



Assessment of urban drainage environmental impact on receiving water bodies: comparison between a detailed and a simplified integrated model

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Nowadays, mathematical models are currently used as a reliable tools for water environmental quality management. This aim requires the analysis of the urban drainage systems in an integrated way: sewer network, wastewater treatment plant and receiving water body.

The need of integrated analysis has been demonstrated in technical literature (e.g. Rauch et al. 1998) and it is also represented in the EU Water Framework Directive 60/2000, that basically proposes a water-quality orientated view on the whole system and requires new ways of assessing its performance.

The need for integrated approaches in urban drainage modelling has been addressed in several ways and the resulted models can be basically grouped in two families: physically based approaches aimed to the detailed analysis of processes that take part both in the urban catchment and in the receiving water body; simplified approaches focusing the attention on a reduced number of processes for which reliable information are more frequently available. Physically based approaches usually have prohibitive data requirements in order to provide reliable results while simplified approaches usually have low adaptability to different cases and situations (G. Vaes and J. Berlamond, 1999).

In the present paper, a comparison between a detailed and a simplified integrated model is proposed. The main goal is to verify the reliability of a simplified approach in case of few available field data. Indeed, especially for water quality analysis, data

availability results to be a crucial point since it is very difficult and expensive to carry out field measurements.

Both models have been applied to an experimental catchment in Bologna (Italy) which consist on a part of the Bologna sewer network and the receiving water body: a reach of the Savena River. This last is a rural ephemeral river about 6 kilometres long, which runs along the south boundary of Bologna in the northern part of Italy. This River is known to have a very variable water flow ranging from a few litres per second during summer period to several cubic metres per second in winter. The catchment that directly affects the considered reach comprises a total surface area of about 450 hectares with 70.000 inhabitants. During rainfall periods, 6 big combined sewer overflows devices from Bologna sewer network discharge into Savena river.

The data adopted for the calibration-validation of the models have been gathered during the INNOVATION DGXIII European Project (Artina et al., 1999).

In this work the results obtained with the simulations of the whole system performed with the InfoWorks model (developed by Wallingford Software) and a simplified conceptualized model (Mannina et al., 2004) have been compared.

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