

Impacts of the Project on Climate Change Research and Improved Livelihoods Outcomes in Africa

Science Impact

This proposed project aims to examine a potentially significant but poorly documented or understood carbon sink. Furthermore, while considerable land change science has been focused on loss of forest cover, we focus our attention on increasing stocks in trees *outside* of forests. These landscapes have been largely ignored by most earth observation analyses because carbon stocks are relatively low and tree density is sparse. However, because the land area covered by TOF systems is expansive an increase in number of trees or productivity of trees can be important carbon fluxes in the global carbon cycle and be an important sink term in the global budget. At the same time, the impact of this work on international policy is high because TOF systems directly connect to livelihoods in poor countries. Further, success in meeting goals for climate change mitigation (e.g. REDD+, Forest Landscape Restoration, Bonn Challenge) and the UN Sustainable Development Goals (cf. SDG #15) will hinge on carbon sequestration and increasing woody perennials in Africa and throughout the developing world.

This project promotes an avenue of investigation that most scholars have not considered important to understanding the global carbon cycle, but emerging evidence suggests otherwise. It is a new area of study and only a handful of analyses have deployed the technical means to examine the importance of trees outside of forests, especially in semi-arid landscapes, although we directly address and embrace those that have. We recognize that our challenge, in part, is that we cannot simply deploy the observational means directly off the bench, and that new methods of observation will need to be developed and deployed – and done in a way that minimizes detection complexities. We have reduced the intellectual risk through considerable testing prior to proposing this larger project.

Supporting the Science in African Institutions and Research Networks

This project will directly support the GOF-C-GOLD regional networks in Africa, primarily through direct engagement of the regional scientists as collaborators and in promoting through demonstration important global change science objectives that have significant ancillary regional and national applications. The two workshops proposed are intended to be collaborative with the GOF-C-GOLD Miombo and WARN networks, hosted by Future Africa at the University of Pretoria. Future Africa is directed by Co-I C. Mbow. Dr. Mbow is committed to working with GOF-C-GOLD within the Future Africa strategic work plan. The project Investigators are active members of GOF-C-GOLD.

Supporting the Advancement of UN Sustainable Development Goals and Indicators

This project will support SDG 15. We shall inform national governments on outcomes of our research as related to the broader goals of SDG 15 and the direct contributions to its Indicators, such as 15.1.1. Co-Is are in government service in Senegal and Malawi as interfaces. Data on changing biomass stocks in TOF are critical to the implementation of land degradation and forest landscape restoration programs in their countries, as well as across the region. Globally, there are several Earth Observation (EO) platforms and initiatives, but until now the connection with SDGs in Africa has been weak. With GOF-C-GOLD we can support the SDG framework in Africa. Facilitating data access is essential for a comprehensive and coordinated national system to monitor SDG progress,

and to deliver timely information to governments to build accountability and evidenced-based action towards the targets.

Contributions to Climate Change Mitigation and Adaptation

The outputs from this project will inform methodologies that support key required measurements in developing REDD+ capacity in Africa, particularly in the countries where we are working closely. Co-Is and Collaborators work within or advise national governments on REDD+. Specific decisions of the UNFCCC have identified technical requirements for inventories of GHG emissions and removals in Agriculture, Forestry and other Land Uses (AFoLU). The specifications fall under the Warsaw Framework which includes methodologies for Measurement, Reporting and Verification (MRV). A robust MRV platform in REDD+ countries centers on the deployment of a National Forest Monitoring System (NFMS). This project will demonstrate models for NFMS, based on its three main pillars: i) a Satellite Land Monitoring System for production of Activity Data from land cover change, ii) a National Forest Inventory for the production of Emissions Factors from field sample plots of carbon stocks, and iii) a Greenhouse Gas Inventory, that is used to estimate emissions and removals associated with various AFoLU-based interventions and policies.

Contributions to Landscape Restoration and Land Productivity

This project will contribute directly to building capacity and information in several important policy initiatives that emphasize forest landscape restoration (FLR). Co-Is are key national actors in such efforts. The project will contribute methods for measurement, which is key to national monitoring. Across Africa the policy response to REDD+ and climate change mitigation is heavily centered on “nature based solutions”, which is largely focused on programs that promote carbon sequestration in tree-based systems. African nations are prioritizing the African Forest Landscape Restoration Initiative (AFR100) as their contribution to the Bonn Challenge, a global effort to bring the world’s deforested and degraded land into restoration by 2030. It has broad contributions to several conventions, notably REDD+ in UNFCCC and Aichi Target 15 in CBD. It is enabled by the Global Partnership in Forest Landscape Restoration, which is a multi-lateral agreement to invest in AFR100, a country-led effort to bring 100 million hectares of land in Africa into restoration by 2030. It aims to accelerate restoration to enhance food security, increase climate change resilience and mitigation, and combat rural poverty.