Introduction

Shrub encroachment and agricultural intensification have been a widespread land use and land cover change in the former communist and socialist countries of Central and Eastern Europe, especially after the collapse of socialism in the early 1990s. Such changes have strongly affected grassland areas which are seen as hotspots of biodiversity in Europe. In this study we have investigated the changes in grassland cover as well as drivers behind those changes in a selected region in Northern Croatia during the post-socialist transition. By using the mixed methods approach we combined remote sensing, statistical modelling and a household-based questionnaire (n=285) to map the changes in the grassland cover and to assess the underlying socio-economic and demographic drivers of the documented changes.

Materials and methods

The detection of bio-physical changes in land use and land cover is based on the unsupervised classification of Landsat TM and ETM+ satellite imagery for 1991 and 2001, respectively. The analysis was conducted using ESRI Arc Map 10.0 and TNTmips software. The images were classified by way of the unsupervised fuzzy classification method, and then classified into “grasslands” and “arable land” by analysing histograms and using auxiliary information such as geographic orthophotos from the Croatian State Geodetic Administration database. The data on forest cover and other types of cover were incorporated from previous research and the images were subsequently filtered by using a 3x3 mask filter. An overall correctness of 81% was achieved with K > 0.7.

Subsequently links between changes in land use and cover and potential environmental and socio-economic drivers of those changes were examined by multiple regression analysis. The nature of these established links was examined through a detailed questionnaire survey conducted on a structured random sample of 285 households in four municipalities.

Results

The Fuzzy C classification of the visible and the near IR Landsat images of the County have demonstrated a 2% loss in grassland areas in the 1991-2001 period. However, in the studied period only 40% of grasslands did not undergo any transitions while the remaining 60% are linked to different types of land use and land cover transitions. The biggest loss in grassland areas was recorded due to expansion of arable land in certain areas (+96 km²) and the biggest gain due to abandoning arable land in other areas (77 km²). This accounted for 2% of all changes in grassland areas. An overall grassland cover gain has been recorded at higher altitudes (> 400 m) and on steeper slopes (>12°) while at all other altitudes and slopes an overall loss has been recorded.

Conclusions

The traditional agricultural system based on small landholding and cattle herding, typical for rural areas throughout Yugoslavia, has survived 50 years of socialist experiments which favoured industrial development over agriculture. After the demise of socialism, changes such as the liberalization of the market and a lack of agricultural subsidies have had a major impact on traditional agricultural practices. The so-called “peasant-workers” have aged and are slowly abandoning agriculture, while new generations, brought up in different social and economic circumstances are increasingly without any agricultural experience. Traditional forms of cattle herding are suffering from farmland conversion, demonstrating that both socio-economic and bio-physical variables are influencing land cover change in the region. The questionnaire survey has shown that the registered changes are in part consequences of households’ adjustment to the new realities of ageing members, lower prices of agricultural produce, and increase in education levels. Such adaptations include geographic factors as well, such as distance from populated centres and accessibility of the land.

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Literature


