UNIVERSITY OF LIFE SCIENCES ”KING MIHAI I” FROM TIMISOARA
”YOUNG PEOPLE AND MULTIDISCIPLINARY RESEARCH IN APPLIED LIFE SCIENCES”

05-06 November 2026



SOIL RESOURCES, PRODUCTIVE POTENTIAL AND SOIL IMPROVEMENT MEASURES FROM REȘIȚA, CARAȘ-SEVERIN COUNTY

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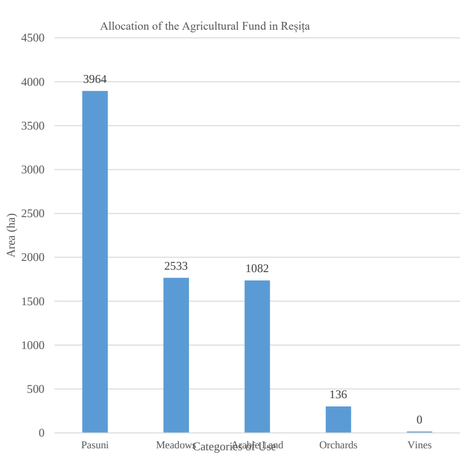
Abstract: This study provides an in-depth analysis of the geographical characteristics, soil resources, and soil improvement potential of the soils in the Municipality of Reșița, located in Caraș-Severin County, at the junction between the Reșița Depression and the Semenic Mountains. The varied relief, consisting of intermontane depressions, partially forested hills, and steep slopes, determines significant pedological, geological, and ecological diversity, directly influencing land use and sustainable land management practices. The research was based on a documentary analysis of soil and geological maps, as well as local soil statistics, complemented by field observations and the correlation of data with recent climatic information. Modern interdisciplinary methods were applied to assess soil characteristics, climatic factors, and the current use of agricultural, peri-urban, and industrial land. The predominant soils reflect a complex pedological mosaic, represented by Luvisols and Eutric Cambisols in hilly areas, Dystric Cambisols on mountain slopes, Fluvisols along the Bârzava Valley, and Technosols in former industrial areas. The land quality assessment reveals moderately productive areas used for peri-urban crops, orchards, and pastures, as well as significant limitations, such as pronounced soil acidity, excess moisture, low bearing capacity, and steep slopes susceptible to erosion, compounded by the legacy of historical industrial pollution. The temperate-continental climate with mountain influences, forest biodiversity, abundant water resources within the Bârzava River Basin, and the dynamics of ongoing development projects support the implementation of viable engineering and agro-pedological measures. The conclusions highlight the soil improvement and economic potential of the municipality, offering promising prospects for sustainable development, the ecological restoration of degraded sites, and the sustainable use of the peri-urban landscape, while also contributing to increased local economic competitiveness.

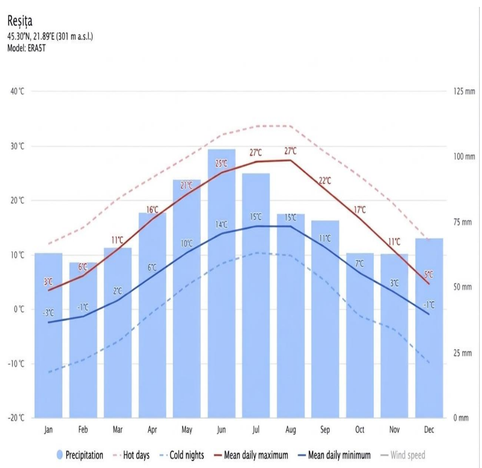
• Introduction

As soils represent finite and dynamic natural systems essential for the biosphere and global ecological balance, pedological mapping and land evaluation become crucial tools for sustainable territorial planning, particularly in the Municipality of Reșița where a varied topography and a legacy of heavy industrial pollution have shaped a highly complex pedological mosaic—comprising Luvisols, Eutric Cambisols, Fluvisols, Dystric Cambisols, and Technosols—thereby establishing an integrated, data-driven scientific foundation required to implement viable engineering and agro-pedological measures for environmental protection, landscape management, and the ecological restoration of degraded sites.

• Material and method

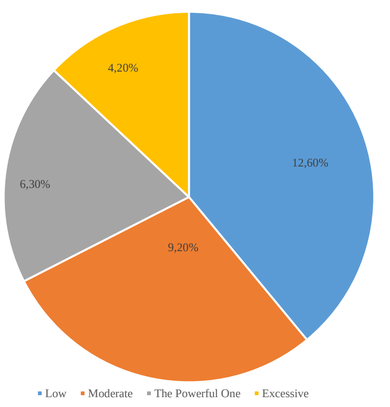
This study employed an interdisciplinary methodology structured across multiple stages, combining the analysis of cartographic and pedological maps (provided by OCPI and ICPA) with local statistical data, historical pollution records, and climatic reports from the Reșița meteorological station to precisely evaluate the spatial distribution, degradation levels, and vulnerability of dominant soil types. Furthermore, the research integrated a comparative analysis with other urban centers in the Mountain Banat region (Bocșa, Anina, and Moldova Nouă) to identify shared territorial structures and economic reconversion patterns, ultimately consolidating all findings through graphical and tabular methods to establish a data-driven framework for urban regeneration, landscape restoration, and sustainable development.

