



## **Erosion processes by water in agricultural landscapes: a low-cost methodology for post-event analyses**

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Throughout the world, agricultural landscapes assume a great importance, especially for supplying food and a livelihood. Among the land degradation phenomena, erosion processes caused by water are those that may most affect the benefits provided by agricultural lands and endanger people who work and live there. In particular, erosion processes that affect the banks of agricultural channels may cause the bank failure and represent, in this way, a severe threat to floodplain inhabitants and agricultural crops. Similarly, rills and gullies are critical soil erosion processes as well, because they bear upon the productivity of a farm and represent a cost that growers have to deal with. To estimate quantitatively soil losses due to bank erosion and rills processes, area based measurements of surface changes are necessary but, sometimes, they may be difficult to realize. In fact, surface changes due to short-term events have to be represented with fine resolution and their monitoring may entail too much money and time. The main objective of this work is to show the effectiveness of a user-friendly and low-cost technique that may even rely on smart-phones, for the post-event analyses of i) bank erosion affecting agricultural channels, and ii) rill processes occurring on an agricultural plot. Two case studies were selected and located in the Veneto floodplain (northeast Italy) and Marche countryside (central Italy), respectively. The work is based on high-resolution topographic data obtained by the emerging, low-cost photogrammetric method named Structure-from-Motion (SfM). Extensive photosets of the case studies were obtained using both standalone reflex digital cameras and smart-phone built-in cameras. Digital Terrain Models (DTMs) derived from SfM revealed to be effective to estimate quantitatively erosion volumes and, in the case of the bank eroded, deposited materials as well. SfM applied to pictures taken by smartphones is useful for the analysis of the topography and Earth surface processes at very low-cost. This methodology should be of great help for farmers and/or technician who work at Land Reclamation Consortia or at Civil Protection for taking suitable post-event field surveys in support to flood risk and soil management.