Land degradation risk assessment using NDVI Landsat derived images – application in the hilly area of NE Romania

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Land degradation represents a complex concept to quantify, especially in today’s global context of climate change. During the last decades, a reduction of land quality has been recorded globally, and literature indicates that climate change and human activities are the most significant factors. To properly assess and mitigate this global problem, several remote sensing techniques are developed mainly to classify the grassland quality, which became a valuable indicator of the state of land degradation.

Nowadays, remote sensing indices are used to evaluate and predict scenarios in matters of land degradation state and evolution. Hence, land cover changes, desertification and deforestation, drought monitoring, soil erosion, and salinization are successfully analyzed using the Normalized Difference Vegetation Index (NDVI). This index is the most efficiently used vegetation indicator to detect the vegetation dynamics and other problem-related to this phenomenon.

Our study aims to analyze the grassland dynamic to assess the land degradation risk in the northeastern lowlands of Romania. During the last century, the area was characterized by successive land reforms that translated to a heterogeneous diversity of grassland exploitation. The socio-economic development has brought, besides land management deficiencies, many other problems related to land ownership, land abandonment, mowing frequency, or grazing intensity. To fulfill our objective, we use the 30m spatial resolution Landsat satellite archive within the Google Earth Engine platform to detect and monitor the regions with high fluctuation of the NDVI values. The investigated period starts in 2000 until 2021.

Correlating the historical background evolution of the land use in NE Romania, with the NDVI time series and the climatic data, has revealed that both human-induced activities and climate change are impacting the grassland dynamics. The mismanagement of the land use intensification process has led to degradation and irreversible changes inside the ecosystem.