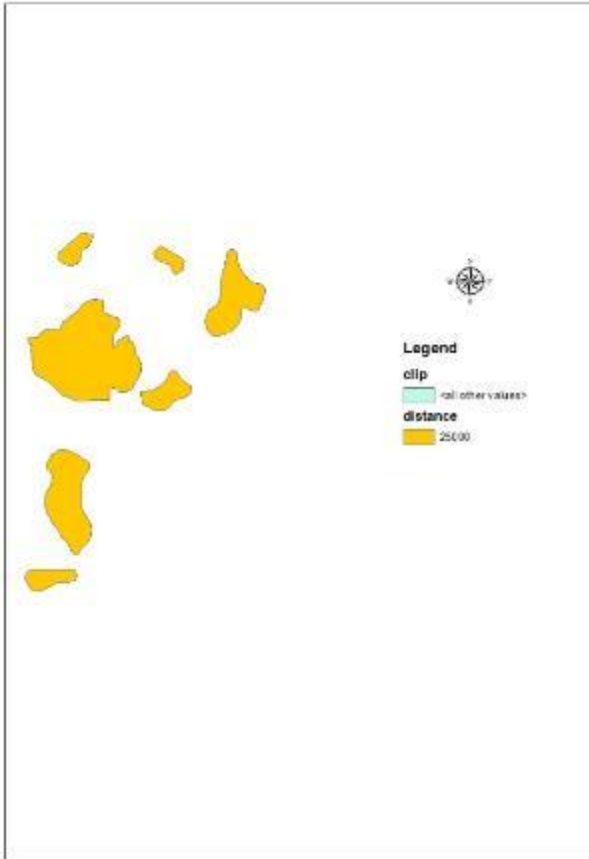


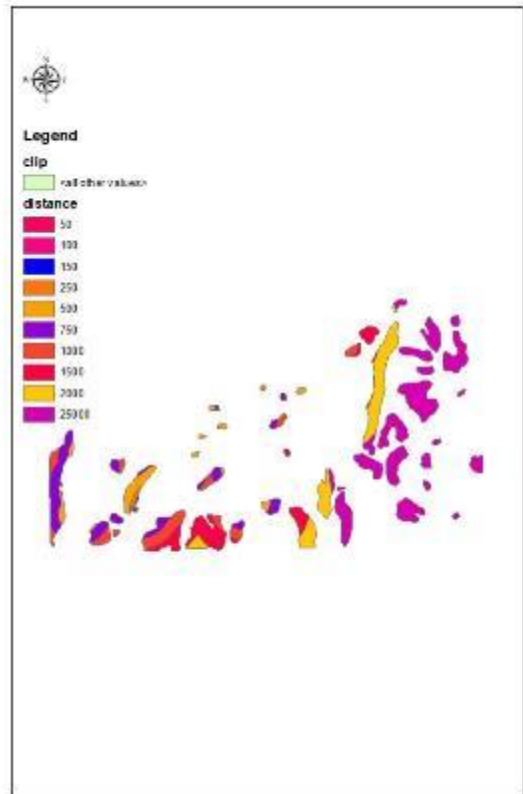
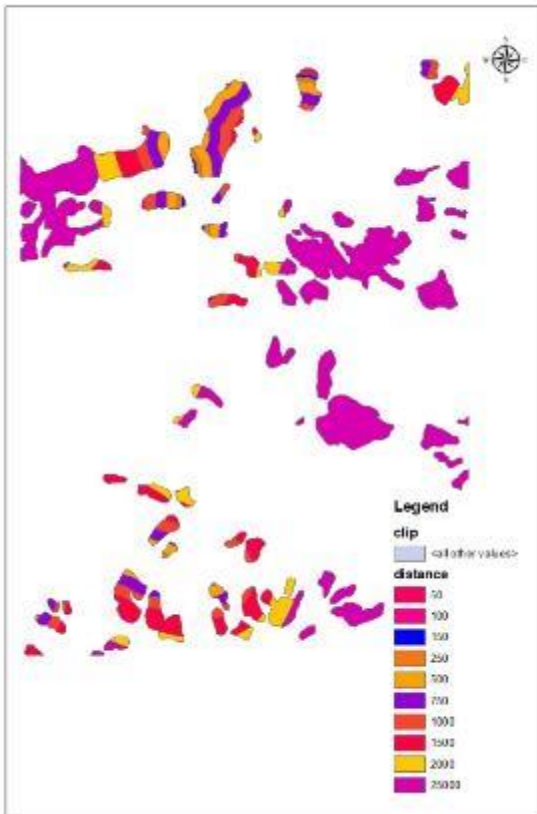
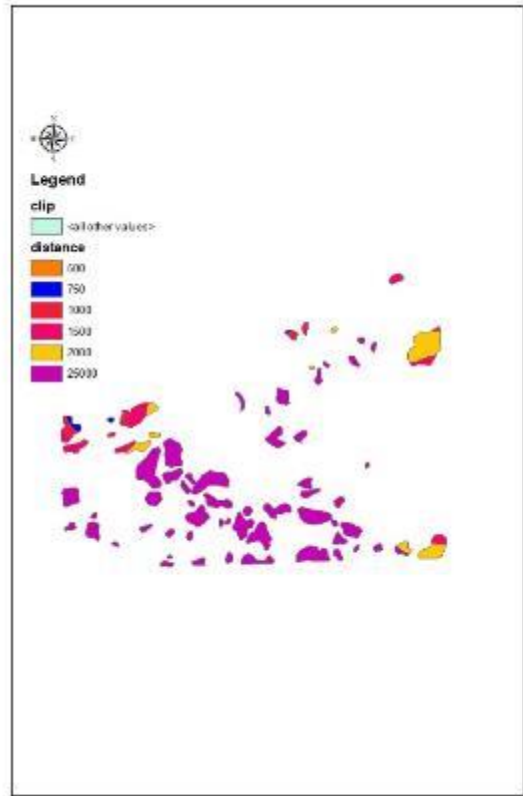
