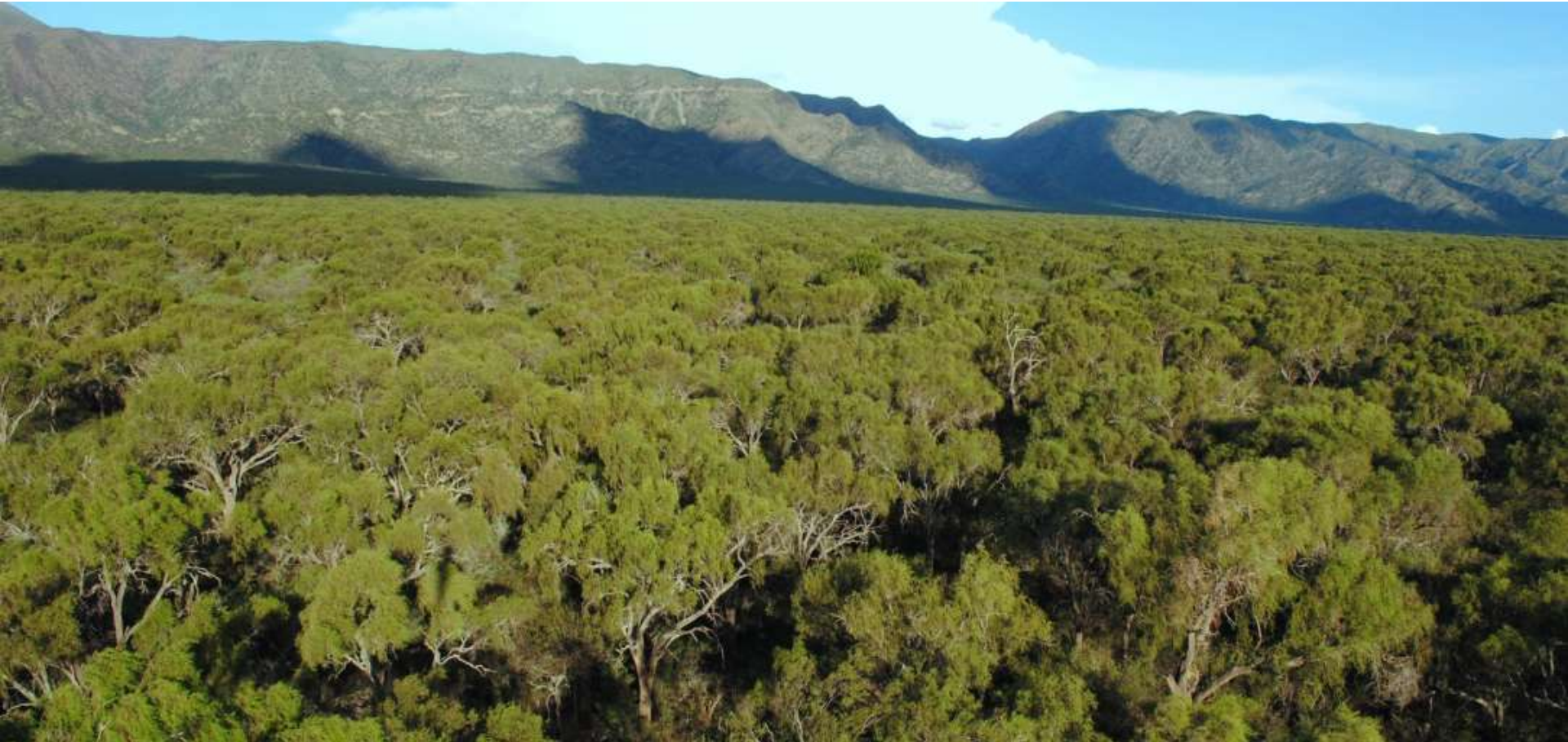


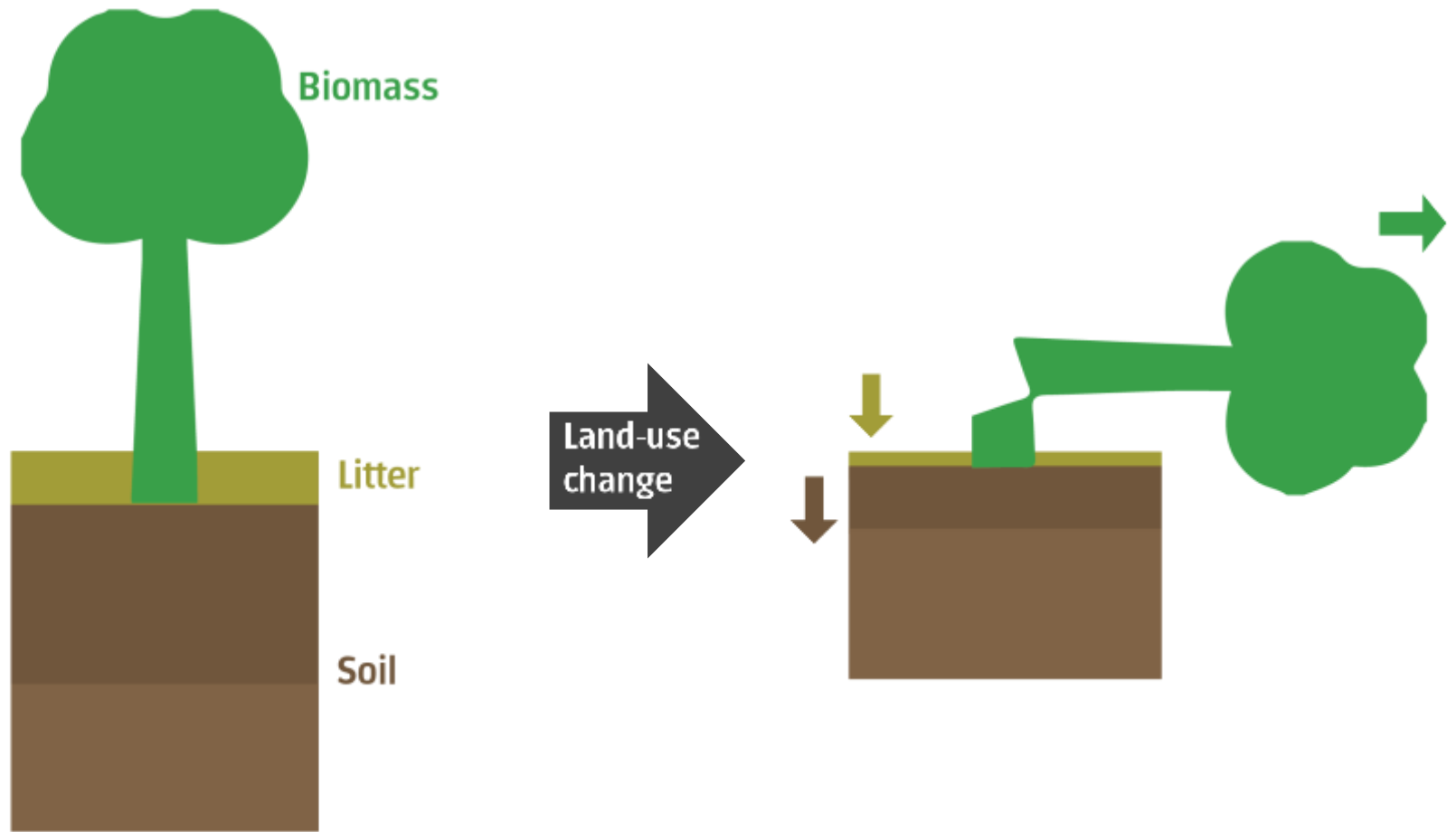
Large effects of land use conversion on C storage in dry forest ecosystems from southern South America



