Scientific Papers. Series A. Agronomy, Vol. LXIV, No. 2, 2021
ISSN 2285-5785; ISSN CD-ROM 2285-5793; ISSN Online 2285-5807; ISSN-L 2285-5785

RESEARCH OF VECTOR MONITORING OF SOIL PROFILES IN IALOVENI DISTRICT BASED ON DIGITALIZED MATERIALS

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Abstract

In the study, the archaeological pedological materials were selected on 25 communes from Ialoveni rayon at 1:10000 scale. The materials were scanned and digitally connected to the national reference system MoldRef-99. The contours of the soil were then vectorized and the attributive information was provided for each contour. These works were performed at a scale of 1:10000. As a result, 4050 soil contours were erected on an area of 57577.10 ha (agricultural land). It is very clear that the predominance of the chernozems' soil cover structure with 62.88% of the agricultural soils, the higher share of the carbonate, levigated and ordinary subtypes. The surface of carbonate soils has virtually doubled (from 9666 ha - first cycle to 17162 ha - cycle II). The second place occupies the gray soils by 13.96%. Alluvial soils are the next step with 8.98%. About 14% of the remaining soils, including 5.1% under landslides. In the works, the general digital layer of soil profiles and soil profiles according to genetic horizons has been created which includes the specific attributive parameters. In the Ialoveni district the morphological and analytical data for 540 profiles and 2831 genetic horizons were introduced.

***Key words**: agricultural land, digital map of the soils cover, Ialoveni district, soil profile, vectoring.*

INTRODUCTION

Soil represents the main natural wealth of the Republic of Moldova.

After the composition and natural fertility, the soils of Moldova are part of the most valuable resource category, characterized by a remarkable diversity, related to the variations of the local horizontal and vertical zones, climatic and geological conditions.

One of the main objectives of the Republic of Moldova is the long-term preservation of the quality of the soil cover, together with the protection of the environment.

The level of soil quality depends to a large extent on the productivity of agricultural crops, the development of the livestock sector, the export of agri-food products, the welfare of the population and the ecological situation in the country. Intensive exploitation of soil resources worldwide has caused degradation in recent decades.

Taking into account the global trends, the degradation rates and the stranded losses of agricultural areas, as well as the development of agriculture, the problem of maintaining the quality of the soil cover on agricultural land becomes for our state a strategic concern of national security. Soil degradation in the Republic of Moldova is one of the most serious problems present at the present stage.

The main forms of degradation of the soil cover are: water erosion, dehumification, soil clearing in nutrients, excessive destructuring and compacting, solonetization, salting, and so on. Degradation processes and non-compliance with agricultural technologies have caused declining production capacity of soils. For imaging the soil (as a resource) in two-dimensional format, the system uses a series of real-world objects through which its description is performed.

Such objects refer to: - soil profile; - horizons and profile layers; - soil areas; - experimental (pedological) sectors.

The use of these data widens the use of geospatial information for the management of other branch and regional core information resources and their components, ensuring integration with other thematic geospatial data.

The system uses the geospatial database model, in which the data presents real spatial object models.

Graphical data is retained as attributes corresponding to spatial objects structured in

appropriate classes and are held in three-dimensional format:
- vector data for the presentation of spatial objects;
- raster data for the presentation of continuous seamless images, network thematic data and surfaces;
- addresses and locators to find the geographic situation.

When viewing objects according to the image generation rules for each of the discrete stairs, appropriate conditions are provided for reflecting the object.

Each scale of object reflection is a combination of geometric primitives: conventional symbols, explanatory inscriptions, and a series of graphical signs: color, size, thickness, discontinuity, hatching, background, font, and so on.

In the real world, the notion of "soil profile" is defined as a slice section of the soil, from its surface to the parental rock, which demonstrates the vertical consecutivity of the sequentially related and logically sequential genetic layers (soil horizons). The profile is described through soil horizons, characterizing them according to morphological criteria (internal), composition and properties.

It can also be described by layers - the depth and sampling interval, which do not depend on ground horizons.

By examining the soil profile as a whole, it is described by a series of inherent properties: the soil type (according to soil classification), the soil profile structure, the depth of the profile, the presence and depth of the groundwater, the depth of penetration roots etc. (Baumgardner, 1988).

Viewing geographic information or geographic view of information allows people to notice changes and even forecasting reality. Applications on virtual reality use representations of real spatial phenomena, but also of non-formal phenomena, simply because the human brain is accustomed to solving problems in three-dimensional space. Important parts of the software component and the data required for configuring and populating cyberspace will be taken from geoprocessing applications, digital geodata archives, and current data flows. Similarly, space research will benefit both from “real space” and from cyberspace applications.

MATERIALS AND METHODS

In the study, the archaeological pedological materials were selected on 25 communes from Ialoveni district at 1:10000 scales. The materials were scanned and digitally connected to the national reference system MoldRef-99. The contours of the soil were then vectorized and the attributive information was provided for each contour. These works were performed at a scale of 1: 10000.

