

The EU H2020 FREEWAT project: an open source software tool for water resource management

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Introduction

The application of the Water Framework Directive (WFD) and water related directives required an increase of monitoring activities on water quantity and quality, determining the availability of a large amount of data and time series. Up to now, such data is not properly exploited. In fact, the use of new technologies dedicated to water management, such as modelling, is still limited among the water authorities. Moreover, the value of using advanced technologies is often diminished by the fact that stakeholders are not actively involved in model development and the lack of participatory approach in using advanced ICT tools for evidence-based decisions constitutes a limit to the application of the water related directives. Indeed, the non-technical aspects of water resource systems (such as societal, political and legal concerns) are recognized as having a fundamental importance to reaching agreed-upon decisions (Soncini-Sessa, Weber & Castelletti, 2007).

Also water resource management in agriculture, specially decision and planning in rural basins and sub-basins, would benefit from the use of advanced tools allowing the integration of soil and weather data with hydrological variables describing underground water dynamics.

The FREEWAT project

FREEWAT is an HORIZON 2020 project financed by the EU Commission. FREEWAT main result will be an open source and public domain GIS integrated modelling environment for the simulation of water quantity and quality in surface water and groundwater, with an integrated water management and planning module. The platform development will be carried out using a participatory approach involving relevant stakeholders. The overall aim is to simplifying the application of the WFD, Groundwater Directive (GWD), Nitrate Directive (NiD) and other water related directives.

The core of the FREEWAT software platform will be the SID&GRID framework, a GIS integrated physically-based distributed numerical hydrological model based on a modified version of MODFLOW 2005 (Rossetto et al. 2013). In FREEWAT, the platform core will be enriched with new modules so that the software fits the end-users requirements. Among the new modules there will be a module dedicated to the simulation and analysis of crop growth and water requirements in agriculture. The objective is to integrate the simulation of processes related to crop water requirements with those related to the water availability and distribution, considering both superficial and underground water dynamics. For this scope already existing codes will be implemented. The codes to implement will be chosen through a screening process of well documented and widely used crop growth models. The implementation of the crop model will allow both to estimate the yield of commonly cultivated crops considering the water availability due to superficial and underground water inputs, and, to analyze basin water dynamics considering the influence of cultivated areas. The implementation in the FREEWAT platform of a solute transport module will also allow the study of nutrients and pesticides fate in hydrological systems.

Bibliografia

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