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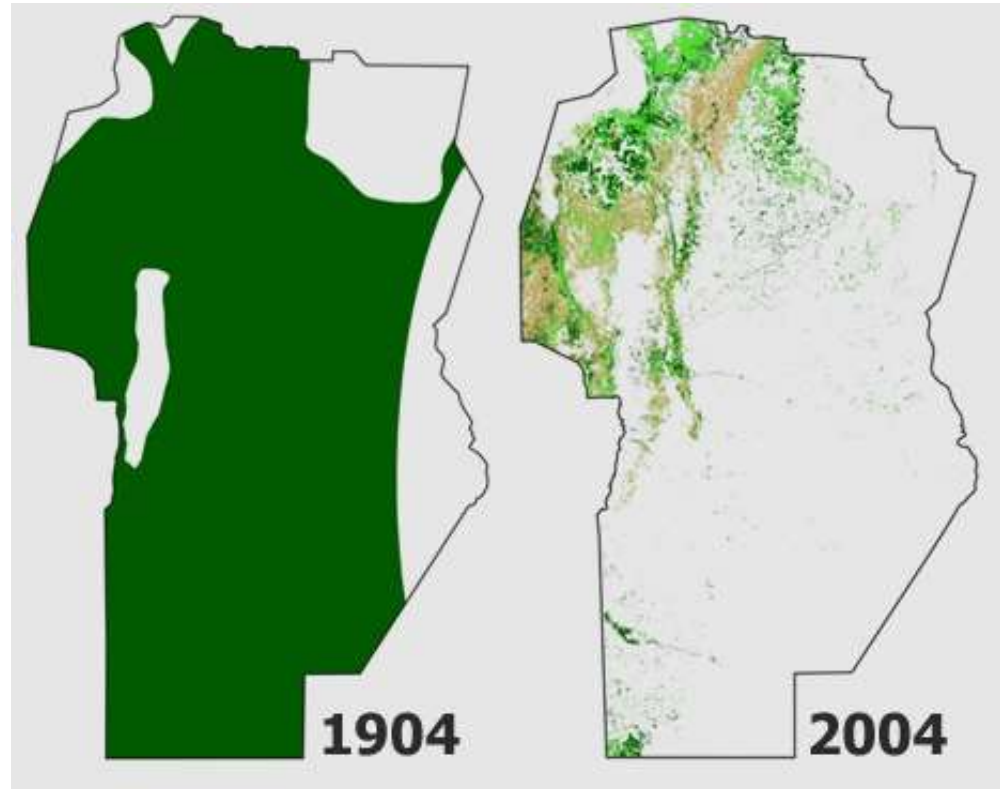


How does land-use change affect ecosystems C storage?



