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Large-scale landslides in Upper Scrivia Valley (Ligurian Apennine, Italy)

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Applied geomorphological maps and landslides maps in practice, are important tools especially in land planning. The Upper Scrivia valley lies in the Ligurian Apennine, along the Alps-Apennine junction, characterized by a significant geological and geomorphological complexity associated with its evolution and various processes (gravity, running waters, structural elements and periglacial processes) that have - nowadays and in the past - originated its landforms. Cretaceous shales and marly limestone flyschs outcrop in the valley, characterized by both alpine and apenninic deformations. Oligocene conglomerates of the BTP (Tertiary Piedmont Basin) outcrops above these Formations linking Alpine and Appenninic Units. These geological and geomorphological characteristics cause susceptibility to mass movements along the slopes, together with a high annual (till over 2000 mm) and daily rainfall (over 700 mm) amounts measured in some Scrivia valley weather stations. The Scrivia Valley is located on the Po slopes of the Apennine, characterized by a moderate steepness and only a few kilometers away from the Ligurian Sea and the regional capital. These particular conditions has led to its historic vocation of main liaison between the Po plain and Genoa harbour. In the valley there are also important naturalistic areas, biotopes, SIC (Sites of Community Interest) and geosites in the Regional Natural Park of Monte Antola. A map of huge landslides scale 1:50,000 has been compiled based on bibliographic studies, a detailed aerial photogrammetry review and original geomorphological field survey.
A significant presence of large landslides, more than national and regional average, has been mapped. In addition many deep-seated gravitational slope deformations (DSGSDs) are located along the slopes. They are mapped with geomorphological forms like scarps, counterscarps, double ridges, trenches, crestal troughs, closed depression, valley bulging, pseudo or para-karst forms. The DSGSDs distribution is particularly related to the geomechanical conditions of geological contacts between the hard rock Oligocene conglomerates and the Cretaceous flyschs, with prevalent weak behaviour. The distribution of these mass movements is also associated with lithological differences in the Cretaceous flysch and local tectonic and neo-tectonic conditions, above all linked to pliocenic and pleostocenic uplift. The mapped landslides are often distributed along DSGSDs which have an extension higher of more than one order of magnitude. In addition data from drillings and monitoring have allowed to analyse some case studies among large landslides surveyed in the valley.
Large landslides and DSGSDs have an important impact on land planning but also directly on the population, as people have always settled there owing to favourable conditions of steepness and agriculture.