

Overview of WOCAT and CBP

4 per 1000

Monitoring climate benefits of sustainable land management with a focus on Soil Organic Carbon

27th April 2021

Aim of the event:

Learn about linked tools to:

- Choose carbon friendly sustainable land management (SLM) practices - **WOCAT**
- Estimate the climate change/SOC impact of your SLM activities
- Collect compatible data on a mobile phone

WOCAT SLM DATABASE

Home Search SLM Data Add SLM data My SLM Data Login English

English
Spanish
French

the Global Database on Sustainable Land Management
is the primary recommended database by UNCCD

Search SLM data Add SLM data

Search SLM Data All SLM Data Search

SLM Technologies

An SLM Technology is a land management practice that controls land degradation and enhances productivity and/or other ecosystem services.

[View all](#)

SLM Approaches

An SLM Approach defines the ways and means used to implement an SLM Technology, including the stakeholders involved and their roles.

[View all](#)

SLM Maps

An SLM Map analyses and depicts the spatial distribution of SLM and land degradation processes, causes, and impacts.

[View all](#)

WOCAT – global database of SLM, recommended by UNCCD



WOCAT Technologies OT 16

2432 Establishment and maintenance methods for vegetative resources

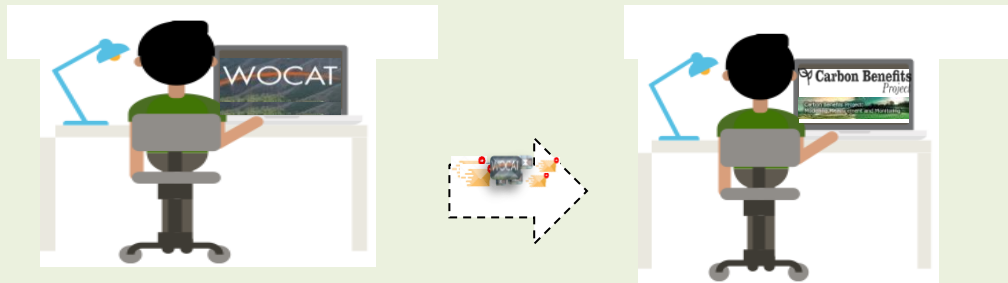
Local establishment

activity (to express)	season of activity	equipment	inputs
1. Digging holes	M	hoe	beginning of rainy season
2. Laying things out of planting material	M	shovel/hoe	beginning of rainy season
3. Transplanting	M	manual/animal	
4. Trenching	M		
5. ...			



Linking WOCAT and the CBP Tools

- **Step 1** – Document SLM Technology with WOCAT
- **Step 2** – Import WOCAT data to CBP Tools
- **Step 3** – Carry out a GHG estimation with CBP
- **Step 4** – Upload CBP summary to the WOCAT SLM Database



Linking WOCAT and the CBP Tools

Step 1 – Document SLM Technology with WOCAT



Closed Area Management (Ethiopia)
Closed area management

DESCRIPTION

Closed area management is an area within a watershed into which access is limited, and the area is left for natural recovery of vegetation. Management relates to activities by the community to ensure such support regeneration, such as constructing drainage and retention bushes removed, regular grass cutting, occasional tree planting, and/or economic activities like grass cutting.

The closed area management technology is applied within Abagerima Watershed of the Water and Land Resource Centre project. In the area closures, community-based participatory management is applied. The area is closed from agricultural activities and livestock grazing. Harvesting and drainage structures are constructed, like small trench drains.

Natural grasses are regularly cut and carried, and selective trees are forage growth for animal feed is encouraged, thereby reducing soil erosion, reducing soil loss, and avoiding conflicts with downstream. The community is committed and responsible for closed area management. Construction of trenches for water drainage and harvesting, plant and reduce soil erosion, the committees of the Abagerima Learning W happy to manage their closed areas and equally share the grass to selective trees.

As a consequence, forage biomass has been increasing over the past regularly cut and carried, while indigenous and introduced trees are through these activities, heavily degraded and overgrazed land into productive land.

