



Flood hazard assessment using 1D and 2D approaches

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The EU flood risk Directive (Directive 2007/60/EC) prescribes risk assessment and mapping to develop flood risk management plans. Flood hazard mapping may be carried out with mathematical models able to determine flood-prone areas once realistic conditions (in terms of discharge or water levels) are imposed at the boundaries of the case study.

The deterministic models are mainly based on shallow water equations expressed in their 1D or 2D formulation. The 1D approach is widely used, especially in technical studies, due to its relative simplicity, its computational efficiency and also because it requires topographical data not as expensive as the ones needed by 2D models.

Even if in a great number of practical situations, such as modeling in-channel flows and not too wide floodplains, the 1D approach may provide results close to the prediction of a more sophisticated 2D model, it must be pointed out that the correct use of a 1D model in practical situations is more complex than it may seem.

The main issues to be correctly modeled in a 1D approach are the definition of hydraulic structures such as bridges and buildings interacting with the flow and the treatment of the tributaries. Clearly all these aspects have to be taken into account also in the 2D modeling, but with fewer difficulties.

The purpose of this paper is to show how the above cited issues can be described using a 1D or 2D unsteady flow modeling. In particular the Authors will show the devices that have to be implemented in 1D modeling to get reliable predictions of water levels and discharges comparable to the ones obtained using a 2D model. Attention will be focused on an actual river (Crati river) located in the South of Italy. This case study is quite complicated since it deals with the simulation of channeled flows, overbank flows, interactions with buildings, bridges and tributaries. Accurate techniques, intentionally developed by the Authors to take into account all these peculiarities in 1D and 2D modeling, will be presented, compared and discussed.