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Impact of global changes on soil erosion in an Italian basin of mixed pastures (Sicily)

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Soil is an essential natural resource, non-renewable on a human time scale, which is degraded mainly by water erosion, especially in the Mediterranean context. Erosion can cause significant soil losses at the plot and catchment level through the transfer of sediments which, in a framework of global changes (climate and land use), may severely increase in intensity.

This study was part of the MASCC/Arimnet2 project, which aimed to assess the vulnerability of Mediterranean agricultural soils to global changes and contribute to the definition of sustainable agricultural conservation strategies for Mediterranean agro-ecosystems. In the challenge of reconciling agricultural production, environmental protection and the effects of climate change, we believe that some trade-offs are possible.

We assessed the impact of global change scenarios on soil loss in a mixed pasture watershed in the Cannata basin (Sicily) by 2050, testing strategies to maintain agricultural production and protect soil resources. With the LANDSOIL model, we simulated soil erosion on different climatic (RCP4.5) and land use scenarios derived from a combination of plausible socio-economic conditions. The land use scenarios have been designed according two principal axes: agricultural production and soil conservation. All scenarios tend towards an increase in crops (wheat and orchard) over different degrees represented by the productivity axis. We also adopted a main differentiation between intensive and extensive practices for pasture, and between conventional and conservative practices for wheat and orchard.

The simulation results show that climate change can lead to a decrease in erosion. The evolution of erosion is also strongly influenced by land use. Environmental protection and sustainability scenarios limit soil erosion compared to the most productive scenarios which, on the contrary, may result in an increase. Reducing intensive grazing in favor of conservation wheat and arboriculture, increases the cultivated area and can decrease soil erosion by 2050 horizon. The use

of a suitable land use scenarios can contribute to environmental protection, sustainability, and provide levers to meet food production requirements.

Key words

Global change, climate, erosion, land use, modelling, agricultural practices, pasture.