Wocat SLM Technologies



CLASSIFICATION OF THE TECHNOLOGY

Main purpose

- improve production
- reduce, prevent, restore land degradation
- conserve ecosystem
- protect a watershed/downstream areas - in combination with other technologies
- preserve/improve biodiversity
- reduce risk of disasters
- adapt to climate change/ extremes and its impacts
- mitigate climate change and its impacts
- create beneficial economic impact
- create beneficial social impact

Purpose related to land degradation

- prevent land degradation
- reduce land degradation
- restore/rehabilitate severely degraded land
- adapt to land degradation
- not applicable

Wocat SLM Technologies

TECHNICAL DRAWING

Technical specifications

The drawing is a free-hand sketch of the area closure near Laguna Giorgis Church in Abagerima Learning Watershed. The boundary of the closed area consists of cut off drains, forests, roads and croplands.

ESTABLISHMENT AND MAINTENANCE ACTIVITIES, INPUTS

Calculation of inputs and costs

- Costs are calculated per Technology area (size and area unit: 31 ha)
- Currency used for cost calculation: USD
- Exchange rate (to USD): 1 USD = n.a
- Average wage cost of hired labour per day: 3.7

- Establishment activities**
- survey (Timing/ frequency: October (end of rainy season))
 - planting & community awareness (Timing/ frequency: October)
 - preparing materials (Timing/ frequency: October)
 - design & layout (Timing/ frequency: November)
 - implementation (Timing/ frequency: December (beginning of dry season))

Establishment inputs and costs (per 31 ha)

Specify input	Unit
Labour	person
construction of trenches	number
preparation for tree planting	number
hand tools	number
Plant material	number
grass and regime seeds	number
grass and regime seeds	kg
Total costs for establishment of the Technology	
Total costs for establishment of the Technology in USD	

Maintenance activities

- grass cutting (Timing/ frequency: once per year)
- brush clearing (Timing/ frequency: irregular)

Maintenance inputs and costs (per 31 ha)

Specify input	Unit
Labour	person
grass cutting	person
brush clearing	person
Total costs for maintenance of the Technology	
Total costs for maintenance of the Technology in USD	

Wocat SLM Technologies

structural measures - S3: Graded ditches, channels, waterways, S4: Level ditches, pits

NATURAL ENVIRONMENT

Parameter	Value	Impact	Direction
Average annual rainfall	250-900 mm	beneficial species (predators, earthworms, pollinators)	increased
sub-humid	habitat diversity	increased	
semi-arid	pest/disease control	decreased	
and	food impacts	increased	
	landslides/ debris flows	increased	
	drought impacts	increased	
	impacts of cyclones, rain storms	increased	
	emission of carbon and greenhouse gases	increased	
	fire risk	increased	
	wind velocity	increased	
	micro-climate	increased	
Slope	flat (0-2%)	off-site impacts	decreased
plateau/plains	water availability	decreased	
ridges	groundwater (springs)	decreased	
mountain slopes	reliable and stable stream flow	decreased	
hilly (1-60%)	downstream flooding (undesired)	increased	
very steep (>60%)	downstream station	increased	
	buffering/ filtering capacity (by soil, vegetation, wetlands)	increased	
	wind transported sediments	increased	
	damage on neighbour's fields	increased	
	damage on public/private infrastructure	increased	
	impact of greenhouse gases	increased	
Soil depth	very shallow (0-20 cm)	soil fertility	decreased
shallow (21-50 cm)	nutrient availability	decreased	
moderately deep (51-80 cm)	water availability	decreased	
deep (81-120 cm)	soil fertility	decreased	
very deep (> 120 cm)	nutrient availability	decreased	
Soil texture (topsoil)	coarse/ light sandy	water availability	decreased
medium (loamy, silty)	nutrient availability	decreased	
fine/ heavy (clay)	water availability	decreased	
Groundwater table	on surface	water availability	decreased
< 5 m	nutrient availability	decreased	
5-50 m	water availability	decreased	
> 50 m	nutrient availability	decreased	
Availability of surface water	good	water availability	decreased
medium	nutrient availability	decreased	
poor/ none	water availability	decreased	

