Geophysical Research Abstracts
Vol. 17, EGU2015-980, 2015
EGU General Assembly 2015

Geomorphometry-based method of landform assessment for geodiversity

Alicja Najwer and Zbigniew Zwoliński

Institute of Geoecology and Geoinformation, Adam Mickiewicz University in Poznań, Poland (alijas@amu.edu.pl; zbzw@amu.edu.pl)

Climate variability primarily induces the variations in the intensity and frequency of surface processes and consequently, principal changes in the landscape. As a result, abiotic heterogeneity may be threatened and the key elements of the natural diversity even decay. The concept of geodiversity was created recently and has rapidly gained the approval of scientists around the world. However, the problem recognition is still at an early stage. Moreover, little progress has been made concerning its assessment and geovisualisation. Geographical Information System (GIS) tools currently provide wide possibilities for the Earth's surface studies. Very often, the main limitation in that analysis is acquisition of geodata in appropriate resolution.

The main objective of this study was to develop a proceeding algorithm for the landform geodiversity assessment using geomorphometric parameters. Furthermore, final maps were compared to those resulting from thematic layers method.

The study area consists of two peculiar valleys, characterized by diverse landscape units and complex geological setting: Sucha Woda in Polish part of Tatra Mts. and Wrzosowka in Sudetes Mts. Both valleys are located in the National Park areas.

The basis for the assessment is a proper selection of geomorphometric parameters with reference to the definition of geodiversity. Seven factor maps were prepared for each valley: General Curvature, Topographic Openness, Potential Incoming Solar Radiation, Topographic Position Index, Topographic Wetness Index, Convergence Index and Relative Heights. After the data integration and performing the necessary geoinformation analysis, the next step with a certain degree of subjectivity is score classification of the input maps using an expert system and geostatistical analysis. The crucial point to generate the final maps of geodiversity by multi-criteria evaluation (MCE) with GIS-based Weighted Sum technique is to assign appropriate weights for each factor map by determining the incoherence of the pairwise comparison matrices. The widely accepted rule of inconsistency is according to Saaty's ratio.

The accuracy of the obtained final maps is strongly influenced by: the quality of the raw data and the cell size of the basic assessment. Furthermore, it can be stated that selected parameters: Topographic Position Index, Topographic Wetness Index and Total Incoming Solar Radiation could be a relevant choice for geodiversity assessment. The remaining ones are characterized by certain linear correlation and therefore their validity in the weighting process was lower. Geodiversity assessment method based on the geomorphometric parameters provides results at a level similar to the method using thematic layers. What is more significant, it is much less labor-intensive and does not require a whole set of geodata. Recognizing parts of the territory that are the most vulnerable to changes turns out to be very crucial for management and planning of natural protected areas. The proposed methodology meets these proposals well.