

## VULNERABILITY OF SOIL COVER IN RELATION TO CLIMATE TREND ARIDIZATION IN THE CENTRAL PLATEAU OF DOBROGEA

A. VRÎNCEANU\*, P. IGNAT\*, ALINA NIȚU\*\*, ANCA LĂCĂTUȘU\*,  
M. MUȘAT\*\*, I. JINGA\*\*

\*National Research and Development Institute for Soil Science, Agrochemistry and  
Environmental Protection of Bucharest

\*\*University of Agronomic Sciences and Veterinary Medicine of Bucharest

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### Abstract

*Increasingly obvious trend of climate change data through a gradual warming of the atmosphere, making the south-eastern Romania one of the most vulnerable regions in terms of the desertification phenomena that occur at the soil level.*

*The geographical position of Dobrogea is routed along the isotherm of 11°C, which makes the plateau to register the lowest values of the index of dryness (Iar) from the whole Romanian territory, between 0.25 - 0.65 so it is that this aridization tendency to induce the climate soil cover a different graduations of various genetic types of soil vulnerability, which is due to both variability of soil formation deposits, the characteristics of topography, groundwater and salinization processes (salinization / sodization) etc.*

*Pedological mosaic of the plateau requires the recruitment of vulnerable groups of soils as a coherent management through sustainable management in an area where biodiversity is a tendency to decrease markedly.*

### INTRODUCTION

In Romania, the territory with high risk of drought, accompanied in some cases aridization and desertification includes large areas of the Romanian Plain, Dobrogea and partly in the Western Plain. These territories may be classified as fragile areas, facing with economic, social and environmental problems, induced by the excessive and prolonged drought. In extremely dry years, it covers every region in our country, as happened in previous years.

Drought, aridization and desertification are determined by natural causes, such as small quantities of precipitation or lack on the long period of time, as well as a number of factors such as anthropogenic ones. It is envisaged that some practices are most harmful, such as irrational deforestation, agro-technical works carried out improperly, leading to an inability to absorb water by soil, slope erosion and clogging of river beds, shares with unexpected consequences, which nobody has been able to manage them properly. These cases are supplemented by the faulty construction of land reclamation works, the failure to realize protection works and

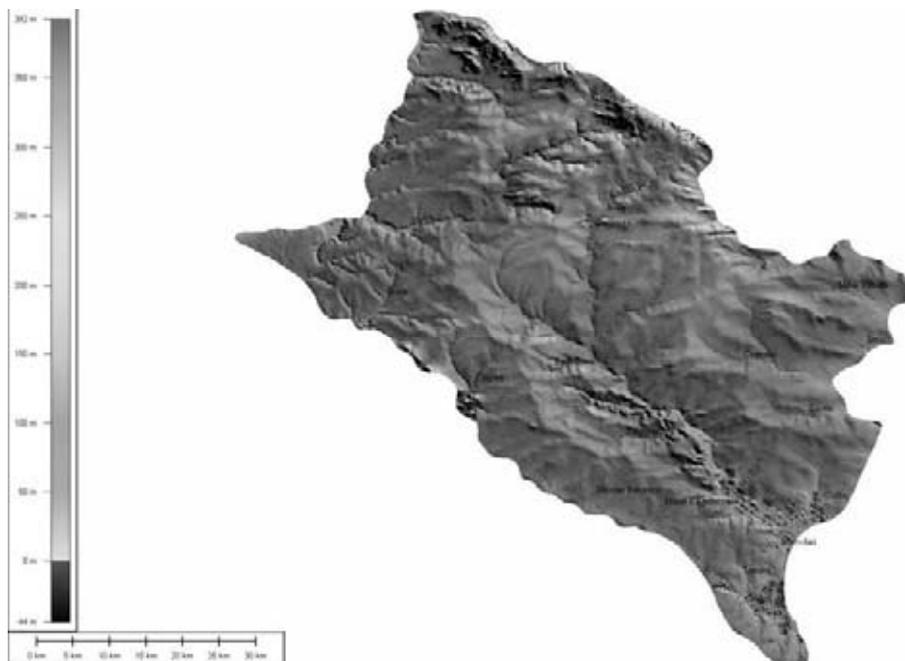
soil improvement, and destruction of irrigation systems in areas with high risk of drought. Drought in our country, without having a very strong cyclic character, returns in generally in intervals of 12-15 years, among them there are extremely dry years, but some disruption (1-3 years) with sufficient rainfall.