COST-BENEFIT ANALYSIS

Benefit compared with establishment costs	Short-term returns	Long-term returns
very negative	negative	positive
negative	negative	positive
Benefit compared with maintenance costs	Short-term returns	Long-term returns
very negative	negative	positive
negative	negative	positive

CHARACTERISTICS OF LAND USERS APPLYING THE TECH

Market orientation	Off-farm income
absent/ (self-supply)	less than 10% of all income
mixed (subsistence/ commercial)	10-50% of all income
commercial/ market	> 50% of all income
Secretary or non-actor	Individuals or groups
Secretary	individual household
Semi-nomadic	group/ community
Nomadic	cooperative
	employee (company, government)
Area used per household	Scale
0-0.5 ha	small-scale
0.5-1 ha	medium-scale
1-2 ha	large-scale
2-5 ha	
5-10 ha	
10-50 ha	
50-100 ha	
100-500 ha	
500-1000 ha	
1000-10000 ha	
> 10000 ha	

CLIMATE CHANGE

Gradual climate change	Annual temperature increase	Seasonal temperature increase	Annual rainfall
not well at all	not well at all	not well at all	not well at all
Climate-related extremes (disasters)	local random	epidemic diseases	insect/ worm infestation
not well at all	not well at all	not well at all	not well at all

ADOPTION AND ADAPTATION

Percentage of land users in the area who have adopted the Technology
single cases/ experimental
1-10%
11-50%
> 50%
Number of households and/ or area covered
600-400 households

Has the Technology been modified recently to adapt to changing conditions?

Yes/ No

To what changing conditions?

climate change/ extremes (changing markets) labour availability (e.g. due to migration)

Wocat SLM Technologies

CONCLUSIONS AND LESSONS LEARNT

Strengths/ land user's view

- Grass biomass increased, runoff to foot slope of cultivated land decreased, water availability increased and conflicts resolved.
- Closed area is also used as a home for wild animals.

Weaknesses/ disadvantages/ risks: land user's view → How to overcome

- Older people complain that animals should still be allowed to openly graze. → Give continuous service for the community.
- Trees are not fully adapt to climate, environment and use. → Select appropriate technology, reintroduce moisture harvesting structures (inside terraces)
- Resource allocation → Raise external support for the Learning watershed

Strengths/ compiler or other key resource persons' view

- Areas are giving high forage biomass for animals.
- Restoring the water & the vegetation cover are fine.
- Generally the closed areas improve the livelihoods of the community due to its economical, social & environmental advantages.

Weaknesses/ disadvantages/ risks: compiler or other key resource persons' view → How to overcome

- Resources allocation & sharing of benefits → Needs to be organized by group & clear bylaws for better management & sharing of resources

Compiler: Melese Billig

Reviewer: Tereza Lemana

Date of documentation: Oct. 25, 2018

Last update: Dec. 4, 2020

REFERENCES

Resource persons: Bekalu Birew - SLM specialist

Full description in the WOCAT database: http://gcat.wocat.net/en/wocat/technologies/view/technologies_4134/

United SLM data

n.a.

Documentation was facilitated by institution:

- CDE Centre for Development and Environment (CDE Centre for Development and Environment) - Switzerland
- Water and Land Resource Centre (WLRC) - Ethiopia
- Project: Carbon Benefits Project (CBP)

Key references

n.a.

Links to relevant information which is available online

n.a.

Wocat SLM Technologies

Closed Area Management

Linking WOCAT and the CBP Tools

Step 2 – Import WOCAT data to CBP Tools



Abagerma closed area management overview photo, with grasses on fallow land in the foreground, and bush and tree recovery in the background. (Melese Biltign)

Closed Area Management (Ethiopia)
Closed area management

DESCRIPTION
Closed area management is an area within a watershed into which human and livestock access is limited, and the area is left for natural recovery of vegetation and soil. Management relates to activities by the community to ensure such protection and to support regeneration, such as constructing drainage and retention structures, selective bush removal, regular grass cutting, occasional tree planting, and organisation of economic activities like grass cutting.

