



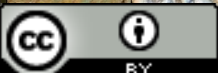
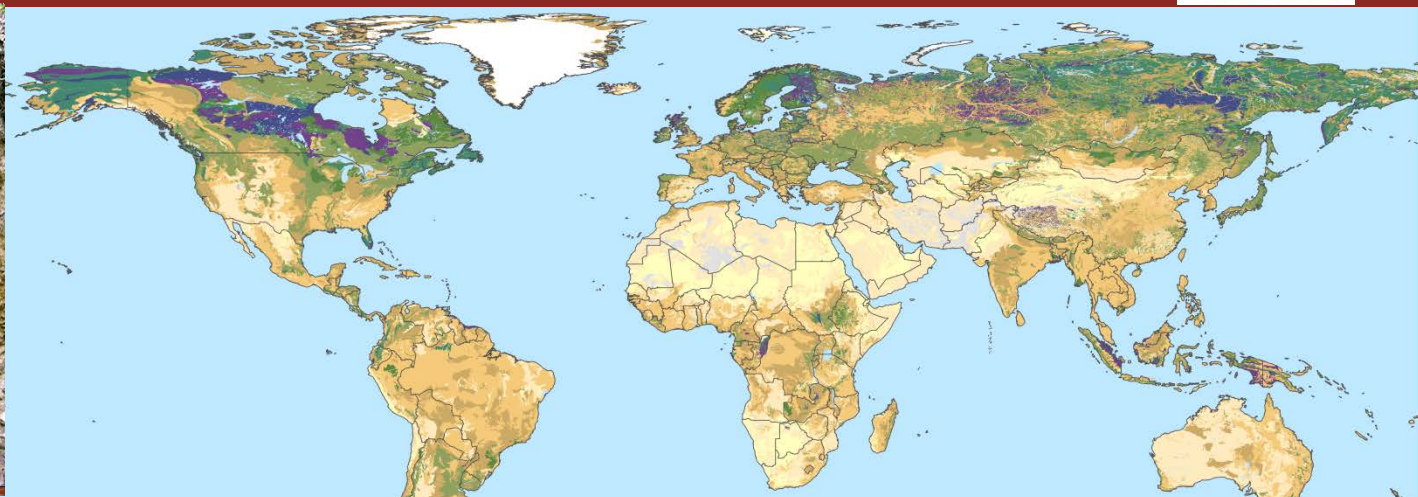
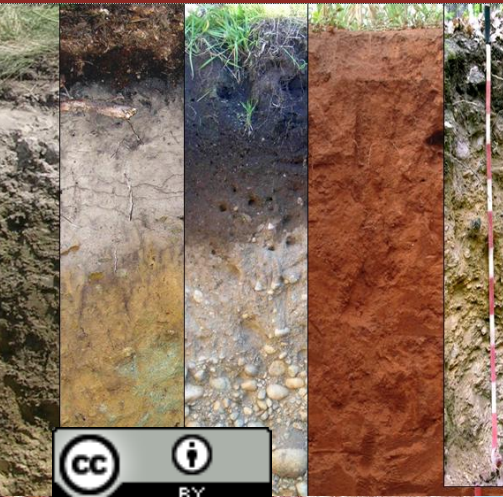
ISRIC
World Soil Information



Carbon Benefits Project (CBP) tools Hands-on Exercise

Niels H. Batjes

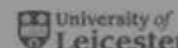
GSP Soil organic carbon mapping training
(6-23 June 2017, Wageningen)



