Agricultural Carbon

By

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Background

- All terrestrial carbon stocks have an essential role to play in climate change mitigation.
- Land management practices can reduce the loss of carbon and other GHGs from ecosystems to the atmosphere and sequester atmospheric carbon in the land sink.
- Each year, agriculture emits 10 to 12 percent of the total estimated GHG emissions.

Background Cntd

- Agriculture helps mitigate climate change by either reducing GHG emissions or by sequestering CO2 from the atmosphere in the soil.
- The application of improved agricultural techniques - Organic agriculture, Conservation tillage, agroforestry reduces or stops soil erosion and converts carbon losses into gains and considerable amounts of CO2 are removed from the atmosphere.
- Organic agriculture already provides effective methods to reach both of these goals.

…and so

- The Fourth Assessment Report (TAR) of the Intergovernmental Panel on Climate Change (IPCC) made important recommendations on how agriculture could mitigate GHG emissions (Smith, *et al.*, 2007).
  - crop rotations and farming system design;
  - nutrient and manure management;
  - livestock management,
  - pasture and fodder supply improvement;
  - fertile soil maintenance and restoration of degraded land.

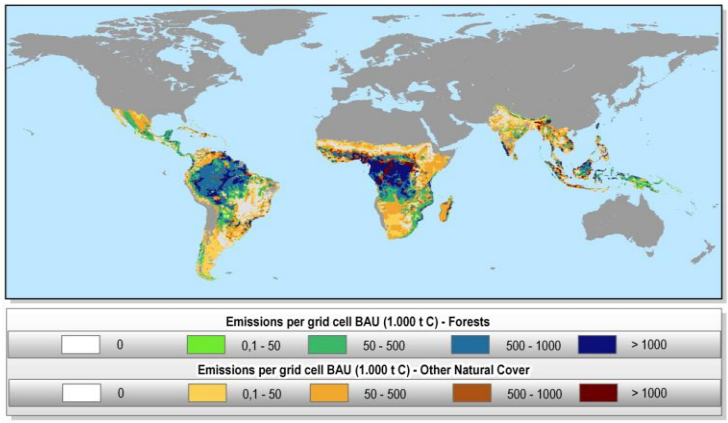
TAR recommends – Sustainable Agriculture

- Sustainable and organic agriculture offer multiple opportunities to reduce GHGs and counteract global warming.
  - For example, organic agriculture reduces energy requirements for production systems by 25 to 50 percent compared to conventional agriculture.
- Carbon is sequestered through an increase of soil organic matter content.
- Reducing GHGs through their sequestration in soil has even greater potential to mitigate climate change.
- Reduces trade-offs among food security, climate change and ecosystem degradation, productive and ecologically sustainable agriculture is crucial.
- Sustainable agriculture represents a multi-targeted and multifunctional strategy.

Agriculture Carbon must be part of the solution

- **Terrestrial Carbon Group Project** run two scenarios to estimate the total volume and spatial distribution of emissions arising from future conversion of the natural landscape for agricultural expansion, over the period from 2000 to 2050.
- **BAU scenario:** The 'business-as-usual' scenario assumes an average of 12 million hectares of additional land is required each year for the purposes of agricultural expansion. This equates to 600 million hectares over the 50-year period from 2000 to 2050.
- **REDD+ scenario:** The 'REDD+ is 100% successful' scenario is a hypothetical case where it is assumed that agricultural expansion is continued at the same rate as under business-as-usual, but expansion that would have occurred on forest land is displaced onto non-forest land. The purpose of this extreme scenario was to investigate the net mitigation impact of a REDD+ scenario that does not take a landscape view of risks and does not address underlying drivers of land use change.

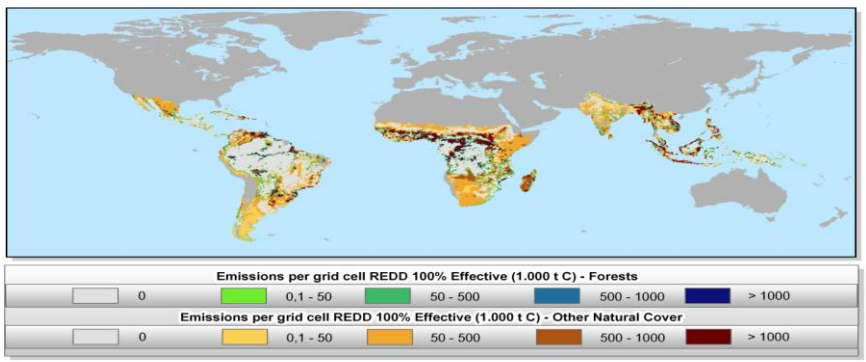
Projected Emissions from Conversion of Natural Lands to Agricultural use (Business as Usual Scenario)



Total land use change area = 600 million hectares: 304m from forested land, 294m from other natural landscapes

Total emissions = 56Gt carbon: 38Gt from forested land, 18Gt from other natural landscapes

Assuming REDD+ is 100% Successful leading to No Further Deforestation



Total land use change area = 600 million hectares: 0 from forested land, 600m ha from other natural landscapes

Total emissions = 36Gt carbon: 0Gt from forested land, 36Gt from other natural landscapes

Source: The Terrestrial Carbon Group, Policy brief 9 – December 2010.