The closed area management technology is applied within Abagerma Learning Watershed of the Water and Land Resources Centre project. In the area closures, community-based participatory management is applied to recover degraded areas.

The area is closed from agricultural activities and livestock grazing, while water harvesting and drainage structures are constructed, like small trenches and cut-off drains.

Natural grasses are regularly cut and carried, and selective trees are planted. Forage growth for animal feed is encouraged, thereby reducing soil erosion, storing water, reducing soil loss, and avoiding conflicts with lower-stream users. The community is committed and responsible for closed area management, such as construction of trenches for water drainage and harvesting, plantation of trees, and to reduce soil erosion. The communities of the Abagerma Learning Watershed are very happy to manage their closed areas and equally share the grass biomass, and later on selective trees.

As a consequence, forage biomass has been increasing over the past 6 years, regularly cut and carried, while indigenous and introduced trees are growing. Through these activities, heavily degraded and overgrazed land could be transformed into productive land.

LOCATION

Location: the area is near Bahir Dar regional capital, Amhara Region, West Gojam Zone, Bahir Dar Zuria, Ethiopia

No. of Technology sites analysed: 2-10 sites

Geo-reference of selected sites
 • 27.50822, 11.65783
 • 27.725, 11.64502

• Spread of the Technology implemented over an area (0,306 km²)

In a permanently protected area?: No

Date of implementation: 2012, less than 10 years ago (recently)

Type of introduction
 through land users' innovation (in part of a traditional system (> 50 years))
 during experiments/ research
 through projects/ external interventions

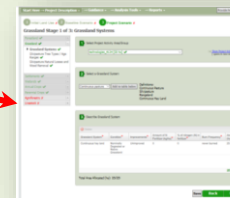
Wocat (SLM) Technologies Closed Area Management 177



General



Spatial



Land use and management

Aim of the event:

Learn about linked tools to:

- Choose carbon friendly sustainable land management (SLM) practices - **WOCAT**
- Estimate the climate change/SOC impact of SLM activities – **Carbon Benefits Project**
- Collect compatible data on a mobile phone

The Carbon Benefits Project (CBP)

www.carbonbenefitsproject.org



The Carbon Benefits Project (CBP) provides tools for agriculture, forestry and land management projects to estimate the impact of their activities on climate change mitigation (carbon stock changes and greenhouse gas (GHG) emissions). The tools are free to use and user-friendly. The CBP modeling tools were developed by Colorado State University and partners under a Global Environment Facility co-financed project implemented by the United Nations Environment Program.

The CBP tools are linked to the WOCAT database of sustainable land management practices meaning you can import WOCAT technologies into the CBP.

Tools

The Carbon Benefits Project has different options for assessing the C benefits and greenhouse gas emissions of a project.

A simple assessment - Suitable for a quick assessment at any stage, including proposals.

A detailed assessment - Suitable for detailed reporting in projects with a reasonable focus on climate change mitigation.

It also has socio-economic tools - a Cost Benefit Analysis and a DPSIR

[Go to Project Tools](#)