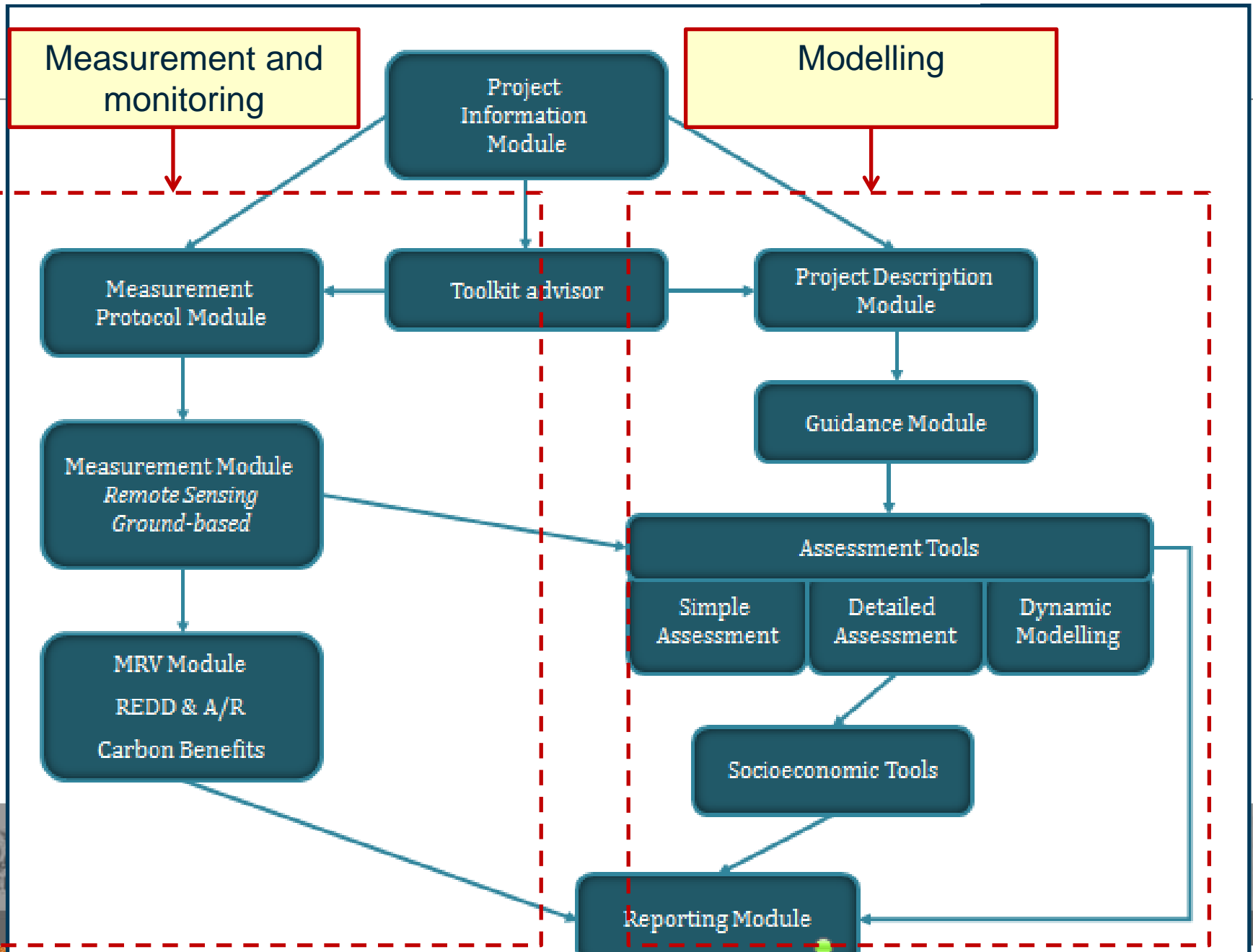
Features of CBP modelling system

Developed to land use carbon project developers in selecting *methods that combine livelihood benefits with climate change mitigation benefits:*

- On-line
- User friendly
- Applicable at any stage of a project
- Can be used for different types of projects with different amounts of data
- Spatially explicit output
- Reporting in a standard format



Concept behind the CBP toolset



CBP toolkit advisor

[Simple Assessment](#) of the impact of a project on carbon stock and greenhouse gas emissions. Requires information on land use changes and/or livestock production in the project area. Suitable for a quick assessment at any stage including proposals. Uses standard information on greenhouse gas emission rates.

[Detailed Assessment](#) of the impact projects have on carbon stocks and greenhouse gas emissions. Requires information on land use changes and/or livestock production in the project area plus can utilize local and project specific field measurements and other local datasets. Suitable for detailed reporting in projects with a reasonable focus on climate change mitigation.

[Dynamic Modelling](#) utilizes the Century Model to assess soil and biomass carbon stock changes. For users with a scientific background who wish to model carbon stock changes in projects with a carbon focus.

[Direct Measurement](#) provides a general protocol and specific methodologies for field, laboratory and remote sensing measurements of carbon stocks and greenhouse gases. Requires extensive field measurements and remote sensing analysis to measure carbon stocks in soil and biomass and monitor their changes over time in the project area. Displays project spatial information in an online information system to manage measurement data in carbon and greenhouse gas projects. Project indicators display a results framework of social, biodiversity and environmental indicators of carbon and greenhouse gas benefits in the project area. The data derived from measurements can be used directly for reporting changes in the carbon and greenhouse gas balance or the measurement data may be used as inputs for CBP modelling assessments.