Regional land-use changes. Actual situation

Forest cover changes in central Argentina



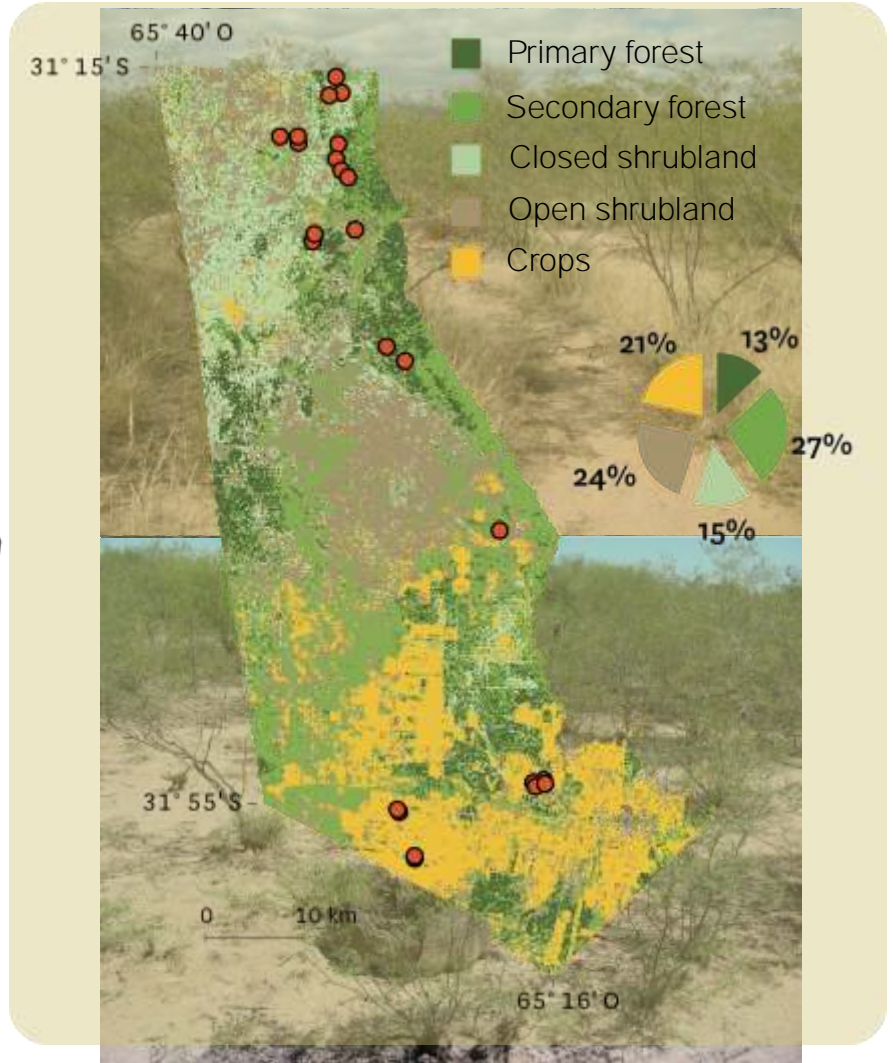
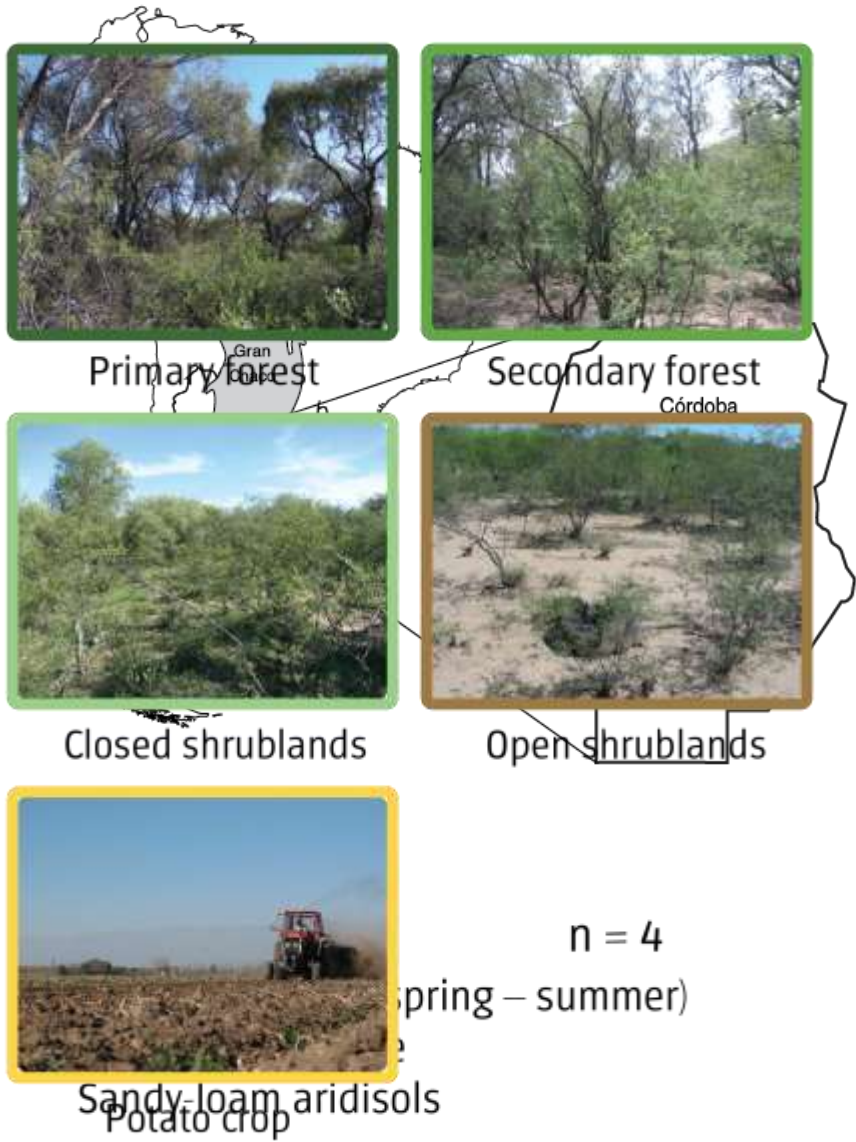
Annual deforestation rate for the area (1969-1999): **2.2%**

