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Postdoctoral

Ecole/Institution/Société:
University de Sao Paulo, **Brazil / Sao Paulo**

Discipline:
Computational Engineering

Type d'emploi::
Full-time

Date de publication:
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Post-doctoral Spatially-explicit modeling of the contributions of pasture restoration

Job Title: Post-doctoral Spatially-explicit modeling of the contributions of pasture restoration - REF 22PDR162

Department: Soil Science (ESALQ) / CEPAGRI (Unicamp)

Institution: University de São Paulo, Campinas, Sao Paulo, Brazil

Job Categories

- Post-Doc
- Academic Fields
- Ecological and Environmental
- Computer Engineering
- Computer Science
- Agricultural
- Engineering - Other

Project title:

Spatially-explicit modeling of the contributions of pasture restoration to carbon sequestration and ecosystem services provision in Brazil

Research theme area:

Climate change ecology/geography

Abstract:

The restoration of degraded pastures in Brazil - which are estimated to occupy more than 60% of the country pasturelands – is being considered as a milestone of environmental compliance in Brazil and as one of the key commitments of the country to abate greenhouse gas emissions in the scope of the Paris Agreement. It has been argued, however, that it may not be the best alternative for reducing GHG emissions since other forms of cattle ranching management (such as feed finishing) may lead to

both better financial revenue and smaller net carbon emissions. In fact, it is stated that as long as the national herd increase GHG emissions will continue rising. Nevertheless, the potential of the country's soil to sequester and store carbon has not yet been fully explored, considering that distinct management practices, of animals, grasses and of the soil itself, can lead to substantially different carbon inputs and stocks in the soil. Moreover, there has been no assessment of the implications of

such large-scale pasture restoration on the provision of key ecosystem services. As such, this PD projects aims at generating spatially explicit projections of the land-use changes associated with Brazil's target of restoring 15 million hectares of pastures, and associated carbon budget and provision of ecosystem services according to different land management scenarios.

It will make use of a modeling framework comprised of a high-resolution land-use change model and a crop productivity and soil carbon model, both well-established as extensively applied to a variety of case studies around the world. Management scenarios will be determined through expert elicitation and literature review and then applied in the modeling framework.

Alterations in the provision of key ecosystem services will be quantified through the relation between land use types and the flow of ecosystem services, either of local and well-defined beneficiaries (e.g. water provision) or of global significance with diffuse beneficiaries (e.g. carbon storage).

The final products of this PD project will be maps showing the preferable location and management practices to proceed with the intended countrywide pasture restoration, as well as accurate estimates on the net carbon budget for each option and consequent implications for ecosystem services. These results will ultimately support the elaboration and implementation of policies and subsidies for the best possible implementation of Brazil's commitment under the Paris Agreement throughout the country.

Description:

The major objective of this PD research project is to investigate the land-use changes, carbon budget, provision of ecosystem services and economic revenue related to the restoration of 15 million hectares of degraded pastures in Brazil according to different scenarios of land management. The following research questions will be pursued as specific objectives, aiming both at the time horizon of the Paris Agreement (2030) and a longer time scale post-Paris Agreement (2050):

1. What cattle ranching management practices following pasture restoration result in the best net carbon budget, especially for soil carbon?

Hypothesis: advanced though probably expensive soil management practices can lead to negative net carbon budget in restored degraded pastures, with positive financial revenue.

2. What are the implications of different land management practices associated with cattle ranching for the provision of key ecosystem services?

Hypothesis: there is a synergy between the highest carbon savings and the provision of the highest number of ecosystem services both of direct and diffuse beneficiaries under a given set of management practices in restore pasturelands.

3. Does the consideration of indirect land-use changes considerably modify the outcomes regarding the carbon balance and provision of ecosystem services?

Hypothesis: the consideration of indirect land-use changes caused by the reconfiguration of land use following large-scale pasture restoration does not lead to significant alterations in carbon and ecosystem services balances.

Requirements to fill the position:

This project is suitable for a highly motivated candidate with programming experience in Python and/or Fortran, and/or C++ or other similar computer languages, and in land-use change modeling, a good record of scientific publications in the field, and ability to dialogue with decision makers and research from different areas; English proficiency is required. Candidates must have a PhD in Ecology, Geography, Computing, Engineering or similar areas.

INFORMATION ABOUT FELLOWSHIP:

This Postdoc fellowship is funded by FAPESP. The fellowship will cover a standard maintenance stipend of R$ 8.479,20 per month.

MORE INFORMATION:

https://www.rcgi.poli.usp.br/opportunities/

Position: Post-Doctoral Fellowship REF: 22PDR162

https://www.rcgi.poli.usp.br/opportunities-aplication/ AND APPLICATION AT REF 22PDR162 – Post-Doctoral Fellowship

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