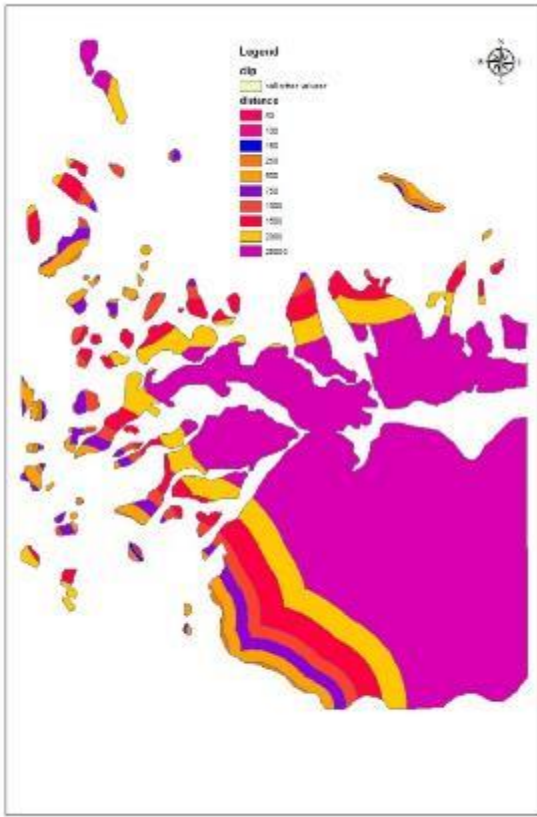
Fig.3 Some of the maps used in the study

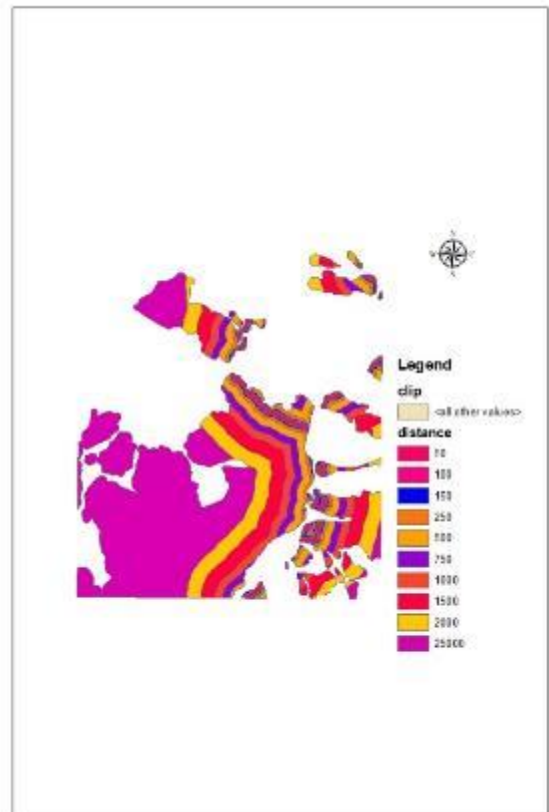
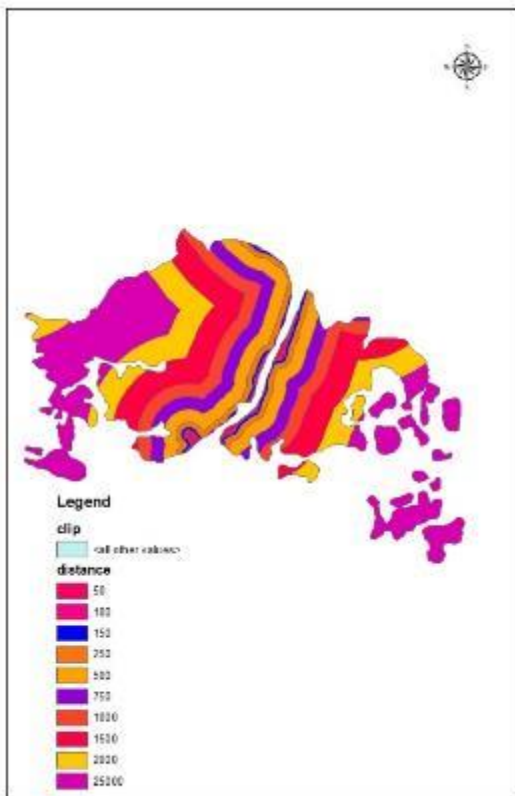