The research presented here aimed to answer the following questions:

- i) How much C is stored in plant and soil pools under different land-uses in the semi-arid Chaco of Argentina?

- ii) Which is the direction and magnitude of change in C pools associated to common land-use transitions in the area?

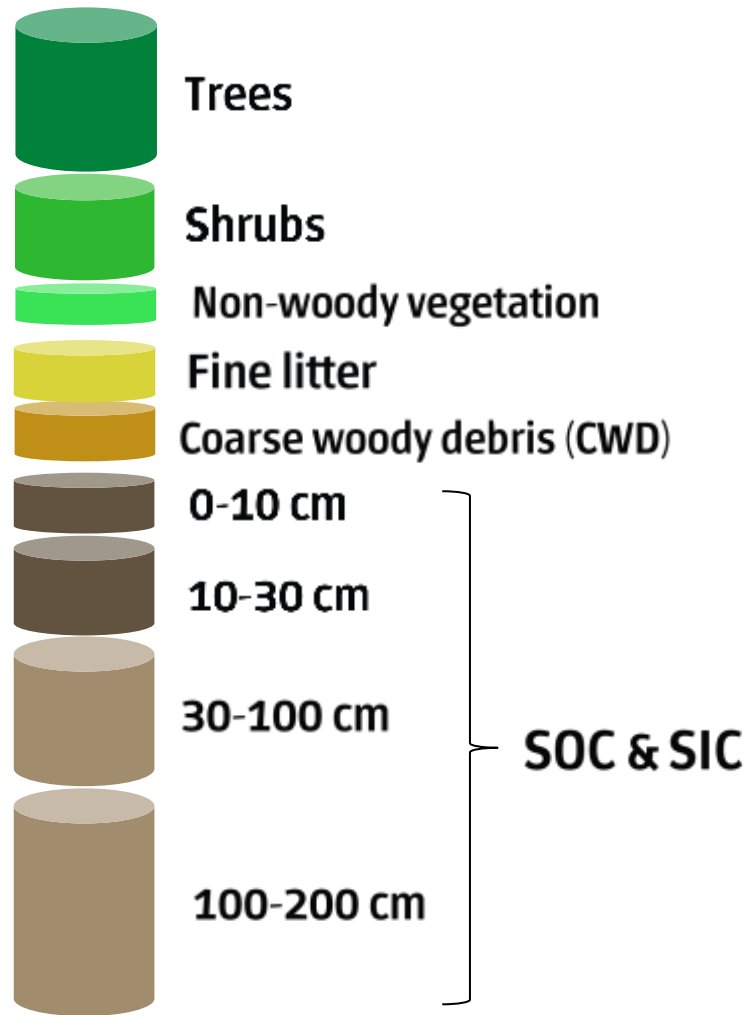
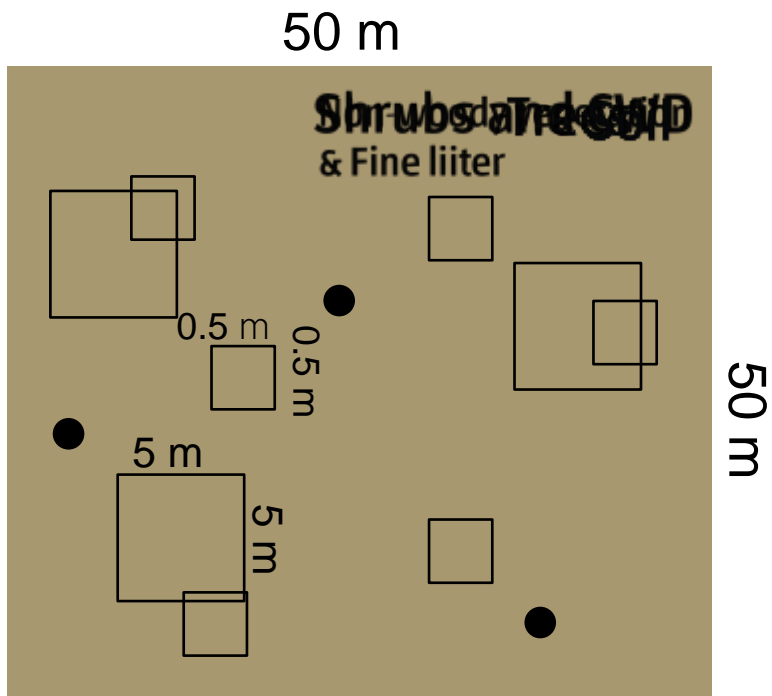
Study area



