



Multidisciplinary approach to evaluate flood damage for residential buildings: first results in Northern Italy

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Flooding is the most common natural instability process in Italy. Flood damage are the results of land-use planning policies which, starting chiefly from the late 1950s and early 1960s, did not take into account the geomorphologic-hydraulic characteristics of an area or the its historical data on past flood events. Historically, compared to other areas, riverside property has always been less valuable. Unfortunately, year after year, even areas of high recreational and environmental value were intensely urbanized despite their being exposed to the threat of flooding. As the number of residential dwellings, infrastructure and industrial buildings increased, what was originally a hazard became a risk. For each flood event, the damage depends on the specific land-use of the area and subsequently on the elements at risk in the area involved and its vulnerability, expressed as a percentage of the element that has actually been lost during the event. This is why a comprehensive knowledge of the area it is so important for conducting a detailed survey of an area's structures and infrastructure and to evaluate the degree of vulnerability.

This paper presents first results in Italy of the European Project called DAMAGE, the first attempt by the civil protection agencies of several European Union member states to devise a common methodology for the assessment of damage caused by natural or anthropic disasters. The main objective was to create an initial tool for practical and immediate application by civil protection agencies and local governments, to assess damage in a multidimensional perspective that takes into account infrastructure, the economy, the environment and social problems. Within the framework of a broad-based project for the evaluation and collection of reports on damage caused by floods, the CNR-IRPI of Turin and Regione Lombardia have directed attention to the town of Cittiglio (province of Varese), which was struck by severe flash flood in May 2002.

One of the aims was to provide public administrations a management tool to help them use damage information. For this purpose a GIS-based model was created that can simulate flood events and evaluate potential direct economic loss due to a catastrophe based on thorough land knowledge coupled with the description of various physical elements of the natural event.

The multidisciplinary method can be summarized in the following steps: 1) Event description: definition of flood parameters (flooded area and water level). This definition is possible because of real-time measurements or event simulation through a hydraulic model; 2) Identifying the affected assets in the flooded area; 3) Evaluation of the degree of damage to the exposed elements as a function of event magnitude identified from the measurement of floodwater depths of an event; 4) Attribution of an economic value to exposed assets. Quantification of economic loss by multiplying the economic value of damaged assets and the degree of damage. The methodology can be used to estimate the damage from the impact of floodwater on exposed elements (direct damage) and to quantify the resulting economic loss (tangible damage).