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ASSESSING THE IMPACT OF SALINIZATION ON SOIL HEALTH WITHIN ROMANIA'S MACROREGION 4 (SOUTH-WEST OLTENIA AND WEST REGIONS)

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Abstract: Soil health is essential for food security, especially under the impact of climate change. This study analyzes the salinization process in Macroregion 4 of Romania (West and South-West), using data from the ADER 20.1.1/2023 project. By integrating methodologies (soil analysis and GIS), areas at risk of salinization were identified in the Socolod Plain and the Danube and Jiu floodplains. The research demonstrates that poor irrigation and drought accelerate secondary salinization through capillary rise, when the mineralized groundwater rises below 2 meters deep. The study proposes a calibration of critical thresholds for key chemical indicators, such as electrical conductivity (ECe) and sodium adsorption ratio (SAR), providing a harmonized monitoring framework in line with the objectives of the EU Soil Strategy 2030. The conclusions recommend investments in drainage rehabilitation, forest shelterbelts and no-till technologies to combat aridification and preserve national soil capital.

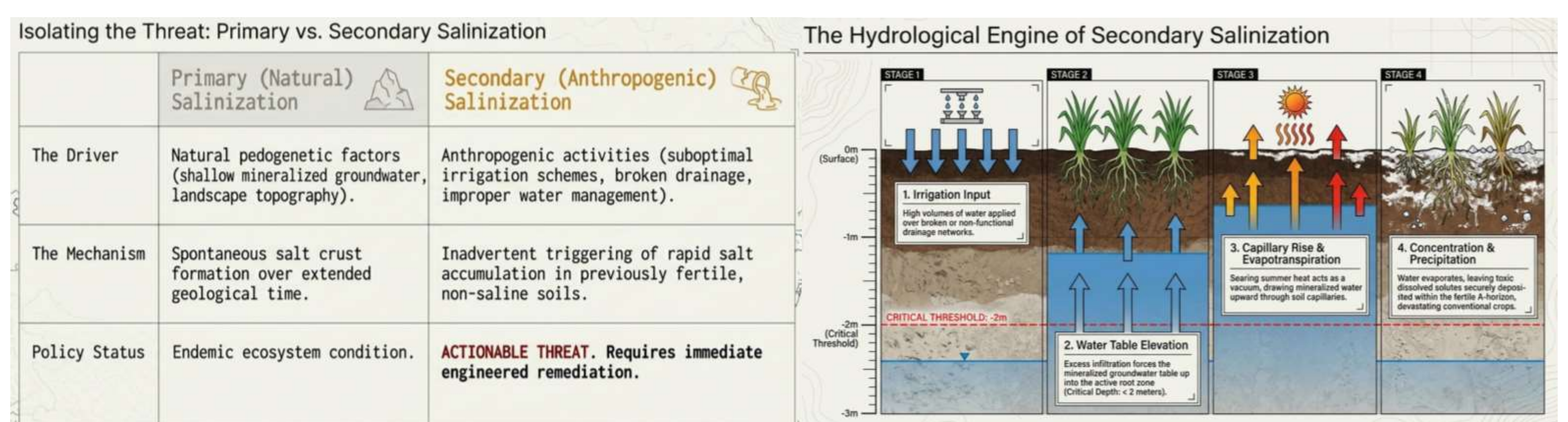
Keywords: soil health, soil salinization, secondary salinization, Macroregion 4