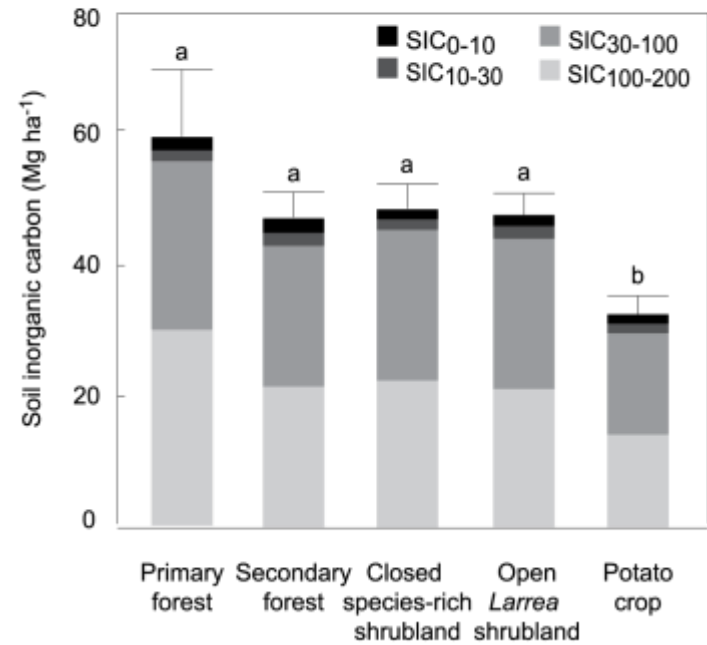
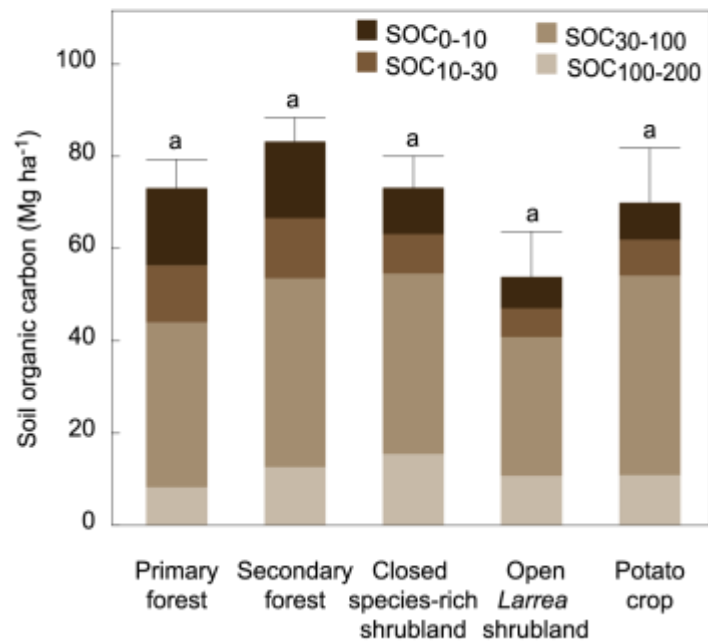
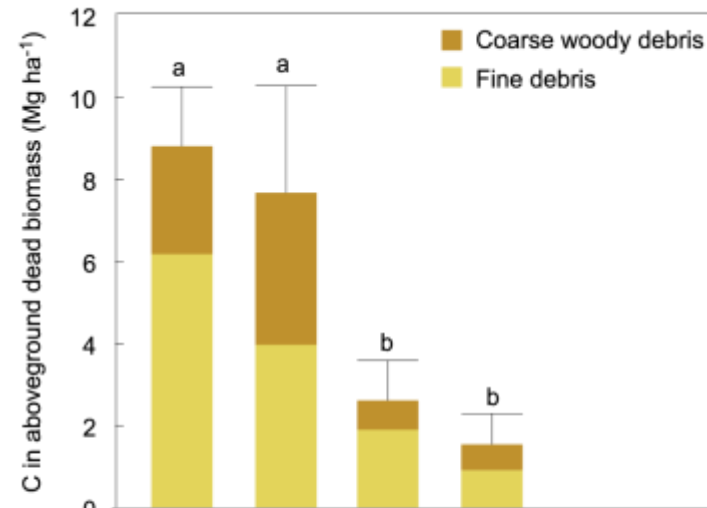
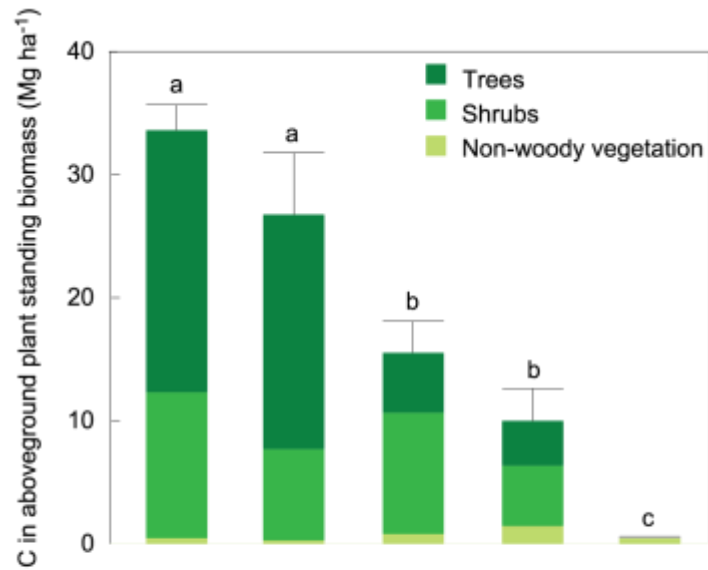
Quantifying CS in the dry Chaco



