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Soil and climate interactions in the Mediterranean. Are we heading for disaster?

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Soils are by definition important carbon sinks, in particular for non-tropical types of climates, an important part of carbon in ecosystems are located on them. Under climate change, those carbon sinks are placed under stress due to often-subtle changes that modify the conditions for their function and rend them particularly vulnerable to dereliction, reducing the capacity to act as carbon sinks at the long term.

In agricultural soils, the intensification of cropping systems and the reduced addition of organic matter results in a sharp reduction of soils' organic content, with important impacts on soil functioning, namely in what concerns water and nutrient cycles, which will reduce soil fertility and carbon content on the long run. This will transfer slowly but steadily soil's organic carbon to the atmosphere, reinforcing climate change.

Forest soils suffer an even more catastrophic impact from climate change, since the regions more vulnerable have a higher frequency and intensity of the big eraser, when the forest systems fail to be in equilibrium with the climate: forest fires. They are responsible altogether by the emissions of various compounds to the atmosphere, comparable to the anthropic emissions in a bad forest fire year. The soils derelict by fire lose an important part of environmental services they provide, namely suffer a significant reduction of their capacity to sink carbon. This adds to the instantaneous loss of carbon to the atmosphere during the fire and downstream to aquatic ecosystems thereafter.

We explore methodologies to reduce those losses in wet Mediterranean areas, aiming to increase the carbon sinks to reduce the atmospheric concentrations.