RESULTS AND DISCUSSIONS

As a result, 4050 soil contours (Figure 1) were erected on an area of 57577.10 ha (agricultural land). It is very clear that the predominance of the chernozems' soil cover structure with 62.88% of the agricultural soils, the higher share of the carbonate, levigated and ordinary subtypes. The surface of carbonate soils has virtually doubled (from 9666 ha - first cycle to 17162 ha - cycle II). The second place occupies the gray soils by 13.96%. Alluvial soils are the next step with 8.98%. About 14% of the remaining soils, including 5.1% under landslides.

For the updating of the pedological map were used: the Ialoveni district soil digital map (the first pedological mapping cycle) elaborated on the basis of IPAPS materials “Nicolae Dimo” at scale 1:50000, the digital map of the soils cover on the communes Ialoveni district (second cycle of pedological mapping) developed on the basis of IPOT materials at scale 1:10000 and analytical data of soil profiles. After mapping the mapping materials, updating and correcting them, the common digital map of the soils was developed. Based on this map of the soil surface, the land under the water category, the mound subcategory, the not agricultural not agricultural land category and the full use of infrastructure based on the digital map of the land infrastructure in 2016 were excluded. The structure of the soil cover was divided for each sub-category/land use category.

In the works, the general digital layer of soil profiles and soil profiles according to genetic horizons has been created which includes the specific attributive parameters.

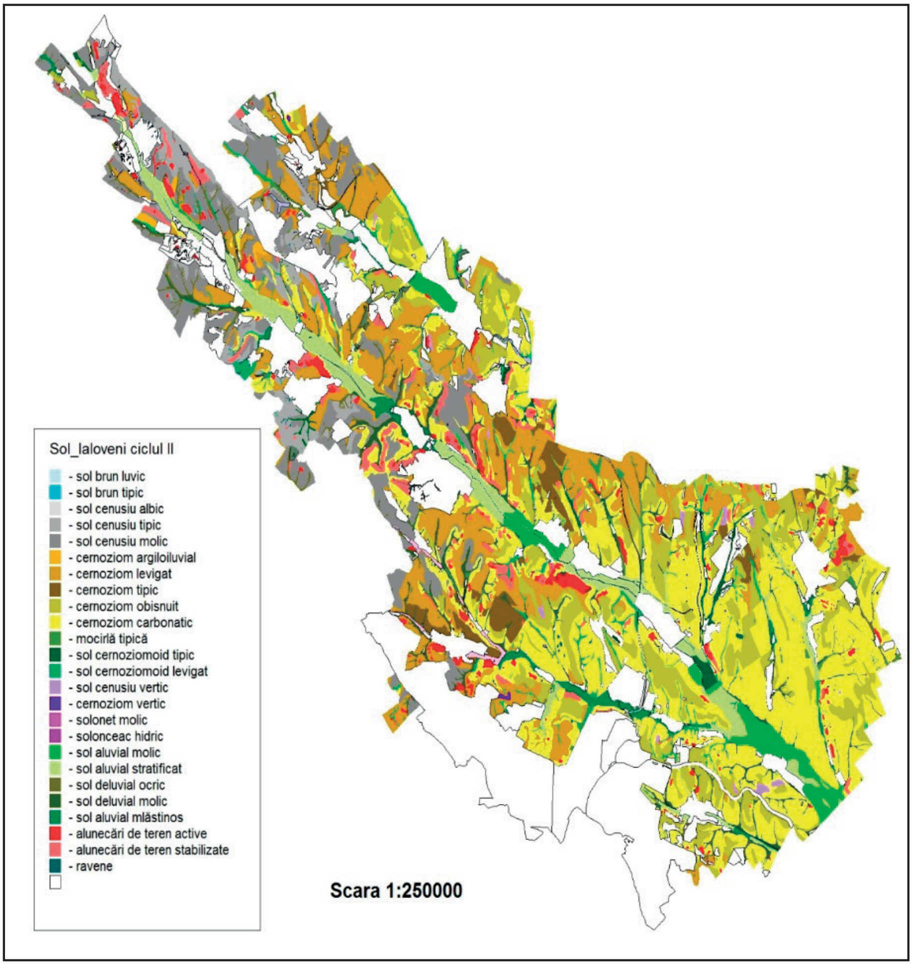

Figure 1. The digital soil maps (II mapping cycle)

On the second place are the gray soils (18.54%) represented by the soft ones with 10.82% and typical with 7.15% of the soils. The area of alluvial soils is 9.01%.

Landslides are 6.65%. The rest of the soils cover an area of about 9%. The weighted average credit rating on the rayon is 66.31 points.

In the Ialoveni district the morphological and analytical data for 540 profiles (Figure 2) and 2831 genetic horizons were introduced.

