Geoinformation in support of sustainable soils’ management to strengthen resilience under the pressure of climate change

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Abstract

The National Map of Saline – Alkaline Soils of Greece was recently developed within the initiative of the European Soil Partnership (ESP) of FAO. The technique combines between other MODIS satellite imagery, spatial interpolation methods and ground surveying to derive at 1 km spatial resolution maps of soil’s salinity (SS) and soil organic carbon (SOC).

The present study investigates for the first time the development of higher resolution maps of these soil properties adopting the aforementioned methodology. Furthermore, this study attempted to estimate the Carbon sequestration (SOC) using Remote Sensing and geostatistic methods of spatial analysis, a concern that is eminent today due to its effect on climate change mitigation.

As a case study the island of Mytilene in Greece is used, for which detailed information on soil properties as well as climatic, geomorphological, geological and soil data was available from previous studies. An MCDA (Multiple Criteria Decision Analysis) method was applied in a GIS environment using Landsat satellite imagery for the composition of a Saline - Alkaline map. Between the key soil parameters estimated spatially included the Electrical Conductivity (EC), Exchangeable Sodium Percentage (ESP) and pH. Geospatial data analysis methods were implemented to visualize all the derived parameters related for the study area and to analyze the final products in the spatial domain.

Finding suggests that climate change and soil directly affect one another. The impact of environmental and climate change in addition to unsustainable agricultural practices seems to be linked to salinity increase, soil erosion and loss of organic matter. In addition, when land degradation as well as erosion and loss of vegetation occur, SOC emissions increase. Under these conditions, soil cannot absorb enough amounts of CO\textsubscript{2}, especially when soil salinization and sodicity exists; inputs are further limited due to declines in vegetation health. The role of geoinformation technologies in support of sustainable agricultural production under the pressure...
of both climate change and anthropogenic activities is also discussed within the present study framework.

**KEYWORDS:** geoinformation, soil, pH, salinity, soil organic carbon, geostatistics, earth observation, GIS, Greece