



The record-breaking flood in Central Italy in September 2022: preliminary impacts analysis from a field survey campaign

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Floods are growing phenomena both in terms of intensity and frequency, due to climate change and rapid urbanization. In fact, several extreme flood events hit populations and assets around the Globe in recent years; one example is the exceptional flood that hit the Marche region (Central Italy) between the 15th and 16th of September 2022, with rainfall reaching local cumulated peaks of 400mm. The intense precipitation triggered widespread landslides, as well as the flooding of several rivers; the short warning that characterized the event prevented the implementation of mitigation measures, causing 12 fatalities and severe damages to activities and buildings.

In the aftermath of the event, several Italian universities and private companies mobilized to conduct an intensive field survey, to collect data enabling a better understanding of the causes of the event, the involved physical phenomena as well as factors leading to damage (<https://sites.google.com/view/misa2022/home-page>). This contribution describes the activity carried out by 6 of them (i.e., 5 universities and an engineering company) aimed at the survey of the damage occurred to the various exposed assets (such as residential buildings, economic and agricultural activities, infrastructure, and cultural heritage). The survey campaign was carried out between October and December 2022 in the municipalities of Senigallia, Ostra and Tre Castelli, where 126 residential buildings, 135 economic activities (manufacturing and commercial), 12 cultural heritage sites and a little number of agricultural activities were investigated. A preliminary descriptive analysis of collected data shows that the water depths recorded in correspondence of the exposed elements frequently exceeded 1 m and, in some cases, reached 3 m, causing severe damage. The most affected buildings are, almost 3 months after the event, still uninhabited and damaged; while some economic activities are not able to reopen. Most of them suffered widespread damage to buildings, stock, and equipment and were not insured. With respect to agriculture, mainly fruit and vegetable companies suffered damage, while fields of cereal and oleaginous plants production were bare, limiting the damage to the soil. For what concern the cultural heritage, the damage was concentrated in assets such as churches, Roman bridges, and

examples of industrial archaeology. However, more quantitative results will be available at the time of the conference. Data collected in this project will be used in future analyses both for understanding the main vulnerabilities of the affected area and for developing and improving damage models for more effective risk management, in planning and emergency phases.

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