Voluntary Carbon Standards & Agricultural carbon (SALM) projects

VCS approve projects that introduce sustainable agriculture land Management practices (SALM) into an agricultural landscape subject to the following conditions:

- Land is either cropland or grassland at the start of the project. Therefore, the land is not wetland or forestland.
- The land is degraded and will continue to be degraded or continue to degrade;
- The area of land under cultivation in the region is constant or increasing in absence of the project.
- Forest land, as defined by the national CDM forest definition, in the area is constant or decreasing over time;

VCS and SALM projects C'ntd

- There is no significant increase in greenhouse gas emissions as a result of an increase in the number of livestock;
- No significant displacement of agricultural residues or manure from outside the project boundary to within the project boundary
- No significant increase in the use of fossil fuels for agricultural management (i.e., use of farm machinery to cultivate, fertilize, harvest).
- No significant increase of use of fossil fuels for cooking and heating as a result of the displacement of manure and/or residuals from the household to the agricultural land as a result of the project.

Why Agricultural Carbon projects?

- Barriers that would prevent the implementation of at least one alternative land use scenarios to increase carbon stocks in an agricultural landscape.
  - Investment barriers;
  - Institutional barriers,
  - Technological barriers;
  - Barriers related to local tradition;
  - Barriers due to prevailing practice;
  - Barriers due to local ecological conditions and
  - Barriers due to social conditions.

What to fix to tap into an Agricultural carbon Market

- Capacity of the agricultural practices to enhance C storage;
- Capacity of farmers to adapt and maintain these practices;
- Ability to monitor C stocks;
- Institutional capacity to aggregate C credits;
- Access of farmers to incentive payments.

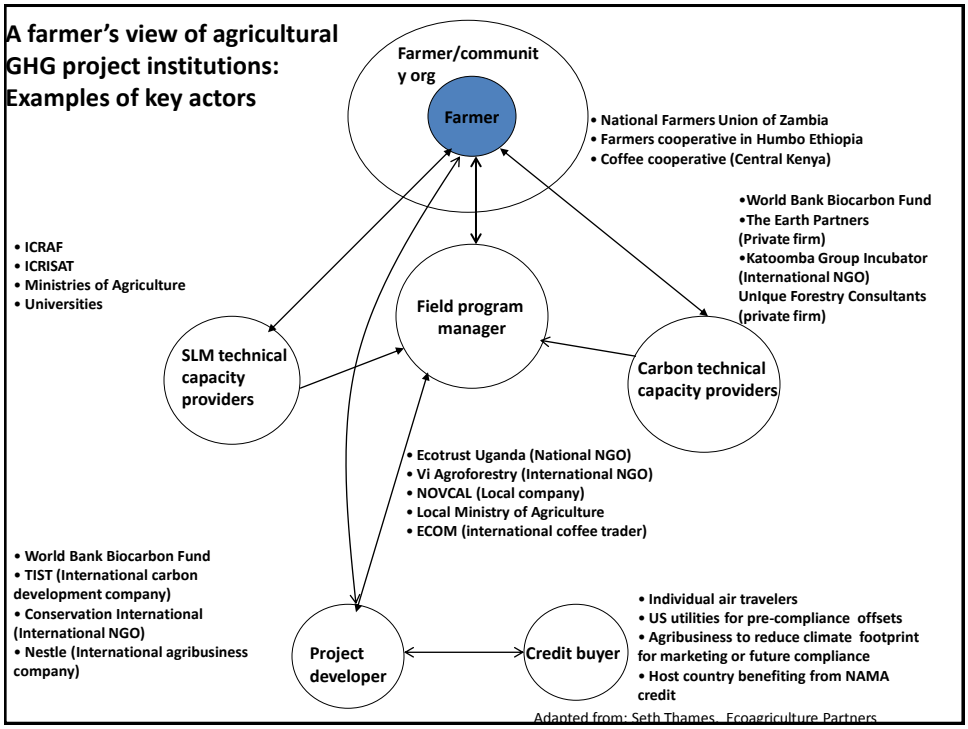
GHG mitigation activities (n=74)

Mitigation activity	% of projects implementing activity alone	% of projects implementing activity alone and in combination with others
Off-farm land rehabilitation with benefits to farmers	30	53
On-farm practices-tree planting, agroforestry agricultural soil management	28	51
REDD with benefits to farmers	7	16
Miscellaneous emission reductions (biodigesters, green charcoal, reducing N20 emissions from fertilizers)	8	9

20% of all cases implement more than one of the activities

Adapted from Ecoagriculture partners' study on Agriculture carbon Projects in Africa 2009

A farmer's view of agricultural GHG project institutions: Examples of key actors



Adapted from: Seth Thames, Ecoagriculture Partners

Western Kenya Smallholder Agricultural Carbon Finance Project

- Implemented by Vi Agroforesrty working with 83,000 Small holder farmer House holds in Kitale and Kisumu project areas covering an estimated area of 60,000 ha .
- The World Bank BioCarbon fund buys the credits.
- The project has introduced sustainable agricultural practices for increasing carbon stocks on the land
  - manure management,
  - use of cover crops,
  - returning composted crop residuals to the field,
  - Introduction of trees into the landscape as.
- cvb

Coming straight home -Hoima

Agriculture impacts on carbon stocks

- 80% of 349,204 persons (2002) engaged in agriculture; 77% in subsistence agriculture.
- Area under agric is …..or …. Percent.
- Major carbon stocks are tropical forests fully stocked and degraded – latter mainly outside Pas.
- Threatened with conversion to cropland – between 1990 and 2005 loss was 21.6%.
- Other drivers of decrease in carbon stocks are unsustainable harvesting of wood products and desire to clear habitat for animals that raid crops.

Within Farmlands

- Huge potential by not cutting remaining trees on farmland – any additionality?
- Increasing on-farm tree cover – even if by 10%. Limited agroforestry practices.
- Conserve native vegetation within large farms – tea and sugar cane plantations.
- Conserve riparian vegetation - Alteast 30m along riverbanks; win-win – carbon, forest based enterprises (e.g. beekeeping), biodiversity, water, water and water!
- Conservation agriculture to address dwindling soil fertility – improved yields, livelihoods and poverty reduction.