



## Remote sensing-based analysis for resilient agriculture in steep slope cultural landscapes

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The morphology of cultivated steep slopes is often the result of the layering of traditional agricultural practices. Their complexity and uniqueness result in high cultural-historical value, sometimes leading to the inclusion of landscapes on special protection lists (such as FAO-GIAHS or UNESCO). Agricultural terraces, adopted in different parts of the world for centuries, successfully combine cultivation needs with various valuable ecosystem services. However, cultivating in steep-slope areas is complex and requires a great effort in terms of human and economic resources (primary reasons for agricultural land abandonment). Moreover, their inherent complexity can become a problem during external disturbances. Heavy rainfall, increasingly frequent due to climate change, can generate surface runoff, soil erosion, terrace wall collapse, and landslides. Therefore, it is crucial to establish appropriate management plans to ensure the functionality of these cultural landscapes, guaranteeing agricultural production and territorial security. The advancement of new technologies in remote sensing, high-resolution mapping, and spatial analysis is opening new frontiers to support the management of such landscapes. A virtuous example is the SOiLUTION SYSTEM project ([www.soilutionsystem.com](http://www.soilutionsystem.com); Rural Development Program for Veneto 2014-2020), carried out in the GIAHS site "Soave Traditional Vineyards" (Italy). It aims to develop innovative soil erosion risk mitigation solutions and improve vineyard management in hilly and mountainous landscapes. It involved high-resolution mapping of terraced landscapes based on low-cost methodologies (such as UAV-SfM photogrammetry) and identifying erosion-prone areas through specific algorithms. In addition, optimal soil management was researched to mitigate surface runoff and sediment production, including adopting biodiversity enhancement strategies. A modelling approach (validated by field measurements) was adopted for the analyses to maximize the reproducibility of the methodology in other contexts. An overview of the opportunities that remote sensing-based analysis can offer to steep-slope agricultural landscapes is proposed here. High-resolution mapping of hydroerosive processes is useful for preventing soil degradation, which, combined with sustainable management, helps to increase the resilience of such cultural and agricultural landscapes.