News & Announcements

CBP online training for Central Asian Countries

Online CBP training videos and slides available on the Resources page

Biomass C Stock Changes

Non-CO₂ GHG Emissions from Burning

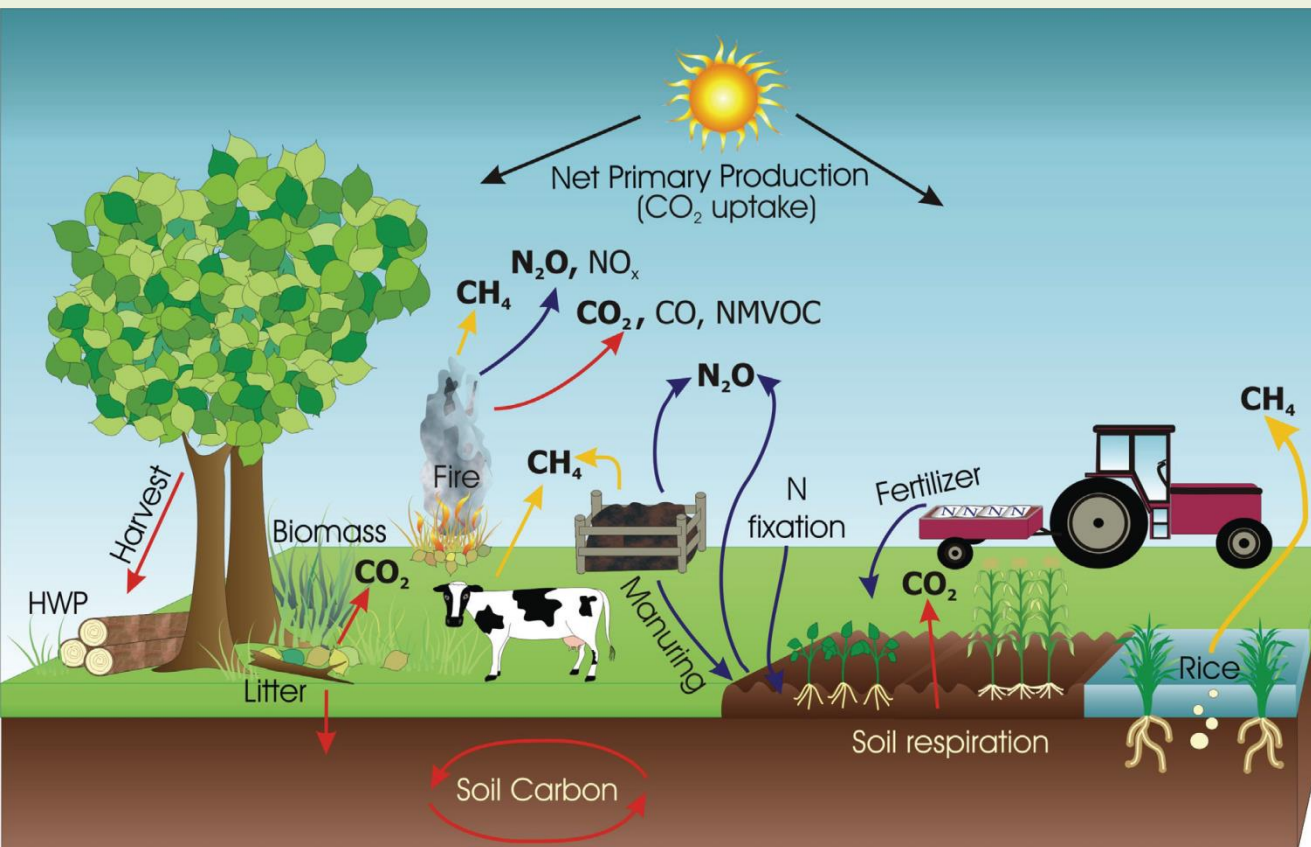
Enteric Methane

CH₄ and N₂O from Manure

Soil N₂O Emissions

Soil C Stock Changes

Rice Methane



From 2006 IPCC Guidelines

Carbon Benefits Project:
Modelling, Measurement and Monitoring

Welcome Eleanor Milne ([Sign out](#))
21 April 2021

[View/Update Profile](#)

[Provide Feedback](#) [Help](#)

Create New Project

1 Please enter basic project information

Project Name*

Project Activities*

Project ID Code*

Project Status*

Project Start Date*

Month: Year:

Project Duration*

 Years

Project Country (Countries)*

Hold CTRL, then click to select multiple countries

Afghanistan
Aksai Chin
Albania
Algeria
American Samoa
Amur Usuri confluence islands