Introduction

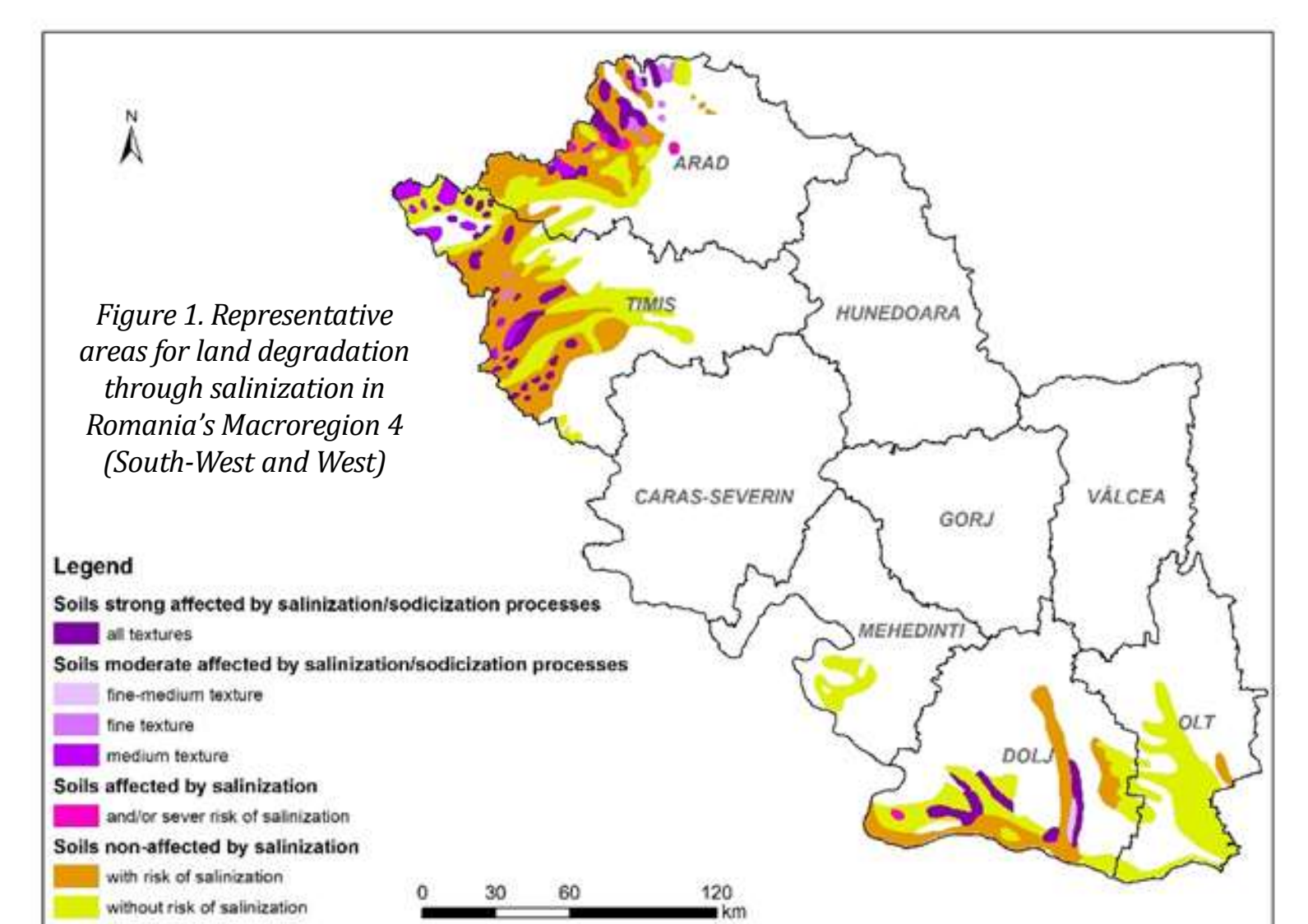
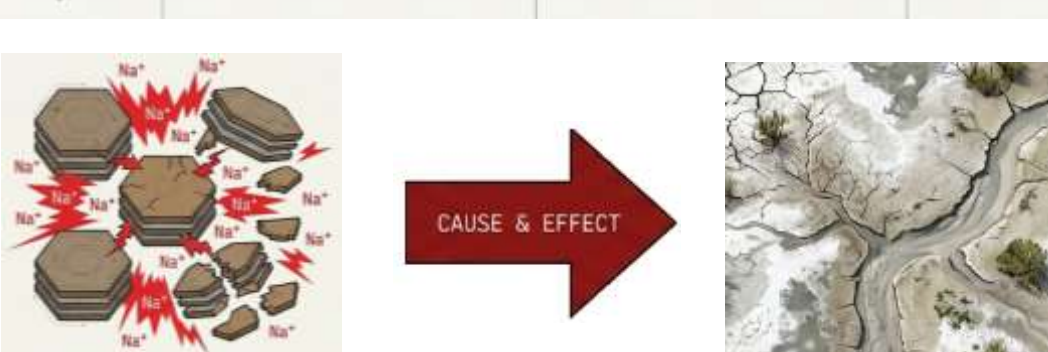
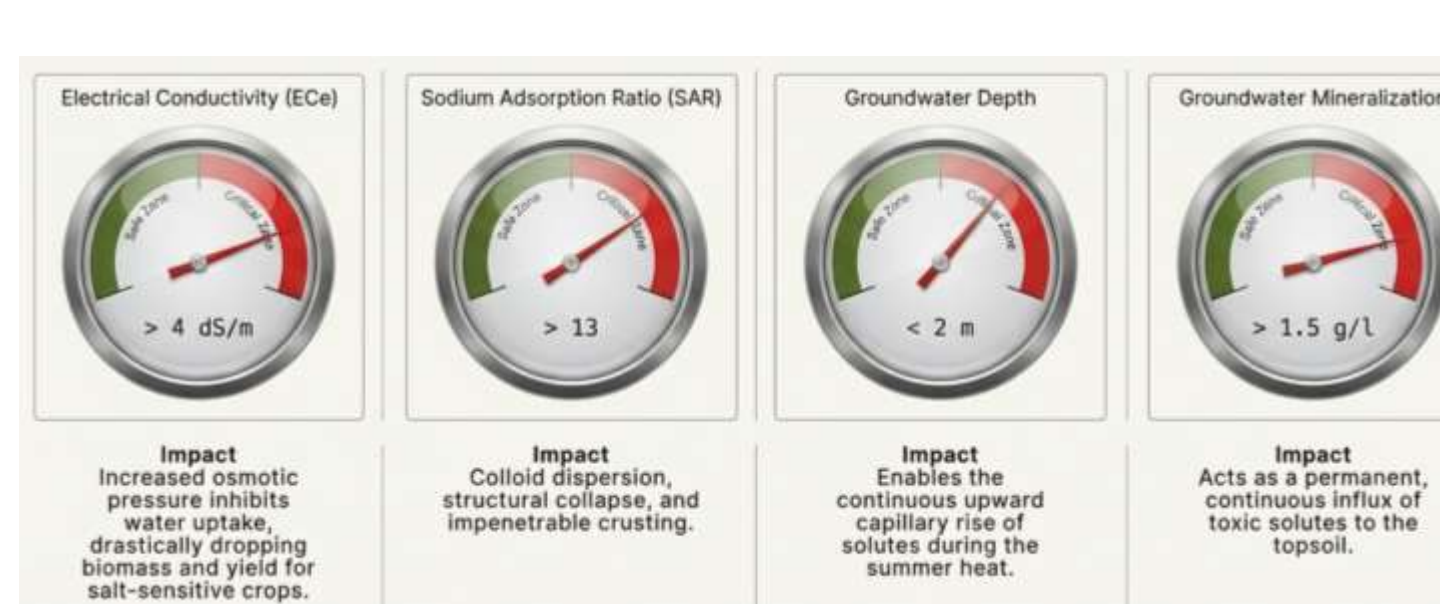
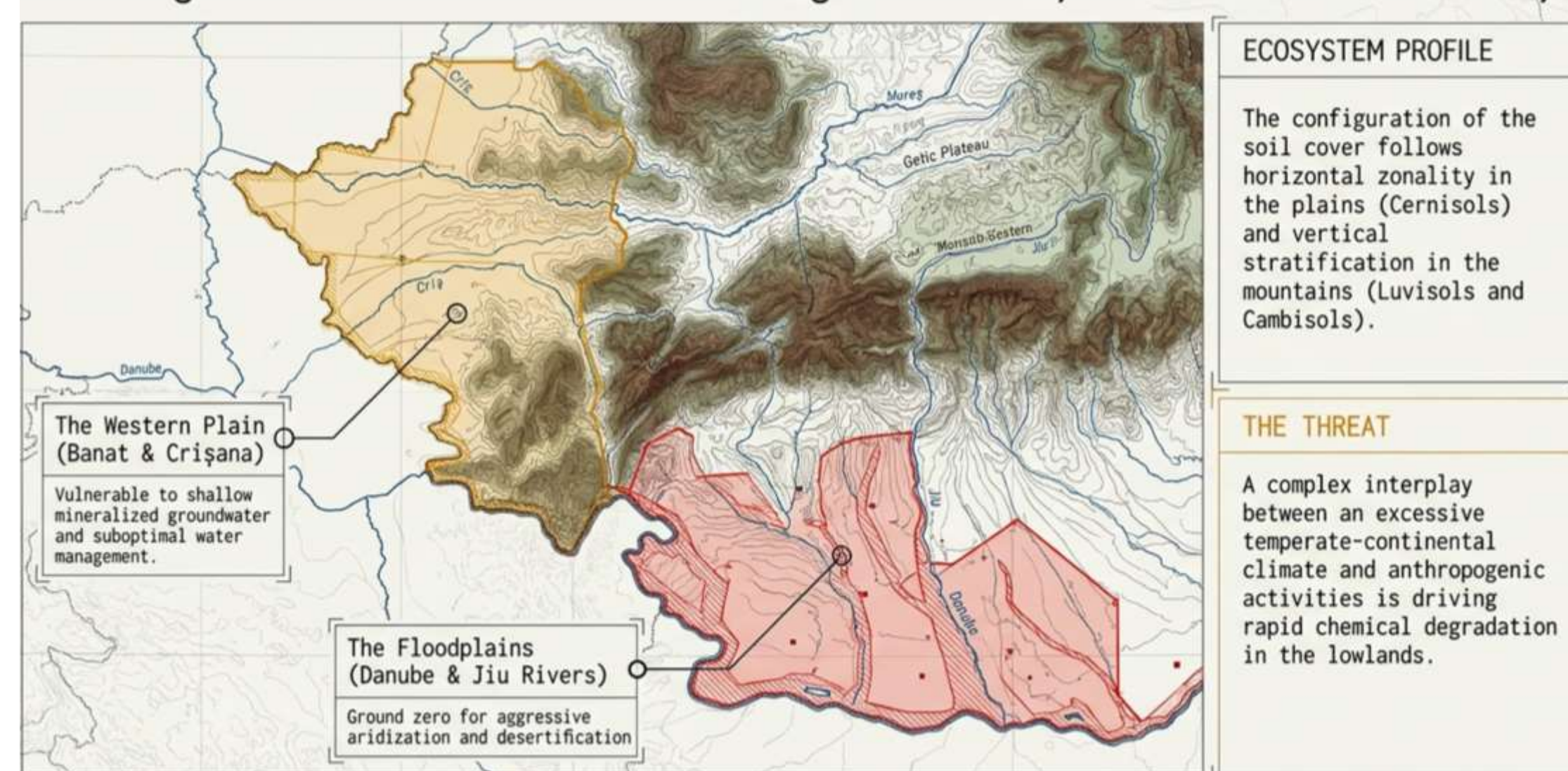
Soil is a finite, non-renewable asset on human timescale. Chemical degradation threatens the fundamental pillar of agro-ecosystem resilience and global food security. Currently, approximately 614,000 hectares of Romania are compromised by salt accumulation, and about 600,000 hectares are at imminent risk of secondary salinization.



