

Geophysical Research Abstracts  
Vol. 17, EGU2015-10792, 2015  
EGU General Assembly 2015  
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## What if quality of damage data is poor: an Entity-Vulnerability approach for flood vulnerability assessment

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The classical approach to flood defence, aimed at reducing the probability of flooding through hard defences, has been substituted by flood risk management approach which accepts the idea of coping with floods and aims at reducing not only the probability of flooding, but also the consequences. In this view, the concept of vulnerability becomes central, such as the (non-structural) measures for its increment.

On 22 November 2011, an exceptional rainstorm hit the Longano catchment (North-East part of Sicily, Italy) producing local heavy rainfall, mud-debris flow and flash flooding. The flash flood involved property, buildings, roads and more than 100 commercial estates have suffered severe damages. Some days after the event, the municipality provided people forms to describe the damages that occurred on their properties. Unfortunately, the lack of common guidelines in compiling them, their coarseness and the impossibility to have monetary information on them (such as damage data from previous events), did not allow the implementation of a detailed damage analysis.

What we're developing in this work is a method for a qualitative evaluation of the consequences of floods, based on vulnerability curves for structures and classes of entities at risk. The difficulty in deriving the vulnerability curves for different building typologies, as function of the water depth, was due to the lack of quantitative information both on damages caused by previous events and on buildings' value. To solve the problem we submitted a questionnaire to a team of experts asking for an estimation of building damages to different hypothetical inundation depths. What we wanted to obtain was deriving the vulnerability data from technicians' experience, believing in the fundamental importance of the collaboration among research and professional engineers. Through the elaboration and the synthesis of the experts' estimations we derived the vulnerability curves for different building typologies and for inundations of both short and long duration.

At the same time we defined the classes of the variable Entity in function of both buildings' asset value and their importance for society. Once the buildings of different typologies are grouped, a GIS-based tool (using hazard information obtained from hydraulic modelling, building parcels, vulnerability curves and entity classes) is used to collocate each element at risk inside an Entity-Vulnerability matrix. The construction of a E-V matrix allow both to understand the actual situation of flood-prone area (and the possible consequences of a flood event) and to study the effectiveness of non-structural measures, just studying how their implementation modifies the distribution of elements at risk inside it.

The proposed approach can be useful for authorities responsible for development and periodical review of adaptive flood risk management plans.