



UNIVERSITY OF LIFE SCIENCES "KING MIHAI I" FROM TIMISOARA

"YOUNG PEOPLE AND MULTIDISCIPLINARY RESEARCH IN APPLIED LIFE SCIENCES"



"Young people and multidisciplinary research in applied life sciences"

16-17 November 2023

CONSERVATION OF SOIL RESOURCES IN THE GIROC AREA

Aurelia MIHUȚ, Ionela IONAȘCĂ, Vlad MĂRĂZAN, Casiana Mihuț, Anișoara DUMA COPCEA
University of Life Sciences "King Mihai I" from Timișoara Calea Aradului 119,300645, Timișoara Romania.

Abstract: Starting from the fundamental idea that man must cooperate with the environment, to consciously become its protector, it is necessary to achieve economic growth in full agreement with the requirements to preserve and protect the environment.

The purpose of the work is to identify and present the soil resources in the town of Giroc, the presentation of the area from a physical-geographic point of view and everything that involves the climatic and edaphic conditions of the area, respectively the identified soil resources, the factors that led to an obvious reduction of the surfaces of soil and land in this space, what quick measures must be taken to conserve what is left without affecting the natural environment, soil resources, people's lives, nor the rapid expansion of the locality. The first documentary mention of Giroc dates from 1371–1372, in a document by which Sigismund of Luxembourg of Hungary donates the Gyureg estate to Vladislaus, the son of Stefan de Taar. The commune of Giroc is made up of the villages of Giroc and Chișoda. At the same time, it is part of the peri-urban localities of the municipality of Timișoara, from which it is separated by only 3 km on the paved road.

The studied material is represented by the blanket of identified soils, soils that were formed under the influence and action of pedogenetic factors, of which climate, hydrology, organisms, relief, rock and human intervention played a more important role. The following soil types were identified within the area: Alluvial soils, 458 ha; Eutricambosols, 2378 ha; Vertosols, 53 ha; Gleiosols, 493 ha and a number of Soil Associations, 521 ha.

In the last 10 years, the locality has depopulated a lot, which has led to a decrease in the areas of cultivated land, large areas of land have been taken out of the agricultural circuit, and real residential neighborhoods have been built on them.

Introduction

- Projections of global population growth show that in less than 50 years humanity will be forced to use up most, if not all, of the earth's available resources. Of the 51 billion hectares of our planet's total surface, dry land occupies less than 13.1 billion hectares, and agriculture uses less than 1.5 billion hectares for cultivation (annually or permanently), which means little more than the total area of Australia or about 100 times the agricultural area of Romania (CĂLINESCU, R., 1969).
- Under these conditions, the soil-human relationship takes on a special significance for the development of world agriculture. Currently, each inhabitant of the Earth has approximately 1.1 hectares of agricultural land of which 0.3 ha is arable land (FAO, 1980, Annuaire), while in Romania per capita 0.643 ha of agricultural land of which 0.406 ha is land arable (CĂRSTEA S., 1996).
- In 2050, the demand for agricultural products will be 3 times higher than today. Moreover, in the last three decades the growth rate of production has declined from 3% in the 1960s to 2.4% in the 1970s and 2.2% in the 1980s (BĂCĂUANU, V., 1989). The production of the main food crops increased constantly in the last 20 years, the increase being 1.45% annually during the period 1971-1991.
- In addition to the requirements of food, clothing and wood, soils will be needed for other and increasingly different requirements. They will be used to a greater extent as a place for multiple and diverse human activities, for various constructions (buildings, roads, water storage basins, dams, etc.), for recreational spaces, platforms and clearing places of much waste and residue (DUMA COPCEA, ET AL., 2021).
- The population is constantly growing, the degradations are diversifying and intensifying, and we have very few possibilities to increase the agricultural areas, and for that huge investments must be made, with little chance of recovery.
- H. G. Wels, quoted by COTEȚ, P., 1973 said that "history is more and more a race between education and catastrophe". To draw attention to the urgency of taking decisions on soil protection and bringing degraded land into circulation
- A 1995 FAO report shows that the potentially cultivable area is 3031 million ha (26% of the total land area) of which 2154 million hectares (28%) are in developing countries and 877 million ha (15%) in developing countries developed.
- Currently, 1442 million ha (48% of potential) are cultivated, of which 776 million ha (36% of potential) in developing countries and 666 million ha (77% of potential) in developed countries. On average, worldwide there are 4 people per cultivated hectare, but in developed countries there are 2 people per hectare, and in underdeveloped countries 5 people.

