

Use of GIS, Remote Sensing and Bayesian Inference Methods to Assess Suitability for De-Rocking in Northwest Syria.

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In Syria's northwestern Idleb region, agriculture is principally constrained by the abundance of surface rock outcrops. A key development activity in this region is therefore to remove the rocks ('de-rocking'), using heavy equipment, and to create new land suitable for agricultural use. A two-stage approach was followed to assist the Idleb Agricultural Development Authority in targeting those areas suitable for de-rocking.

In a first stage a rapid appraisal was conducted to assess potential for de-rocking, using a newly developed land use/land cover map and limited field work, but did not include a systematic soil survey. The criteria used were existing agricultural use, forest cover, excessive rockiness or slopes, nearby presence of historical and cultural sites, quarries, and potential to serve as a conservation area. On the basis of these information sources and other secondary data, integrated in a GIS system, it was possible to disqualify 85% of the study area as having no potential for de-rocking. The strongest predictor of potential for de-rocking was the land use class 'rangelands' on nummulithic limestones.

In a second stage, using a non-hierarchical clustering procedure, 30 watersheds out of the 250 in the potential areas were selected to conduct a limited soil survey, focusing on soil depth and rockiness observations. This field dataset of soil depth and rockiness was complemented with a high-resolution soil depth map, derived from the Quickbird imagery in Google Earth, and maps of slopes, lithological materials and Wetness Index. Using this set of 'evidence layers', Bayesian inference methods were applied, using Expectator software, to produce pixel-based probabilistic maps of soil depth and rockiness for the entire project area. With user-defined thresholds the probability maps were converted into a suitability map and a map identifying 300 hectares of primary target areas and 3,900 hectares of secondary target areas for de-rocking.