2 Is this a GEF co-funded project?

Yes No

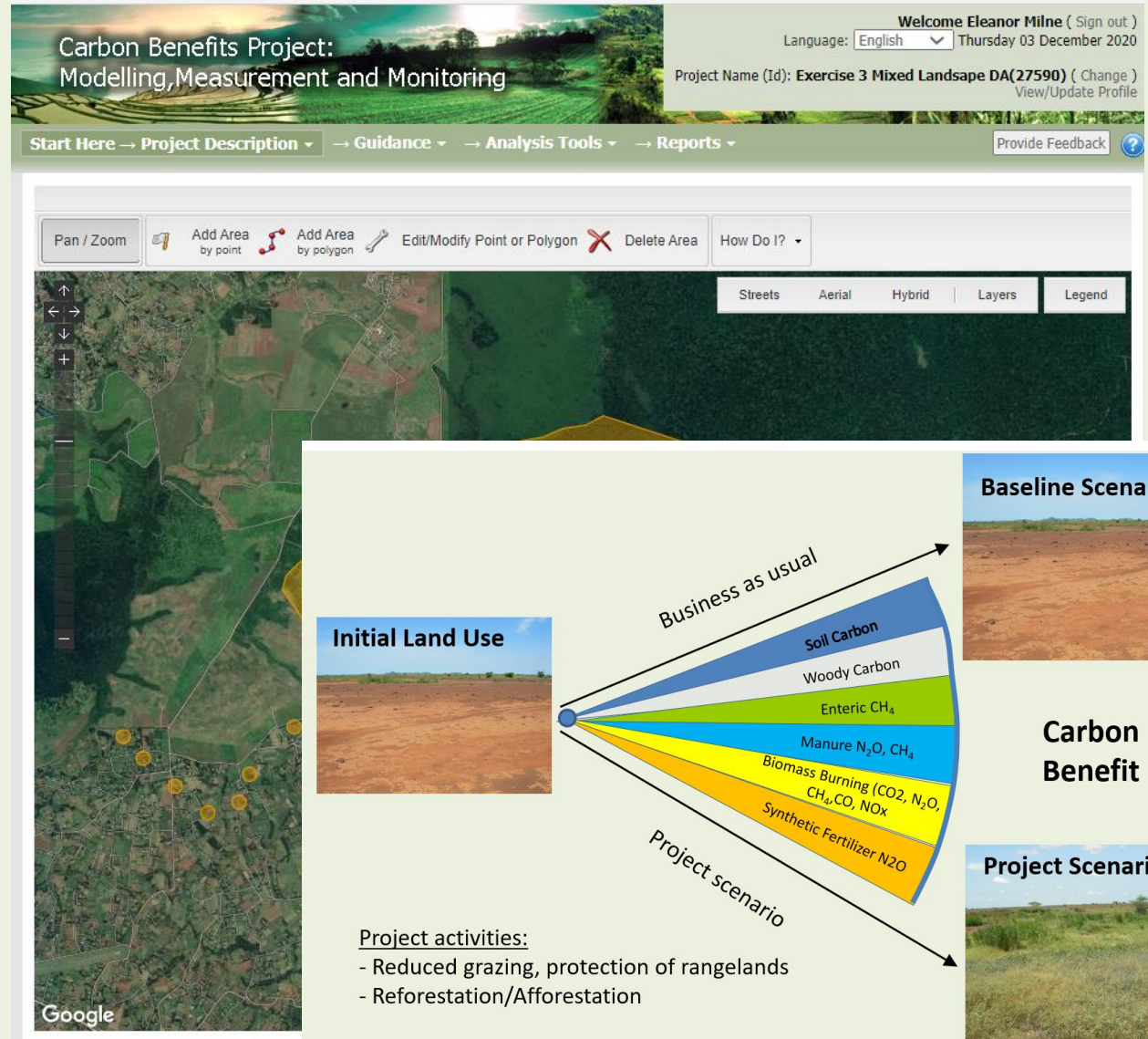
Import project from WOCAT

Select a WOCAT entry from the list to import as a CBP project.

