

ASPECTS REGARDING SOIL DEGRADATION IN THE PLAIN OF THE CRIȘ RIVERS

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Abstract: Located in the center of the Banat-Crișana Plain, between the rivers Barcău and the northern side of the alluvial cone of Mureș River, the Plain of the Criș Rivers is characterized by the presence of zonal soils belonging to the cernisoil class - generally dark colored soils mostly spread in the lower side of the Criș Rivers Plain. In the higher side, as well as in the hill region the argillic soils are present, having a brighter color than the ones from the lower side of the plain, and implicitly a higher albedo. The study regarding soil and subsoil degradation constitutes a very important aspect in understanding the soil condition in the area of the Criș Rivers plain and its economic and social development potential.

Key words: degradation, soil, Plain of the Criș Rivers

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INTRODUCTION

The phenomenon of soil and subsoil degradation started to manifest with the beginning of agricultural practice. Industrial growth, the expansion of habitat, and the gradual improvement in agricultural techniques lead to a severe deterioration of the soils. The main processes of soil degradation on our planet that harm with different intensity large surfaces of land are: hydric and eolian erosion (which causes the depletion of the fertile surface layer of the soil, land deformation, clogging and sedimentation), compactation, water excess, soil deprivation of organic matter and nutritional elements, soil degradation through the phenomenon of salting, acidifying and pollution.

METHODOLOGY

The Office of Pedologic Studies of Bihor and Office of Studies of Arad have supplied the necessary database for the creation of this study. The latter, will be focusing on the analysis of the existing forms of degradation in the Plain of the Criș Rivers. Important research contributions in soil and consequently the Plain of the Criș Riverin soil have had and Florea et al., 1968, Oprea et al., 1962, Măhăra 1972, 1973, 1996, Grigoraș 1999, Domuța et al., 2002 end other.

RESULTS

Compared to the global situation, Romania has a low percentage of completely unproductive land. The most important processes regarding soil degradation, affecting large

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surfaces of land are referring to erosion (47%), drought (48%), temporary excess of water (25%), reduced content of humus (50%), reduced content of accessible phosphor (42%), acidity (23%), secondary compactation (44%), and primary compactation (14%).

The main forms of degradation identified in the Plain of the Criș Rivers stretch on a total surface of 810.668 ha (OSPA Bihor și Arad). They are represented by lands submitted to water erosion, as a result of conventional agricultural practice. This form of degradation is affecting almost every European country, at a smaller or larger scale. In our country, water erosion is affecting almost 50% of the agricultural and arable lands. Soil erosion causes a loss of approximately 126 million tones of fertile soil (ICPA, 2012).

In the area studied here, erosion is present on more confined surfaces: in the high plain, the surface of the soil is affected, while along the valleys we find in-depth erosion and banks collapsing (figure 1).

