



Lessons learnt from past Flash Floods and Debris Flow events to propose future strategies on risk management

Angels Cabello, Marc Velasco, and Isabel Escaler

CETAqua Water Technology Center, Barcelona, Spain (acabello@cetaqua.com / +34933124801)

Floods, including flash floods and debris flow events, are one of the most important hazards in Europe regarding both economic and life loss. Moreover, changes in precipitation patterns and intensity are very likely to increase due to the observed and predicted global warming, rising the risk in areas that are already vulnerable to floods. Therefore, it is very important to carry out new strategies to improve flood protection, but it is also crucial to take into account historical data to identify high risk areas.

The main objective of this paper is to show a comparative analysis of the flood risk management information compiled in four test-bed basins (Llobregat, Guadalhorce, Gardon d'Anduze and Linth basins) from three different European countries (Spain, France and Switzerland) and to identify which are the lessons learnt from their past experiences in order to propose future strategies on risk management. This work is part of the EU 7th FP project IMPRINTS which aims at reducing loss of life and economic damage through the improvement of the preparedness and the operational risk management of flash flood and debris flow (FF & DF) events.

The methodology followed includes the following steps:

- o Specific survey on the effectivity of the implemented emergency plans and risk management procedures sent to the test-bed basin authorities that participate in the project
- o Analysis of the answers from the questionnaire and further research on their methodologies for risk evaluation
- o Compilation of available follow-up studies carried out after major flood events in the four test-bed basins analyzed
- o Collection of the lessons learnt through a comparative analysis of the previous information
- o Recommendations for future strategies on risk management based on lessons learnt and management gaps detected through the process

As the Floods Directive (FD) already states, the flood risks associated to FF & DF events should be assessed through the elaboration of Flood Risk Management Plans (FRMP) with tailored solutions for each basin, evaluating their flood mitigation potential, promoting environmental objectives and increasing the efficiency of the already adopted measures. The FRMP should focus on prevention (and protection), preparedness and response, and these have been the three main risk management phases of a flood crisis that have been assessed when extracting the lessons learnt from past events. Lessons learnt concerning dissemination through the three previously mentioned phases and also related to education initiatives have also been included.

A common response to most of the events described in this paper was to upgrade the meteorological and hydrological forecasting systems, making the forecasting lead-time as large as possible. Another common recommendation from the test-beds was the need to implement and accomplish the land use regulations. All the basins also detected that structural measures are necessary to increase the population's protection level, but replacing the traditional safety mentality by a risk culture based on a comprehensive analysis of the flood risk. The four basins studied have also highlighted the importance of collecting information when FF & DF events occur and creating historic databases that will provide extremely useful information in the future.