The historical expansion of agriculture on natural lands was driven by the incorporation of multiple anthropic elements in the Pampas, thus modifying basic structures and functions of the pristine ecosystem. The stocks and fluxes of carbon and water, closely related to habitat, biodiversity and ecosystem service provision, were profoundly affected with the result of remarkable trade-offs between provision and regulation ecosystem services. Technology incorporation successfully tended to smooth, and even reverse, the conflict in recent times.
Abstract

The Pampas plains were originally covered by grassland communities modulated through the millennia by a combination of rainfall, temperature and small topographic gradients. The anthropic intervention historically modified pristine structures and functions giving rise to a novel ecosystem that was reoriented to produce food, fiber and bio-energy. From the beginning of the 20th century, the quick expansion of agriculture on natural lands and the intensification of agricultural practices triggered big ecological changes that altered the stocks and fluxes of carbon and the hydrological processes as well. Carbon and water were closely linked to the provision of habitat for biodiversity and the supply of regulation ecosystem service. Inevitably, ecological functions associated with carbon and water were profoundly modified the anthropic intervention, but conservation practices and technology incorporation in the last decades smoothed and even reversed the most outstanding negative trends. It is well known today that a return to the pristine condition will no longer be possible in the Argentine Pampas because of social and economic reasons, but an adaptive, science-based management helps maintaining the agricultural productivity preserving at the same time novel biodiversity assemblages and new configurations of ecosystem service provision.

Keywords

Agricultural intensification; Agro-ecosystems; Carbon, Croplands, Ecosystem functioning, Ecosystem services, Land use/cover change, Rangelands, Technology adoption, Water resources
Figures

Figure 1. Climatic and edaphic characteristics and sub-regions of the Pampean biome. Sources: Own elaboration with data from LocClim (FAO, 2006), Moscatelli (1991), Berhongaray (2010) and Cabrera (1951).

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Figure 6. Estimated figures show the difference in carbon emissions, soil carbon sequestration and carbon balance (ton ha\(^{-1}\) year\(^{-1}\)) between four crop production systems that are spread in South America. Negative figures indicate that carbon emission is greater than carbon sequestration.
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