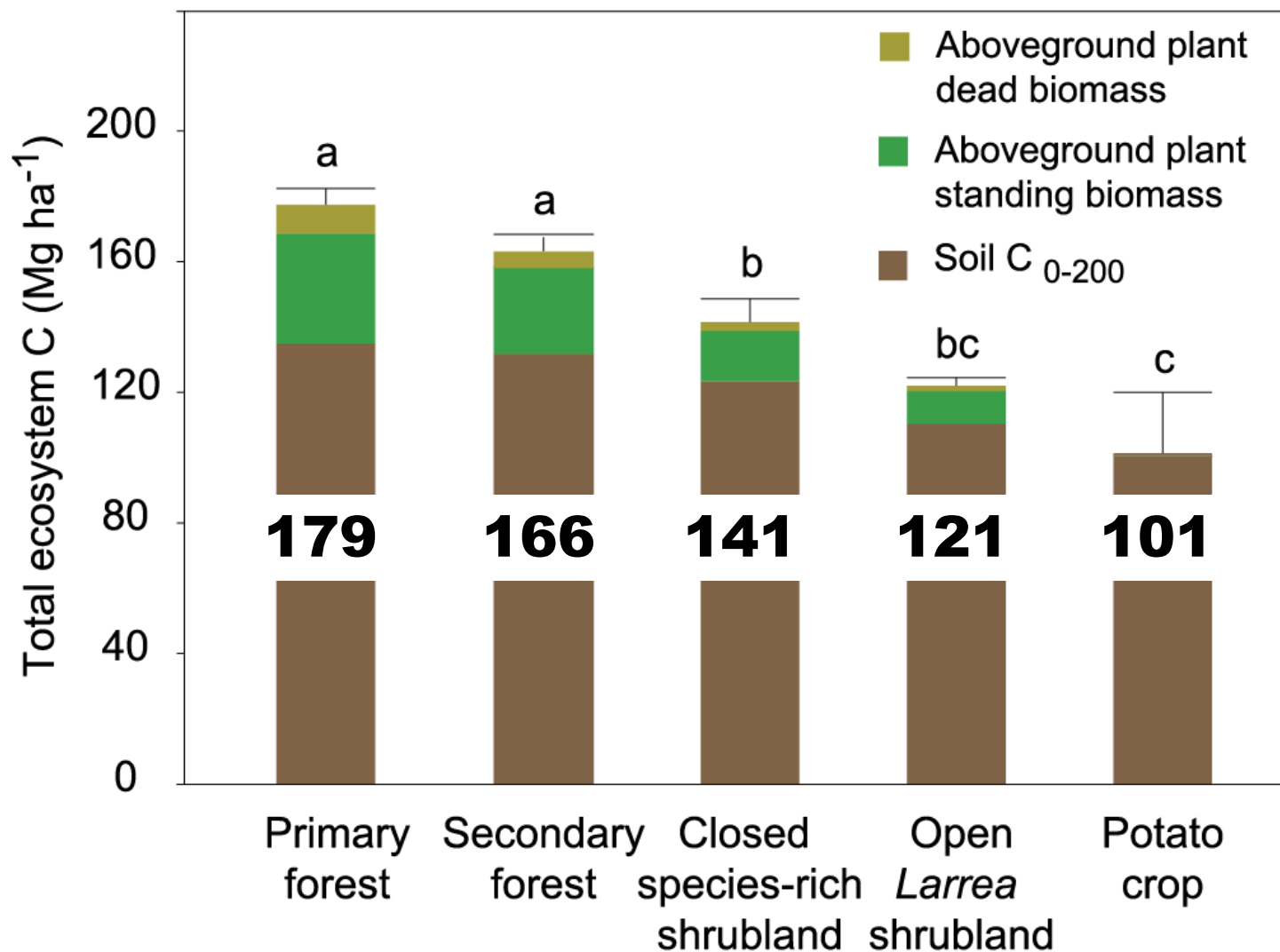
$DBH \times H \times WSD$ (Weight, ramifications)
 $Mg\ ha^{-1} = BD \times depth \times OC$
 (and Basal diameter (n = 7.72))
 affected by changes in bulk density
 (Wendt & Hauser, 2013)
 $ASB = \rho_{sp} \times WSD \times H$ (Project-specific biomass equations)
 $OC (Mg\ ha^{-1}) = BD \times depth \times OC$ (multiple regression equations)
 corrected by changes in bulk density
 (Wendt & Hauser, 2013)
 Inorganic C measured as carbonate calcium