Number	Name
Technology 1699	Grassland preservation
Technology 669	Establishment of improved orchards and vineyards
Technology 672	Rehabilitation of degraded pastures with alfalfa
Technology 939	Reduced contour tillage of cereals in semi-arid environments
Technology 1323	Conservation Agriculture
Technology 945	No-till with controlled traffic
Technology 940	Small-scale conservation tillage

Select

User enters:
Spatial areas
where the project
is working



Carbon Benefits Project: Modelling, Measurement and Monitoring

Welcome Eleanor Milne (Sign out)
Language: English Thursday 03 December 2020
Project Name (Id): Exercise 3 Mixed Landscape DA(27590) (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?

Streets Aerial Hybrid Layers Legend

Initial Land Use

Business as usual

Project scenario

Baseline Scenario

Project Scenario

Carbon Benefit

Project activities:

- Reduced grazing, protection of rangelands
- Reforestation/Afforestation

Soil Carbon
Woody Carbon
Enteric CH₄
Manure N₂O, CH₄
Biomass Burning (CO₂, N₂O, CH₄, CO, NO_x)
Synthetic Fertilizer N₂O

Step 3 – Carry out a GHG estimation with CBP

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

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

Introduced Agroforestry [201 ha] ✓

⇒ Show Project Activity Areas
(opens in new window)

2 Select an Annual Cropping System

Annual Cropping System

- Continuous wheat/barley/oats/upland rice
- Fallow - wheat/barley/oats/upland rice
- Continuous maize/sorghum/millet
- Fallow - maize/sorghum/millet
- Maize/sorghum/millet legume
- Maize/sorghum/millet intercropped with legume
- Fallow - maize/sorghum/millet intercropped with legume
- Continuous wetland rice
- Wetland rice - wheat
- Continuous vegetables
- Vegetables - wheat/barley/oat/upland rice
- Continuous cotton/tobacco
- Vegetable - cotton/tobacco
- Continuous root crop
- Cassava/potato/manioc - vegetable
- Cassava/potato/manioc - wheat/barley/oat
- Cassava/potato/manioc - maize/sorghum/millet
- Hay
- Wheat or similar rotation with hay/pasture
- Maize or similar rotation with hay/pasture

of N (kg/ha)*	% of nitrogen (N) in fertilizer*	Residue Management*	Area (ha)*
	46	Collected	190

190

Total Area Allocated (ha): 190/190



Carbon Benefits Project: Modelling, Measurement and Monitoring

Welcome Eleanor Milne (Sign out)
 Language: English Thursday 22 April 2021
 Project Name (Id): Exercise 3 Mixed Landscape DA(27590) (Change)
 View/Update Profile

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

Provide Feedback 

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

Annual Crops Stage 1 of 1: Cropping Systems



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

1 Select Project Activity Area/Group

Introduced Agroforestry [201 ha] ✓ 

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

2 Specify an Annual Cropping System

 Add |  Delete

Cropping System Name	Area
Maize intercropped with legume	190

190

Total Area Allocated (ha): 190/190 **Save**

3 Cropping System Planting Sequences

3 Cropping System Planting Sequences

[+ Add](#) | [- Delete](#)

Year	Crop 1 (required)	Crop 2 (optional)	Crop 3 (optional)
1	maize, dry	legumes and pulses, fresh	

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, dry	Collected	Full	<input checked="" type="checkbox"/>	5	46
1	2	legumes and pulses, fresh	Collected	Full	<input type="checkbox"/>	0	0

Save

Back

Next



Emission Factors

- Forestland ✓ (+)
- Grassland ✓ (+)
- Settlements ✓ (+)
- Wetlands ✓ (+)
- Annual Crops ✓ (-)
 - Annual Cropping Systems ✓
 - ▶ Emission Factors ✓
- Perennial Crops ✓ (+)
- Agroforestry ✓ (+)
- Livestock ✓ (+)

