# BOOK REVIEW

**Hoechstetter, S.:** ENHANCED METHODS FOR ANALYSING LANDSCAPE STRUCTURE. Landscape metrics for characterising three-dimensional patterns and ecological gradients. Fernerkundung and angewandte Geoinformatik, Band 6, TU Dresden, Rhombos-Verlag Berlin, 2009, 182 p. ISBN 978-3-941216-13-6. Paperback, 32,8 EUR.

One of the central goals of landscape ecology is relativ spatial patterns to ecological processes. Therefore, effective methods for measuring landscape structure are needed. One of the most widely used approaches in this context is the patch-corridor-matrix model, which regards landscapes as being mosaics made up of different units or elements (patches). Landscape metrix are used for quantifying the composition and configuration of these mosaics. But this concept is connected with a number of problems. In this work, two main deficiencies of the concept are identified and dealth with in detail.

The first issue refers to the fact that the third spatial dimension (elevation) is largely neglected and cannot be analysed using standard landscape metrix. The landscape is perceived as being a flat surface regardless of the underlying relief. Thus, information about ecologically relevant terrain features is lost. Moreover, it is shown that landscapes with a variable relief, the calculation of common landscape metrix can lead to erroneous results, since the planimetric projection of landscape elements leads to underestimation of their area and perimeter as well as of the distances between them.

The second problem associated with the patch-corridor-matrix model is the fact that it requires clearly defined landscape elements with sharp boundaries as a basis for calculating landscape metrix. However, in many cases environmental parameters appear in the form of ecological gradients rather than as categorical patterns. Thus, the concept can be regarded as oversimplifying in certain situations.

In this research study, these deficiencies are dealt with in detail and possible methodical solutions are presented. This way, this work is meant to contribute to an improved concept of landscape structure analysis in order to meet the challenges posed by the complexity of landscape ecological problems. It addresses the needs of both scientists and practitioners in this field.

Sebastian Hoechstetter in his study focuses on the critical analysis of structural parameters of landscape metrix as adapted during the last twenty years under the so-called patch-corridor-matrix model. Extraction of signifiant weaknesses of the model should lead to an adaptation and to the extensit of structural measures with special regard to the systematic integration of the third dimension of the coordinative determinativ of position, shape, extensit and heterogenity of landscape elements and their respective degree of correlation.

It is surprising that quantitave landscape ecology up to now did not pay sufficient attention to this matter. The scientific vacuum is thus significant and needs to be filled with reliable research results. Sebastian Hoechstetter provides a wide spectrum of relevant research work in order to minimise this deficit. Consideration of parameters of relief energy firstly relies to simple components of structural measures like distance, area, circumference, but also to more complex entities such as heterogenity of relief (roughness) and related changes in texture of landscape elements. In this regards the textural measure of lacunarity, which was implied by fractal geometry, is specifically highlighted. This topic is not at all new, but extended applications for a better description of the three-dimensionality of ecological gradients towards consideration of the fact that transitions between ecological, geographical and environmental units are continua are lacking till now. This fact does not

only concern the relations between landscape elements and land use classes (fuzzy logics), but also the variations in multi-scale levels of analysis to the point of the dispersion of populations in respective distribution areas. Statistically simplified the existence of an ecological gradient can be described by the decrease of variance in function of increasing distance to the respective reference entity (landscape element, habitat)

Generally advanced technologies of very high resolution three-dimensional spatial data acquisition like airborne laser scanning (LiDaR) and extended storage, maintenance, retrieval and analysis capacities of 3D-geodata in a GIS environment push the intensification of research towards the integration of these new dimensions of data analysis and data visualisation. The presented study satisfied these needs to a large extent. It serves as a most valuable and scientifically relevant add-on in research an the development and application of landscape metrics in very high resolution three-dimensional landscape analysis. It is a matter of fact that the publication of this study will be welcomed by the respective research community.

***Petr Maděra****

* *Mendel University in Brno, Faculty of Forestry and Wood Technology, Department of Forest Botany, Dendrology and Geobiocoenology, Zemědělská 3,616 00 Brno, Czech Republic*