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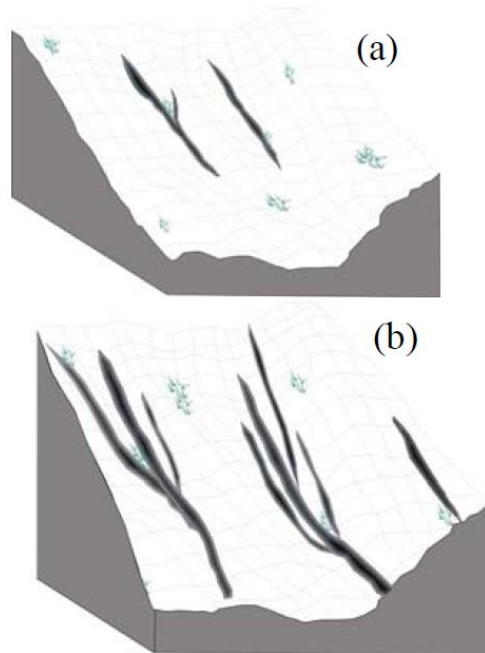
Title: Extracting Gully Erosion features from High Resolution Imagery Using Object Oriented Analysis

Level: PhD

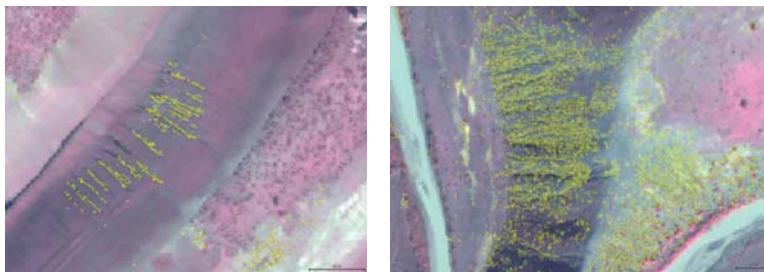
Description of work:

Gully erosion is responsible for a substantial amount of soil loss and is generally considered an indicator of desertification. The spatial distribution of gullies is one of the most critical information types required for soil conservation and management practices. Field-based mapping and change assessment of gullies is not practical, given the scale and dynamics variability. An ideal way is through the use of remote sensing. My research focuses on extracting these gully features from Ikonos (MSS and PAN data) along with topographic information derived from DEM (1m) generated using GeoEye-1 stereo data.

Accurate identification of gullies is not possible without additional data or expert knowledge. Additional information, such as the geometric properties of the gullies, makes it possible to treat them as spatial objects. Such spatial objects can be characterized based on their shape, orientation and texture but also their spatial relationship to surrounding features. Additionally, by using auxiliary information, such as DEM derivatives or landuse system characteristics, gullies can effectively be separated from spectrally similar features. This is the underlying premise of object-oriented analysis (OOA), which thus resembles the cognitive approach of manual visual image interpretation. This allows to distinguish, for example, individual gullies on gentle slope ($<10^\circ$) (a) and dendritic feature like gully system on steeper slopes ($>10^\circ$) (b). A rule set is being developed in Definiens Developer 7 to extract gully features using MSS, PAN data, DEM derivatives such as slope, curvature and flow accumulation and landuse systems association.



(a) Individual gullies on gentle slope ($<10^\circ$) and (b) dendritic feature like gully system on steeper slopes ($>10^\circ$)



Individual gullies and dendritic features such as gully systems extracted

Avoiding misclassification of gullies remains a challenge, and the accuracy of this procedure has not yet been estimated. The next step in this project is to improve the ruleset by additional

information on orientation of slope,

slope length, and landuse system knowledge acquired from field information to reduce the false positives and false negatives.

Biography: I have an M.Tech in remote sensing and GIS Application Water Resources from the Indian Institute of Remote Sensing. I worked at Center for Ecological Sciences, Indian Institute of Science, Bangalore from 2003-2006. My work during this period involved modeling the water budget for five major river basins of Central Western Ghats. I started with my PhD research at ESA in March 2008. My research topic is focused on improvising gully erosion prediction using high resolution image analysis for a semi-arid region in Morocco.

