

UNCCD Science Conference April 10th 2013

A New Tracking Tool for Carbon Benefits: The Carbon Benefits Project

GEF Session: Carbon - a valuable global benefit of
sustainable land management



The Current Situation

- Manmade emissions of GHGs (mainly CO₂, CH₄ and N₂O) equivalent to over 50 billion tonnes of CO₂ yr⁻¹
- ~30% comes from land use and land use change



Sustainable Land Management

Sustainable land management projects such as those supported by the GEF have potential to:



- reduce GHG emissions
- sequester C from the atmosphere

Features of the CBP Modelling System

The system is:

- Online, free to anyone
- User friendly
- Can be used at any stage of a project
- Can be used for different types of projects with different amounts of data
- Gives spatially explicit output
- Gives a report in a standard format



The Tools

Assessment Tools

Who are the tools aimed at?

- Managers and potential managers of GEF or other land management projects
- Others at GEF implementing and executing agencies
- Anyone wanting to estimate the GHG impact of land management activities



Who could the output be used by?

- GEF and other Program Officers wanting reports from multiple projects in a standardized format
- Those wanting multiple reports from projects in different focal areas, countries, project types, etc.
- Those deciding which projects to fund

Assessment Tools

Simple
Assessment

Detailed
Assessment

Dynamic
Modelling

The screenshot shows the 'Grassland Stage 1 of 3: Grassland Systems' configuration screen. It includes a navigation menu on the left with categories like 'Grassland X', 'Settlements', 'Wetlands', 'Annual Crops', 'Perennial Crops', 'Agroforestry', and 'Livestock'. The main content area has three numbered steps: 1. Select Project Activity Area/Group (with a dropdown menu showing 'Yada [50 ha]'), 2. Select a Grassland System (with a dropdown menu showing 'Continuous pasture'), and 3. Describe Grassland System. A table at the bottom displays data for 'Rangeland' and 'Silvopasture' systems.

Grassland System*	Condition*	Improvements*	Amount of N Fertilizer (kg/ha)**	% of nitrogen (N) in fertilizer**	Burn Frequency*	Area (ha)**
Rangeland	Severely Degraded Grassland	Unimproved	0	0	never burned	25
Silvopasture	Improved Grassland	Multiple	0	0	never burned	25

Default data provided, choose from drop-down menus

What is needed to use it?

- A computer with an internet connection
- Information on land management activities and where they occur
- An idea of land use/management under a baseline and a project scenario

Who is it suitable for?

- Suitable for use in projects without many resources for C monitoring & reporting
- Also suitable for use by those developing project proposals
- Available in English, Chinese, Spanish, French, Russian (Portuguese soon)

Carbon Benefits Project: Modelling, Measurement and Monitoring

Assessment Tools

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The screenshot shows the 'Emission Factors' selection screen in the Carbon Benefits Project software. The interface includes a navigation bar at the top with options like 'Start Here', 'Project Description', 'Guidance', 'Analysis Tools', and 'Reports'. Below the navigation bar, there are three numbered steps: 1. Initial Land Use, 2. Baseline Scenario, and 3. Project Scenario. The main content area is titled 'Emission Factors' and features a list of categories on the left, including Forestland, Grassland, Settlements, Wetlands, Annual Crops, Perennial Crops, Agroforestry, and Livestock. The 'Forestland' category is selected, and a list of emission factors is displayed in a table. A legend above the table explains the color coding: green text for factors that can be improved through measurement and monitoring, black text for more complex factors, and red text for factors that are difficult to measure or are physical constants.

Factor Name	Factor Type	Units	Source Category	SubSource Category
Bw: Aboveground Biomass Stock	Field Measurement	tonnes dmha	Biomass C Stocks	Forestland
DEFT: Biomass Expansion Factor for Fuelwood	Field Measurement	unitless	Biomass C Stocks	Timber Harvest and Fuelwood Gathering
DEFT: Biomass Expansion Factor for Timber	Field Measurement	unitless	Biomass C Stocks	Timber Harvest and Fuelwood Gathering
Fw: Biomass Fraction Left After Harvest	Field Measurement	fraction	Biomass C Stocks	Timber Harvest and Fuelwood Gathering
CF: Carbon Fraction	Complex Measurement	tonnes C/tonnes dm	Biomass C Stocks	Deforestation
CF: Carbon Fraction	Complex Measurement	tonnes C/tonnes dm	Biomass C Stocks	Forestland
CF: Carbon Fraction	Complex Measurement	tonnes C/tonnes dm	Biomass C Stocks	Shifting Cultivation
CF: Carbon Fraction	Complex Measurement	tonnes C/tonnes dm	Biomass C Stocks	Timber Harvest and Fuelwood Gathering
Fl: Land Use Factor	Field Measurement	unitless	Soil C Stocks	Mineral Soils
MF: Mass of Fuel	Laboratory Measurement	tonnes dmha	Biomass During	Deforestation

