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Innovative approaches to analysing carbon sequestration as a mitigation strategy in tropical pasture landscapes in two emblematic contexts, the Amazon and the West African Sahel

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Key Messages

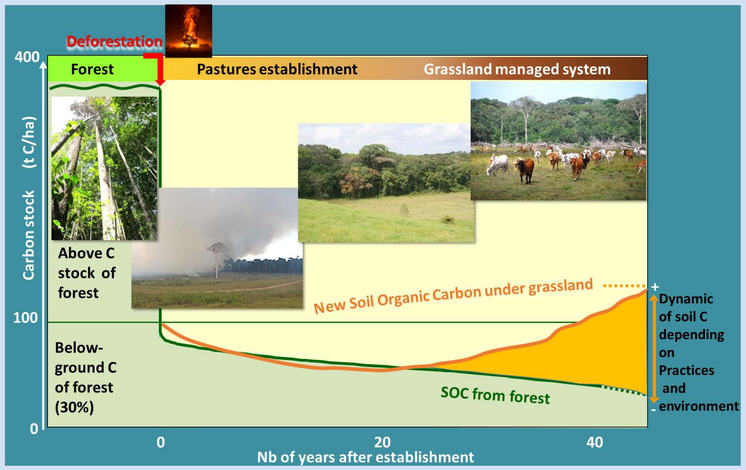
✓ **The complex relationship between livestock grazing systems and climate change**. Their efficient use of non-renewable energy and their contribution to carbon (C) sequestration are key factors in the new environmental challenge. The reality of this mitigation potential is called into question in the global agriculture and climate change debate. Few scientific references are available on these questions in tropical zone, the standard metrics and methods used may turn out to be unsuitable for the correct evaluation of grazed ecosystems in these regions.

✓ **Objective of this work :**identify original points of view, and adapt analytical methods to them to produce information that is complementary to current knowledge on the complex variable C cycle. W**e focus on mitigation options offered by rangelands and grasslands and their management in two emblematic tropical contexts**:

- In **Amazonia**, efforts to curb deforestation should therefore continue to be a priority to preserve C stocks and forest biodiversity, but need to be accompanied by sustainable management of areas that have already been converted into pastures, including strategies for the mitigation of GHG emissions.
- In the **West African Sahelian region (Northern Senegal**), extensive pastoral production systems are often accused of emitting excessive amounts of GHG per kilogram of milk or meat produced due to large-scale enteric methane emissions. On the other hand, livestock movement plays an important role in the reorganization of nutrient and carbon (C)

Results and evidence

Soil carbon stocks after conversion of Amazonian tropical forest into grazed pasture (French Amazonia)

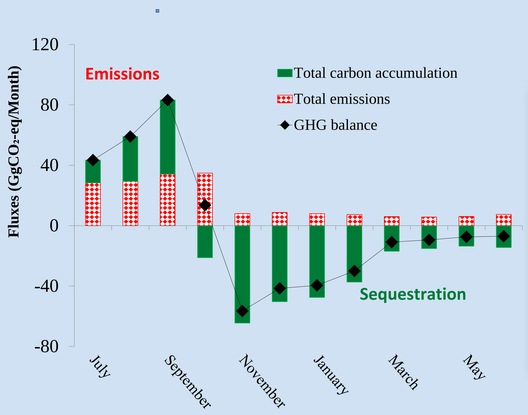


In french Guiana , the C storage function can be re-established in grasslands two decades after deforestation (1.27 ± 0.37 tC ha-1 yr-1), contributing to mitigate a part of the GHG emissions of these grazing farming systems. (Stah and al, 2017) https://doi.org/10.1111/gcb.13573)

Landscape and intensification of grazing systems in the Brazilian Amazon (Paragominas municipality along the Belém-Brasília highway

A moderate intensification livestock production avoids deforestation, promotes forest restoration. New landscapes are appearing with land use matrixes highly efficient to produce ecosystemic services, for production and conservation objectives. (Osis a&ns al., 2019) http://agritrop.cirad.fr/594474/.

Pastoral landscapes in the Sahel: a carbon balance with unexpected potential for climate change mitigation



Carbone balance is calculated by using an ecosystem approach at the landscape level that takes into account all main sources of GHG emissions and C sinks of the ecosystem, (total C balance -0.09 tCO_2-eq ha-1 year-1). This neutral C balance shows that the GHG emissions are mitigated by C sequestration in trees, soil, and animals. (Assouma and al., 2017) http://dx.doi.org/0.007/s40333-07-000-y)

Conclusion

✓ **Simply having a grassland or rangeland does not automatically result is a carbon sink, and it is unrealistic to imagine that all grasslands will act as a permanent carbon sink**

✓ **BUT the approaches we propose here to establish baselines and to enhance our knowledge of C potential sequestration processes contribute to design climate smart extensive livestock systems**

✓ **The challenge is to move on from a partial view limited to improving the production and productivity of systems, to a more integrated and sustainable approach that incorporates climate change mitigation and adaptation .**

✓ **These knowledge processes will need to be designed with the objective of feeding assessment and simulation tools at different decision levels, from farmers to policy makers.**

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