▪ Landscape Structure Model

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Abstract

To report on the state of the nature environment as requested for example by the sustainable development strategy of the European Union, information on the landscape and the underlying processes forming the landscape is needed.

In principle we can differentiate two basic approaches to analyse the processes forming the landscape. These processes can be measured directly using measurements of energy- and nutrient flows. Information on the processes can, on the other hand, be derived indirectly using landscape structure as main information source. The basic idea is that the landscape structure, i.e. what we see today, was produced by flows yesterday, resulting in a linkage between structure and processes (FORMAN 1995).

In this paper, we define the term “landscape structure” and discuss the processes occurring in different landscapes and the interactions between the landscapes. Different landscape types in Austria serve as an example for the discussion of this processes and relationships.

According to FORMAN and GODRON, 1986, *a landscape can be defined as a heterogeneous land area composed of a cluster of interacting ecosystems (landscape elements) that is repeated in similar form throughout.*

The basic unit of a landscape is the *landscape element*. A landscape element is a “*homogenous surface area that differs from its surroundings in nature or appearance*”(TURNER et al. 2001) or “*the smallest possible land unit that is a holistic unit which forms a patch or corridor* (FORMAN and GODRON 1986). Whether an observed area is homogenous or not, depends on the scale of observation. Using remote sensing images, we define homogeneity in relation to the pixel size. Details smaller than pixel size are not considered for the assessment of homogeneity. Therefore, the minimum size of observed patches is a few pixels. According to the shape of the landscape element we call a compact element *patch* and an elongated element *corridor.*

The mosaic of the predominating patch type or background cover is defined as the matrix.

This concept of patch – matrix – corridor was originally introduced by (FORMAN and GODRON 1986) and is a means to describe and to analyse the landscape processes.

The concept is based on the analysis of the spatial arrangement of the landscape elements. In other words, the structural pattern of patches, corridors and the matrix is used as major determinate of functional flows and movements in and through the landscape. The changes in landscape pattern are used as an indication for process changes over time.

This indirect measurement of processes in a landscape is referred to as spatially oriented analysis.

In contrast, the process oriented analysis consideres the processes based on the direct measurement of energy- and nutrient flows within a measurement unit, regardless of the spatial arrangement of the measurement units.

This linkage between structure and processes like the flow of energy and nutrients is important for the functions of ecosystems. Flows create structures but structures determines flows and movements (FORMAN 1995).

According to the landscape structure, different ecological functions of the landscape are provided. In this paper, Austrian landscapes are discussed to interpret the different ecological functions according to structural differences. For example, the process of forest fragmentation and the loss of stepstone biotopes leads to a varying arrangement of forest patches within an agricultural landscape. The change of this spatial arrangement of patches influences the ecological functions like the corridor function for the movement of red deer.

Literature:

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