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TOWARDS AN INTEGRATED STUDY OF LANDSCAPE PATTERN

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This poster introduces the research programme of the department of landscape ecology of the Research Institute for Nature Management. This programme should contribute to the study of spatial organization of landscape cells (ecotopes) and their interrelations, as a basis for planning and management of rural and natural landscapes.

Ecotopes are defined by vegetation homogeneity. Coinciding with this vegetation patch are a particular set of abiotic factors and a characteristic fauna. Through a network of within-ecotope relations these ecotope components are closely linked as a functional unit. However, an ecotope is anything but a closed ecosystem. Between ecotopes and the surrounding area (which is, in fact, an aggregation of ecotopes) another network of relations is effected by way of animals and abiotic factors. The nature of these between-ecotope relations is determined by the ecotope features and by the way the ecotopes are arranged. Through these between-ecotope relations, an assemblage of ecotopes constitute a functional system, called landscape.

A holistic study of the landscape as an ecosystem should begin with a survey of abiotic and biotic landscape patterns. On the basis of vegetation units and within-ecotope relations, ecotopes can be delimited and described. Therefore, part of our investigations is directed at relations between vegetation and abiotic factors and between vegetation and fauna. Research projects of this type are:

1. Relation between vegetation and physical and chemical properties of (ground)water, both on land (vascular plants) and in aquatic situations (diatoms).
2. Composition of fauna groups in relation to structure and composition of vegetation. Fauna groups presently studied are birds, amphibians, reptiles, and carabids.

The correlations between vegetation patterns, abiotic factors and fauna composition provide a basis for the analysis of between-ecotope relations. Current research projects are aimed at:

1. Effects of (ground)water flow and water chemistry for plant and diatom communities.
2. Significance of different types of edges as a biotope for plant and animal communities.
3. Occurrence of amphibians and reptiles as a function of landscape structure and ecotope arrangement.
4. Structure and composition of bird communities as a result of landscape structure and ecotope arrangement.

As an example, some remarks are made on the relations between birds and vegetation- and landscape structure. In different forest types it was tried to measure a number of structural features (e.g. coverage of

different layers, heterogeneity in coverage per layer and circumference of tree stems). Bird species densities were also measured and a set of bird parameters was calculated (e.g. total number of species, total density and density of ecological guilds). In a multiple regression analysis the variation in bird parameters could be explained by a set of structural features. In Oak-Beech forests the heterogeneity in the canopy-layer and plant species diversity were the main factors. In Pine forests, on the other hand, total coverage of all vegetation layers and coverage of bush-layer explained most of the variation in total number of bird species and total bird density.

Such results are used in studies at the landscape level. An area of about 10 km^2 is censused for bird territories. After grid transformation the area is divided into units with a more or less homogeneous bird community. The types of these units and their distribution over the area are then related to landscape pattern, e.g. vegetation type (including structural features), presence of ditches, hedgerows, isolated trees, arrangement of ecotopes and landscape heterogeneity.