

EGU2020-9833

<https://doi.org/10.5194/egusphere-egu2020-9833>

EGU General Assembly 2020

© Author(s) 2020. This work is distributed under the Creative Commons Attribution 4.0 License.



Ground effects triggered by the 19-21 October 2019 extreme rainfall in the middle-lower Lemme River catchment (NW Italy)

Andrea Mandarino¹, Fabio Luino², and Francesco Faccini¹

¹University of Genova, Department of Earth, Environment and Life Sciences, Genova, Italy (faccini@unige.it)

²National Research Council, Research Institute for Geo-Hydrological Protection, Torino, Italy (fabio.luino@irpi.cnr.it)

From 19 to 21 October 2019 a severe rainfall event occurred in the south eastern part of the Piemonte Region, in particular in the catchments of the Orba and Scrivia Rivers (NW Italy). It originated widespread shallow landslides, soil erosion processes, flood peaks, debris transport along the minor hydrographic network, morphological changes along the main rivers and flooding of lowland areas. All of this caused one casualty and severe damage to transport infrastructure, private homes and agricultural activities. The most critical phase of the event was registered in the afternoon and evening of Monday 21, and it was associated with a thunderstorm cell formed on the Ligurian Sea and then extended northward on the aforementioned catchments, where it remained stationary for some 12 hours. This dynamic resulted into exceptional rainfalls in terms of both cumulated values and intensity.

The rainfall-induced geomorphic effects were particularly severe within the Stura, Piota, Albedosa and Lemme Valleys, namely all the main right-bank tributaries of the Orba River. This contribute aims at documenting the rainfall magnitude and presenting the preliminary results concerning the analysis and mapping of landforms and geomorphic processes related to this rainfall event, within the middle and lower Lemme River catchment. The research is based on field survey and interpretation of aerial photographs taken along the main valley floor.

Considering the entire Lemme River catchment (180 km²), all rainfall-induced ground effects were substantially surveyed in its middle and lower parts, which present a mountain-hilly landscape and large fluvial terraces, respectively. Within the study area, with reference to the Gavi Ligure rain gauge, a cumulative rainfall of 428 mm in 12 h was registered, along with maximum values of rainfall intensity of 76.4 mm in 1 h, 205.8 mm in 3 h, 318.4 mm in 6 h. The cumulative rainfall measured during the 19-21 October 2019 event was 548,6 mm, that is approximatively half of the mean annual rainfall.

As a result, wide lowland areas were flooded by both the main channels and the minor hydrographic network. Wide plots of land on slopes were affected by sheet erosion and rills development. Numerous and widespread landslides were mapped both on slopes and on terrace scarps. Generally, they were shallow and involved eluvial-colluvial and anthropically reworked deposits directly overlying the bedrock. These landslides often evolved into debris-avalanches or debris-flows. A relevant sediment input affected the minor channels and newly-formed in-channel

deposits and alluvial fans were observed along them. The main fluvial stems experienced severe riverbed widening and intense sediment mobilization. These ground effects involved facilities, infrastructures and cultivated areas causing widespread and severe damage.

The findings of this study are useful: i) to document another relevant case in this area of Piemonte Region that has been often affected by serious geo-hydrological events; ii) to implement future researches on landslides, surface erosion processes and flood-related fluvial dynamics; iii) to provide relevant information for land management under a geo-hydrological risks mitigation perspective.