## **MATERIAL AND METHODS**

This material was prepared having as basis the Soil Map of Romania, scale 1:200,000, processed using Geographic Information System (GIS). Soil types have been renamed in line with those of the Romanian System of Soil Taxonomy (SRTS 2003). It also covered a number of specialty papers (Methodology to Elaborating of the Pedological Studies, Part III, Ecopedological Indicators, MEPS, 1987) and the expert type analysis of existing information from the research area which is studied.

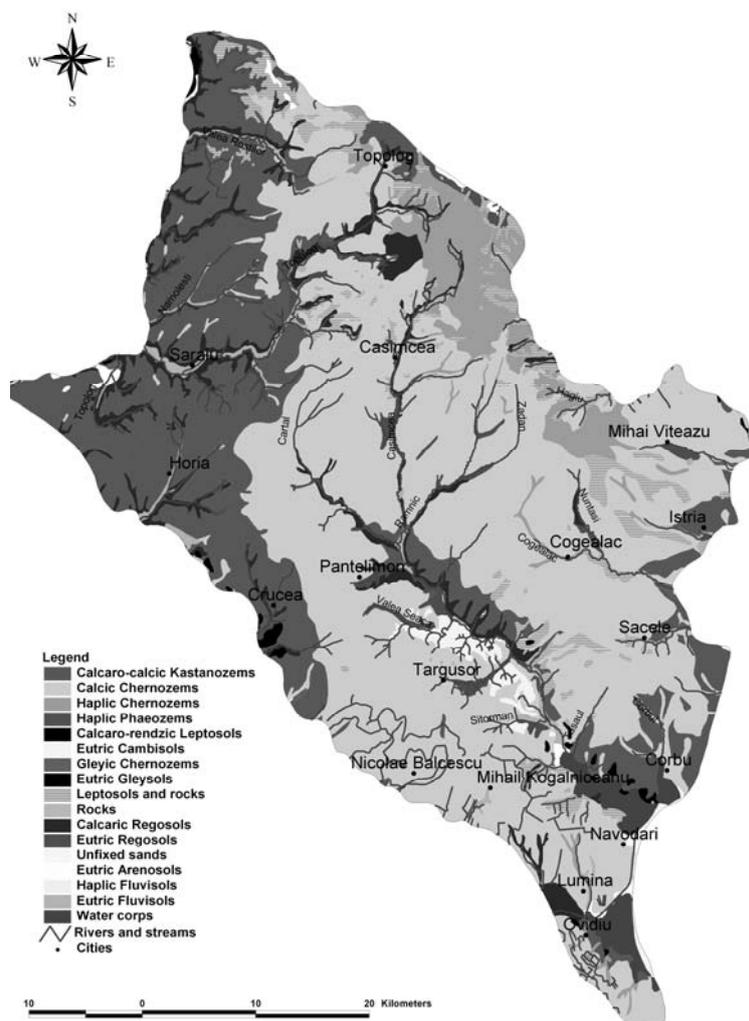
## **RESULTS AND DISCUSSION**

In conjunction to the information available, it can be said that a large part of the Dobrogea, as is the Central Plateau of Dobrogea is subject to gradual degradation processes due climate aridization and the lands from this area shows soils with high vulnerability (Figure 1).



