

Drivers of Postsocialist Cropland Abandonment in Romania

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The collapse of the command economy fostered drastic changes in political and socioeconomic structures in Eastern Europe. It was accompanied by a restructuring of the farming sector, initiated by land reforms and massive ownership transfers of natural resources and capital assets. The transition from command to market-oriented economies drastically affected land ownership and land management in Eastern Europe and resulted in widespread land-cover and land-use changes.

The most pronounced change across Central and Eastern Europe is arguably the decrease in cropland. Traditional cultural landscapes --- often providing diverse habitats --- are increasingly lost where cropland becomes abandoned and agricultural biodiversity is threatened. On the other hand, when cropland converges to grassland or forests, large amounts of carbon may become sequestered, soil erosion risks decline, and ground water levels stabilize. Mapping the extent of cropland abandonment and understanding the underlying drivers for change are therefore of great concern.

In Romania, as in many former socialist countries, the transition to a market-based economy altered economic opportunities in all economic sectors and provoked rapid demographic processes. Massive ownership transfers were instigated to achieve a more efficient and equitable use of natural resources and capital assets in rural areas. As a result, extensive changes in land cover and land use, and in particular a decrease in cropland, have occurred.

We analyzed the causes of postsocialist cropland abandonment in Argeş County in southern Romania using integrated human-environment data. To derive the amount of cropland we used automatic image classification for the years 1990, 1995, 2000, and 2005. Abandoned areas were mapped using post-classification change detection. Total net abandonment was 515 square kilometers or 21% of the cropland in 1990. The rate of cropland abandonment was strongest in areas dominated by small-scale farming, namely the hilly and mountainous segments of the study area.

Land-cover data were integrated with spatially explicit geophysical indicators and socioeconomic variables to estimate the determinants of cropland abandonment using spatially-explicit logit models. To arrive at equal rates of cropland change, we analyzed the drivers of cropland abandonment for two periods (1990 to 1995 and 1995 to 2005). The models were estimated for three elevation subgroups to account for the distinct patterns of change at varying topographic settings. We control for spatial autocorrelation in the data and include variables that capture the heterogeneity of cropland as an additional driver for abandonment.

Results suggest that isolated cropland patches were more likely to become abandoned than areas with larger clusters of cropland. Adverse topography was an important determinant of abandonment in the plain and, to a lesser extent, hilly areas, but not in the mountains where locations with adverse markets access and higher plot fragmentation were under higher threat of cropland abandonment. In sum, the results suggested that abandonment is widespread throughout the study area, spurred by topographic complexity, temporary and permanent population losses, and various factors affecting the profitability of agriculture. The rate of abandonment was highest in areas where small-scale farming and traditional cultivation techniques are prevalent. From a biodiversity perspective, the maintenance of farmland under cultivation may warrant significant external inputs in areas where farmland possess high inclusive nature values.

Keywords: Cropland abandonment; spatial model; integrated analysis; Landsat; Romania.