[Project Planning Tools](#) provide supporting information for project managers during the development phase of landscape carbon and other sustainable land management projects. The information provided is useful for making decisions on which trees to plant based on a large database of agroforestry trees, to estimate the economic benefits that can be expected from participating in the carbon markets by planting trees and support in setting up project boundaries using available maps.



Differences in methodological complexity and data needs

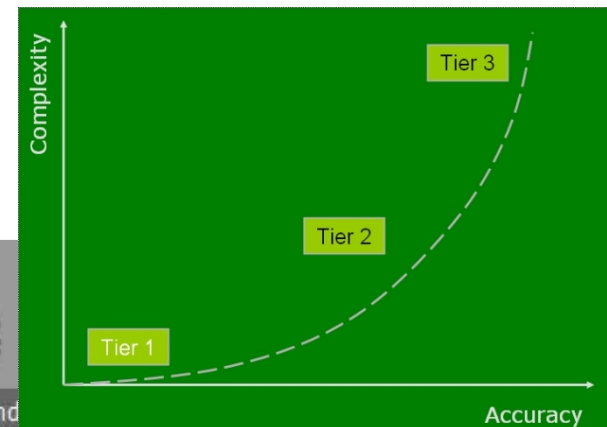
| Soil carbon pool | Tier 1 | Tier 2 | Tier 3 |
|--------------------------------|---|--|--|
| Organic carbon in mineral soil | Default reference C stocks and stock change factors from IPCC | Country-specific data on reference C stocks & stock change factors | Validated model complemented by measures, or direct measures of stock change through monitoring networks |
| Organic carbon in organic soil | Default emission factor from IPCC | Country-specific data on emission factors | Validated model complemented by measures, or direct measures of stock change |

<http://www.gofc-gold.uni-jena.de/redd/>

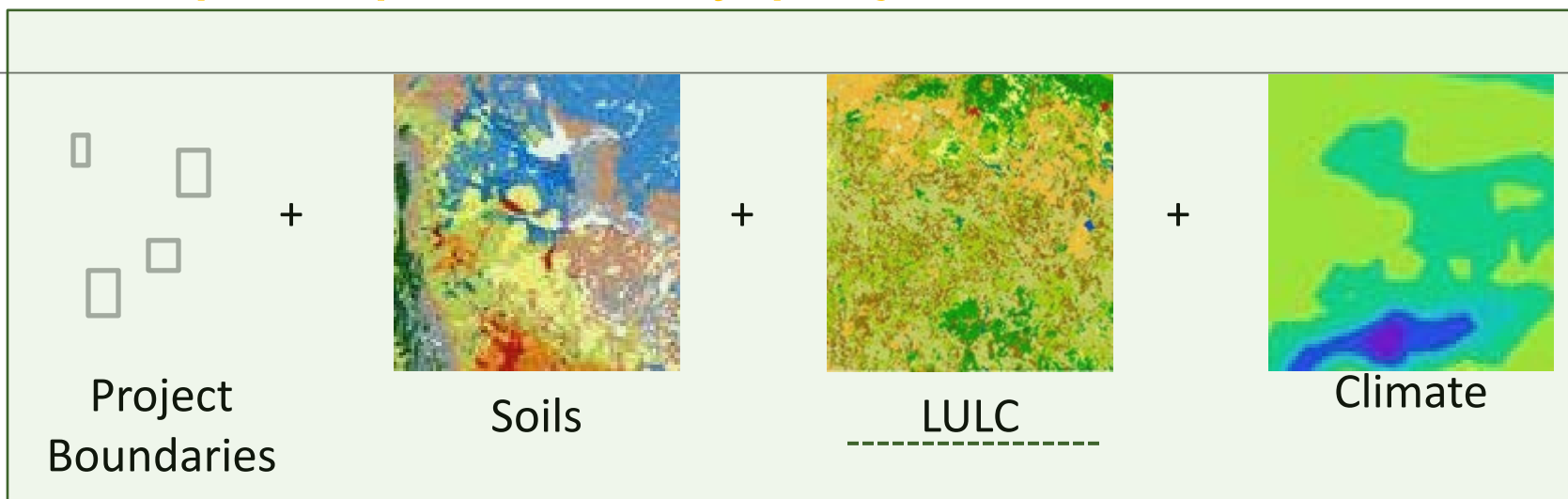
CBP Assessment Tools:

