

The Impact of Land use on Soil Resources in the Tajik Loess Hills - Remote Sensing contributing to Sustainable Land Management

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The foothills of central Tajikistan consist mainly of easily erodable loess deposits. In the 1990s, increasing poverty triggered by the civil war and the transformation of the economy led to wide-spread cultivation of steep slopes. In these areas water erosion is considered to be the fastest and most widespread soil degradation process. The overall objective of this study was to attain an improved understanding of the link between land cover / land use and soil resources, which will allow the identification of opportunities for sustainable land management in the loess hills of central Tajikistan. A specific focus was placed on the exploration of how GIS and remote sensing in conjunction with soil nearinfrared spectroscopy may contribute to planning and assessment of sustainable land management.

A soil spectral library was elaborated, which allows SOC content prediction for soil samples from the loess hills in a rapid manner and at low cost. Calibration between Landsat ETM+ satellite images and field observation of land cover classes, erosion occurrence and SOC content classes “low” and “high” was conducted using classification tree modeling. The resulting maps were linked in a hot/bright spot matrix.

The results of this study showed that large areas are affected by erosion, with 21% of the study area being classified as degraded and 24% as degrading areas. Distinctly lower SOC content levels have been observed for areas with temporary crop cultivation, where during the 1990s cultivation was widespread and has now been abandoned again in many places. On the other hand, there are strong indications that afforestations and fruit orchards established in the 1980s have been successful in conserving soil resources, also when transformed to intercropping systems. Areas showing well conserved soil resources covered 33% of the study area.