A web-based spatial decision supporting system (S-DSS) for grapevine quality: the viticultural tool of the SOILCONS-WEB Project

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The SOILCONSWEB Project aims to create a decision support system operating at the landscape scale (Spatial-DSS) for the protection and the management of soils in both agricultural and environmental issues; it is a cyber-infrastructure built on remote servers operating through the web at www.landconsultingweb.eu. It includes - among others - a series of tools specifically designed to a Viticulture aiming at high quality wines production. The system is realized thanks to a collaboration between the University of Naples Federico II, CNR ISAFoM, Ariespace srl and SeSIRCA-Campania Region within a 5-years LIFE+ project funded by European Community.

The system includes tools based on modelling procedures at different level of complexity some of which specifically designed for viticulture issues. One of the implemented models arise from the original desktop based SWAP model (Kroes et al, 2008). It can be run "on the fly" through a very user friendly web-interface. The specific tool, thanks to the model based on the Richard's equation can produce data on vineyard water stress, simulating the soil water balances of the different soil types within an area of interest.

Thanks to a specific program developed within the project activities, the Spatial-DSS every day acquires punctual weather data and automatically spatialize them with geostatistical approaches in order to use the data as input for the SPA (Soil Plant Atmosphere) model running. In particular for defining the upper boundary condition (rainfall and temperatures to estimate ET0 by the Hargraves model). Soil hydraulic properties (47 soil profiles within the study area), also essential for modelling simulation, were measured in laboratory using the Wind's approach or estimated through HYPRES PTF. Water retention and hydraulic conductivity relationships were parameterized according to the van Genuchten-Mualem model;

Decision makers (individuals, groups of interests and public bodies) through the DSS can have real-time (or near real-time) access to critical, accurate, complete and up-to-date spatial data/output models held/processed in multiple data stores. The system allows the users interested in viticulture to have free, easy and immediate access to a number of environmental data and information very useful for quality wines production and especially for viticulture planning and management in a context of environmental sustainability. It produces detailed spatial documents, report and maps on a series of questions including the identification and description of terroir characteristics.

The user once connected to the S-DSS can select an area of interest (i.e. farm, municipality, district) or draw it and obtain in real time a series of detailed information regarding that specific area, including maps and reports of landscape physical factors (i.e. soils, climate, geology, geomorphology, etc.), viticulture suitability, plant disease data and modelling, trends of viticulture years, bioclimatic indexes, etc. The user can also choose between different options such as the time period of the simulation runs or the type of data (maps, report or graphs) to be produced by the system.

The S-DSS is being developed, tested and applied in an area of about 20,000 ha in south of Italy (Valle Telesina, in Campania region) mainly vocated to quality wines production (designation of origin DOC and DOCG).

Key words: Decision Support System, spatial data, model simulation, soil hydrological properties, cyber infrastructure.