

Abstract for: Gemeinsame Jahrestagung SGPBF, DGPF und OVG 19.-
21.06.2007 Muttenz / Basel

Quantitative erosion estimation in the rugged topography of the high Himalayas. Integrated approach.

Author:

Christoff Andermann, Remote Sensing Group
TU Bergakademie Freiberg, 09599 Freiberg
Tel: +49 179 4822053
E-Mail: christoff.andermann@gmail.com
Web: <http://www.geo.tu-freiberg.de/fernerkundung/>

Dr. Susanne Stadler, TU Bergakademie, Dept. Hydrogeology
Prof. Richard Gloaguen, TU Bergakademie, Remote sensing Group

Abstract:

Nepal and the Himalayas are among the tectonically most active areas in the world. Recent faulting and rock uplift are responsible for a rugged topography and a distinct relief. Summer monsoon, anthropogenic influences and the extremely high relief energy cause high erosion rates. In most of the areas along the Himalayan topographic front, erosion plays a crucial role in regional development. Remote sensing can contribute to a better understanding of the controlling processes. By using digital elevation models, time series of atmospherically and terrain corrected spectral satellite images (e.g. Landsat ETM+, TM, ASTER etc.) and vegetation index calculations (e.g. NDVI, SAVI, etc.), integrated in a GIS model, erosion can be quantified and classified according to its origin. Land use derived from supervised-, object-oriented- and SVM classification methods, in combination with annual soil loss data are powerful tools to estimate quantitative erosion rates for high mountain areas. Due to the active tectonic settings, the river gradient increases proportionally in response to uplift rate. Assuming tectonic uplift equals the erosion rate, the total soil loss can be evaluated from along-river profiles. Since the terrain in the Himalayas is very extreme and agricultural land use takes place exclusively on small scale terraces, high resolution terrain models are indispensable.

Due to precise reflectance corrections, high resolution modeling and target oriented classifications, combined with the integrative approach (in-situ measurement and ground truthing) of direct and indirect measured site factors (vegetation, slopes, aspects and soil types), very accurate land use maps will be computed. Utilizing the land use maps and quantitative river profile analysis, resilient information from the spatial repartition of erosion and implications for tectonic uplift are derived. Applying models on the basis of remote information techniques, in context with field data, consolidated findings for hardly accessible areas are possible.