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THE NECESSITY OF COMPLEX PLANNING CONSIDERATIONS HĂULITA RAVINE, VRANCEA COUNTY

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Abstract:
Deep erosion cause great damage, especially if they occur in areas with human activities. In this case refer this work shows increasing erosion causes, forms and processes of evolution and development techniques.

Key words*: deep erosion, landslides, longitudinal profile, ravine, surface erosion*

INTRODUCTION

Erosion means the mechanical phenomenon which continually shapes the lithosphere under the action of atmosphere and hydrosphere.
Here are included erosion by water and wind, the processes of weathering and alteration of rocks and field movements. Narrowly, erosion is a dynamic process, physical and geological kneading - displacement, transport and deposition of soil and rock particles by erosive agents.
Deep erosion is the most advanced expression of soil erosion and is also the most destructive because of concentration leakage.
The deep erosion occupies a small area in the locations where they occur, but may have very serious consequences in the area, depending on the depth and the distance between them.
Deep erosion formations may occur simultaneously with surface erosion and landslides, resulting in, excessive damage not only the soil but also the land.

MATERIALS AND METHODS

Location

Vrancea County is recognized by the large share of total degraded land by erosion and also by extensive deep erosion formations, (Partene I., 2011). This category includes ravine Hăulita, part of second order Şuşiţa basin, river basin of order I Siret with cadastral code XII. 1. 000. 00. 00. 0. The route of the ravine crosses the Panciu town, the administrative centre of the vineyard with the same name, with an area of 9500 ha, located in the foothills Movila Panciu and Chicerea, in the foothills of the Carpathians and Sub-Carpathians Vrancea curve.
Relief unit that sits Panciu city is Sub-Carpathians glacis and represents inclined plane and is not exceeding 25 °, which makes the transition from the hillside to the plains.
In terms of catchment area is crossed by rivers Zăbrăuţi to north and Şuşiţa to south, tributaries of the Siret River

Climate

The climate is typical steppe zone resulted in an Eastern European continental climate with Central European influences, influenced by the movement of air masses from south and tropical Mediterranean-Scandinavian-Baltic in the north.
The average annual temperature is 9.5°C. The maximum temperature recorded in the area is 37.5 °C and minimum temperature recorded is -26 °C.
Average annual rainfall in Panciu is 591l / m highs of 117.2 l/m (at 01/07/1974) and even 199.00 l / m (in summer 2005).
These climatic conditions provide a growing season of about 185 days, corresponding to favorable development of vines, fruit trees and cereals.

Lately reveals a significant change in rainfall by increasing the torrential rain and aggression, while a random distribution characterized by alternating periods of drought with rainy periods.

The consequence of this phenomenon is the acceleration of soil degradation through erosion surface and deep, liquid and solid flows due to large catchments flowing in the ravine Hăulita, consisting of agricultural and non-agricultural areas.

Hăulita ravine catchment area is 480 ha consisting of the following categories of using the land: vine plantations, 266.08ha, orchards, 19.06 ha, arable land, 29.83ha, pasture, 36.2 ha, forest, 7.79ha, unproductive, 32.64 ha, farm roads, 19.67ha unproductive, 32.64ha.

Slope is between 5.5% and 12.79%, which indicates that the entire basin is subject to surface erosion. Hăulita weighted average basin slope is 7.4%.

Potential serious risk that it presents Hăulita ravine is the evolution of the width on the line that crosses Panciu town and threatening economic households and social activities taking place on adjacent land.

For this reason, studies were conducted to substantiate specialized techniques of local disaster prevention, picture no. 1 and 2 (Maracine N., 2010).

Picture no 1. Cross section of Hăulita ravine in the village

Picture no 2. Ravine shore erosion

The general objective is to develop a longitudinal profile of the thalweg ravine to ensure relative stability of the ravine bottom, ensuring in this way the banks stability by strengthening their base.

Solving this problem should consider the following objectives: Establishment of work development should be made after a thorough analysis of the data because they are expensive and difficult to execute, taking into account the following conditions:

- The ravine shows great economic and social importance throw different objectives damage;
- The ravine is in a state of intense activity;
- The works in catchments are not sufficient to remove the effects of the flood;

Forest plantation works on drainage network torrent can not be applied without initially giving a first stability to the bed and banks network. Hydraulic construction works to be applied differ by location in three categories: works from the top ravine; works on the thalweg; works on the sewage.

RESULTS AND DISCUSSION

The calculation of the debt leaked version undeveloped regime.

Calculation of the slope drained flow was performed by the method of similarity and observations on the current state of land (Stematiu D., Drobot R., 2007).

Energy calculation of erosion (morph metric indicator for basin characterization of the area):

$$l = \frac{H}{\sqrt[4]{A}} = \frac{153m}{\sqrt[4]{4.800.000}} = 3,27$$

H = Depth of erosion
H = 318m – 165.12m =152,88 m ≈ 153m
S = river basin surface, S= 480ha = 4.800.000m^2
Morphometric elements of river basin ravine-length = 5.6 km

- maximum width of the basin = 940m basin-wide average = 489.6m ~ 490m
- asymmetry coefficient is ~ 1 (bh is symmetrical)
- longitudinal slope. vlHăulita = 7%

Estimating surface erosion status
Soils located on slopes subject to erosion in the area, site area is steppe framed in class. 1 of moderate erosion slopes characterized by erosion of up to 50% of the horizon "A"

Estimating the state of deep erosion
The area is characterized by the existence of deep erosion formations, rare and deep at distances more than 100m for ravines and thick for wheel track cutting at distances less than 100m.

