# POSSIBILITIES FOR IMPROVING DEGRADED LAND THROUGH FOREST VEGETATION

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***Abstract***

*The present paper has as major objectives knowledge of the soil's state conditions, soil degradation and the possibility of improving and strengthening them with the help of forest vegetation. The land slip process is a particularly damaging process whose many consequences affect human activity. Schematically, the consequences of this process relate to the degradation of cropland. Thus, the process of stabilizing these forms of degradation is extremely important for the integrity of both the fields of culture, the forest and the integrity of all people, because we know quite well a lot of accidents caused by landslides.*

**Key words:** Improvement, degradation, vegetation, possibility, trees

## INTRODUCTION

Against the background of the changes in the nature of the property, in the landscape in Maramures, especially in Baia Mare, there are some empty hills, from the former pastures or even from the old forests that are getting degraded every day and from the different degree of torrential formations that grow more and more amplified with the passage of time. Natural vegetation is becoming more and more impoverished, even though the number of grazing animals has dropped dramatically.

According to the living environment of forest phytogenosas, soil can be defined as a subsystem integrated within the forest and resort as an ecosystem. Within the forest as a land ecosystem, the soil is formed and evolved by pedogenic factors and is constantly influenced by these factors, forming together with the near atmosphere, the biotope or the forest resort, the living environment of the biocenosis.

As a natural system, soil forms in the area of lithosphere interference with the atmosphere, the biosphere and the hydrosphere, thus forming the coating of the earth called the pedosphere. The elements of the four spheres play the role of solidification factors or pedogenetic factors. (Bodog, 2018)

Rock or parental material, along with the relief, climate and living vegetable and animal organisms are the main solidification factors. The external coating of the earth or earth's crust is composed of rocks and minerals, against which the soil is formed by the action of the climatic

elements, the surface and the groundwater and the animal and plant organisms in the biosphere.

The relief represents the space on which the pedogenesis process takes place and influences the formation of the soil both directly, by the nature of the surface store, resulting from the process of disaggregation-alteration and geological erosion and its age, and indirectly through the change of the local climate and vegetation. (Traci, 1985)

**MATERIAL AND METHOD**

Following the study carried out in the vicinity of Firiza Forest District, Maramures County, P.U. Baia Mare, a.u. 43A, soils have been identified that are affected by degradation phenomena, i.e., landslides. Landslides are complex phenomena consisting in the detachment and displacement of sloping earth masses. On the studied territory we find land with fragmented slipped mass. They are represented by earthen masses, moderate to very strongly fragmented. The slid earth mass is consistent, not soaked in water, respectively with excess water, especially during wet periods.

"The land-sliding process is a particularly damaging process whose many consequences are passed on to human activity. Schematically, the consequences of this process relate to the degradation of croplands" (Ciortuz, 1981)

The production unit P.U. I, Baia Mare, within the Firiza Forest District, Maramures County, has an area of 615.20 ha., which is made up of four types of soil.

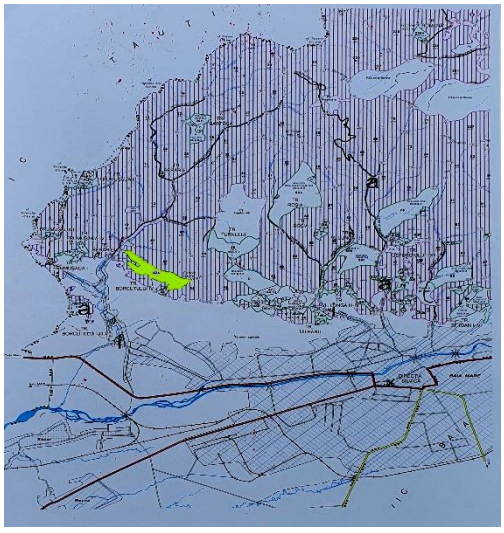

Fig..1 Location of the case study

In this case, landslides have as their main cause the combined action of gravity and infiltration waters, of meteoric water that leads to large changes in the specific weight of some earth masses, weakening the cohesion of the rocks, thus relishing the formation of displacement surfaces.

Another factor that helps to form the phenomenon of decay is the faulty activity of man through the faulty management of the earth, in this case, the deforestation of the land.

Fig. 2 Landslides in P.U. I, a.u. 43 A

Climatic-meteorological factors are the factors that play a determining role in the onset and evolution of landslides. Thus, a period of heavy rainfall can cause changes in the state of tensions inside the earth massif. The infiltration of precipitation leads to an increase in hydrostatic pressure that causes the earth's consistency to change and thus a reduction in cohesion and the angle of inner friction. Thus, the landslide forces exceed the lump resistance of the land causing the cession.

A factor that conditions the process of landslide is also the geological substrate. In principle, this factor influences the process to which we refer by its petrographic nature and structure. The relief or geomorphological factor also influences the process of displacement, largely determining both the predisposition to displacement, as well as the character of the motion and the plane shape of the lands.

