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Importance of the Remote Sensing Image Analysis for Mapping Forest Land Cover in Šumava National Park

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belonged to soil organic horizons of plot SP3. In native forest soil (SP1), it is 1.2 and in plot SP2 1.5 times as less compared to plot SP3. In mineral horizons of soil, the W values are 4–5 times as less than those in forest litters. The reverse dependence was found for mineral soil horizons, the highest metabolic activity belonged to native forest soil (1367 ± 1021) and the lowest – to soil of plot SP3 (424 ± 53). At plot SP1, SMCs of organic and mineral horizons had close total consumption values. Mineral horizons differed from forest litters only by a less active assimilation by microorganisms of pentoses and oligosaccharides and a better assimilation of aminoacids, polymeric (starch, dextrane, tween-80) and nitrogen-containing compounds. At plot SP2, the intensity of substrata assimilation decreased in all horizons. At plot SP3, it was characterized by an increased assimilation by microorganisms of oligosaccharides, aminoacids, polymers and nitrogen-containing organic compounds. SMCs at plot SP3 had higher values of Shannon index (5.1–5.4) and d (0.05–0.2) indices responsible for a stable status of soil microbe system. Unfavorable ecological conditions in podzolic soils at early after cutting succession stages due to temporal over-moisture, development of gleyzation processes, and high acidity of upper soil horizons hampered development of soil microbe complexes at early succession stages (newly-cut areas) that gradually re-covered at later stages ('old' secondary forests).

Key words: cuttings, functional diversity, microbiota, multi-substrate testing, podzolic soils, taiga forests.

IMPORTANCE OF REMOTE SENSING IMAGE ANALYSIS FOR MAPPING FOREST LAND COVER IN ŠUMAVA NATIONAL PARK

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The study area is Šumava National Park (ŠNP), the largest of the four national parks located in the south-west of the Czech Republic, established as a special regime of environmental protection. A unique mosaic of forest habitats of exceptional natural value of European-wide significance, the ŠNP represents the largest terrestrial significant part of the Natura 2000 network in Czech Republic and Germany with unique mosaic of forest biotopes, rare, endemic and endangered species. It forms one of the largest forested areas between the Atlantic Ocean and the Ural. Recently, the ŠNP experienced changes in the landscapes and ecological community dynamics due to both natural climate changes and human impacts. Some parts of ŠNP are deforested and used for agriculture in the last decades. Most of the fields and meadow areas have been abandoned. Many species are threatened by the land-use changes. During the last decades some ecosystems' components are being gradually changed, degrading, some

endangered, rare, unique and important species are under extinction. As a result, the vegetation in the forest ecosystems is gradually changing and degrading. Human effects include fragmentation, and deforestation of original floodplain forests. Therefore, the questions of environmentally sustainable management is highly important and the future of nature conservation of ŠNP caused discussions and worries. Current paper contributes to the environmental mapping of this precious forest area. The research aim was to analyse how the forest landscapes has changed from 1991 up to 2009 (18-years) using remote sensing data and GIS. The data include GIS layers: raster Landsat TM images and vector thematic layers in ArcGIS format. Technically, the GIS project was made in Quantum GIS environment. Methodologically, spatial analysis was used to test the importance of the land cover changes in forest areas. The results include two maps showing the geographic distribution of land cover types within the 18-year period. The results visualized forest landscape dynamics in 1991 and 2009. They demonstrated effective application of QGIS software with multi-source geospatial data for environmental mapping of precious forest areas. The combination of remote sensing data and GIS tools for pattern recognition proved to be effective for geo-botanical forest research.

Key words: biogeographic mapping, forest conservation, landscape monitoring, spatial analysis.

DEVELOPMENT OF A HYBRID FOREST MAP USING UKRAINE AS A CASE STUDY

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The development of a high resolution forest cover map is a relevant task for countries that have not produced their own regional products (e.g. Eastern European countries such as Ukraine and Russia). During the last two decades, a number of global land cover products as well as global forest maps have emerged. However, the accuracy of these maps can vary considerably over space. Data fusion methods allow geographical information from available forest maps and ground-based data to be combined in order to produce a hybrid product of higher accuracy than any of the individual input maps. Here we have applied the method of geographically weighted regression (GWR) to generate a