Flow calculation under undeveloped regime
Calculation of maximum flow to areas receiving up to 10.0 km ^{2} in unimproved system:

$$Q = 0.167 \times c \times i \times A$$

Q = flow rate (m ^{3} / s) by providing 5% (m^3/ s)
C = coefficient of discharge
I $_{10\%}$ = average rainfall intensity calculated in Vrancea (zone 2) (mm / min) - unimproved 0.44 (mm / min)
A = surface collection (ha) = 480 ha
i = 7.4% - weighted average slope

Runoff coefficient depending on land use category:
-Arable (maize, soybean, sun flower without anti-erosion measures and fodder)
C = 0.60 * 29.83 ha
-Vineyards
C = 0.35 * 266.08 ha
-Roads of agricultural exploitation from earth
C = 0.70 * 19.67 ha
-Unproductive (Ravine)
C = 0.70 * 32.64 ha
- degrade partially pasture
C = 0.60 * 36.20 ha
- Forest
C = 0.25 * 7.79 ha
- Orchard
C = 0.30 * 19.06 ha
- Yards construction ~agricultural
C = 0.60 * 68.73 ha

Leakage coefficients calculation on land uses (weighted average), (Maracine N., 2010)**.:**

$$C = \frac{\sum Ci \times Si}{S_{B.H.}}$$

C = coefficient of discharge
C $_i$ = leakage coefficient on land used category
S $_i$ = partial surface from the ravine basin with the same covering shape
S $_{B.H.}$ = Hăulita basin surface

$$C = ((C_1 * S_{ar}) + (C_2 * S_{vie}) + (C_3 * S_{dr.ag.}) + (C_4 * S_{nep}) + (C_5 * S_{ps}) + (C_6 * S_{pd}) + (C_7 * S_{lv}) + (C_8 * S_{cc}))/S_{B.H.} = 240,13/480 = 0,50$$

$$Q_{10\%} = 0.167 \times 0.5 \times 0.44 \times 480 = 17.64\ m^3/s$$

Rain intensity
Is determined from the intensity and duration of heavy rains diagram with frequency of 1/10 for zone 2 (the area within the city Panciu) and depending on the time of concentration.

Concentration time

$$T_c = t_v + t_c + t_{rv}(min)$$

T_C = total duration of concentration (min)
t_v = time of concentration of runoff on the slope (min)
t_c = time of concentration of runoff in intercepting channels (min)

t_{rv} = time of concentration of runoff in the ravine (min)

Concentration time of runoff on the slope:

$$t_v = 0{,}0167 * K * \sqrt{\frac{l_v}{\sqrt{I}}}$$

lv = flow length (average) of the slope= 469.5m

I = average slope of the slope = 7.4%

K = parameter with different values in relation to the roughness = 30 on cultivated slopes

$$t_v = 0{,}0167 * 30 * \sqrt{\frac{469{,}5}{\sqrt{7{,}4}}} = 6{,}58 \text{ min}$$

Concentration time of runoff in intercepting channels:

$$t_c = K * \frac{l}{\sqrt{I}}$$

l average = length of water leakage (m) = 1878m channels

I = average slope of leakage (%) = 7.4%

K = parameter with different values in relation to channel roughness = 0.00278 strengthened by grassing.

$$t_c = 0{,}00278 * \frac{1878}{\sqrt{7{,}4}} = 1{,}92 \text{ min}$$

Concentration time of runoff in the ravine

$$t_{rv} = \frac{L}{60 * v}$$

L = length of flow along the main thalweg (m) = 5.6km = 5600m

v = velocity of water flow (m / s) = 1.08m / s (for particle diameter between 2.50 ÷ 5.00mm)

$$t_{rv} = \frac{5600}{60 * 1{,}08} = 86{,}419 \text{ min} \cong 86{,}42 \text{ min}$$

$$t_C = t_v + t_c + t_{rv}(\text{min}) = 6{,}58 + 1{,}92 + 86{,}42 = 94{,}92 \text{ min}$$

Calculation of annual soil loss caused by erosion surface in unimproved system (Maracine N., 2010).**:**

$$E = K * S * C * C_s * L^m * j^n$$

E = average annual erosion in tons/ha or cu. m/ha

K = coefficient of aggression climate = 0.144 (to the south of Moldova and the Carpathian foothills)

S = erosion coefficient determined by soil resistance to erosion = 0.7 (moderately erosion soils with medium cohesion)

C = crop influence factor = 0.58

- For monoculture corn in uneven rotation = 1
- For the vineyards = 0.7
- Potatoes and beet = 0.6
- Perennial grass after 2nd year = 0,014

C average = 0.5785 ~ 0.58

Cs = influence factor of soil conservation measures = 0.6 (for works on the level curve)

L = length of the slope = 469.5m

I = slope (average) = 7.4%

$$E = K * S * C * C_s * L^m * j^n = 0{,}144 * 0{,}70 * 0{,}58 * 0{,}60 * 469{,}50^{0{,}5} * 7{,}4^{1{,}4} = 12{,}53 \text{ To/Ha}$$

CONCLUSIONS

Analyzing the results of calculation of flow and loss of soil is found that the erosion is significant and fertile soil losses are large from Horizon A (12.53 tons/year). Under these conditions it is necessary to take measures to control erosion surface so that agricultural potential of agricultural land use will not diminish continuously, and economic losses due to low agricultural productivity of the land to be smaller.

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