

The Regional Universities Forum for Capacity Building in Agriculture with support from the Global Research Alliance on Agricultural Greenhouse Gases have funded eight Graduate Research Grants (GRG) aimed at building the capability of graduate and post-graduate level students in Africa to conduct applied research on agricultural greenhouse gases. Each GRA-GRG supports a Principal Investigator (an individual senior lecturer of a RUFORUM member university) and two Masters Students to undertake research and training on topics related to the measurement and management of greenhouse gas emissions and removals in ruminant farming systems in Sub-Saharan Africa over a two-year period.

Project Coordinator
Makerere University,
Uganda

Project ID: RU/2020/
GRG/07

Project duration:
24 months

Start date
16th November 2020

Funding
RUFORUM

Total budget:
US\$70,040.00

Project partners:
Ministry of Water and
Environment- Climate
change unit

Ministry of Agriculture,
Animal Industry and
Fisheries

Farmers within the
study areas

Kyambogo University
Uganda National
Meteorology Authority

Project title

Effects of changes in Land Use/Cover and Climate on Carbon Stocks in selected Agro-Ecological Zones of Uganda

Summary

Significant changes in climate and land use/cover have been reported in most of the agro-ecological zones of Uganda, thus, altering carbon stocks and greenhouse gas emissions. The proposed project seeks to: i) inventorise contemporary carbon (C) stocks in vegetation and soils of two selected agro-ecological zones and assess soil C fluxes following climate and land use/cover change; ii) assess the influence of spatial and temporal heterogeneity of the environment on carbon stocks; iii) estimate the historical and project future changes in total C levels due to land use and potential climate changes in the two agro-ecological zones; and iv) assess land use management scenarios that are optimize recarbonisation of fragile agro-ecological zones in the future. The objectives of this project build upon each other to span both basic and applied scientific endeavors with a view to understand biogeochemical processes and nutrient (re)cycling in the two agro-ecological zones and their implications on elevated atmospheric CO₂. Using protocols developed by IPCC an inventory of terrestrial carbon stocks will be determined and paired site sampling scheme will be used to assess C fluxes following climate and land use/cover change. This will then be integrated in the CENTURY Ecosystem Model, to determine the impacts of land change and future climate change on the dynamics of carbon stocks in the two agro-ecological zones

Objectives

Overall: To contribute to the assessment of distributions and temporal carbon stocks dynamics in the different types of vegetation communities of Uganda associated with land use/cover and climate change to improve estimates of the carbon balance in different ecosystems and enhance climate mitigation and adaptation actions.

The specific objectives are:

1. To inventorise contemporary carbon (C) stocks in vegetation and soils of the two agro-ecological zones and assess soil C fluxes following change in land use/cover and climate
2. To assess the influence of spatial and temporal heterogeneity of the environment on the amount of carbon stocks in the two agro-ecosystems

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3. To estimate the historical and project future changes in total C levels due to land use/cover and potential climate changes
4. To assess the land use/cover management scenarios that optimize recarbonisation of fragile agro-ecological zones in the future.

General planned activities

1. Recruitment of masters' students
2. Inception meeting with district key personnel in the two agroecological zones
3. Site selection for Carbon flux assessments
4. Field carbon stock and flux assessment
5. Laboratory analysis (Remote sensing data extraction, laboratory soil and plant analysis)
6. Land use/cover change projection
7. Climate scenarios downscaling
8. Identification of best management options (Century model)

Students activities

Student 1: Estimation of carbon stocks

Student 2: Assessment of the historical and future changes in total C levels due to land use/cover and potential climate changes in the two agro-ecological zones of Uganda

Expected outcomes

1. An inventory of land use/cover types in the two agroecological zones documented
2. Increased understanding of climate impact on crop production
3. Best management options that optimize recarbonisation of fragile agro-ecological zones proposed.
4. Two students trained
5. Increased adoption of the best management options

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