

Landscape ecological modelling as an image analysis knowledge base for the automatic extraction of cultural landscape elements

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Since thousands of years people have changed European landscapes, leading on the one hand to poor landscape structures under intensive agricultural use but on the other hand also to heterogeneous cultural landscapes with high biodiversity. One cannot simply equate anthropogenic landscape intervention with destruction. Over millenniums a complex interplay between man-made and natural influences has been achieved. As a historically grown, culturally affected and still rapidly changing part of the environment, cultural landscapes must be seen as a cultural heritage of mankind which should not be conserved in a static museum-like way, but must rather be protected in terms of a sustainable development. Because the monitoring of a sustainable landscape development is legally bound by European initiatives and directives (e. g. the Natura 2000 network of the European Union), there is an urgent necessity for objective, transparent and standardized systems to implement a large-scale and recurrent assessment of landscape conditions.

Currently this geodata acquisition is often done by manual digitizing, i.e. manually delineating natural boundaries and conditions. The automatic extraction of landscape elements can support these ambitions by expanding existing automatic image analysis models with landscape ecological parameters. This means a detailed definition of cultural landscape components and their ecological discrimination in order to assist the implementation of image-analytical algorithms. This implementation is realized within a cooperative project of the Institute of Landscape Ecology (ILÖK, University of Muenster) and the company EFTAS Remote Sensing Transfer of Technology GmbH (Muenster). The main focus is put on landscape elements as defined in the context of Cross Compliance and the Integrated Administration and Control System (IACS), two systems by the European Union. The landscape elements are extracted using an object-based hierarchical classification and an additional image analysis evaluation by surveying their textural information.

As an objective and standardised method to capture quantitative and qualitative landscape characteristics, the automatic extraction of landscape elements using a landscape ecological image model can support the monitoring, protection and development of a heavily structured cultural landscape.