

LANDSCAPE ECOLOGY

A sub-discipline researching in a holistic and systemic way the spatial structure of landscape, its elements and relations between them, as well as the functions performed in ecological processes.

The term "landscape ecology" was introduced in the 1930s by the German biologist and geographer Carl Troll. Inspired by aerial photography, he presented an inclusive approach, defining the subject of landscape ecology as a functional analysis of landscape contents and the changing relationships between them, taking into account human influence on this dynamic process. Similar intuitions were presented by the Russian researcher Vladimir Skachev, who proposed the term "geobiocenology" in the 1940s.

Landscape ecology is strongly embedded in two disciplines: geography and biology. From the point of view of the former, geoecology which examines the landscape and human activity as a whole is usually referred, while the latter's perspective takes into account geobiocenology or bioecology, which emphasises evolutionary processes. Due to the growing role of anthropogenic factors, i.e. human activity and presence all over the world, humanities are becoming increasingly important in the field of landscape ecology. A study focusing on social activity in relation to natural conditions is concerned with human ecology, while animal ecology - with the landscape related to the analysis of territorialism in animals. The International Association for Landscape Ecology (IALE) stresses the importance of biophysical and social factors in the creation of landscape diversity. For this reason, studies of landscape ecology are inherently inter- and trans-disciplinary in nature, although at the same time they are based on their own theoretical and methodological foundations. Landscape ecology helps to formulate postulates for the shaping and use of the environment, which is mediated by such fields as landscape architecture, spatial planning, forestry or nature conservation.

Within landscape ecology there are several perspectives depending on the main object of the analysis. Pietrzak indicates four areas: global, situating the landscape in the context of nature in general and its diversity; geo-complex, exploring natural complexes, defined as systems of related geo-components; structural-functional, focusing on time-spatial variables; ecosystem, understanding the landscape as a spatial equivalent of the ecosystem. The following approaches can also be distinguished: geographical, landscape and ecological, (eco)systemic, geo-ecological, spatial and ecological as well as environmental (application) approaches.

The key assumptions of landscape ecology concern landscape patterns and spatial structures, such as urban, rural and wilderness systems. It is not only about how much a share a specific component has in space, but also about how it is organised. Different characteristics of systems, generated and transformed both by the forces of nature and man, influence ecological processes, the explanation of which is sought by differentiating scales – from micro-ecology researching aphids and bees to macro-ecology operating with

continental dimensions. The most important element in choosing the scale is to determine the relation between spatial heterogeneity and the processes occurring in it or a variable that is interesting for the study.

Landscape ecology distinguishes four factors shaping spatial patterns: abiotic templates, biotic interactions, land use by humans and vegetative disturbances and successions.

Abiotic factors include: climate, understood as permanent and sustained weather conditions in a given region, terrain, understood as geological forms, e.g. valleys, plains and hills resulting from geological and geo-morphological processes, which together with climate influence the structure of soil and the type of ecosystem.

Biotic interactions include various relationships within and between plant and animal species. Interactions can lead to domination and homogenisation. If the dominant species determines the spatial pattern, it is referred to as the basic species, such as coral for the tropical coastline. There are also the so-called ecosystem engineers: one of them is the beaver, which by building dams and raising the water level changes the habitat surrounding its habitat.

Human use refers to the ways and purposes of using the land's resources, e.g. in industry, recreation or housing. Although man's influence on landscape ecology dates back to prehistory, it was only in the modern era that a decisive change in the nature of the terrestrial biosphere occurred as a result of human activity.

The last group of factors are disturbances and plant succession. A disruption is an incidental event that disrupts the ecosystem through changes in resource availability or population structure, such as fires or volcanic eruptions.

Landscape Ecology, which has been published continuously since 1987, is the leading journal on landscape ecology as a whole. Its current editor, Jianguo Wu, has identified 10 main topics of landscape ecology: (1) pattern (spatial structure) - scale relationship, (2) continuity and fragmentation of landscape, (3) scale and scaling, (4) spatial analysis and landscape modelling, (5) changes in land use and land cover, (6) impacts of history and landscape heritage, (7) interactions between climate change and landscape, (8) ecosystem services in a changing landscape, (9) landscape sustainability, (10) accuracy of estimation and risk analysis.

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