A comparison of susceptibility maps created with logistic regression and SINMAP for spatial planning in the Lanzhou City, China

Shibiao Bai (1,2), Benni Thiebes (2), Rainer Bell (2), Thomas Glade (2), and Jian Wang (1)

(1) College of Geographical Sciences, Key Laboratory of Virtual Geographical Environment (Ministry of Education), Nanjing Normal University, Nanjing 210046, China (shibiaobai@njnu.edu.cn), (2) Department of Geography and Regional Research, University of Vienna, Universitaetsstr.7, 1010 Vienna, Austria

Lanzhou city, the second largest city in north-western China. Its vicinity is known as one of the most landslide-prone areas in China. Thus, landslide risk must be reduced by e.g. spatial planning strategies. Reliable landslide susceptibility maps are an essential part of such a strategy.

The study area is located upstream of the Yellow River and varies extremely in topography, population density, and relevant geological and geomorphologic processes.

Within this study, landslide susceptibility maps are produced by a) GIS-based logistic regression and b) stability index mapping (the SINMAP approach). A landslide inventory was set up and landslide characteristics such as frequency and distribution were analysed. The landslide inventory provides the basis for both modelling approaches. Herein, logistic regression (LR) is based on distance from drainage systems, faults and roads, slope angle and aspect, topographic elevation, topographical wetness index, land use and loess hydraulic and geotechnical parameters. SINMAP is a terrain stability model that combines steady state hydrology assumptions with the infinite slope stability model to assess susceptibility to shallow landslides.

The quality of the landslide susceptibility maps is validated and final maps of the different approaches are compared. Landslide susceptibility maps can be used for planning of protection and mitigation measures and provide the basis of the Lanzhou city landslide risk assessment.