Total C stocks in different land uses - Results



Total C stocks in different land uses - Results



Changes in C stocks between land uses - Results

Absolute C change (Mg C ha⁻¹) with relative change between brackets

Land-use change transition	Aboveground plant standing biomass	Aboveground plant dead biomass	SOC ₀₋₃₀	SIC ₀₋₂₀₀	Total organic C ₀₋₃₀
<i>Primary forest to secondary forest</i>	-6.8 (-20.4%)	-1.2 (-13%)	0.6 (+2.1%)	-12.3 (-20.3%)	-7.4 (-10.4%)
<i>Primary forest to closed shrubland</i>	-18.1 (-53.9%)	-6.2 (-70.3%)	-10.5 (-8.7%)	-10.7 (-6.2%)	-34.8 (-48.6)
<i>Primary forest to open shrubland</i>	-23.6 (-70.3%)	-7.3 (-82.4%)	-16.1 (-55.4%)	-11.8 (-19.4%)	-47 (-65.7%)
<i>Primary forest to potatoe crop</i>	-33.2 (-98.7%)	-8.8 (-100%)	-13.2 (-45.8%)	-27.63 (-45.4%)	-55.5 (-77.6%)
<i>Secondary forest to closed shrubland</i>	-11.2 (-42.1%)	-5.1 (-65.8%)	-11.1 (-37.3%)	1.7 (+3.4%)	-27.4 (-42.7%)
<i>Secondary forest to open shrubland</i>	-16.8 (-62.7%)	-6.1 (-79.8%)	-16.7 (-56.3%)	0.6 (+1.2%)	-39.6 (-61.8%)
<i>Secondary forest to potatoe crop</i>	-26.3 (-98.3%)	-7.7 (-100%)	-13.9 (-46.7%)	-15.2 (-31.6%)	-48.1 (-6.8%)
<i>Closed shrubland to open shrubland</i>	-5.5 (-35.6%)	-1.1 (-40.9%)	-5.6 (-30.4%)	-1.1 (-2.2%)	-12.2 (-33.3%)
<i>Closed shrubland to potatoe crop</i>	-15 (-97.2%)	-2.6 (-100%)	-2.8 (-15%)	-16.9 (-33.8%)	-20.7 (-56.4%)
<i>Open shrubland to potatoe crop</i>	-9.5 (-95.6%)	-1.5 (-100%)	2.9 (+22.1%)	-15.7 (-32.3%)	-8.5 (-34.6%)

Remarking conclusions about land use effects on C stocks in the semiarid Chaco forest of Argentina

