Abstract

The topic of the doctoral thesis is the development of a comprehensive classification of global environmental systems based on a geographical synthesis of abiotic, biotic and anthropogenic factors. The dramatic changes in the Earth's natural environment, the noticeable loss of biodiversity and the increasing impact of human activity in many different aspects raise the need for a comprehensive classification that provides an appropriate spatial framework for assessing the impacts of these changes.

Several global classifications have been developed in the past, but most of them only work with various natural environmental gradients (especially climate or relief). However, most regions of the world have been so fundamentally affected or even completely transformed by human activity that the omission of anthropogenic factors in comprehensive environmental classifications may lead to erroneous conclusions. For this reason, new global environmental classifications have recently begun to emerge abroad that attempt to deal with anthropogenic changes to the natural environment and include them in a comprehensive assessment. The proposal of a methodology and the actual creation of the classification of global environmental systems based on abiotic gradients, biodiversity distribution and spatial differentiation of human influence is the main objective of the presented thesis. The classification is based on 22 datasets characterising abiotic, biotic, and anthropogenic factors. These factors include climatic conditions, relief characteristics, species richness of fauna and flora, land cover, population density, intensity of agricultural use, etc.

The input abiotic rasters underwent a principal component analysis (PCA) as a first step. The resulting multiband raster was subsequently subjected to a segmentation process which, after further modifications, resulted in a layer of 18,554 segments. The values of all abiotic, biotic and anthropogenic indicators were calculated for each segment, as well as the land cover was analysed for each segment. The next step was to perform a cluster analysis resulting in three classifications of abiotic, biotic and anthropogenic conditions, each with ten classes. The abiotic and biotic classifications were synthesised to form the classification of natural conditions, and its subsequent combination with the anthropogenic classification resulted in the final global environmental systems classification, comprising a total of 169 global environmental systems classes.

The distribution of biodiversity is significantly affected by global anthropogenic environmental transformation. The concept of biodiversity hotspots captures biodiversity gradients, as well as the degree of threat and the urgency of conservation. Biodiversity hotspots are regions where large numbers of often endemic species face enormous losses

of their original habitat due to intensive human activities. The different sub-classifications – abiotic, biotic and anthropogenic – as well as the final classification of global environmental systems were analysed for each of the 36 biodiversity hotspots and for the hotspots as a whole. The results indicate that globally important hotspot areas are more threatened by various types of human activity than the rest of the world. Additionally, the most valuable biodiversity hotspots are currently experiencing significant anthropogenic impacts.

Key words: classification, anthropogenic transformation, global environmental systems, biodiversity hotspots