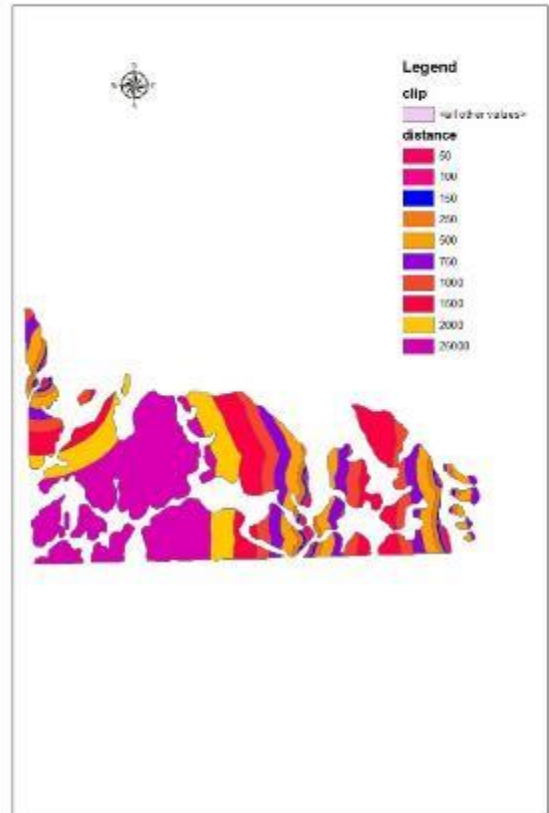
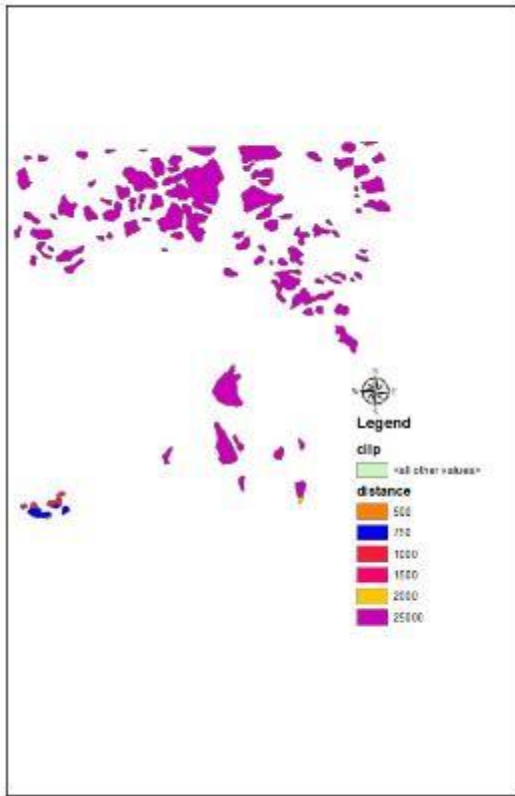
Continuation of figure 3

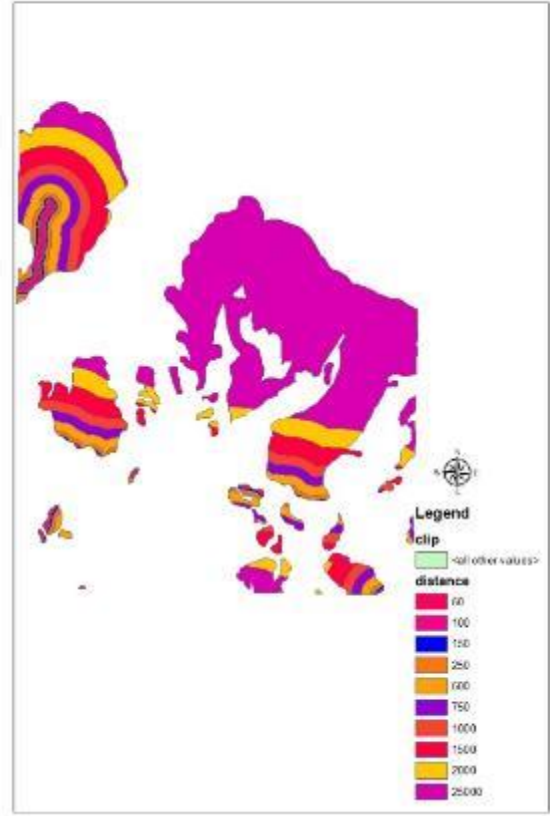