Material and method

- The studied material refers to the soil cover identified in this area, soils that were formed over time under the influence and action of certain pedogenetic factors, an important role was played by: relief, climate, rock, hydrology, organisms but also human intervention (MUNTEANU I., FLOREA N., 2009; OBREJANU GR. ȘERBĂNESCU I., CANARACHE A., MANUȚĂ O., 1964).
- The commune of Giroc is located in the Timiș Plain, in the west of Romania, in the center of the Timiș county, at the intersection of the parallel of 45°50'30" north latitude with the meridian of 21°30' east longitude, south of the Municipality of Timișoara. Giroc plays an important role for the economy of Timișoara, as it was established as a labor force reserve and in recent years it has started to host economic agents attracted by the Timișoara economy but who have located in the neighboring areas. The development of the Timișoara industry, the need for the labor force, causes many families to settle in Giroc, where they buy houses or live in rent and from where they commute in good conditions to Timișoara, especially after, in 1963, the bus route was established on the Timișoara - Giroc route (PASCU, R., M., 1983; POSEA GH., 2009; RĂUȚĂ C., 1995).
- The objectives considered refer to:
- 1. Identification and description of soil types, respectively occupied surfaces;
- 2. Description of the natural setting of the area;
- 3. Identifying the limiting factors that lead to the limitation for certain cultures and ways of using the soils in the area;
- 4. Placement in quality classes;
- 5. Establishing measures that lead to the conservation of these soil resources.
- Within the studied perimeter, the following soil types were identified:
- Alluvial soils, 458 ha;
- Eutricambosols, 2378 ha;
- Vertosoluri, 53 ha;
- Gleiosols, 493 ha;
- Soil associations, 521 ha.
- The studies were carried out on the territory of the commune of Giroc, which is currently literally attached to the Municipality of Timișoara. The only thing that warns you that you have left the city on Bega, is the entrance sign to the locality (ȚĂRĂU D., BORZA I., ȚĂRĂU IRINA, RĂCOVICEAN M., 2005) (figure 1).



Figure 1. Map of the town of Giroc in Timiș County
(https://www.google.com/maps/place/Giroc)

Conclusions:

The studied territory is found in a subsidence plain area, at an altitude between 88.1-91.37 m, being adjacent to the Municipality of Timișoara and it is composed of two localities: Giroc and Chișoda.

The soils identified within the Giroc locality belong to different classes, namely: from the Protisols class, the Alluvium covers an area of 458 ha; from the Cambisols class, the Eutricambosol, has an area of 2378 ha; from the Vertisols class, the Vertosol is found on 53 ha; from the Hydrosol class, the Gleiosol occupies 493 ha; along with 521 hectares that are occupied by a number of Soil Associations.

In the last decade, there was a development and expansion of the locality which led to a reduction of cultivated land, large areas of land were taken out of the agricultural circuit and then occupied by new residential districts, the best known is "Cartierul Florilor" which includes the "Ogrindova and Planiște" area.

The town has a total area of 5277 ha, of which 4521 ha is outside the town and 756 ha is inside the town. Of the 4,521 ha, 3,903 ha is agricultural and 419 ha is wooded (the forest occupies 7.94%).

From the total of 4322 ha of agricultural land, forest and land occupied by water, 4312.12 ha is agricultural land, of which 702.26 ha are affected by salinization and acidification processes, namely: 701.26 ha are affected by a weak saltiness; 1 ha is moderately affected by salinity; 1343.71 ha are affected by acidification to a lesser extent; 1117.02 ha is moderately affected by acidification; 515.24 ha are strongly and excessively affected by acidification.

As a soil type affected by different factors and/or pedogenesis processes, all 4 identified soil types are affected to certain degrees and measures by the factors present in the area (acidification, subsidence, excess moisture).

Vertosols are the most affected by subsidence: 1125 ha are slightly affected; 952 ha are moderately affected; 1236 ha are heavily affected.

Considering the quality of the soils, they were classified into the following classes: Class I: 15 ha; Class II: 715 ha; Class III: 1990 ha; Class IV: 653 ha and Class V: 207 ha, with an average score of 47 points.

