

Land use changes in the Carpathians 1819 – 2018: how many forests remain

Kuchma, Tetyana; Furdychko, Orest; Tarariko, Oleksandr; Landin, Volodymyr
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Over the last 200 years the Carpathian region experienced several major political transformations from Habsburg Empire to World Wars and Soviet Union expansion and collapse, which brought forth significant land-use and forest cover changes and fragmentation [1]. The aim of the research is to quantify rates and spatial patterns of forest cover change in response to socio-economic transformations. The historical land use dataset [1] of the Carpathian region (1819-1980) from digitized historical maps of three time periods: Habsburg period (1819 – 1873), World Wars period (1923 –1945), Socialist period (1950–1980) was used supplemented by land cover data derived from recent satellite images (2014-2018).

A set of landscape metrics was applied for forest cover fragmentation assessment of each time period and the efficiency of ten landscape metrics was confirmed, in particular: the largest fragment index, the edge density index, core area index, Shannon diversity index, Simpson's evenness index, contact index, the circle index, patch density index, the proximity index and the cohesion index. The map of forest cover change magnitude was developed highlighting the unchanged forest areas over the last two centuries, according to the historical maps. This data was compared with statistical information of State Forest Resources Agency of Ukraine on primeval forests and protective forest areas in administrative districts of Ukraine.

These results confirm the efficiency of landscape metrics as a tool for forest structure monitoring, modeling and comparing the different land-use scenarios.

Juraj Lieskovský, Dominik Kaim, Pál Balázs, Martin Boltžiar, Mateusz Chmiel, Ewa Grabska, Géza Király, Éva Konkoly-Gyuró, Jacek Kozak, Katarína Antalová, Tetyana Kuchma, Peter Mackovčin, Matej Mojses, Catalina Munteanu, Krzysztof Ostafin, Katarzyna Ostapowicz, Oleksandra Shandra, Premysl Stych & Volker C. Radeloff (2018) Historical land use dataset of the Carpathian region (1819–1980), *Journal of Maps*, 14:2, 644-651, DOI: 10.1080/17445647.2018.1502099