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How much is the value of the abandonment of a citrus grove in a semi-arid Mediterranean region - a carbon storage perspective using the InVEST model

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Sicily's landscape features lush fields of olives, citrus trees, and vineyards, as well as vast stretches of beaches and Mount Etna. However, this landscape is changing fast, as some farmers are removing traditional crops (olives and citrus trees) to cultivate exotic ones (avocados, bananas, kiwi, mango, papaya, passion fruit, and pineapple) or abandoned agricultural/pasture areas. Facing a complex climatic scenario, especially related to a lack of water in the reservoirs and wells, the future projections indicate an increasing trend in these abandoned areas in Sicily. Land use and land cover change (LUCC) is a critical driver of carbon storage dynamics in terrestrial ecosystems, as it changes vegetation structure, soil properties, and ecological processes, which impacts the carbon balance (source and sink). This work is the first step in evaluating ecosystem services related to carbon sequestration in citrus cultivation compared to abandoned agricultural areas in semi-arid Mediterranean climate conditions, Centuripe. The modeling was carried out using the InVEST model, which simulates the net change in carbon sequestration over time and its economic value. The Centuripe region has roughly 615 thousand hectares of agricultural abandoned area. The model pointed out an abandoned area around 0,45 Mg C ha^{-1} is stored below and above ground while the citrus grove stores around 7,69 Mg C ha^{-1}. The model simulations pointed out that citrus groves that have been around for 12 and 32 years generate US$793.34 per hectare and US$1,575.65 per hectare, respectively, for the ecosystem service of carbon sequestration. Therefore, actions should be assessed to motivate farmers and decision-makers to sustain citrus groves instead of abandoning them.

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