

A Strategic Approach to Improve Adriatic Bathing Waters: the Water Quality Integrated System

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Abstract—In the Adriatic Sea, massive rainfall events are causing flooding of rivers and streams, with severe consequences on the environment. The consequent bacterial contamination of bathing water poses public health risks besides damaging tourism and economy. This study was conducted in the framework of WATERCARE, an EU Interreg Italy-Croatia Project, which aims at reducing the impact of microbial contamination on Adriatic bathing water due to heavy rainfall events drained in the local sewage network and; enhancing the quality of local waters; and providing support for the decision-making processes regarding the management of bathing water in line with EU regulations. The study involved the development of an innovative water quality integrated system that helps meeting these objectives. It consists of four components: a real-time hydro-meteorological monitoring system; an auto-sampler to collect freshwater samples during and after significant rainfall events; a forecast system to simulate the dispersion of pollutants in seawater; and a real-time alert system that can predict the potential ecological risk from the microbial contamination of seawater.

A finite element hydrodynamic model was applied to the studied areas, which differ in hydrological, urban and morphological characteristics. Modules for transport-diffusion and microbial decay were used in order to study the distribution of *Escherichia coli* during significant raining events. The model results were validated against data acquired on field (water level, temperature, salinity and microbial concentrations) demonstrating the ability of the modeling suite to simulate the circulation in the coastal areas of the Adriatic Sea. Furthermore, the model simulates the main dynamics of transport and diffusion, such as fluvial and polluted waters dispersion.

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The modeling suite and all results obtained will serve to develop guidelines for urban wastewater and coastal system quality assessments to contribute developing policy actions and final governance decisions as required by the EU Bathing Water Directive.

Keywords—Bathing water management, decision support system, faecal pollution, numerical model.

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