- **Simple Assessment** (Tier I)
- **Detailed Assessment** (Tier II)
- **Dynamic Modelling** (Tier III)

data needs



Main principle: Stratify project areas

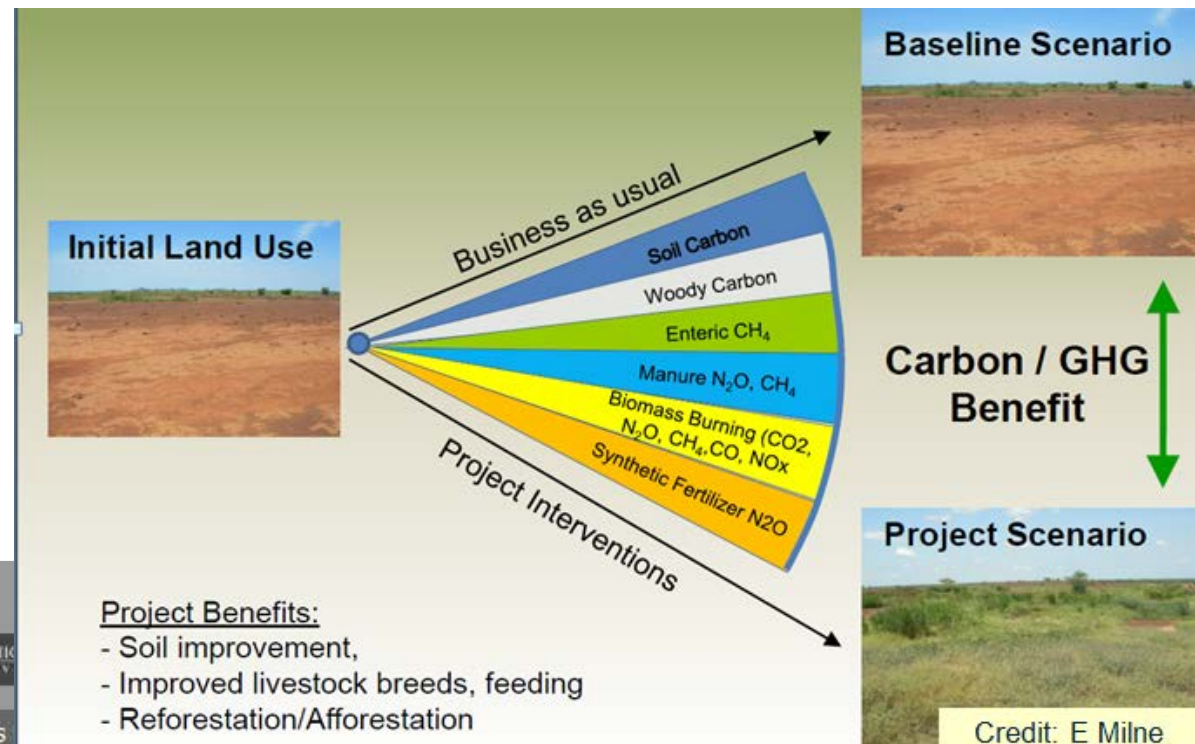


| Area | Soil | LULC | Climate |
|----------|------------------|--|----------------|
| 50000 ha | Ferralsols → LAC | Forest land to Cropland Cropland | Tropical moist |
| 76 ha | Histosols → ORG | Wetland remaining Wetland | Tropical moist |
| 2300 ha | Fluvisols → WET | Cropland to Agroforestry Agroforestry | Tropical moist |

↓
**CBP
tools/models**

Simple Assessment Exercise

- Determine if project interventions provide a carbon/ Greenhouse Gas benefit relative to the baseline scenario ('business as usual').
- For example, do the proposed land management interventions lead to an increase in carbon stocks in soils and biomass and/or a reduction in GHG emissions?



