Geophysical Research Abstracts
Vol. 15, EGU2013-13630, 2013
EGU General Assembly 2013

Hybrid geomorphological maps as the basis for assessing geoconservation potential in Lech, Vorarlberg (Austria)

Harry Seijmonsbergen (1), Mat de Jong (2), Niels Anders (3,1,3), Leo de Graaff (2), and Erik Cammeraat (1)

(1) Institute for Biodiversity and Ecosystem Dynamics, Universiteit van Amsterdam, Amsterdam , The Netherlands, (2) Research Foundation for Alpine and Subalpine Environments, Amsterdam, The Netherlands, (3) Department of Soil Physics and Land Management, Universiteit Wageningen, Wageningen, The Netherlands

Geoconservation potential is, in our approach, closely linked to the spatial distribution of geomorphological sites and thus, geomorphological inventories. Detailed geomorphological maps are translated, using a standardized workflow, into polygonal maps showing the potential geoconservation value of landforms. A new development is to semi-automatically extract in a GIS geomorphological information from high resolution topographical data, such as LiDAR, and combine this with conventional data types (e.g. airphotos, geological maps) into geomorphological maps. Such hybrid digital geomorphological maps are also easily translated into digital information layers which show the geoconservation potential in an area.

We present a protocol for digital geomorphological mapping illustrated with an example for the municipality of Lech in Vorarlberg (Austria). The protocol consists of 5 steps: 1. data preparation, 2. generating training and validation samples, 3. parameterization, 4. feature extraction, and 5. assessing classification accuracy.

The resulting semi-automated digital geomorphological map is then further validated, in two ways. Firstly, the map is manually checked with the help of a series of digital datasets (e.g. airphotos) in a digital 3D environment, such as ArcScene. The second validation is field visit, which preferably occurs in parallel to the digital evaluation, so that updates are quickly achieved.

The final digital and coded geomorphological information layer is converted into a potential geoconservation map by weighting and ranking the landforms based on four criteria: scientific relevance, frequency of occurrence, disturbance, and environmental vulnerability. The criteria with predefined scores for the various landform types are stored in a separate GIS attribute table, which is joined to the attribute table of the hybrid geomorphological information layer in an automated procedure. The results of the assessment can be displayed as the potential geoconservation map or as GeoPDF in a separate information layer.

The Lech example highlights the problems ski resorts in a fragile high-alpine mountain environment are facing. The ongoing development poses a challenge to the communities. Which place do the high-ranking potential geoconservation sites get in the landscape planning and management? Must they be sacrificed to the economic benefits of winter tourism or, conversely, can their value be exploited in summer tourism – or is their intrinsic value enough to justify protection?

Our method is transparent, takes into account the total landscape, and allows for rapid updating of the geodatabase. Evaluating the change in geoconservation potential over time, as a consequence of expansion of infrastructure or change in intensity of natural processes, is possible. In addition, model scenarios can be run to assess the impact of man-induced change on the potential geoconservation value of landforms.