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
SFs: Scaling Factor for Soil Type	Recommend Default Only	unitless	Rice Methane	
SFw: Scaling Factor for Water Management	Recommend Default Only	unitless	Rice Methane	
Fi: Input Factor	Recommend Default Only	unitless	Soil C Stocks	Mineral Soils
Flu: Land Use Factor	Laboratory Measurement	unitless	Soil C Stocks	Mineral Soils
Fmg: Management Factor	Laboratory Measurement	unitless	Soil C Stocks	Mineral Soils
EF: Organic Soil Emission Factor	Recommend Default Only	tonnes C/ha/yr	Soil C Stocks	Organic Soils
SOCref: Reference Soil Carbon Stock	Laboratory Measurement	tonnes C/ha	Soil C Stocks	Mineral Soils
CF: Carbon Fraction	Complex Measurement	tonnes C/tonnes dm	Soil Nitrous Oxide	Cropland Residue
EF: Direct Emission Factor for Crop Residues	Recommend Default Only	Kg N2O-N/Kg N	Soil Nitrous Oxide	Cropland Residue
EF: Direct Emission Factor for Cultivated Organic Soil	Recommend Default Only	Kg N2O-N/ha/yr	Soil Nitrous Oxide	Mineralization of Cultivated Organic Soils
EF: Direct Emission Factor for N Fertilizers	Recommend Default Only	Kg N2O-N/Kg N	Soil Nitrous Oxide	Synthetic N Fertilizer
DMF: Dry Matter Fraction of Residue	Laboratory Measurement	tonnes dm/tonnes residue	Soil Nitrous Oxide	Cropland Residue

Please Select One of the Following to Create a Report

Rerun Calculations

1 Summary Report Options

Create Summary Report for Review

View Graphs

A1 Mineral Soils C Stocks

	A	B	C	D	E	F	G
26	Fmg	Uncertainty in Fmg	Percent	Factor Uncertainty			
27	Fmg	Management Factor	unitless	Factor Value			
28	InputSoilCls	Input Soil Class		Stratum			
29	LUSoilCls	Land Use Soil Class		Stratum			
30	MgmtSoilCls	Management Soil Class		Stratum			
31	Project Activity Area	Project Activity Area Group		Stratum			
32	SOC	Mineral Soils C Stocks	tonnes C	Equation Result			
33	SOCref	Uncertainty in SOCref	Percent	Factor Uncertainty			
34	SOCref	Reference Soil Carbon Stock	tonnes C/ha	Factor Value			
35	Soil	Soil		Stratum			
36	SubCategory	Activity Data Subcategory		Stratum			
37	Uncertainty (%)	Uncertainty in Equation Result	Percent	Result Uncertainty			
38	Results:						
39	Project Activity Area	Climate	Soil	Category	SubCategory	MgmtSoilCls	InputSoilCls
40	Introduced Agroforestry	Tropical Montane	Low Activity Clay Mineral	Agroforestry	Avacado and Banana with reduced Tillage	Reduced Tillage	Medium
41	Reforestation Area 1	Tropical Montane	Low Activity Clay Mineral	Forestland	Kakamega Native	N/A	N/A
42	Reforestation Area 1	Tropical Montane	Low Activity Clay Mineral	Forestland	Tropical mountain systems	N/A	N/A
43	Reforestation Area 1	Tropical Montane	Low Activity Clay Mineral	Forestland	Tropical mountain systems	N/A	N/A
44	Avoided Deforestation Area	Tropical Montane	Low Activity Clay Mineral	Forestland	Tropical mountain systems	N/A	N/A
45	Total						

Signs for uptake are (-) and for emissions (+).

Other GHGs include NOx, CO, VOC, SO2.

Values not identified as 'stocks' are emissions.

A. Forest and other Woody Biomass includes biomass growth and losses from timber harvest and fuelwood gathering.

B. Forest and Grassland Conversion includes emissions from deforestation and shifting cultivation.

net reduction in emissions.

Highcharts.com

- Choosing SLM technologies with the WOCAT database
- Estimating climate change impacts with the CBP tools and linking back to WOCAT
- Collating supporting data in the field with LandPKS