Simple Assessment Calculation *IPCC Tier-I inventory approach*

SOC changes in mineral soils (IPCC 2006):

$$\Delta \text{SOC} = \sum_{h=1}^H (\text{SOC}_t(h) - \text{SOC}_{t-20}(h))$$

$$\text{SOC}(h) = \text{SOC}_{\text{REF}} * (F_{\text{LU}} * F_{\text{MG}} * F_{\text{I}}) * A$$

- SOC_{REF} – reference carbon stock (for climate-soil stratum)
- Stock change factors:
 - F_{LU} – base factor (land use)
 - F_{MG} – tillage factor (management system)
 - F_{I} – input factor (inputs of organic matter)
- A – land area (for given stratum)



Study area: Yala region, western Kenya

The goals of many SLM projects in the Yala region are to decrease soil erosion, reduce deforestation, improve food security and diversify the agricultural economy

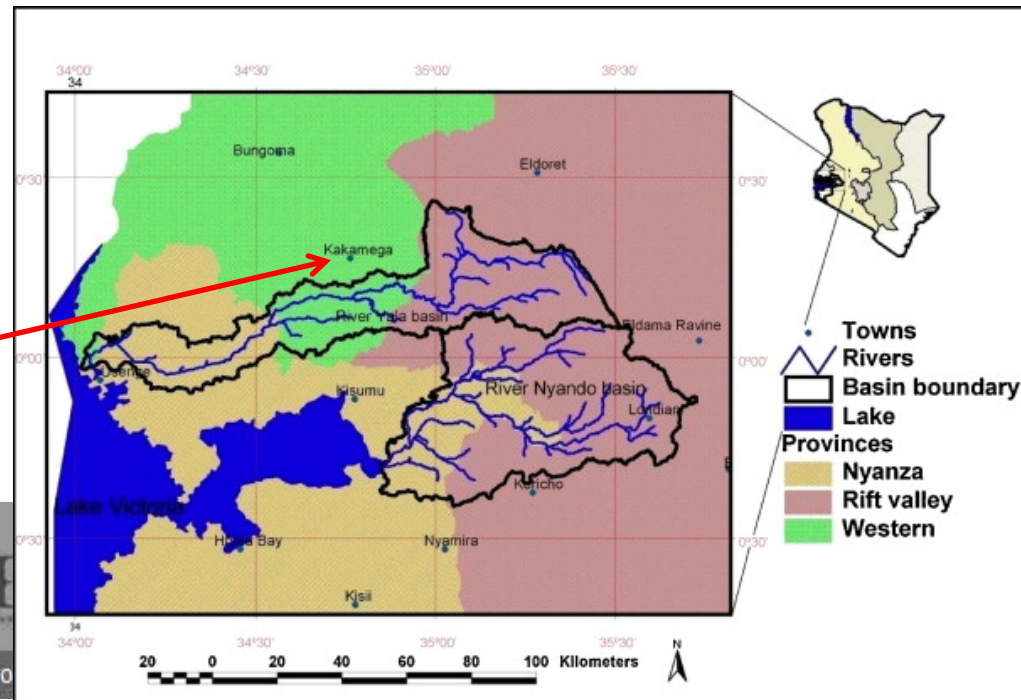


Project area: Kakamega

Our *hypothetical* example is a project which aims to do all of these things in an area of the Yala River Watershed through:

- Avoided deforestation
- Reforestation
- Introduction of agroforestry

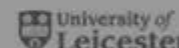
Kakamega area



Project description

| Land use category | Initial land use | Baseline scenario | Project scenario |
|--------------------------|------------------|-------------------|------------------|
| Forestland | 3017 | 2417 | 3607 |
| Grassland | 590 | 590 | 0 |
| Settlements | 0 | 0 | 0 |
| Wetlands | 0 | 0 | 0 |
| Annual cropland | 95 | 600 | 0 |
| Agroforestry | 0 | 0 | 95 |
| Total (ha) | 3702 | 3702 | 3702 |
| <i>Livestock (heads)</i> | | | 275 |

For details see printed exercise



Login first: <http://cbp-web1.nrel.colostate.edu>

Carbon Benefits Project: Modelling, Measurement and Monitoring

Please Login

[Not Yet Registered?](#)

E-mail

Password

[Forgot your password?](#)

Remember me?

Login >>

Carbon Benefits Project: Modelling, Measurement and Monitoring

Tutorial for the Project Information Module (PIM)

1. Introduction

Welcome to the Carbon Benefits Project website. These tutorials will cover all aspects of the toolkit, from registering as a new user, to creating projects, to detailed use of the different parts of the toolkit, to creating a Carbon Benefits Project Report.

As well as these tutorials we also have an extensive Glossary and 'Frequently Asked Questions' for all parts of the Carbon Benefits Project Toolkit.

2. Creating a User Account

The first time you wish to use the Carbon Benefits Project Toolkit, you will be required to register. This is achieved by clicking on the '**Not Yet Registered?**' link (*Figure 1*) on the opening login page.

