Numerical simulation models for urban drainage systems have become increasingly important for both hydraulic aspects (design or verification of conduits and devices) and for environmental issues, with particular reference to the Combined Sewer Overflows (CSOs) impact on receiving water bodies (“first flush” phenomenon). The models reproduce qualitative-quantitative processes separating what happens in the drainage network from what happens on the basin’s surface.

Quantitative (hydraulic) aspects, may be outlined as follows: net rainfall calculation, surface runoff and flow through the drainage system conduits. Water quality aspects include: accumulation (build-up) of pollutants on the basin’s surface during the dry weather period, the mobilization and transport (wash-off) of pollutants due to rain, propagation into the drainage system.

In order to estimate the parameters required for a reliable numerical model, long and accurate monitoring campaign are recommended. Actually, monitoring activities are a relevant part in the analysis of qualitative-quantitative processes, as both qualitative and hydraulic data are useful not just for calibrating the models, but also to understand the studied phenomena.

Numerical simulations, either based on individual rainfall events (real or synthetic) or over long time series allow to evaluate the behaviour of the network and compare the effects of possible interventions in order to mitigate the environmental impact.

These effects can be controlled by inserting storage units within the network, whose function is of temporarily accumulating a portion of the rain event volume, and later sending it to the treatment plant or to return it to receiving waters. Larger volumes are required for the hydraulic protection (detention or retention tanks), while smaller first flush tanks provide a mitigation effects on pollutant spills. Ongoing investigations aim to understand the real operation of the reservoirs with respect to the simplified design criteria traditionally used in engineering practice.
MAIN PUBLICATIONS


RESEARCH PROJECTS


Research and Consulting Contract with the Province of Rimini (2011), "Development of the plan to address the management of stormwater pollution of the Province of Rimini", Scientific Coordinator: Marco Maglionico.


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CONTACTS

sandro.artina@unibo.it
and.bolognesi@unibo.it
marco.maglionico@unibo.it