DRAINAGE DENSITY BY SPATIAL ANALYSIS

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Abstract. Drainage density or landscape fragmentation is the ratio of slope length (measured in m) and unit area (measured in km ²) and expresses the horizontal fragmentation of the landscape. In the study presented in this article refers to the area for the three administrative units studied: Savadisla ATU, Ciurila ATU and Floresti ATU. Creating GIS spatial analysis model required the following steps: creating the database, appropriate spatial modeling, model validation to quantify the risk. Spatial analysis is based only on morphometric characteristics of the territory, which are derived from digital elevation model (DEM). Each element of morphometric database we included spatial analysis model parameter identification probability of landslides.

Keywords: horizontal fragmentation, slope length, landscape fragmentation.

INTRODUCTION

The application of the drainage density parameter is useful in dissecting the expression level in the horizontal plane of the surface morphology of an area, due to its shaping as a result of the action of exogenous factors.

Drainage density is a significant parameter in calculating and determining the likelihood of landslides. This parameter enters class training parameters. In the case of obtaining a high, calculated on the basis of the data values or the slope of the slope results in a high instability. At high values of the drainage network density results in a high fragmentation of the slope, which is favorable in geomorphological processes evolving slope. Water infiltration is due to a considerable portion of the slope and geomorphological processes, the mechanism of development and manifestation thereof:

Regarding the consequences of linear erosion caused by the drainage network, low values of horizontal fragmentation are suitable slopes and landforms stable and relatively stable. They set a low probability for the occurrence of landslides.

Drainage density occurs on the progression of human activities. Areas which have large horizontal fragmentation coefficient, leading to limitation evoluării network communication paths, limiting growth in areas with crops, and so on, in the lowlands where they are possible. In mountainous areas, high coefficient of horizontal fragmentation leads to strong fragmentation surface leveling, if any, or lead to gradients of land areas and help the formation of ravines.

MATERIAL AND METHOD

Ciurila village is spread Feleacului Hill (832 m), which is the watershed between the basin Aries and Somes, down from the peak Committee (Magura Sălicii 827 m) to Hăşdate depression in the valley basin Hăşdate. Hăşdate River is a left tributary of the Aries River flows 20 km common in the eastern slope of Gilau Mountains. Inside the village Ciurila valley Hăşdate is left tributary Dumbrava Filei, Pârâul Ciurilii, Micuş, Negoteasa, Sălicea and Sălişte and right tributaries, Livada, Petridul, Feredeu, Pârâul

Lupului, Aron, Arinei Creek and Filii Velly. Hăşdate river gorge formed five lakes and dig Turda Gorge was formed by slowly raising the Jurassic limestone ridge.

Săvădisla village is widespread in sub-mountainous area Gilău-Big Mountain Mountains and river basins superimposed Hăşdate Valley, Finişelului Valley, Savadisla Filii Valley. It is crossed by two rivers coming from the mountains and normal water flow, the flow increases during rainy year. Hăşdate Valley is flowing into Aries River Valley Finişelului flowing into Somes.

Calculation of the probability of landscape fragmentation

For low probability
(0,1 * 51,96) / 100 = 0,052
0 + 0,052 = 0,052
For the average probability
(0,20 * 24,51) / 100 = 0,049
0,10 + 0,049 = 0,149
For medium - high probability
(0,19 * 7,60) / 100 = 0,014
0,31 + 0,014 = 0,324
For high probability
(0,29 * 12,22) / 100 = 0,035
0,51 + 0,035 = 0,545
For very high probability
(0,20 * 3,71) / 100 = 0,007
0,80 + 0,007 = 0,807

Databases using GIS spatial analysis methodology are given vector, raster data, attribute data and derived (hypsometry, slope, slope aspect, drainage density, drainage depth, slope orientation).

Vector data defined thematic layers that give points, lines and polygons representing land surface elements. Points can define quotas elevation springs, localities may represent contour lines, roads, rivers, river networks, and polygons can symbolize buildings plots category of land use, soil type, etc.. Of particular importance have vector data to raster data realization.

RESULTS AND DISCUSSION

Digital elevation model, seen as a model database, it supports the parameters that compose the equation spatial analysis.

With respect to the weight of each probability interval, the total area of the area studied, it can be seen that the expansion of the range of the highest probability is reduced, that is, 51.96%, representing 126.12 km2, the probability interval followed by an average of 24 51% for an area of 59.50 km2 and the range of 12.22% to a high probability of 29.66 km2 area, which shows the relative stability of the slopes in the area studied.

Probability intervals medium-high and very high cover small areas of 7.60% for supafaţa of 18.44 km2 and 3.71% for 9 km2 area of the total area surveyed.

