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Effect of land use and land cover changes on carbon sequestration in vegetation and soils between 1956 and 2007 (southern Spain)

M Muñoz-Rojas (1,2), A Jordán (2), LM Zavala (2), D de la Rosa (3), SK Abd-Elmabod (1,2,4), and M Anaya-Romero (1)

(1) Evenor-Tech (CSIC spin-off), Sevilla, Spain, (2) MED_Soil Research Group, Department of Christallography, Mineralogy and Agricultural Chemistry, University of Sevilla, Sevilla, Spain, (3) Institute for Natural Resources and Agrobiology (CSIC), Sevilla, Spain, (4) Department of Soil and Water Use, National Research Center, Cairo, Egypt

Land use has significantly changed during the last decades at global and local scale, while the importance of ecosystems as sources/sinks of C has been highlighted, emphasizing the global impact of land use changes. The aim of this research was to improve and test methodologies to assess land use and land cover change dynamics and temporal and spatial variability in C stored in soils and vegetation at a wide scale. A Mediterranean region (Andalusia, Southern Spain) was selected for this pilot study in the period 1956-2007.
Land use changes were detected by comparison of data layers, and soil information was gathered from available spatial databases. Data from land use and land cover change were reclassified according to CORINE Land Cover legend, according to land cover flows reported in Europe. Carbon vegetation stocks for 1956 and 2007 were calculated by multiplying C density for each land cover class and area. Soil carbon stocks were determined for each combination of soil and land use type at different standard depths (0-25, 25-50 and 50-75 cm).
Total current carbon stocks (2007) are 156.1 Tg in vegetation and 415 Tg in soils (in the first 75 cm). Southern Spain has supported intense land cover changes affecting more than one third of the study area, with significant consequences for C stocks. Vegetation carbon increased 17.24 Mt since 1956 after afforestation practices and intensification of agriculture. Soil C stock decreased mainly in Cambisols and Regosols (above 80%) after forest areas were transformed into agricultural areas.
The methodologies and information generated in this project constitute a basis for modelling of C sequestration and analysis of potential scenarios, as a new component of MicroLEIS DSS. This study highlights the importance of land cover changes for C sequestration in Mediterranean areas, highlighting possible trends for management policies in Europe in order to mitigate climate change.