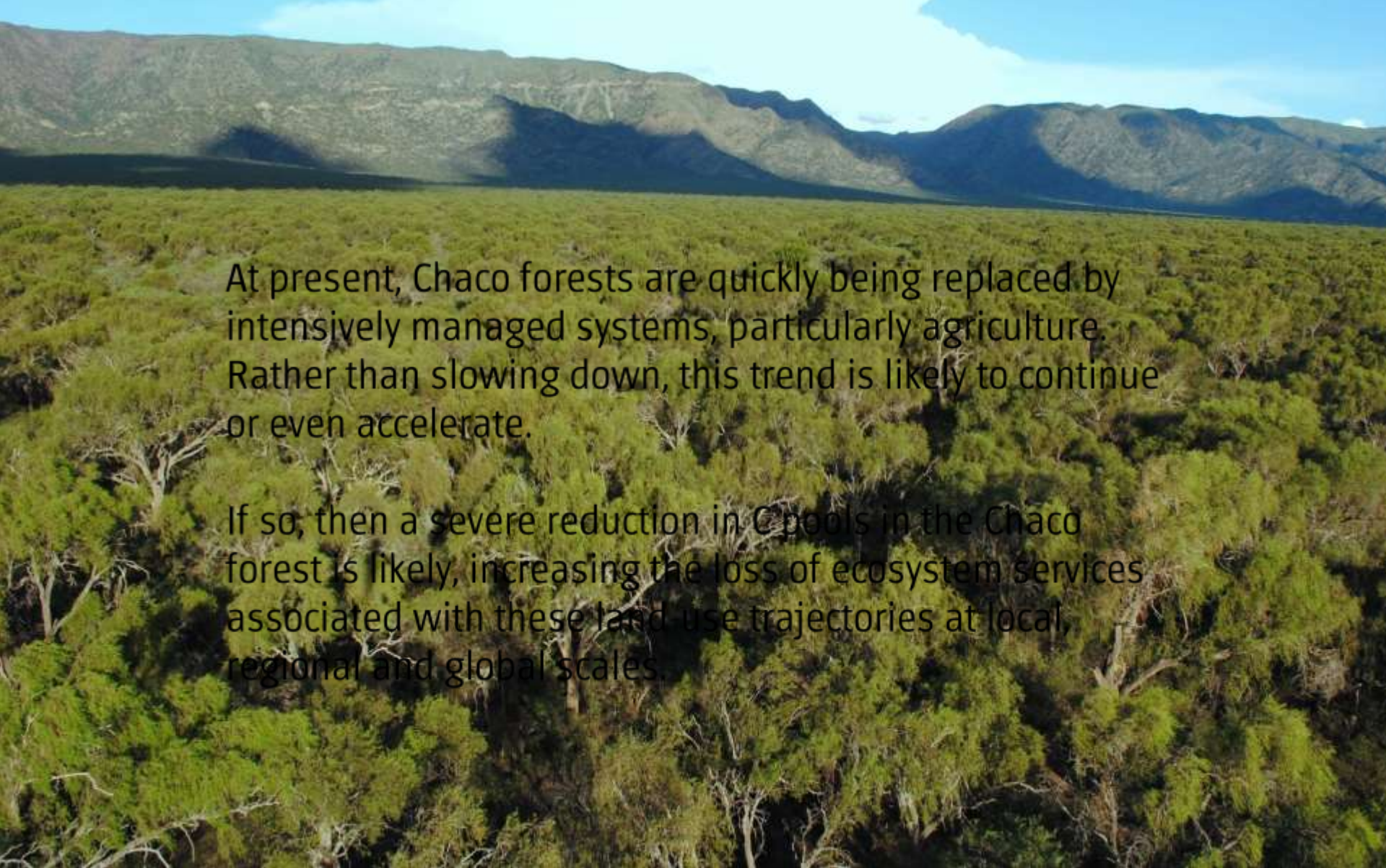
Total ecosystem C in the most conserved Chaco forest accounted for 179 Mg C ha^{-1}

Shrubs represented a significant proportion of the aboveground standing biomass (at least 28%) in all land uses (except cultivated ones).

C stored in organic soil represented the most important stock ($\approx 40\%$) in all land-uses, and specifically the fraction under 30 cm depth.

Land-use not only alters the amount of C stored in biomass and in the organic fractions of the soil (SOC) but also in the inorganic C fraction.

Forest conversion to croplands and degraded shrublands reduces $\approx 70\%$ the organic C stored in the ecosystem, with a relative reduction in surface SOC of 45%.

An aerial photograph showing a vast, dense forest of green trees in the foreground and middle ground. In the background, there are long, low mountains under a blue sky with some white clouds. The forest appears to be a Chaco forest, characterized by its dense, low-lying vegetation.

At present, Chaco forests are quickly being replaced by intensively managed systems, particularly agriculture. Rather than slowing down, this trend is likely to continue or even accelerate.

If so, then a severe reduction in C pools in the Chaco forest is likely, increasing the loss of ecosystem services associated with these land use trajectories at local, regional and global scales.

THANKS FOR YOUR ATTENTION!