Keywords: agroecosystem services, mapping, arable land, grassland
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(6860 - 1455) Soil organic matter quality as indicator of ecosystem services

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Soil organic matter (SOM), although a minor component in most soils, is primarily responsible for structure, function and sustainability of the ecosystems. Regarding the effects of soil degradation, those associated to SOM have importance and complexity, since changes in the quantity and quality of SOM may occur as a function of agricultural management practices. Ecosystem services (ES) are the benefits that humans obtain from ecosystems and so is necessary to develop methodologies capable to assess the potential of agroecosystems to provide ES; to subsidize public policies that encourage the adoption of conservationist agricultural practices and; consequently, the payment of ecosystem services (PES). For this, is necessary to identify parameters that can act as indicators of such services. Since SOM is a key component in soil ES provisioning, its characterization is mandatory to this discussion, and ^{13}C nuclear magnetic resonance (NMR) spectroscopy is one of the most powerful tools for this purpose, making possible, with the aid of multivariate analysis, to compare different soil management practices for ES evaluation. For the evaluation of a new management model, tested in Pito Acceso watershed, in Bom Jardim/Rio de Janeiro State, Brazil, with typical soils of mountain environment under the Atlantic Forest cover, we analyzed soil samples from four land uses/soil management: forest; permanent conventional crop; annual conventional crop and annual implemented crop, in two depths: 0-5 and 80-100 cm. Three pseudoreplicates from each area were collected. The extraction of the humic acids (AH) was carried out according to the method suggested by the International Humic Substances Society. The HA were analyzed by solid state NMR in a Varian INOVA (11.74 T) spectrometer. To help in data interpretation, the technique "Multivariate Curves Resolution" was used. The superficial layer (0 – 5 cm), the implemented crop presented AH similar to those obtained from the forest, with predominance of aliphatic structure. In depth (80 - 100 cm) there is a relative accumulation of aged (partially oxidized) pyrogenic C and carbohydrates, which probably percolated through the soil. The HA composition, determined by NMR, proved to be efficient in the evaluation of the soil potential to provide ES and can be used as an indicator of ES or as a reference method for the validation of other low-cost indicators.

Keywords: Humic acids, multivariate analysis, Nuclear Magnetic Resonance, Ecosystem Services Indicators
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(9678 - 1127) Spatial Bayesian belief networks: A participatory approach for mapping soil vulnerability at the Itatiaia National Park, Brazil

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The Itatiaia National Park (INP) is a conservation unit, with a multitude of species of the Brazilian fauna and flora, some endemic. The INP is the origin of 12 watersheds that contribute to the rivers Rio Grande and Paraíba do Sul, important rivers in southern and south regions of Brazil. It is one of the parks that receive most visitors in Brazil due to the landscape and biodiversity characteristics. The aim of this study was to assess the soil vulnerability in the INP by integrating the information of physical environment with knowledge of experts, to reconcile demand for public use and of ecosystems conservation. The method used was spatial application of a probabilistic model known as Bayesian Belief Network (BBN). Soil data (such as carbon content, texture, depth, and capacity to store water) were integrated with data derived from remote sensing (e.g. land use) and relief (elevation and slope) and with the expert opinion of land managers, decision makers and researchers that work with the INP or surrounding areas. Integrating environmental factors and expert opinion is a suitable approach to assess the soil vulnerability in INP. The most fragile areas were identified with soils with high levels of carbon, profiles less developed (shallow), with accentuated slopes, and a vegetation cover with herbaceous graminoid plants, with a predominance of Cyperaceae and Poaceae (high altitude fields). This approach will help decision makers to identify priority areas for intervention, in order to reduce soil degradation in the areas with high vulnerability. The results could also be used as a basis to support the INP management plan, as well as to contribute to other researches, especially those related with ecosystem services in the Atlantic Forest Biome.

Keywords: Ecosystem services; soil degradation; soil functions; soil security
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(7195 - 1946) Sugarcane straw removal for bioenergy production in Brazil: short-term effects on soil functions and plant yield

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Brazil is the largest sugarcane producer in the world, accounting for about 40% of the global production. Despite that, growing demands for bioenergies and market opportunities have raised the industry's interest for removing the sugarcane straw left on the field during stalk harvesting to produce bioelectricity and/or cellulosic ethanol. However, the straw maintenance in the field has a key role for preserving or improving soil functioning and plant growth. Therefore, indiscriminate straw removal management can deplete soil quality, decreasing its capacity to sustain suitable biomass production over time. In light of that, a multi-local study has been conducted since 2014 across central-southern Brazil. We investigated the impacts of sugarcane straw removal rates on soil and plant growth aiming to produce a useful scientific base to the sector for supporting decision-making. In nine study sites, we assessed straw decomposition, multiple soil properties (chemical, physical and biological) and sugarcane biomass production under increasing amount of straw that representing 100, 75, 50, 25 and 0% of removal straw. After two years of study, the short-term effects indicated that indiscriminate (total) removal of sugarcane straw from the field induced negative impacts on key soil functions, such as cycling and storage of C and nutrients, thermal regulation, plant-available water storage and resistance to structural degradation, especially in the surface layers (up to 10 cm). Soil functions were little or no impacted by moderate straw removal (~50%). In terms of plants, straw removal affected positively plant sprouting, but it had none or a slight negative effect on the sugarcane yield. Both, soil and plant responses varied according site-specific conditions of soil, sugarcane variety and climate, confirming that