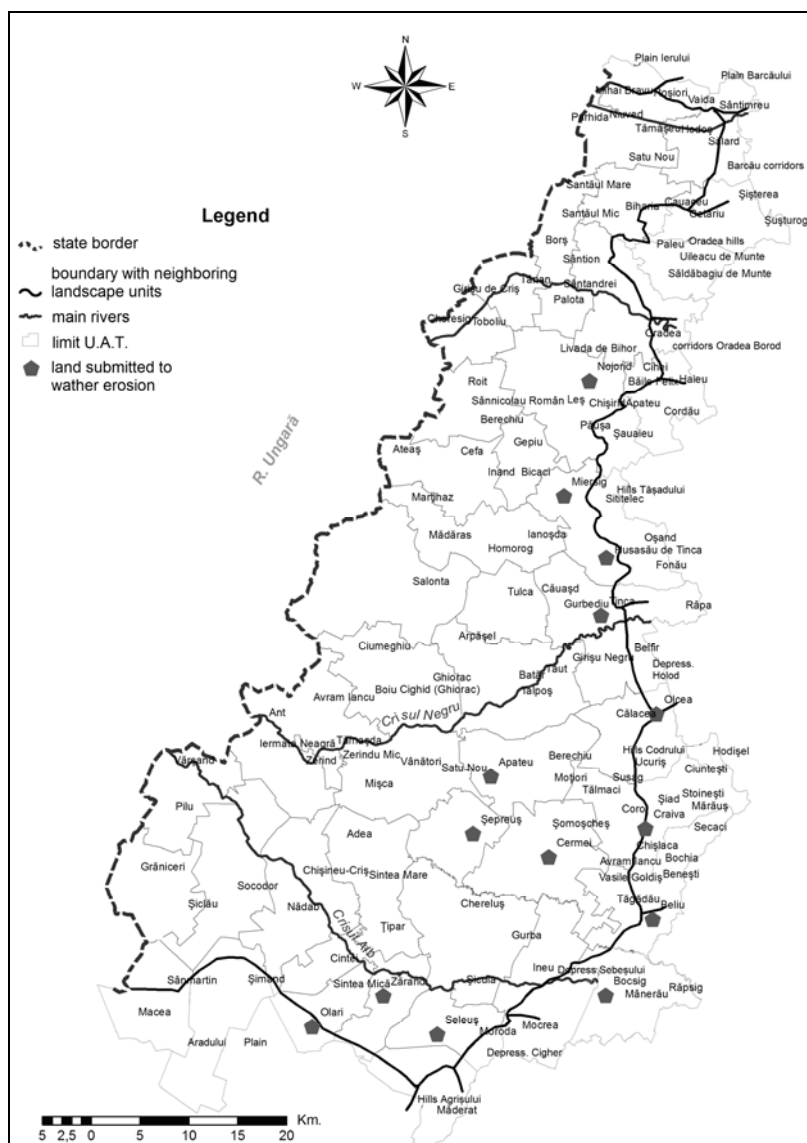


Figure 1. Representation of lands submitted to water erosion (Source: prepared after data from archive OSPABH and OSPAAAR)

Soil compaction leads to the loss of their productive capacity through the reduction of aeration, permeableness, destruction of its structure, deterioration of its hydric and thermal regime, and the dysfunction of the plants' nutrition regime.

The main cause of soil compaction is the inadequate work execution (plough sole - hardpan). Compactions can occur on clayey, clayey-loamy and loamy soils also, through the direct pressure applied by oversized machines. The correction of the plough sole is made by repeating the process of soil refining with ploughings of 50 to 70 cm in depth, realized after a number of complex pedologic studies (figure 3).

