

How to assign a value to soil sustainability? An example based on water erosion modelling.

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Water erosion is a major threat to soil sustainability. In the context of global change, erosion intensity could be dramatically increased, hence decreasing the capability of soils to sustain agriculture. We evaluated soil sustainability to water erosion in two watersheds (about 100 km² each) located in Southern France and Northern Tunisia. Erosion both at present time and in the future (about 100 years) was assessed using the STREAM model. The ARPEGE model was used to simulate climate change scenarios and the CLUE model for land-use change scenarios. Results show that land-use change is the main factor controlling soil sustainability, which means that soil sustainability can be dramatically affected by decisions about watershed management. Results also show a large spatial variability of soil sustainability inside the watersheds, with small areas of low sustainability. As a consequence, targeted decisions should be more efficient than general policies. Usually, soil sustainability to water erosion is gauged through erosion rates (T/ha/y) or changes in soil thickness (mm/y). However, because life expectancy is a familiar concept, it can be understood easily by non-specialists, such as decision-makers. Life expectancy of soils thus appears to be a valuable indicator of soil sustainability.

Keywords: soil sustainability, water erosion, modelling, life expectancy