SUSTAINABLE LAND MANAGMENT IN AFRICA

OPPORTUNITIES FOR INCREASING AGRICULTURAL PRODUCTIVITY AND GREENHOUSE GAS MITIGATION

UNFCCC Article 4.1(c): Promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emission of greenhouse gases not controlled by the Montreal Protocol in all relevant sectors, including the energy, transport, industry, agriculture, forestry and waste management sectors.

Land degradation and land use change are the largest sources of greenhouse gas emissions in Africa

Soil and vegetation on the earth's land surface store three times the carbon present in the Earth's atmosphere.[1] Land-clearing and degradation turn this valuable carbon sink into a major source of greenhouse gas (GHG) emissions. As land continues to degrade, livelihood options for at least 485 million Africans also dwindle with it.[2]

- 43% of Africa's total CO_2 emissions come from land-clearing for agricultural use, including croplands and shifting cultivation.[3] 5 million hectares of forest will likely be lost annually in Africa from 2005-2015, releasing nearly 2 billion tons of CO_2eq each year[4], or 13% of annual global emissions from forestry and agriculture combined.[5]
- African topsoils are storing 316 billion tons of CO_2eq.[6] But with 2/3rd of sub-Saharan Africa's cropland, rangeland, and woodland already degraded,[7] this stored carbon is being returned to the atmosphere.

Mitigation through sustainable management of agricultural land

The GHG mitigation potential of Sustainable Land Management (SLM) in agricultural lands is very large. SLM strategies and practices can prevent land degradation, restore degraded lands, and reduce the need for further conversion of natural forests and grasslands. Farmers can, reduce GHG emissions, increase carbon sequestration, and maintain above- and below-ground carbon stocks at relatively low cost, while also improving food production and livelihoods.

SLM increases carbon storage in soil

Improved agricultural practices can reduce carbon emissions from soil erosion and disturbance, and capture carbon from the atmosphere to store long-term in soils. Practices like cover cropping, applying crop residues, mulch, manuring, reduced tillage, and rotational cropping with legumes increase organic matter in soil, while also increasing crop yields.

- With better agronomic practices, nutrient and water management, reduced tillage and crop residue management, African croplands could potentially reduce GHG emissions by 2.0–3.5 million tons of CO_2eq per hectare per year[8] or a total of 52.3–91.5 million tons of CO_2eq[9] equal to 5-9% of annual African fossil fuel emissions in 2005.[3]

SLM uses trees and other perennials that store carbon on farms

Unlike annual crops, perennial trees and grasses live for years, sequestering and storing carbon in their roots and branches as they grow, as well as in the soil. As part of SLM, farmers grow trees in and around their farm fields, to harvest useful products such as fruit, livestock fodder and medicines. This benefits the climate as well as ecosystems.

- In humid zones of Africa, retaining shade and understory trees in cacao can provide vast carbon stores. For example, mature cacao agroforestry systems in Cameroon store 565 tons of CO_2eq per hectare.[10] Even in semi-arid lands, agroforestry systems like intercropping or silvopasture, with 50 trees per hectare, can store 110 to 147 tons of CO_2eq per hectare in the soil alone.[11]

SLM sequesters carbon while restoring degraded lands and watersheds

Unsustainable cropping practices and overgrazing of pastures have led to large-scale degradation of productive land and watersheds, releasing huge amounts of carbon from soils and vegetation. Bringing degraded lands back into productive use through SLM can sequester carbon while restoring critical watersheds. Re-vegetationcan sequester 3.5 tons of CO_2eq per hectare in a year in dry environments and up to 4.5 tons in cool-moist ones.[8]

- In rotational grazing, livestock move from one pasture to another at frequent intervals, giving plants time to recover and thus preventing desertification and soil carbon loss. Proper pasture management can potentially store from 110 kg of CO_2eq per hectare per year in drylands to 810 kg of CO_2eq per hectare in humid lands.[8]
- Farmer-managed natural regeneration in Niger has grown 200 million trees in 5 million hectares of land in two decades. This sequestered over 100 million tons of CO_2eq, while providing diverse livelihood benefits to farmers.[12]

Expanding SLM's role in climate change mitigation

Afforestation activities are already eligible for the Clean Development Mechanism (CDM), and REDD (Reducing Emissions from Deforestation and Degradation) is being considered for inclusion in a post-Kyoto climate regime. But the potential contribution of agricultural land management to climate change mitigation is not recognized. Yet this is the critical element to establish landscape-scale mitigation projects that fully account for land use change. The estimated biophysical GHG mitigation potential of agricultural lands in Africa is over 1,000 MtCO2eq per year by 2030.[8] To realize this great potential, policymakers can:

1. **Promote the development of carbon markets that will eventually include the full range of land-use options** that provide real and measurable climate and livelihood benefits. Land-use carbon accounting tools must be advanced that reliably measure those benefits from soils, trees, grasses and other components of the landscape. Including agricultural activities, afforestation and avoided deforestation in future compliance markets for GHG mitigation would increase demand for land-use based emission reductions.
2. **Integrate SLM fully into national and international strategies for reducing GHG emissions** and enhancing carbon sequestration within landscapes. Land-use-focused research and advisory systems should provide technologies that enhance above- and below-ground carbon sequestration and produce synergies between productivity, climate resilience and carbon sequestration.
3. **Scale up investments for land management and climate change by building on existing policy frameworks and platforms.** TerrAfrica is a multi-stakeholder platform to upscale and align SLM-related investment in Africa. The platform supports implementation of sub-Saharan countries' UNCCD National Action Programs, and NEPAD's Comprehensive Africa Agriculture Development Program (CAADP) to improve food security and productivity. TerrAfrica provides knowledge-sharing, coalition-building and coordination of country-based investments across sectors. Other existing policy frameworks can also be entry points for mitigation efforts.
4. **Support local, national and regional African farmer organizations in overcoming barriers to adopt SLM technologies and accessing the carbon market.** Initiatives need to develop cost-efficient methodologies for farmers to access carbon markets and their income benefits, and that lower barriers to adoption of sustainable land management practices which enhance land productivity and sustainability.

For more informaiton on the TerrAfrica platform, please visit: www.terrafrica.org.

This Brief was prepared on behalf of TerrAfrica by Sara J. Scherr and Sajal Sthapit of Ecoagriculture Partners in collaboration with the World Bank/TerrAfrica team (Frank Sperling, Christophe Crepin, Steve Danyo, Florence Richard and Johannes Woelcke). The opinions presented are solely of the authors alone and should not be attributed to their respective organizations. This Brief complements the TerrAfrica/IFPRI paper "The Role of SLM for Climate Change Adaptation and Mitigation in Sub-Saharan Africa" by Pender, Place, Ringler and Magalhaes. 2009.

Sources: 1. Scherr & Sthapit 2009; 2. TerrAfrica.org; 3. Canadell, Raupach & Houghton 2009; 4. Sohngen, Beach & Andrasko 2008; 5. IPCC 2007; 6. Henry, Valentini & Bernoux 2009; 7. Pender *et al.* 2009; 8. Smith & Martino 2007; 9. faostat.fao.org; 10. Rice & Greenberg 2000; 11. Nair *et al.* 2009; 12. Rinaudo 2009.

For full references, please visit: www.ecoagriculture.org/publications.php.

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