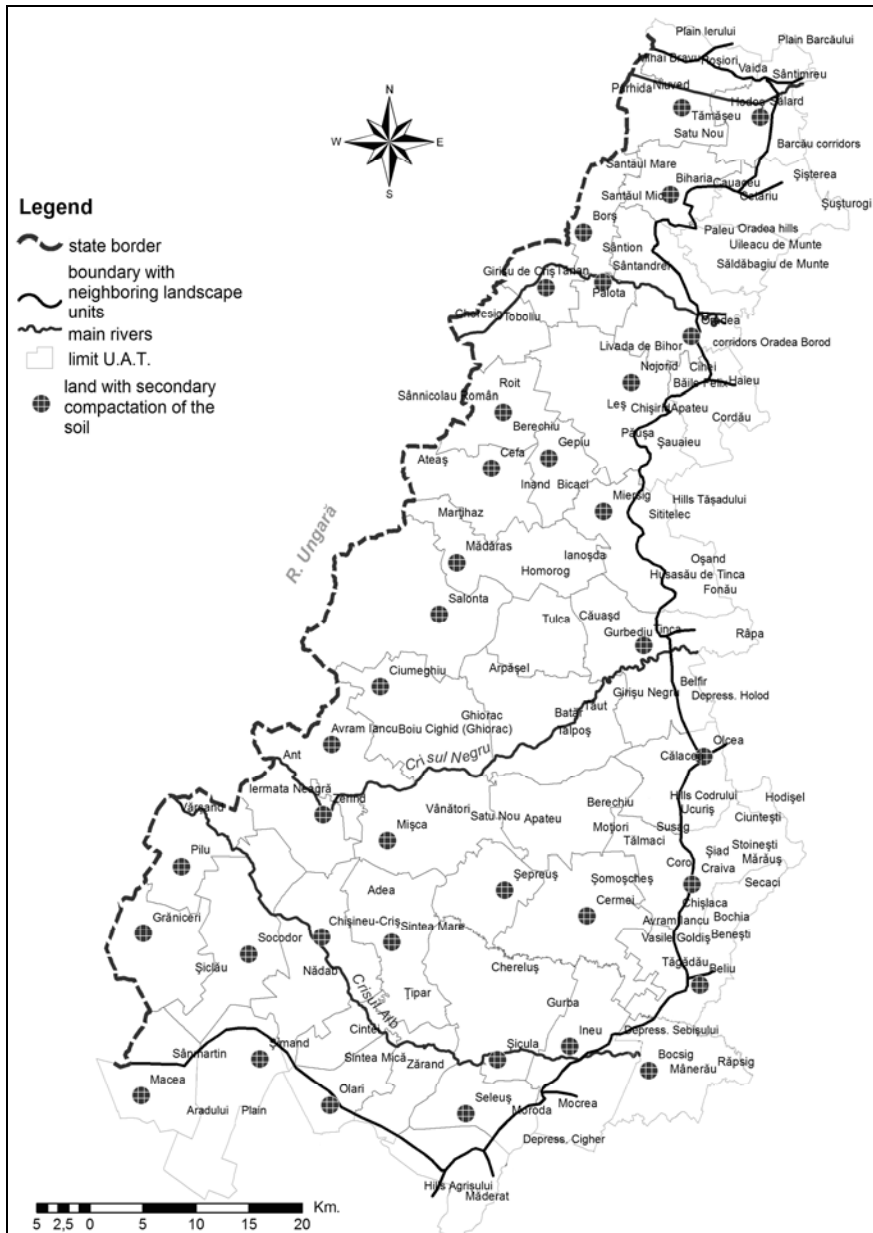


Figure 3. Representation of lands with secondary compaction of the soil
(Source: prepared after date from archive OSPABH and OSPAAAR)

The soil salting phenomena have begun to occur almost two centuries ago, after the first works of embankment and canalization which were not accompanied by the necessary measures and working methods in order to ensure a satisfying flow of the surface and underground water. Underground salt charged waters found at low depths increased in level, pushing the salts to the surface of the soil and causing soil salting.

This phenomenon leads to the formation of saline soils (holomorphic soils), which include solonchak soils and sodic (solonet) soils. Saline soils are spread in patches, or belts, occupying larger surfaces in the low plain area between Zărand - Socodor - Grăniceri, in the areas of Chișinău - Criș, Salonta and between Mărțihaș and Sănnicolau Român. The types of salinisation in the Plain of the Criș Rivers are sulfate sodic and sodic sulfate chlorinic (OSPA Arad and Bihor) (figure 4).



Figure 4. Representation of lands affected by salting

(Source: prepared after data from archive OSPABH and OSPAAAR)

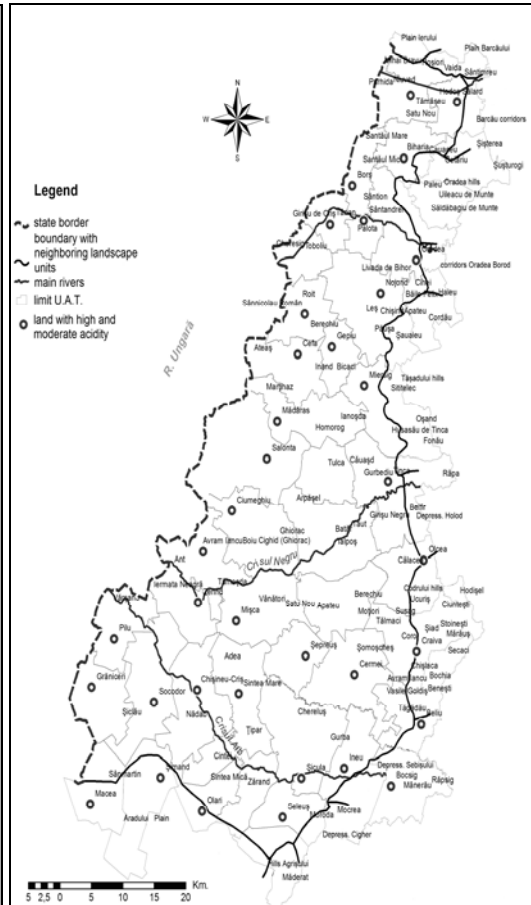


Figure 5. Representation of lands with high and moderate acidity

The acidifying of the soil is another aspect of degradation in the area of study through which the soil is being deprived of its essential elements, constantly suffering a growth in the acidity level (figure 5).

The acidifying of the soils depends on the capacity of acid precipitation to penetrate the soil, the nature of the stone and soil, and the proximity to major sources of pollution. The reduced content of essential microelements for the nutrition of plants causes a form of degradation through its incapacity to ensure the elements needed for the plants to develop.

Excessive grazing combined with the excessive population of animals are real dangers that can cause soil degradation. This form of soil degradation manifests in the beginning through the destruction of the vegetal carpet and eventually through erosions followed, in some cases, by desertification. This form of degradation is present all throughout the area of study.

