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The impact of landscape changes on carbon sequestration and storage in the sabor river's upper basin

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The landscape in northeastern Portugal has changed in the past decades mainly driven by depopulation and agriculture abandonment. These changes can have major impacts on the provision of ecosystem services including the climate regulation service. In order to assess the influence of landscape changes in the provision of this ecosystem service we quantified, valued and mapped carbon stored and sequestered in the sabor river's upper basin, Bragança, Portugal, using the invest model. The assessment relied on the interpretation of land use/land cover (lulc) changes between 1990 and 2006 and the estimation of carbon stocks in aboveground, belowground, litter and soil pools for the entire landscape. For the economical valuation we used the social costs of carbon approach. Also, three alternative landscape scenarios (forest expansion, shrubland expansion and agriculture abandonment) have been projected for 2020. The results suggested that between 1990 and 2006 carbon stored in the landscape increased and that the variation of the carbon sequestered and stored in the landscape occurred mainly due to changes in lulc and to the increase of forest tree biomass. Carbon distribution among pools varied depending on lulc types. however, for all lulc types, soil was estimated as the major carbon pool. The scenario that simulates the expansion of forest areas revealed a higher potential for carbon sequestration, which could indicate a higher value for this ecosystem service. In contrast, the expansion of shrubland areas revealed a lower potential for carbon sequestration in the landscape.