Can create own crop/ grass/ forest/ agroforestry types and systems

Can use project specific emission factors

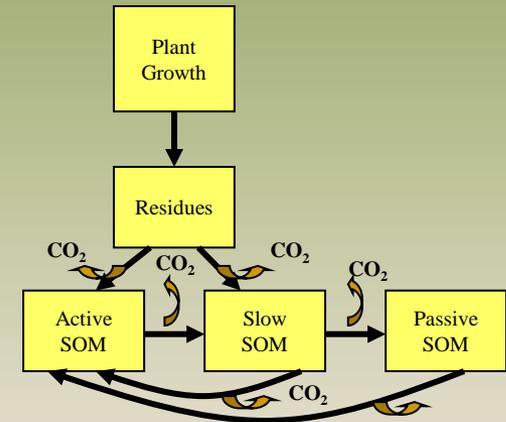
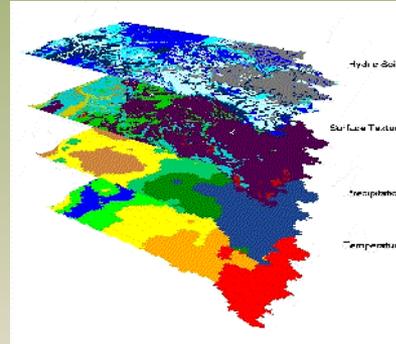
What is needed to use it?

Same as Simple Assessment plus:

- Specific information on crop/grass/forest species and systems
- Optional measurements to improve emission factors
- Resources and facilities for field sampling and lab analysis (to varying extents)

Who is it suitable for?

- Projects wanting to reduce uncertainties in emissions estimations
- Suitable for use in projects with more emphasis on C benefits
- Available in English, Chinese, Spanish, French, Russian (Portuguese soon)



Utilises a dynamic model to assess soil and biomass carbon stock changes.

What is needed to use it?

- Knowledge of GIS
- Knowledge of ecosystem models
- Data for model parameterisation

Who is it suitable for?

- For users with a scientific background who wish to model carbon stock changes in projects with a carbon focus.

Training and capacity building



> 80 people from GEF projects in Africa, Asia and Latin America

Brazilian Test Case



Mato Grosso State

- 90.7 millions of ha
- The main Brazilian Agricultural Frontier
- 7.0 millions ha of annual cropland (soybean, maize, cotton)
- 22.0 millions ha of grassland

Define Project Boundaries

Carbon Benefits Project:
Modelling, Measurement and Monitoring

Welcome Stoecio Maia (Sign out)

Language: en-GB Wednesday 03 April 2013

Project Name (Id): Mato Grosso GHG(184) (Change)
View/Update Profile

Start Here → Project Description → Guidance → Analysis Tools → Reports

Provide Feedback

Pan / Zoom Add Area by point Add Area by polygon Edit/Modify Point or Polygon Delete Area How Do I?



- Draw or Edit Project Location on a Map;

- Enter Project Location Coordinates;

- Upload Your Our GIS Files.

Describe Project Land Use

- **Initial Land Use:** The situation at year 0 before your project started.

- **Baseline Scenario:** What would have happened without any project activity.

- **Project Scenario:** What happens with project activities.

2 Select Project Activity Area/Group

Project Activity Area Group 1 [90797554 ha]

[Show Project Activity Areas](#)
(opens in new window)

3 Enter land use area in ha

Land Use Category	Initial Land Use (ha)	Baseline Scenario (ha)	Project Scenario (ha)
Forestland	88695554	80169130	61746835
Grassland	2000000	10289550	22027935
Settlements	2000	6378	58121
Wetlands	0	0	0
Annual Cropland	90000	311238	6906542
Perennial Cropland	10000	21258	58121
Agroforestry	0	0	0
Livestock	0	0	0
Total Area (ha)*	90797554	90797554	90797554

* The total area includes all of the area in all of the first seven land use categories, but does not include the number of livestock.

In the **Project Scenario** we had, for example the increase of no-tillage systems and Improved grassland as well as the increase of degraded grassland.