**Fig. 1. General overview of the Central Plateau of Dobrogea**

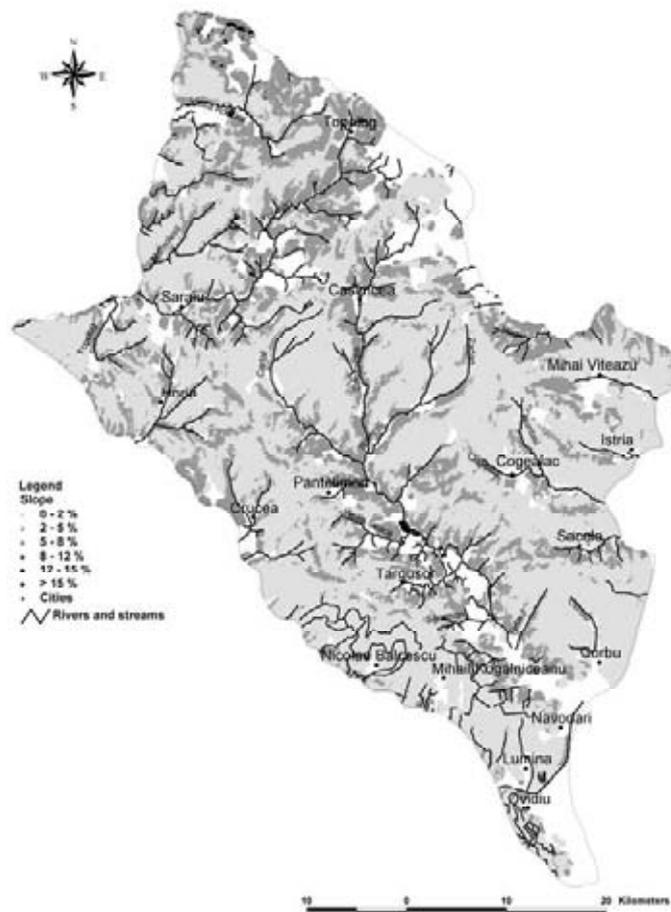
The most vulnerable lands are mostly formed from the sandy soils and open sands (such as arenosols) located in the coastal areas from the North of Constanta (near Năvodari), where the relief is hummocky by the eolian influences. These lands are not influenced from groundwater, because of their texture have an very good overall drainage, showing a great capacity for water infiltration, but instead the ability to easily accessible water for plants is very low, which makes the presence of vegetation cover very discreet, and facilitates their dissipation by the wind (wind erosion), not allowing the installation of soil formation processes (Figure 2).



**Fig. 2. Soil map of the Central Plateau of Dobrogea**

A special group is the lands with salty soils (Solonetz and Solonchaks) which are present especially around the Razelm-Sinoe lagoon complex, as a consequence of the ecopedological conditions in which they were formed and evolved increased exposure to solar radiation, the presence of groundwater at shallow depths but also because of its high mineralization degree.