Please Login [Not Yet Registered?](#)

E-mail

Password

[Forgot your password?](#)

Remember me?

Login >>



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Figure 1

Carbon Benefits Project: Modelling, Measurement and Monitoring

1 Register

2 Confirm Email

3 Registration Complete

Step 1 of 3: Please Enter Registration Information

[Already Registered?](#)

First (Given) Name

Second (Family) Name

Organization

Password

Please confirm password

E-mail (this will be your **username**)

Please confirm e-mail

Next >>

Write it down ...

Back

Help

**Account creation was unsuccessful.
Please correct the errors and try again.**

First (Given) Name

You must provide your first name.

Second (Family) Name

You must provide your second name.

Organization

Password

Your password must be between 6 and 12 characters.

Please confirm password

E-mail (this will be your **username**)

You must provide an email address.

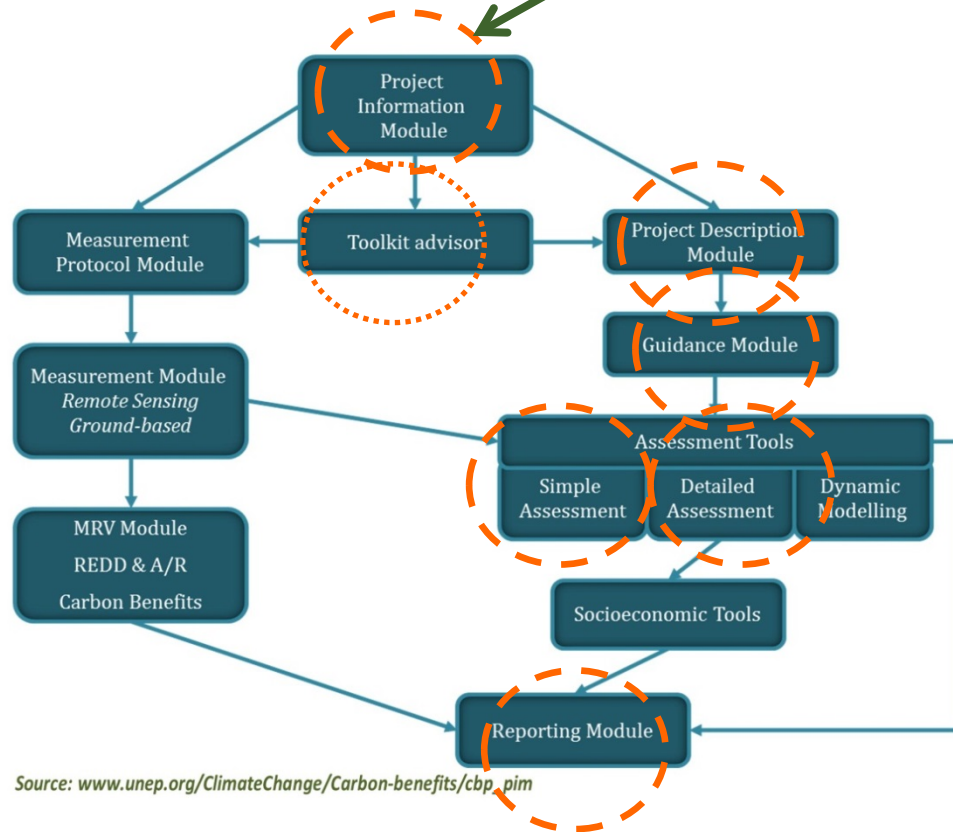
Please confirm e-mail

Next >>



The CBP toolset

Focus of Hands-on-Exercices



Source: www.unep.org/ClimateChange/Carbon-benefits/cbp_pim

<http://cbp-web1.nrel.colostate.edu>



Getting started ...

- Download course materials:
<http://www.isric.org/documents/document-type/training-material-gsoc-mapping-cbp-tools>
- Register at*:
<http://cbp-web1.nrel.colostate.edu>

* *CBP tool is best used with Firefox, Chrome or Safari*

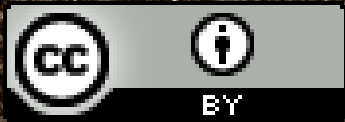




ISRIC
World Soil Information



“Irrespective of the climate debate, soil quality and its organic matter content must be restored, enhanced and improved”



www.isric.org



Acknowledgements: This presentation draws on materials derived from many sources which, to the extent possible, have been acknowledged using URLs to the original studies/materials.