Results and discussions



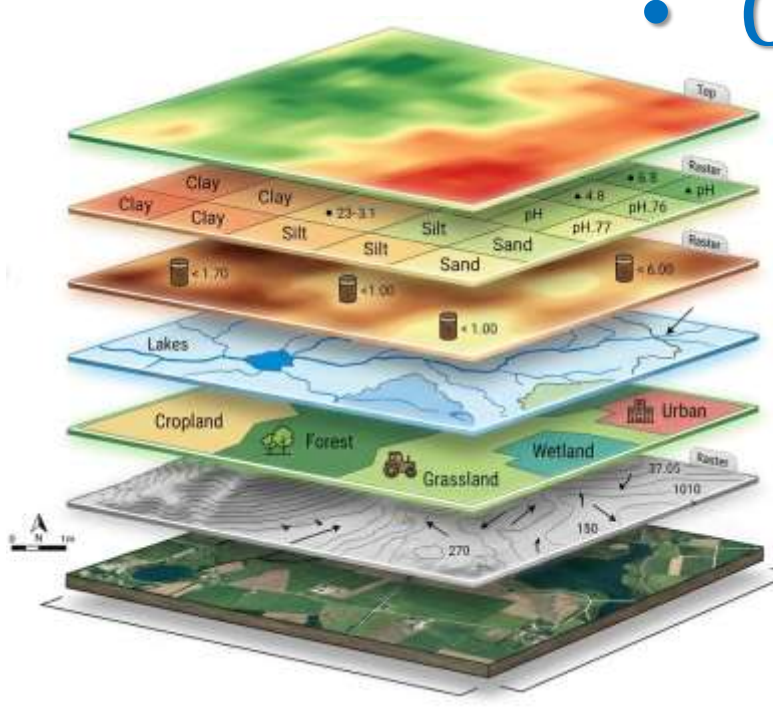
Macroregion 4: The Intersection of Pedological Diversity and Climate Vulnerability



