



## **Assimilation of qualitative hydrological information in water-related risk framework**

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In recent years water-related risks are increasing worldwide. In particular, floods have been one of the most damaging natural disasters in Europe, in terms of economic losses. Non-structural measures such as flood risk mapping are generally used to reduce the impact of flood in important area. The increasing data availability makes it possible to develop new models which can be used to assimilate different kinds of information and reduce the uncertainty of the state of a basin. The aim of this work is to propose a methodology to assimilate uncertain, qualitative information within hydrological models in order to improve the evaluation of catchment responses. Qualitative information is defined here as the one that can be interpreted as and assimilated into a hydrological model as a fuzzy value, for instance those coming from text messages or citizen's pictures.

The methodology is applied in the Brue catchment, located in the South West of England, having a drainage area of 135 km<sup>2</sup>, average annual rainfall of 867 mm and average discharge of 1.92 m<sup>3</sup>/s at Lovington considering the period among 1961 and 1990. In order to estimate the response of the catchment to a flood event with given intensity, a conceptual distributed hydrological model was implemented. First, the basin was divided in different sub-basins, then, the hydrograph at the outlet section was estimated using a Nash cascade model and the propagation of the flood wave was carried out considering the lag time in the other each sub-basins.

The assimilation of the qualitative information was carried out using different techniques. The results of this work show how the spatial location and uncertainty of the qualitative information can affect the flow hydrograph in the outlet section and the consequent flood extent in the downstream area. This study is part of the FP7 European Project WeSenseIt.