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Farmers’ and academia’s views”

Africa’s woodlands in transition: effects of climate change, land-use change on plant functional diversity and their carbon pools

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Abstract

Globally, forest and savannah ecosystems are among those containing the main carbon pools. Woody biomass within Africa’s ecosystem stores about 25 % of tropical forest carbon. However, African forest and savannah ecosystems are currently experiencing rapid transitions due to deforestation and land-use intensification, with profound, usually negative consequences for carbon storage in woody biomass. At the same time, ongoing climate change is projected to have substantial effects on carbon pools, which potentially interact with the effect of land-use change. Moreover, climate and land-use change are known to be the most important drivers for biodiversity losses, which can in turn have indirect effects on carbon stocks. There is the need for a better understanding of how climate and land-use change jointly and directly affect carbon pools in Africa’s woody vegetation. Likewise, we need to better understand the extent they exert indirect effects on carbon storage through their effects on plant diversity.

We will conduct a field study along a latitudinal climatic gradient in West Africa, from Sudan Savannah to tropical Guinean climate zone. Along this climatic gradient, four study sites will be located where we will capture local gradients of land-use intensity, spanning from protected areas over rangelands to intensively used agricultural fields. In this way, we can use a crossed space-for-time substitution for climate and land-use change, which will allow us to disentangle potentially interactive effects of these two global change drivers on carbon storage in woody vegetation. Aboveground and belowground biomass and carbon pools of woody vegetation will be quantified via novel methodology designed for disturbance-prone ecosystems. Woody species’ plant functional traits in the global spectrum of plant form and function will be recorded to assess indirect effects of climate and land-use change on carbon stocks via their imprint on functional vegetation composition and diversity

Keywords: Biomass, carbon pools, climate change, functional diversity, functional traits , land-use change