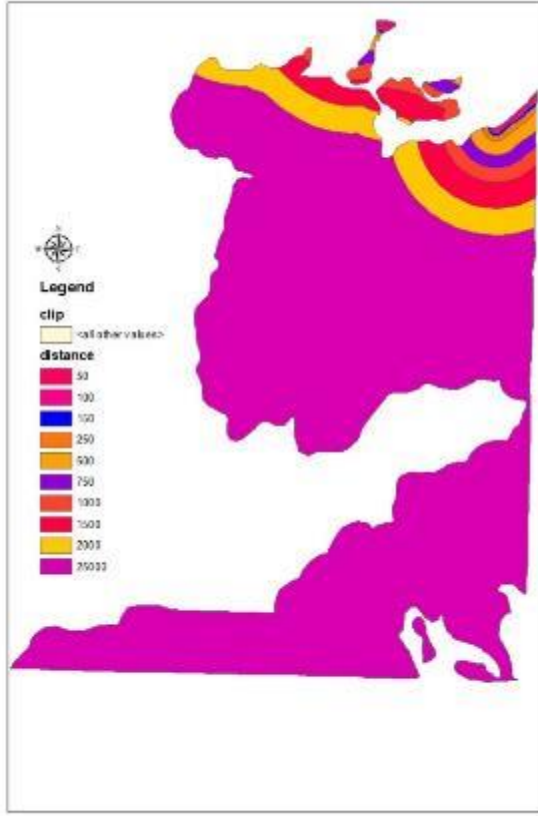












V. CONCLUSION

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).”

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