ASSESSMENT OF LANDSCAPE VULNERABILITY IN THE CZECH-SLOVAK BORDER REGION USING NATIONAL APPROACHES

HODNOCENÍ ZRANITELNOSTI KRAJINY V ČESKO-SLOVENSKÉM POHRANIČÍ S VYUŽITÍM NÁRODNÍCH PŘÍSTUPŮ

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Abstract

The effects of climate change are evident worldwide and have various environmental, social, and economic impacts. The fundamental principle of mitigating these impacts is to understand the causes, identify vulnerable areas, and propose appropriate adaptation and mitigation measures. These steps must respect the character of the landscape being assessed.

Landscape research is very often limited by administrative national borders, which certainly do not correspond to the boundaries of ecosystem units. However, natural processes and other driving forces of landscape change operate in a broader context and must be analysed within logical, functional, and natural boundaries. This is doubly true for research on climate and its manifestations.

Landscape processes not only along the Czech-Slovak border do not recognize administrative boundaries; rather, they take shape and exert their influence based on natural conditions and the locally specific nature of land use. Analyses and adaptation measures implemented within the boundaries of administrative units are therefore insufficient and do not yield the expected benefits for the landscape or human society, partly due to the mutual interaction of various measures implemented in neighbouring areas.

Currently, there are important methodological procedures (applications) for landscape vulnerability assessment on both sides of the border Czech-Slovak Republic border. In Slovakia it is the application "Horia obce" and in the Czech ESAI+. However, both

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approaches focus only on their territories, taking into account administrative borders and the availability of national datasets. However, the European Commission aims to coordinate and link data, especially on the living environment. In line with this objective, it is therefore desirable to prepare analyses (data, knowledge base) that take into account the manifestations and connections of entire natural units on the Czech-Slovak border, regardless of national borders.

Therefore, the two methodologies were first compared in terms of the assessment concepts and data used. In the next phase, both methodologies were applied first in the home territory and then in the opposite territory, and seamless maps of the entire cross-border area were created and integrated into a publicly accessible map portal. The methodologies and their applicability were evaluated using the SWOT analysis.

This phase was followed by the development of a new, unified methodology for assessing landscape vulnerability. In the first phase, the individual components of the vulnerability equation, based on the Intergovernmental Panel on Climate Change (IPCC) concept, were defined as vulnerability matrices. A vulnerability matrix is a tabular breakdown of the individual components of the vulnerability equation (Exposure, Sensitivity, Regulatory/Adaptive Capacity) for individual causes of vulnerability, which serves as an ontological concept for the analytical solution itself. Our unified strategy is currently based on five matrices representing the main causes of vulnerability: heat waves, drought, loss of natural habitats, insufficient regulation of extreme flows, and loss of soil fertility. Each matrix was then populated with individual indicators across all three components.

The next step was to define, prepare, or create suitable data sources that were available for the entire territory. In particular, characteristics documenting the current state of the landscape (habitat map, the degree to which ecosystem functions are fulfilled and the landscape's resilience, the degree of land cover and its changes over time, current land cover, the degree of connectivity, the occurrence of clearings, vegetation height and density, albedo, surface overheating, and soil moisture conditions) were completely re-processed at high spatial resolution (habitat level or 10 m/px) for the entire study area in a uniform manner.

Further processing of these data resulted in unique indicators of the sensitivity and adaptive capacity of the landscape in the Czech-Slovak border region at a very high level of spatial detail, and they enable the proposed methodology to be applied uniformly anywhere within the territory. The resulting values for the components and vulnerability itself are evaluated in the form of Level 10 hexagons according to the international H3 grid (area: 1.51 ha).

The results of the analyses are available on the *JIZKES* map portal. The outputs also include methodological guidelines and tools for selecting appropriate adaptation measures.

Keywords: vulnerability, landscape, climate change, spatial analyses, adaptation measures, data harmonization

Kľúčové slová: zraniteľnosť, krajina, klimatická zmena, priestorové analýzy, adaptačné opatrenia, harmonizácia dát