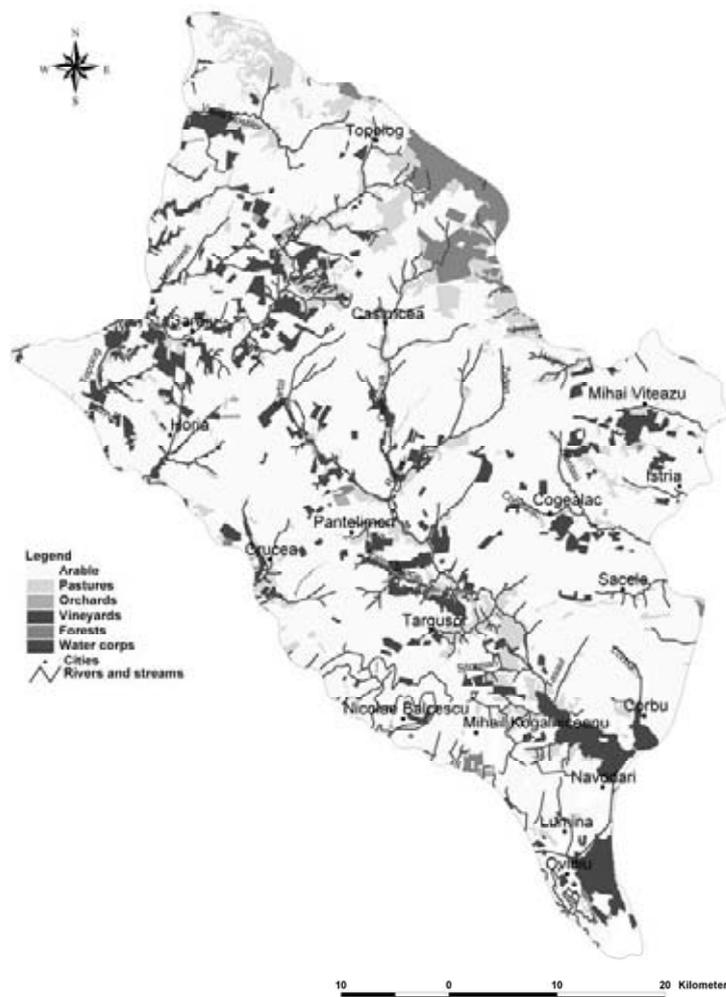
Soils located on the lands comprising a fragmented landscape and an important role it is surface erosion (Figure 3) presence and depth that can sometimes be accompanied by landslides (slumps) are the typical and calcic kastanozems formed on loess and eolian deposits with medium texture (particularly in the western Central Plateau of Dobrogea), calcaro-rendzic leptosols and rendzic leptosols, and in some areas (along the valleys) meet regosols, eutri-lithic leptosols or haplic regosols (in the plateau areas).



**Fig. 3. Slope map of the Central Plateau of Dobrogea**

There are also lands that have formed and evolved on loess and eolian deposits, but the relief is unfragmented or very slightly fragmented. Usually, they are represented mostly in Central Plateau of Dobrogea and west of the Razelm-Sinoe lagoon complex. The dominant soil types are represented by calcic and calcareo-calcic chernozem.

The soils located in a fragmented landscape, and those which were formed under conditions of unfragmented relief, are soils with a very large spatial distribution in the landshaft of Dobrogea, and their development on loess and eolian deposits give them favorable physical and chemical properties, which creates a high potential agro-productive (Figure 4).



**Fig. 4. The land use map of the Central Plateau of Dobrogea**

## CONCLUSIONS

The water and temperature regime (ustic-xeric) precisely due to its geographic location along the isotherm of 11<sup>0</sup>C makes the summer temperatures and low rainfall level in conjunction with an unequal distribution of them; highlight the soil risks due to degradation on associated phenomena of the aridization and desertification. In addition, the study area has a very low coverage of forest vegetation (Constanta county has only about 5%) and with the most described above, makes it possible to install drought on the long and frequent periods (12-15 years).

All these problems caused by the aridization/desertification processes may improve by introducing some basic steps:

1. Administration regularly of organic fertilizers correlated with the chemical fertilizers.
2. Compensation of water shortfall from the soil in most of the year using irrigation systems and by an appropriate structure/rotation of crops.
3. Development of curtains protective forest system and culture that improves the thermo-fluid balance.

In conclusion, we can say that vulnerability of the soil cover to the complex phenomenon caused by drought, aridization, desertification is expressed with equal intensity in both areas with low hummocky or plan relief, in which soils are subjected to degradation both by processes of salinization/sodization but and the presence of wind erosion of soils, especially in the eastern Central Plateau of Dobrogea. Also the risk of degradation is on increasing and sloping surfaces, they present a major moisture deficit due to leakage of the slope, the water depth of the ground layer and caused by evapotranspiration losses.

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