



Improving flood risk mapping in Italy: the FloodRisk open-source software

Raffaele Albano (1), Leonardo Mancusi (2), Iulia Craciun (3), Aurelia Sole (1), and Alexandru Ozunu (3)

(1) University of Basilicata, School of Engineering, Potenza, Italy (raffaele.albano@unibas.it), (2) Sustainable Development and Energy Resources Department, Research on Energy Systems SpA, Milano, Italy, (3) Babes-Bolyai University, Faculty of Environmental Science and Engineering, Cluj-Napoca, România

Time and again, floods around the world illustrate the devastating impact they can have on societies. Furthermore, the expectation that the flood damages can increase over time with climate, land-use change and social growth in flood prone-areas has raised the public and other stakeholders' (governments, international organization, re-insurance companies and emergency responders) awareness for the need to manage risks in order to mitigate their causes and consequences. In this light, the choice of appropriate measures, the assessment of the costs and effects of such measures, and their prioritization are crucial for decision makers. As a result, a priori flood risk assessment has become a key part of flood management practices with the aim of minimizing the total costs related to the risk management cycle. In this context, The EU Flood Directive 2007/60 requires the delineation of flood risk maps on the bases of most appropriate and advanced tools, with particular attention on limiting required economic efforts. The main aim of these risk maps is to provide the required knowledge for the development of flood risk management plans (FRMPs) by considering both costs and benefits of alternatives and results from consultation with all interested parties.

In this context, this research project developed a free and open-source (FOSS) GIS software, called FloodRisk, to operatively support stakeholders in their compliance with the FRMPs. FloodRisk aims to facilitate the development of risk maps and the evaluation and management of current and future flood risk for multi-purpose applications. This new approach overcomes the limits of the expert-drive qualitative (EDQ) approach currently adopted in several European countries, such as Italy, which does not permit a suitable evaluation of the effectiveness of risk mitigation strategies, because the vulnerability component cannot be properly assessed. Moreover, FloodRisk is also able to involve the citizens in the flood management process, enhancing their awareness. This FOSS approach can promote transparency and accountability through a process of "guided discovery". Moreover, the immediacy with which information is presented by the qualitative flood risk map, can facilitate and speed up the process of knowledge acquisition.

An application of FloodRisk model is showed on a pilot case in "Serio" Valley, (North Italy), and its strengths and limits, in terms of additional efforts required in its application compared with EDQ procedure, have been highlighted focusing on the utility of the results provided for the development of FRMPs. Although they still present limits which prevent the FloodRisk application without critically consider the peculiarities of the investigated area in terms of available knowledge on hazard, exposure and vulnerability, the proposed approach surely produces an increase in available knowledge of flood risk and its drivers. This further information cannot be neglected for defining risk mitigation objectives and strategies. Hence, considering the ongoing efforts in the improvement of data availability and quality, FloodRisk could be a suitable tool for the next revision of flood risk maps due by December 2019, supporting effectively Italian and EU practitioners in the delineation of FRMPs (and for flood risk management in general).