Geophysical Research Abstracts
Vol. 21, EGU2019-4965, 2019
EGU General Assembly 2019

Climatic and socio-economic effects on land cover changes across Europe: Does protected area designation matter?

Niels Hellwig (1,2), Ariane Walz (1), and Danijela Markovic (2)

(1) Potsdam University, Institute of Environmental Sciences and Geography, Germany (niels.hellwig@uni-potsdam.de), (2) Osnabrück University of Applied Sciences, Faculty of Business Management and Social Sciences, Germany

Land cover change is a dynamic phenomenon driven by synergetic effects of various socio-economic and biophysical processes. It involves massive transitions from natural to less natural habitats and thereby threatens ecosystems and the services they provide. To retain intact ecosystems and safeguard important ecosystem functions, a dense network of protected areas has been established throughout Europe. However, recent studies suggest that even protected areas and in particular the zones around protected areas undergo land cover changes. The aim of this study is to compare land cover changes in and around protected areas and to investigate how land cover changes are related to climatic and socio-economic factors.

We analyse land cover changes across Europe from 2000 to 2012 considering three area types (protected areas, non-protected areas, 1 km protected area buffers), four spatial aggregation levels (biogeographical regions, countries, regions on NUTS3 level of the European Nomenclature of Territorial Units for Statistics, local administrative units) and six major change processes (urbanisation, afforestation, deforestation, intensification of agriculture, extensification of agriculture, water bodies construction). At the NUTS3 and at the local scale, we utilise a data-mining approach based on boosted regression trees to model relationships between land cover changes and climatic and socioeconomic factors.

Our results show that land cover changes were most frequent in 1 km protected area buffers (area of 3% affected as compared to 2.7% in all non-protected areas). As protected areas are closely interrelated with their surroundings, these findings indicate a threat also to ecological functions provided inside protected areas. Land cover changes inside protected areas still arose on an area of 1.5%. In some parts of Europe, up to 25% of land cover changes in protected areas resulted from urbanisation and intensification of agriculture, processes that can clearly be attributed to human activities. The modelling results reveal a distinct relationship between land cover changes and a combination of influencing factors. Coarse-scale patterns (NUTS3 level) of land cover changes were the closest connected with demographic factors, whereas fine-scale patterns (local level) were most related to the general east/west economic gradient and the north/south climatic gradient. Modelling climatic and socio-economic effects on land cover changes in protected areas and beyond has high potential for monitoring the effects of anthropogenic activities and environmental dynamics on conservation success across Europe.