Simple Assessment

Annual Cropland

Annual Crops Stage 1 of 1: Cropping Systems

- Forestland ✓
- Grassland ✓
- Settlements ✓
- Wetlands ✓
- Annual Crops ✓
 - ▶ Cropping Systems ✓
- Perennial Crops ✓
- Agroforestry ✓
- Livestock ✓

1 Select Project Activity Area/Group

Project Activity Area Group 1 [90797554 ha] ✓

[Show Project Activity Areas](#)
(opens in new window)

2 Select an Annual Cropping System

Annual Cropping System

Continuous wheat/barley/oats/upland rice

Add to table below

3 Describe Selected Annual Cropping Systems

Annual Crop Name	Improved?	Tillage System*	Amount of N Fertilizer (kg/ha)*	% of nitrogen (N) in fertilizer*	Residue Management*	Area (ha)*
Maize/sorghum/millet intercropped with legume	<input type="checkbox"/>	None	40	45	Retained	5998108
Continuous maize/sorghum/millet	<input type="checkbox"/>	Full	50	45	Retained	908434

690...

Total Area Allocated (ha): 6906542/6906542

Simple Assessment

Grassland

Grassland Stage 1 of 3: Grassland Systems

- Forestland ✓ (+)
- Grassland ✓ (-)
- ▶ **Grassland Systems** ✓
 - Silvipasture Tree Types / Age Ranges ✓
 - Silvipasture Natural Losses and Wood Removal ✓
- Settlements ✓ (+)
- Wetlands ✓ (+)
- Annual Crops ✓ (+)
- Perennial Crops ✓ (+)
- Agroforestry ✓ (+)
- Livestock ✓ (+)

1 Select Project Activity Area/Group

Project Activity Area Group 1 [90797554 ha] ✓

[Show Project Activity Areas](#)
(opens in new window)

2 Select a Grassland System

Continuous pasture ▾ [Add to table below](#)

Definitions:
Continuous Pasture
Silvipasture
Rangeland
Continuous Hay Land

3 Describe Grassland System

⊖ Delete

Grassland System*	Condition*	Improvements*	Amount of N Fertilizer (kg/ha)*	% of nitrogen (N) in fertilizer*	Burn Frequency*	Area (ha)*
Continuous pasture	Moderately Degraded Grassland	Unimproved	0	0	once or more than once per year	12437..
Continuous pasture	Nominally Degraded or Native Grassland	Unimproved	0	0	once or more than once per year	398130..

220...

Total Area Allocated (ha): 22027935/22027935

Simple Assessment

Carbon Benefits Project:
Modelling, Measurement and Monitoring

Welcome **Stoecio Maia** (Sign out)
Language: **en-GB** Wednesday 03 April 2013
Project Name (Id): **Mato Grosso GHG(184)** (Change)
View/Update Profile

Start Here → Project Description → Guidance → **Analysis Tools** → Reports → Provide Feedback ?

1 Initial Land Use ✓ 2 Baseline Scenario ✓ 3 Project Scenario ✓

Simple Assessment Home

- Forestland ✓
 - Forest Types and Tree Age Ranges ✓
 - Natural Losses and Wood Removal ✓
- Grassland ✓ +
- Settlements ✓ +
- Wetlands ✓ +
- Annual Crops ✓ +
- Perennial Crops ✓ +
- Agroforestry ✓ +
- Livestock ✓ +

Goal

The Simple Assessment provides a simple tool to assess the impact of a project on carbon stocks and greenhouse gas emissions. The tool will be most useful to Sustainable Land Management projects involving relatively few land use/management changes on a small area or on relatively few combinations of soil type and climate.

Getting Started

Start by entering information for your Project Activity Areas for the 'Initial Land Use' (the situation at year 0 before your project started). Click on the land use categories in the left hand menu and complete each section in turn. Then do the same for the 'Baseline Scenario' (what would have happened in your project area over the project period without any project activities) and finally the 'Project Scenario'. The project period can be any length of time defined by the user. Information for the baseline and project scenarios should represent the change over the entire period. For further explanation of the scenarios and help with the Simple Assessment click on the 'Help' button, top right.

