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Mapping and assessment of future land use change impacts on habitat quality in Lithuania

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Abstract

Human activity is directly responsible for land use and land cover changes, affecting different ecosystem services. Thus, from the perspective of land use management is critical to project potential future land-use changes. This study aimed: (i) to detect possible changes in land-use structure in response to different four scenarios, namely: business as usual, urbanization, afforestation and land abandonment, and agricultural intensification scenario; and (ii) to measure the landscape habitat quality (an ecosystem services proxy) according to those projected futures. We selected as case study Lithuania due to the potential future increased human pressures on the landscape, and due to the high landscape value of this territory. The projected year was 2050, and we used the Cellular Automata method (applying the Dinamica EGO software) to project future land-use changes, and the InVEST model to assess the habitat quality. The land-use scenarios outcomes were validated using a fuzzy comparison function, and 80% of accuracy was achieved (comparing a simulated land use map of 2018, and the observed map for the same year). The results showed that the agricultural intensification scenario represents the greatest predicted landscape deterioration (from 0.71 in 2018 to 0.64). In the urbanization scenario, the highest landscape degradation prediction is identified around the most important cities (Vilnius, Kaunas, and Klaipėda). In the opposite direction, the afforestation and land abandonment scenario show the highest improvement on the habitat quality, from 0.71 in 2018 to 0.74.

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