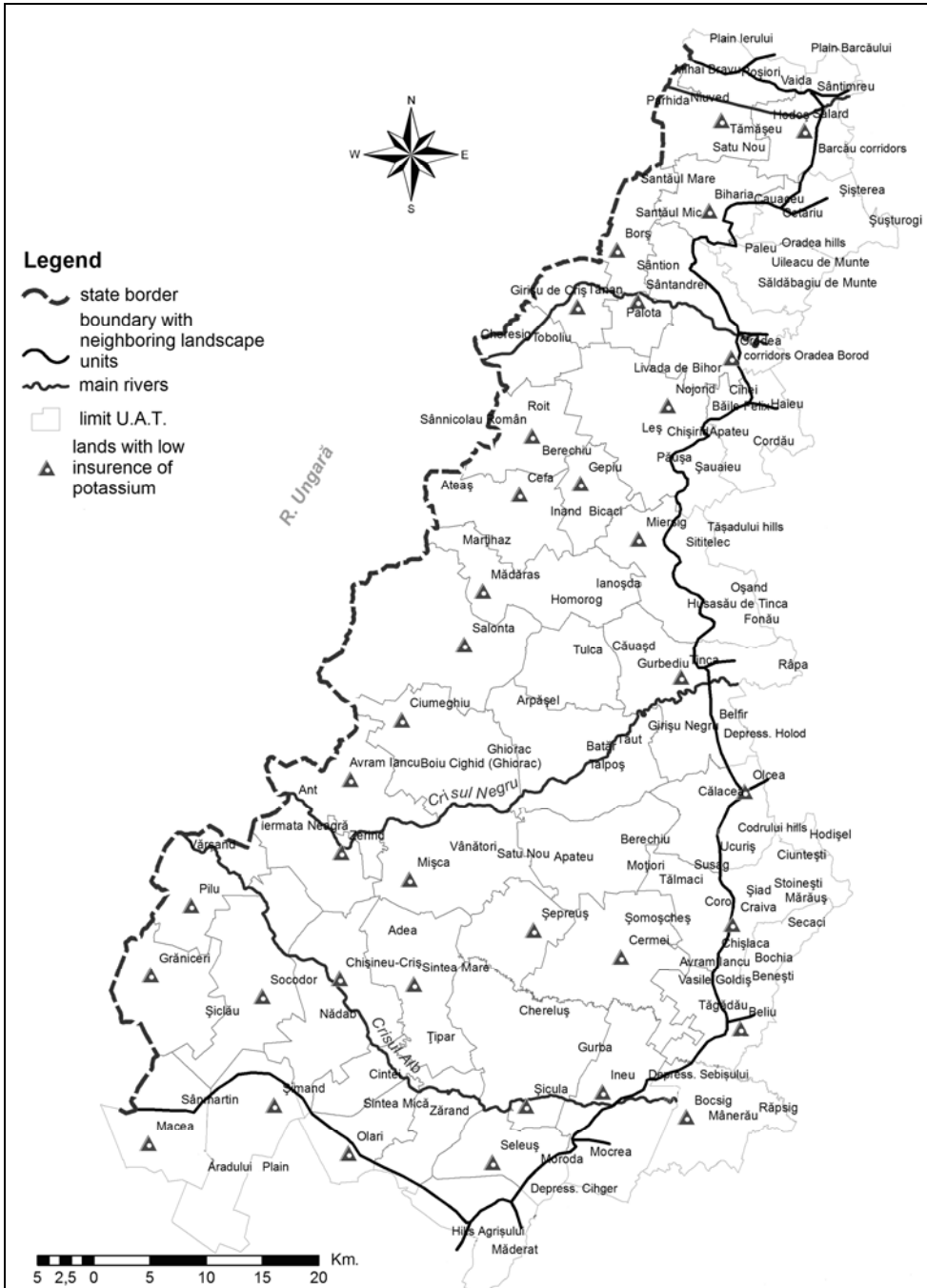


Figure 7. Representation of lands with low insurance of potassium
(Source: prepared after data from archive OSPABH and OSPAAAR)

CONCLUSIONS

The study of this phenomenon has a great importance in the cognition of the degraded surfaces of land and the causes that determine the appearance of these forms of degradation. The growth risk of the soil degrading phenomenon leads to the disabling of many new surfaces of land from the agricultural circuit, which is contrary to the durable economic development of each country. The complex processes of degradation affecting the ground surface cause a dysfunction in the normal functioning of the soil, altering its bioproductive capacity. This degradation is a result of an irrational use of agricultural machines or ploughs throughout the years, irrational use of chemical fertilizers, pesticides, herbicides, without consulting a specialist in this matter, performing soil treatments without the proper knowledge, irrigations and canal draining.

According to this study, the total soil degraded surface reaches 810.668 ha, being affected by different forms of degradation, such as: fields submitted to water erosion, permanent humidity excess, soil compaction, soil acidifying, reduced content of microelements, and excessive grazing.

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