



Decision support systems nested in a common base of complex datasets: experiences in the Central Italy

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In the effort to develop hydrological software tools meant as Decision Support Systems, two software, based on different models and with different peculiar aims, have been developed. The first one is an evaluation model of the available water resource, the second one is a simulation model of the managed water resource for multipurpose uses. These two software were developed independently but the necessity to combine and integrate their functionalities soon arose. The first one bases its algorithms upon regionalization procedures of flow parameters deduced from the geomorphologic features of the soil of the basin (BFI, Area) and presents, as output, a set of duration curves (DC) of the natural, measurable (natural after withdrawal), and residual (discharge usable for dissipative use) flow. The hydrological modeling allows to process the dataset and regionalize the information of each section of the hydrographic network, in order to attain information about the effect of upriver withdrawals, in terms of evaluation parameters (measurable DC) to maintain an optimal water supply all along the entire downstream network. This model was projected with a WEB interface, developed in PERL and connected to a MySQL database. The second software tool simulates the allocation of the water resource for multipurpose uses. The algorithm is based on a topological sketch of the hydrographic network in terms of "Nodes" and "Links" combined with computation procedures for managing the water resource of big reservoirs. The peculiar feature of this method is that it performs a preliminary budget between the total available amount and the demand over a time span longer than the simulation step (week, month). During the managing phase, four different allocation methods are available: proportional, percentage, priority and balanced priority, hence this tool becomes flexible and allows to simulate many different management policies. This project was developed in JAVA as a workstation product. The first step towards

this integration foresees the unavoidable creation of a large database (Postgres) with specific features in order to contain hydrological data sets for many different basins. This database not only contains hydrometeorological data at the single basin scale but also integrates all the information from river basin authorities about withdrawals and uses. This is the real core of the integration between the two tools, for it provides a common set of tables on which they can exchange data and both take advantage of the results of the different evaluations and simulations. The database itself is meant as a mean to uniform and validate all the datasets that can be easily uploaded, via a series of interfaces, by the users of the system. Those interfaces, besides providing uploading access to the database, allow the users to download the hydrometeorological data and to retrieve statistical information from the time series contained. The common base on which both software tools will be handled as a single integrated system is a GIS map engine and interface, that will make available not only the functionalities of the models and their calculation algorithms, but also the possibility to insert and modify different network structures together with their datasets. The final aim of this project is to be able to share these scientific tools and hydrological data among many institutional uses. For this purpose, a WEB-based system, under the control of an administrator, provides on the one hand the possibility to easily keep the database up-to-date and on the other, the possibility to share data and retrieve the results of the procedures optimized for managing superficial water resources at the basin scale.