Results and discussions

- The total area of the town is 5,277 ha, of which the extravillage occupies 4,521 ha and the intravillage 756 ha. Of the 4,521 hectares, agricultural land occupies 3,903 ha, respectively 73.96% and the forest, 419 ha, i.e. 7.94%.
- From the composition of the commune, the following localities are in administration: Giroc and Chișoda.
- Following the study of the specialized bibliography (OSPAT Timișoara, Giroc City Hall, PAT] Timiș) and the numerous field trips made between March 2020 and November 2022, we identified the following soils (figure 2.):
- Alluvial soils, 458 ha;
- Eutricambosols, 2378 ha;
- Vertosoluri, 53 ha;
- Gleiosols, 493 ha;
- Soil associations, 521 ha.

From the total of 4322 hectares of agricultural land together with the forest part and the surface occupied by water, 4312.12 is land without water, of which 702.26 hectares are affected by certain salinization processes, processes that manifest themselves with different intensities like as can be seen from table 1. Table 1.

City	Total hectares	Lands affected by salinization and acidification processes					
		Processes present:					
		salinization			acidified		
		low	moderate	strong excess	slabă	moderate	strong excess
Giroc	4,312.12	701.26	1.00	-	1,343.71	1,117.02	515.24

From the data presented above, it can be seen that most of the agricultural area is affected by certain pedogenetic processes of salinization and acidification to a lesser or greater extent, namely:

- 701.26 ha are affected to a lesser degree by salinity;
- 1 ha is moderately affected by the salting phenomenon;
- 1343.71 ha are affected by acidification to a lesser extent;
- 1117.02 ha are moderately affected by acidification;
- 515.24 ha are lands strongly and excessively affected by acidification.

Among the 4 types of soils identified within the studied territory, Alluviosols are most often affected by these processes, followed by Vertosols and Eutricambosols which are affected by a weak salinity, while a moderate salinity was found in the Gleiosols. Much of the soils in the area are affected by excess surface and water table moisture. The soils that are affected by an excess of surface moisture are those of the Alluviosol type, namely:

- 1084 ha are slightly affected;
- 323 ha are moderately affected;
- 617 ha are strongly and excessively affected.

Gleiosols are also affected by an excess of moisture, this time the moisture comes from the capillary fringe located at a low height (1.4-2 m) and which affects this type of soil to varying degrees, namely:

- 352 ha are moderately affected;
- 2495 ha are heavily affected;
- 519 ha are strongly and excessively affected.

Also, Vertosols, due to the presence of clay in a very large amount (45-55%), are most often affected by subsidence, namely:

- 1125 ha are slightly affected by subsidence;
- 952 ha are moderately affected;
- 1236 ha are heavily affected.

Considering the quality of the soils in the area, the agricultural area of the locality (3580 ha, figure 4.) was classified into the following quality classes (VLAD V., 19997):

- First class (between 81-100 points) = 15 ha;
- Class II (with 61-80 points) = 715 ha;
- Class III (between 41-60 points) = 1990 ha;
- Class IV (between 21-40 points) = 653 ha;
- V class (with 1-20 points) = 207 ha.
- The weighted average grade of arable land was 47 points.

Considering all these unwanted phenomena that affect to certain degrees (stages) the soils in this area, it is imperative to take a series of measures to remove all these unwanted processes on the one hand and on the other hand to preserve and conserve the already rather limited soil resources of this beautiful and flourishing area. In order to achieve these things, it is necessary to intervene by applying measures to reduce and eliminate excess water, by rehabilitating and modernizing some irrigation-drainage works that can be justified both from an ecological and economic point of view.

It is also necessary to provide good information and awareness to citizens and all those empowered to remove the causes that led to soil acidification, by reducing the use of mineral fertilizers and especially those with a high nitrogen content and the use of green plants (legumes), organic fertilizers (manure, manure, compost, pellets from various plant residues such as coccine and straw, etc.). Finally, man as a citizen must become a wise "partner" of nature, of the environment in which he lives and of the soil he occupies, works and leads his daily existence. We cannot talk about a conservation of soil resources without thinking about a clean environment, our future and that of our children depends on us and the measures we take for a healthy environment and unpolluted water and soil resources.

If we eliminate all the factors that led over time to the appearance and development of those processes that affected the soil resources in the area, we will ensure a better, cleaner and healthier lifestyle for the generations to come. This can also be achieved by applying measures to limit and correct those that affect the productive potential of soils, applying pedohydroameliorative works, as well as the use of quality biological materials that lead to an increase in the fertility of these soils and, therefore, obtaining bigger, more natural and better quality productions.