

EGU22-9007

<https://doi.org/10.5194/egusphere-egu22-9007>

EGU General Assembly 2022

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



Geodiversity assessment with global and local S-MCA in different landscapes based on expert and crowdsourcing data

Zbigniew Zwoliński¹, Alicja Najwer¹, and Piotr Jankowski^{1,2}

¹Department of Geoinformation, Institute of Geoecology and Geoinformation, Adam Mickiewicz University in Poznań, Poznan, Poland (zbow@amu.edu.pl)

²Department of Geography, San Diego State University, USA

The term geodiversity was proposed in the 1990s, however there is still a noticeable lack of established conceptual and methodological framework for geodiversity assessment. In its absence, various geodiversity assessment methods have been proposed. They can be categorized, based on data sources, into direct and indirect, and based on the assessment procedure into qualitative, quantitative, and mixed (qualitative-quantitative). Each of these categories introduces an ambiguity by relying on expert judgment or interpreted geodata rather than on direct measurement. Despite the impressive number of different terrain-specific studies, there has been a conspicuous absence of comparative studies testing the efficacy of geodiversity assessment methods across different types of terrain characterized by differences in morphology, morphogenesis, and relief energy.

Therefore, we have selected three different national parks represent different landscape types: mountains (Karkonosze National Park), uplands (Roztocze National Park), and lowlands (Wolin National Park). Input datasets included 1 m DEM and thematic map layers: lithological, geomorphological, hydrographical and soils features as well as CORINE Land Cover. The presentation reports on geodiversity assessments performed independently by experts and volunteers as crowdsourcing analytical data. A potential strength of the crowdsourcing approach over the expert-based approach is that the former minimizes subjectivism, which is a common critique of expert-based environmental valuation, including the subject of our research - geodiversity assessment. Using the DEM data and *r.watershed* tool, the 1-order catchments were delineated for the national parks (KNP 212, RNP 403, WNP 289) and used as spatial units for geodiversity assessment. The use of catchments instead of squares, grid cells or arbitrary polygons is a new approach in geodiversity assessments. The expert and volunteer assessment data sets were separately processed with two spatial multicriteria methods: Weighted Linear Combination (WLC) - also referred to as the global version of WLC, and Local Weighted Linear Combination (L-WLC) resulting in two geodiversity maps for each of the parks. More over we used two scenarios. Under the first scenario, called the expert-based scenario, an expert familiar with the study area or a group of experts classifies the individual abiotic components of geodiversity and assigns them weights instrumental for computing a geodiversity score. In the second scenario, called the crowdsource-based scenario, multiple individual ratings concerning the abiotic

components of geodiversity and their weights are collected and aggregated to yield a corresponding geodiversity score. The maps were qualitatively evaluated for their efficacy of capturing spatial heterogeneity and differentiating between high and low geodiversity of specific areas within the national parks. The expert-based maps were compared with the volunteer-based maps using statistical measures of association and similarity: Spearman's correlation coefficient, the Jaccard similarity index, also known as Tanimoto index, and the relative Manhattan similarity.

The results show that L-WLC is more suitable for geodiversity mapping of mountainous areas characterized by high morphogenetic and morphometric diversity whereas WLC yields better results in less diverse areas such as uplands and lowlands. The use of data originating from volunteer-based assessment requires meeting internal and external data quality standards and should be treated with caution.