

Europe is currently facing dynamic land use changes. On one hand, we can observe settlement development, very often connected to urban sprawl, while on the other hand, the process of land abandonment, leading to forest cover increase, can be observed all over the continent, especially in mountain areas. The above-mentioned processes lead to an increase of the zone located on the neighborhood between human-dominated landscape and natural areas, i.e. forests, often called in the scientific literature as Wildland-Urban Interface (WUI). Recently researchers indicated that WUI areas are prone to human-wildlife conflict. One of the regions in Europe, where we can observe dynamic land use changes and at the same time, where recovery of large carnivores can be observed is the Polish Carpathians. Although a lot of research indicates the directions of recent land changes, little is known about the impact the changes had and have on: a) WUI creation, b) its influence on human-wildlife conflict. This project aims at explaining the role of land use changes in the Polish Carpathians on WUI creation and development, in order to verify whether WUI existence influences the frequency of human-wildlife conflict in the area. Specifically, the project will answer the respective research questions:

[1] What explained the spatial pattern of WUI in the past and explain it currently and how strong is a legacy effect in WUI existence over time?

[2] Does the human-wildlife conflicts in the Carpathians happens more likely in WUI than in other areas?

To answer the first research question [1], detailed WUI maps will be produced for the whole territory of the Polish Carpathians for two periods – for current times and for the mid-19th century, the time, when the forest cover was at its minimum. The method of WUI mapping for both time periods will be in line with the most common WUI definition proposed by the US Department of Agriculture, where building density, forest proportion and forest patch sizes are taken into account. According to this methodology, there are two kinds of WUI: a) interface WUI where the settlement abuts the wildland vegetation, and b) intermix, where scattered houses intermingle with wildland vegetation. WUI pattern will be verified based on spatial determinants' analysis conducted separately for mid-19th and current WUI. The mid-19th century WUI determinants have to be analysed based on the historical socio-economic data incl. land ownership structure, population data or accessibility data. Respective socio-economic data were already collected. The data for the current period are also available. The drivers will be defined based on a set of methods including exploratory regression analysis aiming at best subset selection and geographically weighted regression, accounting for the spatial character of the phenomenon. Being aware that historical land use implies a strong legacy effect for current situation, apart of mid-19th century and current WUI, for five selected case studies, the maps of 1970s WUI will be produced and will be distributed in the study area, based on the large carnivores occurrence (e.g. Beskid Żywiecki, Beskid Sądecki, Beskid Niski, Bieszczady). The 19th century and 1970s WUI maps, will help in defining the long-term (since 19th century) and short-term (since the 1970s) legacy effect of WUI existence currently, in the regions with different land use history.

In order to answer the second research question [2], the project will analyse the occurrence of damages done by three protected species of large carnivores living in the Carpathians – brown bear, wolf and lynx. Data on the damages and compensations will be collected from the Regional Directorates of the Environmental Protection in Katowice, Kraków and Rzeszów, in order to cover the whole territory of the Polish Carpathians. The data will be analysed by employing the models of spatial and spatio-temporal clustering, similar to those used in e.g. crime mapping or hot-spot analysis, in order to answer the question of WUI impact on human-wildlife conflict. Spatio-temporal GIS analysis offers also an opportunity to answer the question, whether the damages done by predators are clustered not only in space but also in time. To verify it, the techniques indicating near-repeat victimization (if the damages are happening more often in a relatively short period of time) available in GIS software, will be used. The results will help in defining the spatial planning policies helpful in decreasing human-wildlife conflict occurrence, humans' attitude towards large carnivores what influences and the conservation efforts. It matters not only for countries, where large carnivores are already abundant, but also in the countries, where they might appear in near future.