Vegetation is a factor that ensures the stability of land, preventing or limiting the movement of soil and rock masses on slopes. The absence or the totally sporadic presence of lands in the process of slipping into forests is a proof of the important role that vegetation plays, especially woody vegetation, in counteracting the displacement process.

Fig..3 Landslides in P.U. I, a.u. 43 A

In the development unit 43A, we identified, in four situations, the phenomenon of landslides, on an area of about 1.2 ha.

**RESULTS AND DISCUSSION**

As a result of the sliding processes, a variety of forms of land degradation result, depending on the type of slippage, the extent and intensity of the manifestation of the phenomena. Of these, the most widespread are: the ravine or the detachment surface, the lands slipped into the block with the slipped mass unfragmented or poorly cracked.

It is noted the large share of luvisols that account for 360.60 ha, soils that in favorable climatic conditions, provide good conditions for the development of forest vegetation. This is reflected in the increases in the hoisters which, at the rate of 83%, achieve higher and medium production classes.

***Preluvosol -*** occupies a share of 22%, more precisely 132.03 ha of the entire production unit. The composition and morphological characterization of the profile represents the following sequence of profile horizons: ***Ao-Bt-C.*** It has a different profile texture, medium (loamy) in Ao, and at the level of the Bt horizon, fine or medium, but with greater clay content. The structure is in the

relatively well-developed horizon and column-prismatic or prismatic, well developed in Bt. Humus content is 2-3%, the pH has relatively high values: the reaction is weakly acidic in the Ao horizon with pH below 6 and neutral or weakly alkaline towards the base of the profile with a pH of less than 7 superiorly grainy,

The distribution of soil types is shown in the following diagram:

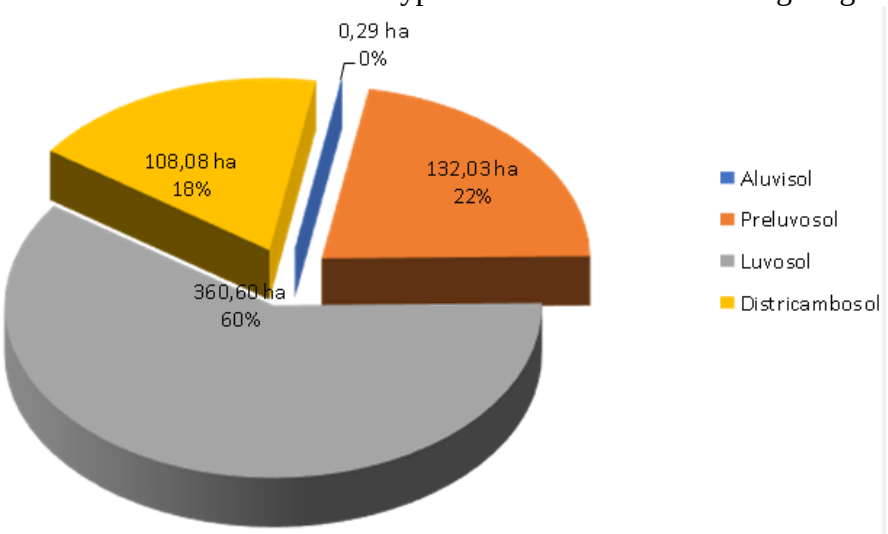


Fig. 4 Distribution of soil types

***Luvosoil*** **-** occupies the largest share of the entire production unit being spread over 60% of the unit area, namely 360.60 ha. The composition and morphological characterization of the profile: it represents the following sequence of horizons on ***the Ao-El-Bt-C*** profile. It has a differentiated texture on the profile, medium (loamy-sandy or loamy) in Ao, at the level of the horizon He the clay content decreases (the texture all medium or to coarse), and at the level of the Bt horizon the texture becomes fine or all medium, but with a higher clay content. The structure in the upper horizon is grainy, less developed, the horizon He is unstructured or with polyhedral or lamellar structure and Bt represents prismatic structure, well developed. The humus content is about 2%, and the pH has low values, below 5. It is a soil of middle and superior creditworthiness for oak, oak-beech and beech of hills. Currently, on these soils we find, oak, beech and poor beech and hornbeam mixtures, with good vegetation condition with medium production class.

***Districambosoil*** **-** occupies 18% of the surface, being found in the entire production unit. The composition and morphological characterization of the profile presents the following sequence of horizons on the profile: ***Ao-Bv-C(R).*** It has a medium-coarse to medium-to-middle texture, undifferentiated

on the profile, poorly-moderately developed structure, grainy in Ao and polyhedral in Bv. Other physical, physico-mechanical and aeration properties are generally favorable. The content in humus is 3-4% and consists mainly of fulvic acids but can have a blackberry amount of organic matter up to 20-25%, the degree of saturation in bases low (V ≤ 35%). The reaction of the soil is acidic to strongly acidic (pH = 4.5-5.0)

As a result of the research carried out in the case study, we have identified the soil type in the U.P. I Baia Mare, u.a. 43 A as typical *Luvosoil-code 2201*.