Detailed Assessment

Annual Cropland

2 Specify an Annual Cropping System

+ Add | - Delete

Cropping System Name	Area
Soybean	5000000
Maize	998108
Soybean/Maize/Cotton	908434

3 Cropping System Planting Sequences

+ Add | - Delete

Year	Crop 1 (required)	Crop 2	Crop 3
1	maize, green	cotton	

4 Crop Management Details

Year	Planting Sequence	Crop Name	Residue Management*	Tillage System*	Fert	Amount of N Fertilizer (kg/ha)*	% of nitrogen (N) in fertilizer*
1	1	maize, green	Retained	Full	<input checked="" type="checkbox"/>	50	45
1	2	cotton	Retained	Full	<input type="checkbox"/>	0	0

4 Crop Management Details

Planting Sequence*	Tillage System*	Fert	Amount of N Fertilizer (kg/ha)*	% of nitrogen (N) in fertilizer*	Org	Cov	Irr	Lim	Var	Leg	Burn
1	None	<input type="checkbox"/>	0	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	None	<input checked="" type="checkbox"/>	30	45	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Detailed Assessment

Emission Factors

The main difference between the Simple and Detailed Assessment

Start Here → Project Description → Guidance → Analysis Tools → Reports → Provide Feedback

1 Initial Land Use ✓ 2 Baseline Scenario ✓ 3 Project Scenario ✓

Emission Factors

1 Select a Factor Show List of Greenhouse Gas Equations and Factors

- Factors in **green text** are good candidates for improvement through a measurement and monitoring program. They can be edited.
- Factors in **black text** are more complex and/or expensive to measure though they can be improved through a measurement and monitoring program. They can be edited.
- Factors in **red text** are either very difficult and/or expensive to measure, or they are well understood and cannot be improved upon, or they are physical constants. They cannot be edited.

Factor Name	Factor Type	Units	Source Category	SubSource Category
EF: Indirect Emission Factor for N Leached/Runoff	Recommend Default Only	Kg N2O-N/Kg N leached and runoff	Soil Nitrous Oxide	Synthetic N Fertilizer
EF: Indirect Emission Factor for Volatilized N	Recommend Default Only	Kg N2O-N/Kg N volatilized	Soil Nitrous Oxide	Synthetic N Fertilizer
Fi: Input Factor	Recommend Default Only	unitless	Soil C Stocks	Mineral Soils
Fl: Land Use Factor	Field Measurement	unitless	Soil C Stocks	Mineral Soils
Fmg: Management Factor	Field Measurement	unitless	Soil C Stocks	Mineral Soils
NC: N:C Ratio	Laboratory Measurement	tonnes Nitrogen C	Soil Nitrous Oxide	Cropland Residue
EF: Organic Soil Emission Factor	Recommend Default Only	tonnes Charlyr	Soil C Stocks	Organic Soils
Cb: Previous Herbaceous Biomass C Stock	Field Measurement	tonnes C/ha	Biomass C Stocks	Herbaceous Biomass (Land Use Change)
EFc: Reference Methane Emission Factor	Recommend Default Only	g CH4/m2	Rice Methane	
SOCref: Reference Soil Carbon Stock	Field Measurement	tonnes C/ha	Soil C Stocks	Mineral Soils

2 View/Update Factor Values and Confidence Intervals

Land Use Climate Region	Soil Management Class	Factor Value	Factor Type	Uncertainty (+/- %)
Tropical Wet	Full Tillage	0.9400	Field Measurement	4.5000
Tropical Wet	Reduced Tillage	1.1500	Field Measurement	8.0000
Tropical Wet	No Tillage	1.0800	Field Measurement	5.5000
Tropical Wet	Nominal/Native	1.2400	Field Measurement	5.6000
Tropical Wet	Moderately Degraded	0.9100	Field Measurement	15.0000
Tropical Wet	Severely Degraded	0.7000	Field Measurement	40.0000
Tropical Wet	Improved	1.1900	Field Measurement	5.8000
Tropical Wet		1.1700	Field Measurement	0.0000

Create a Report

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View/Update Profile

Start Here → Project Description → Guidance → Analysis Tools → Reports → Provide Feedback ?

Please Select One of the Following to Create a Report

Rerun Calculations

1 Summary Report Options

Create Summary Report for Review View Graphs

2 Please Select One of the Following to Create a **Detailed** Report

for Analysis of Initial Land Use
 for Analysis of Baseline Scenario
 for Analysis of Project Scenario

Create Detailed Report

Results

	Carbon Benefits		
	Total tCO ₂ e	tCO ₂ e / ha	tCO ₂ e / ha / yr
Simple Assessment	17603920	0.19	0.00345
Detailed Assessment	11365376	0.13	0.00236



Difference of 46%

There was also a substantial reduction in uncertainty due to the Detailed Assessment adoption.

Carbon Benefits Project Toolkit **Web Site**

www.unep.org/climatechange/carbon-benefits/cbp_pim

User Group

<http://groups.google.com/group/cbp-users>

Contact for more information

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