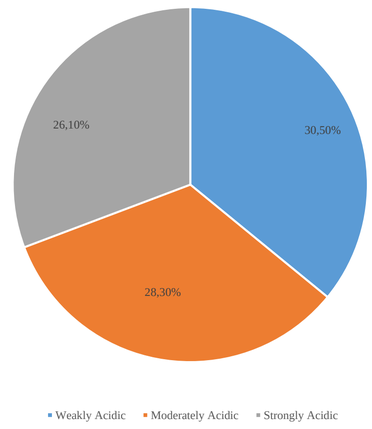


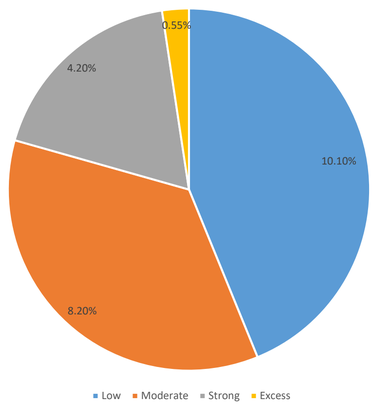


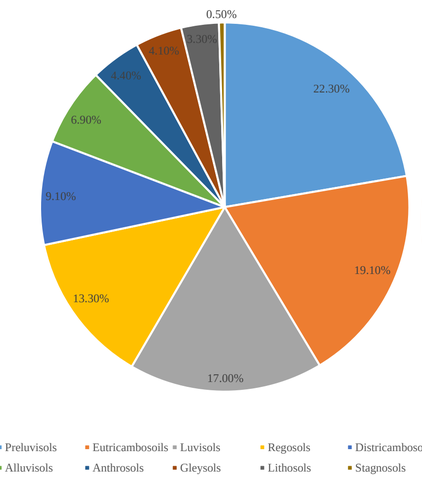
• Results and discussions

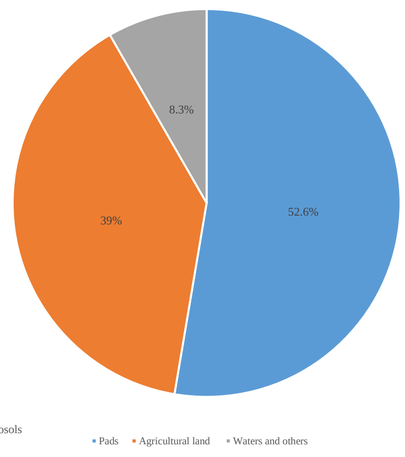
The spatial analysis of the study area reveals a distinct pedological distribution where Luvisols and Eutric Cambisols dominate the hilly agricultural regions, Fluvisols occupy the Bârzava floodplain, and Dystric Cambisols cover the steep mountain slopes, all contrasting sharply with the highly modified Technosols found in urbanized and former heavy industrial zones which exhibit severe limitations such as legacy heavy metal pollution, high soil acidity, poor load-bearing capacity, and high susceptibility to water erosion, yet the region’s robust hydrological network and forest biodiversity offer high agro-pedological resilience and viable opportunities for implementing engineering measures, site-specific soil stabilization, and targeted ecological restoration to drive local sustainable development.

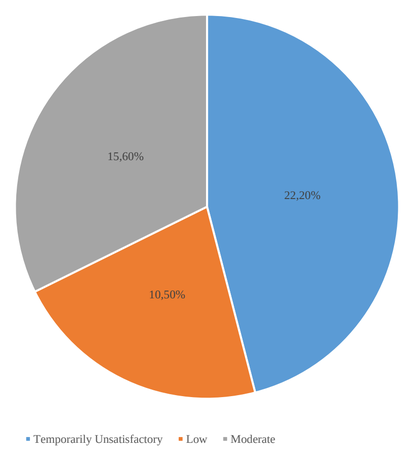












• Conclusions

More than 84% of the land suffers from high acidity that requires lime amendments, a problem further compounded by erosion-prone slopes and historically polluted industrial technosols. However, by applying proper ecopedological planning, rehabilitating decommissioned brownfields, and expanding eco-tourism, the city can be transformed into a regional model of resilience for the entire Mountain Banat area.