As a result of the work carried out within the object, 59820 contours (Figure 3) have an area of 66017.51 ha, compared to 2418 of the original contours covering an area of 72632.29 ha.

In the structure of the soil cover the chernozems predominate with about 56%, where the leachates prevail with 19.33%, the usual (16.88%), the carbonate with 13.30%.

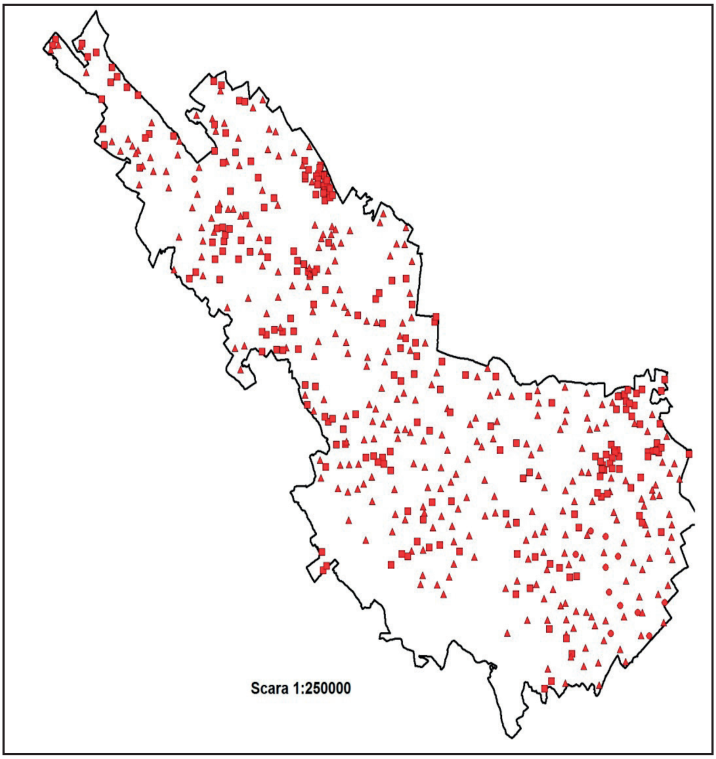

Figure 2. Location of soil profiles

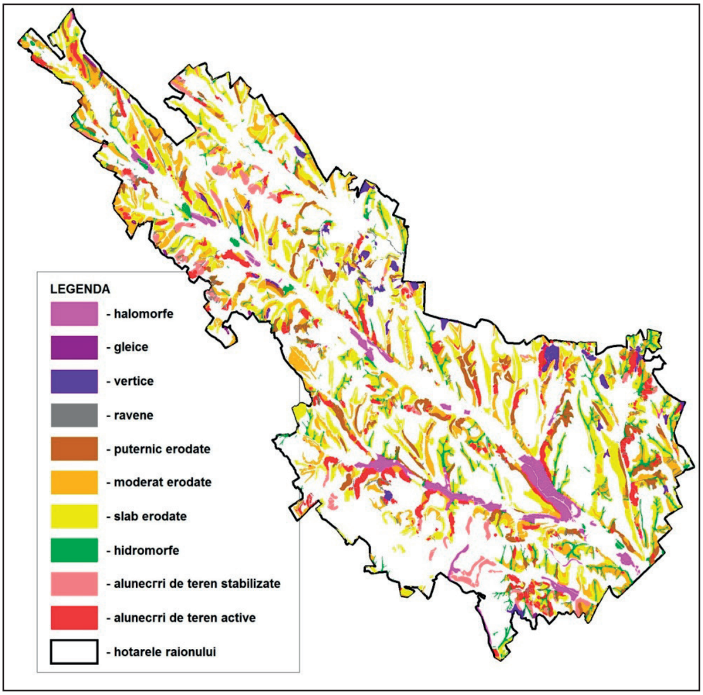

Figure 3. Degraded Soil Map

CONCLUSIONS

Chernozem subtypes predominant in the composition of the ravine soil cover are the most extensively subjected to degradation by water erosion. The surface of these soils amounts to 16536.51 ha, which represents 82.45% of the eroded land. The most affected are carbonate chernozems with 69.04%. More than 16% of eroded soils hang on gray soils.

The landslides have become widely spread. The area of lands lands or lands up to 4387.65 ha or 6.65% of the territory due to the intensive land use of landowners, which makes it impossible to carry out complex protection works.

The analysis shows that about 25089.96 ha (38%) of the total of 66017.51 ha of the soils of the Ialoveni district are subjected to various degradation processes.

The soil and laboratory pedological works have determined: humus content, texture, degree of solonization, carbonate content and depth, degree of erosion, current reaction, hydrolytic acidity, parental rock and so on.

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***Regulamentului cu privire la conţinutul documentaţiei cadastrului funciar general, aprobat prin Hotărârea Guvernului RM nr. 24 din 11.01.1995.