

Urban and peri-urban flood impact change: the case of the Metropolitan Area of Barcelona

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Floods are the most important natural hazard in the world. Nowadays, mitigation and adaptation strategies to reduce the impact that climate change will have on them, are a priority in most government agendas. Recent reports from the IPCC (2012, 2014) still show significant uncertainty associated with future projections of precipitation extremes. This uncertainty is higher when referred to floods and even larger when interactions with society and the changes in vulnerability are considered. Consequently, there is now a call to treat floods from a holistic perspective that integrates bottom-up (from impact and vulnerability) and top-down (from hazard) approaches (Hall et al., 2014).

The study of flood risk in urban and peri-urban areas is complex and involves multiple factors. This is the case of the Metropolitan Area of Barcelona (AMB), which concentrates 43% of total population of Catalonia in less than 2% of the whole territory. The impervious soil has grown more than 200% from 1956 to 2009 (resulting in higher values of runoff), the population has increased more than 80% in the same period and, simultaneously, an improvement of the drainage system and flood prevention has been developed. As a result, we have seen that the flood risk evolution in the area holds a strong link to these human changes. Actually, floods in this region are usually due to drainage problems, flash floods in ungauged torrential catchments and, only in some occasions, river floods are produced (i.e. the Llobregat River on September 1971). But, in all the cases they are due to heavy precipitations.

The main objective of the contribution is assessing the relationship between precipitation in the AMB and the social impacts produced. In order to do it, different impact indicators have been proposed, such as the population affected or the duration of the flood event (Merz et al., 2010). These indicators have been implemented for the different cases analyzed, which affected AMB for the period 1981-2015. These indicators have allowed developing a risk index based on the research of Amaro et al. (2010) and Barberia et al. (2014). Furthermore, the results are validated with damage information provided by the Insurance Compensation Consortium of Spain. The study also explores the evolution of land uses, population and precipitation from the middle of the 20th century until now, and how these changes have affected (or not) the flood risk in the AMB. This work has been developed in the framework of the Spanish project HOPE (CGL2014-52571-R) and METROBS study.