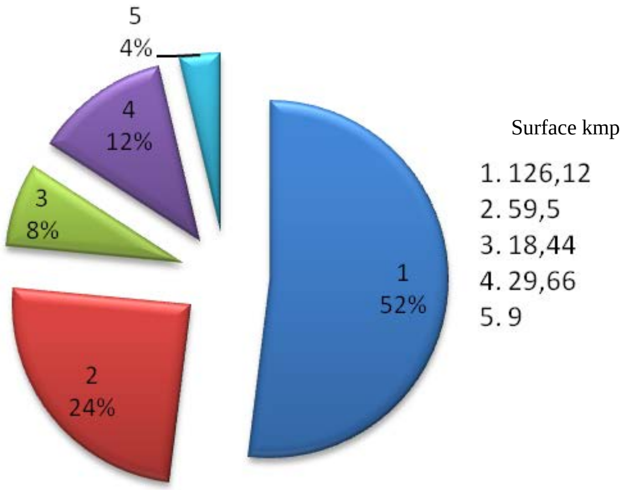

Fig. 1. Reclassification by a raster grid database

Table 1.

Values and probability classes (drainage density)

Value	Probability	Interval (m/km^2)	Probability value	Surface (km^2)	(%)
< 0.1	low	0 - 1	0.052	126.12	51.96
0.1 - 0.3	medium	1 - 1,5	0.149	59.50	24.51
0.31 - 0.5	medium-high	1,5 - 2	0.324	18.44	7.60
0.51 - 0.8	high	2 - 2,5	0.545	29.66	12.22
> 0.8	very high	> 2,5	0.807	9.00	3.71

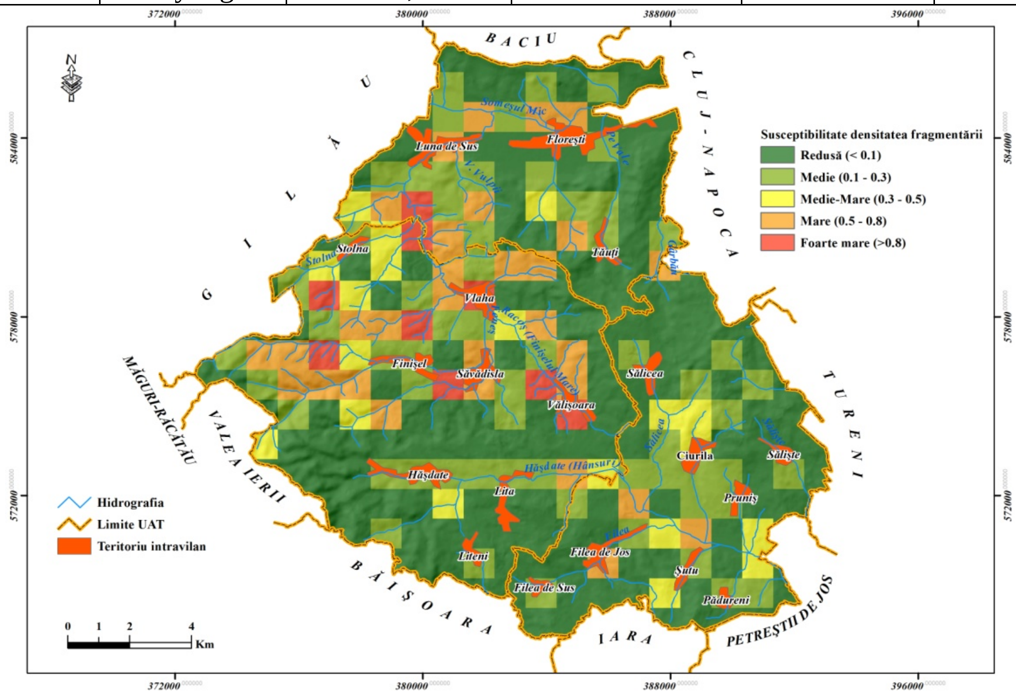

Fig. 2. Susceptibility to landscape fragmentation

CONCLUSIONS

Given that the area studied is part of the Transylvania Plateau, landslides are most often land erosion processes. This is due to favourable lithology, hydroclimatic conditions, geodeclivity and misuse of land during the transition from communism centralized farming, farming today, which led to the division of property. Model implementation in a relief unit defined by large changes of morphological and morphometric model assigns a high degree of generality.

Developing spatial analysis model was based on the creation and database analysis and thematic maps for each parameter. They set specific intervals which each parameter and the probability of each class based on the total area of the analysed territory.

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