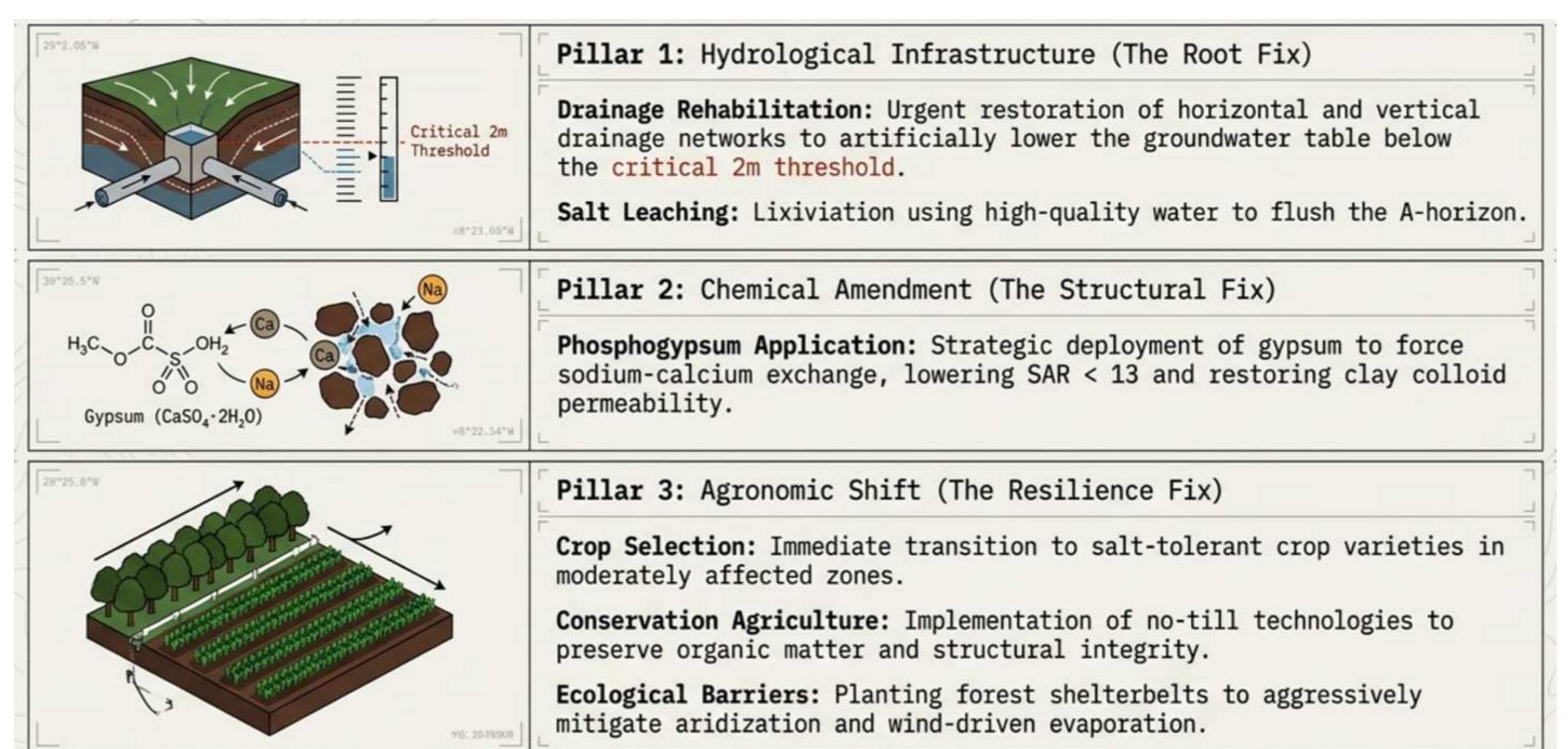
Material and method

The evaluation of the salinization process required an integrated approach, combining GIS spatial data with in-situ soil analyses. The methodology was based on multi-criteria analysis within a GIS environment, using a comprehensive set of cartographic resources: the Soil Map of Romania; the Map of Salt-Affected Soils and Soils Susceptible to Salinization in Romania; the Groundwater Map; the Landform Map; and the Climatic Map. Additionally, topographic maps were integrated as georeferenced images.

The soil health indicators selected for calibration included electrical conductivity (ECe), the sodium adsorption ratio (SAR), soil pH, groundwater depth, and groundwater mineralization. The calibration of these thresholds was performed by correlating GIS spatial data with laboratory analytical results and crop tolerance levels (VOICU et al., 2025).



Conclusions



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