



Identifying how the strategies used to evaluate flood damages can affect the results of the evaluation

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The evaluation of flood damages is a complex interdisciplinary task which demands great efforts on assessment and modelling processes. Several methods and models can be used in practice to evaluate flood damages. On the one hand, hydrological and hydrodynamic aspects of floods shall be modelled in order to forecast different characteristics of floods, e.g. return period, flood extent, water depth, duration of submersion and flow speed. Different hydrological assumptions can take place when determining return periods of extreme events. Several hydrodynamic models can be used to simulate floods. These models have different levels of complexity and different acquisition, implementation and maintenance costs. On the other hand, geographic, engineering, social and economic aspects of the system exposed to floods shall be assessed, e.g. assets location, vulnerability characteristics, susceptibility to suffer damages. Once again, several methods and datasets with different liability and different levels of feasibility can be used to assess these characteristics. Uncertainty exists all over the evaluation process. When reducing uncertainty on the evaluation results by improving the strategies used, we could generate the elevation of the costs of the evaluation and compromise its feasibility. To deal with feasibility of the evaluation process and with uncertainty on the evaluation results is a big scientific and operational challenge.

The aim of this paper is to develop a research framework to analyze the impact of different strategies used to evaluate flood damages on the feasibility of the evaluation and on the liability of its results. The two main parts of the evaluation process are discussed: (1) the hydrodynamic simulation of flood events and its hydrological components and (2) the assessment of assets vulnerability to floods. The framework compares two aspects of the evaluation: uncertainty - variability of the evaluation results according to the choice of models and methods to model hazard and assess vulnerability; feasibility - time and investment required to realize and maintain (in a long term perspective) the evaluation. The objectives of this methodological framework are to better understand the whole flood damage evaluation process and to identify the relevance of the different steps of the evaluation. We intend to help decision makers stakeholders in the choice of evaluation strategies with a good compromise between evaluation efforts and results liability.

In this paper we start by discussing the overall process of flood damage evaluation, taking from literature different methods and examples revealing uncertainty related to the evaluation process. Secondly, the research framework is proposed based on the comparison of different methods, models, assumptions and datasets to evaluate flood damages: we consider different hypothesis when analyzing hydrological measures and determining confidence intervals; different hydrodynamic models are compared, e.g. commercial/non commercial, 1D, 2D, 1D/2D, mathematical computation assumptions; different methods used to assess vulnerability to floods are (confronted), e.g. existing data exploration, generation of new data; we also propose hypothetical examples concerning the choice of the scale of the evaluation. Finally, we discuss how to make choices concerning models and methods to evaluate flood damages.