

Dottorato XXXIV ciclo

Sustainable Agricultural and Forestry Systems and Food Security

Titolo: Quantification and implementation of soil-related Ecosystem Services in Geospatial Decision Support Systems

Proponente tutor

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Obiettivi del progetto di ricerca nel triennio e collaborazioni interdisciplinari

Soils provide multiple services to human communities (biomass primary production in agriculture and forestry, water and climate regulation, habitat for organisms, energy provision, protection towards natural hazards) and are widely recognized as valuable resources, for agriculture and spatial planning and also for addressing food security.

This PhD project work aims at developing operational methods for quantifying and modelling soil-based ESS useful for primary production and spatial planning purposes to be implemented into Geospatial Decision Support Systems.

In the addressing soil related ESS a special emphasis will be given into physically based models (e.g. SPA models).

The activities will also include the use of soil databases, Digital Soil Mapping techniques and also monetary evaluation. The activity will require multidisciplinary approaches to be implemented into S-DSS systems for evaluating the interaction and trade-off among different land uses and land management for sustainable development.

Elementi di innovazione e/o originalità del progetto rispetto allo stato dell'arte

Notwithstanding soil functions play a vital role in human well-being, relationships between soil functions and ecosystem services are still poorly understood and when quantified simplified mono-functional approaches to their study have been applied. Despite EU/National/Regional land policies regulations and requirements, few research approaches to soil functions and ESS studies are data-driven and ever fewer are the methods based on frameworks that analyse how soil contributes to ecosystem services through rigorous quantitative methods at different scales.

Despite the crucial importance of ES goods and services, tools for quantifying complex ESS at several scales and operational frameworks for assessing the capacity of soils of delivering ES have not yet been defined. As result, soil preservation and active management find difficult application in territorial planning and management at all scales and sectors (spatial planning, agriculture and forest management) and are thus considered very poorly in decision-making processes.

Indeed, DSS make it possible to link physical properties of different ecosystems and soils and several land use management scenarios with their capacity to provide ESS at different scales. For instance, through S-DSS it is possible to frame the complexity of a specific scale, decomposing and analysing the components of the ecosystem. With a specific modelling framework, it is thus feasible to present ESS in an operational format that actively supports decision-making spatial process.

Disponibilità fondi

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Collaborazioni con istituzioni straniere

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