Fig. 5 Luvosol tipic

The morphological composition of the profile represents the following sequence of profile: **Ao-El-Bt-C**, where the horizon Ao has a thickness of about 10-20 cm having a brown, light brown color. El horizon, partially depleted in clay, organic matter having a thickness between 10 -20 cm, being lighter in color. The Bt horizon is much thicker than in brown soils, having at least 50% of the colors in 10YR and yellow shades.

This type of soil is formed on parental materials represented by loamy, sands, clays, deposits, loessoid and various metamorphic and igneous rocks poorer in calcium minerals. The vegetation under which this type of soil was formed is made up of sessile or beech forests, with a more acidophilic flora.

Mineral trophicity is medium or medium to upper. For forest species, nitrogen trophicity is also satisfactory. The soils located on the ridges or in the upper part of the slope dry up to the state of dryness, especially in the thinned stands. Because the water in horizon B cannot climb into the upper horizons and the saplings of forest species may suffer from dryness. But the shaded slopes have more moist soils and without variations. Therefore, on

these slopes the stands of sessile oak, beech sessile oak and pure beech trees are of higher production classes than those on the ensued slopes.

This type of soil is of medium to upper creditworthiness for oak, oak-berches and pure beadings, but even for the Hungarian Oak and the lindenberry. The average creditworthiness is determined by the middle edaphic volume, because of the loamy and compact Bt horizon in the summer season.

Due to the harsh conditions of vegetation in land suffering from land sliding earthen masses, a serious hindrance to the installation of forest vegetation arises. As a result, the list of species, which can be used for afforestation of these lands, is considerably narrowing. In general, for the afforestation of sliding lands, species are used that bear the heavy texture and moisture variations, and that have a rich and deep root system.

Taking into account on the one hand the characteristics of the land and on the other hand the ecological characteristics and requirements of the species for the consolidation of landslides- affected land, it is recommended to use the following species of trees and shrubs.

- Trees: black pine, Sylvester pine, black amen, white amen, white willow, willow, white poplar, acacia, ash, sycamore, Turkish cherry, forest cherry, salty, Turkestan elm.
- Shrubs: white buckthorn, green amen, dwarf acacia, bloodsucker, dogwood, red ossorish, etc.

Obviously, the specified species are distributed according to the stationary conditions.

The recommended afforestation composition in this situation is 50Ac50As. Crop densely: 5,000 seedlings/ha (1×2), so on the entire improvement area the required number of seedlings is 6,000 pieces.

For the consolidation of degraded lands in the study area, the planting of tree species will be done in pits of 30×30×30.

**CONCLUSIONS**

Within the complex of measures, which is applied to degraded lands by landslides of earth masses, phyto-ameliorative afforestation works play a decisive role of the first importance.

These works constitute a powerful means of fixing land and capitalizing on such land because:

- the carpet of trees and shrubs retains a large part of the precipitation on the canopy.
- prevents snow from drifting and sudden melting.

- regulates surface runoff by preventing concentrated infiltration and undermining of slopes.
- uniformizes the thermal regime.
- eliminates through sweating an appreciable amount of water.
- bind together the layers of soil and rock thus increasing their cohesion.
- restores and relieves the soil.
- raises the economic and social value of land.

In order to improve the phenomenon of sliding the earthen masses, in the studied arrangement unit, in accordance with, the existing stationary conditions, we chose to use the planting by mixture of *acacia* and *ash* bouquets for the execution of the consolidation works.

Due to the stationary causes generated by the general natural context but also by those of a customized nature at the level of the lands in the studied unit, the reconstruction and stabilization of the lands affected by the slips, is much more difficult compared to other forms of degradation.

One of the problems of carrying out these types of works would be, the small number of forest species capable of coping with these stationary conditions, with the exception of micro-depressions in the areas affected by slips that benefit from a more favorable soil moisture regime.

According to the, the stationary conditions, in order to improve the conditions of degradation, I believe that planting in bouquets of *acacia* and *ash* is the right choice, because, they have land, but at the same time, the ability to stabilize in a short term the phenomenon of acacia slips, brings another benefit, especially for beekeepers, through the melliferous flowers that it produces, thus at the age of 5 it produces flowers in abundance.

Due to the fact that both forest species are able to adapt very well and to unfavorable conditions, due to the degradation of the land, I believe that the area that requires the consolidation of the sliding earth masses will not be a problem for these species. Thus, the stabilization of the degraded lands is carried out without problems.

For the improvement area studied, a number of 5,000 seedlings/ha are required. Thus, for the entire area of 1.2 ha, the number of seedlings needed is 6,000 seedlings.

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