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A web-based spatial decision supporting system (S-DSS) for landscape management: the SOILCONSWEB Project tool for soil ecosystem services

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The multiple functions of soils are under increasing threat from a wide range of human activities. These threats are often complex and typically inter−linked. The EU Soil Thematic Strategy considers as threats of major concern: erosion, decline in organic matter, soil sealing, soil compaction, decline in soil biodiversity and landslides. The complexity of these threats require a new way of thinking and acting on the territory.
In this context our contribution aims to refer on some findings of the SOILCONSWEB (EU LIFE+) project which deals with a web based spatial decision support system embedding spatial and soil-plant-atmosphere modeling procedures, digital soil mapping engines and spatial data management processes; The primary aim of the project is to develop, to test and to apply a Web Based-Spatial Decision Supporting System (WB-SDSS) to support (stakeholders) decisions on landscape issues aiming at both the best soil conservation/land management and an easy landscape implementation of some important environmental EU directives and regulations. Decision makers (individuals, groups of interests and public bodies) through the system can have real-time (or near real-time) access to critical, accurate, complete and up-to-date spatial data held in multiple data stores. The SOILCONSWEB system is data-driven: the entire process feeds off the collection and availability of data to analyze. The system is a server-side Web: it requires only a browser installed on the client machine to carry out the system tasks. The SDSS has been developed, tested and applied in an area of about 20,000 hectares in South Italy (Valle Telesina, Campania region) but its development will enable future applications in other areas;
In order to deal the issue of physical processes involved in the dynamics of soil/landscape ecosystem, we present here a SOILCONSWEB tool specially designed for the estimate of the loss of soil ecosystem services related to new urbanization. The tool is GIS and dynamic-modeling based. It implements both the calibrated Swap model (van Dam et al., 1997) for the simulation of soil water flows, and GIS functionalities to estimate on the fly some distributed landscape variables at different spatial scales. When activated in a user-specified area this tool runs the Swap model using as input data high quality (measured) soil physical parameter and spatialized climate data. Are also available simulation of future climate data to estimate the impacts in a future climate change scenario. Simultaneously the tool applies some GIS functionalities within the area of interest, in order to query the DSS spatial database and to produce statistics of some soil-landscape parameters. The tool called "Simulates the effects of a new urbanization", returns as output the effects on soil services of a potential new urbanization from detailed to large scale. These effects are accounted by the loss of i) soil hydrological functions (water table recharge capacity and soil water content capacity); ii) potential wheat production; iii) potential food supply; iv) soil organic matter; v) landscape biodiversity.