Parallel session L2.1: Developing and evaluating climate-smart practices

Evaluating agricultural mitigation and scaling up climate-smart practices using the FAO EX-Ante Carbon-balance Tool

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Evaluating agricultural mitigation and scaling up climate-smart practices using the FAO EX-Ante Carbon-balance Tool

Share of GHG

Total emissions in 2010 (49.5 Billions tons of CO$_2$-eq)

- Agriculture, Forestry and Other Land Use (AFOLU) - 23%
- Energy (35%)
- Transportation (14%)
- Construction (6%)
- Industries and Waste (21%)

Adapted from 5th IPCC Assessment Report – WG3 – Chapter 1 (2014)
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**Background**

Total emissions in 2010 (49.5 Billions tons of CO$_2$-eq)

- Annual average for 2000-2010 (Billions tons of CO$_2$-eq):
  - Agriculture: 5.0 to 5.8
  - Land-use change: 4.3 to 5.5

- 23% AFOLU/LULUCF

- For last décade:
  - CO$_2$: at least 10% of anthropogenic CO$_2$ emissions
  - CH$_4$: ~ 50% of anthropogenic CH$_4$ emissions
  - N$_2$O: ~ 60% of anthropogenic N$_2$O emissions

Adapted from 5th IPCC Assessment Report – WG3 – Chapter 1 (2014) and WG1- Chapter 6
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Background

AFOLU is also mitigation

Sources

Sinks
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How to correctly account for sources and sinks?
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A full landscape approach is needed

How to double the production?

Option A

Option B

GHG (tCO₂-eq)
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A full landscape approach is needed

How to double the production?

Option A?

or

Option B?

Needs to account for all land-use changes, managements options, inputs, livestock,...
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Background
GHG and C-balance have become essential

International Financial Institution Framework for a Harmonised Approach to Greenhouse Gas Accounting

November 2012

Media release
For immediate release: 30.10.14

New Climate Bonds Expert Working Group
kicks off to develop eligibility criteria for climate bonds linked to Agriculture and Forestry investments

Working group of 15 international experts gets the Standard development under way
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Background
GHG and C-balance have become essential

Policy
Finance

Private Sector
Developpement

Research
Civil Society
EX-ACT was proposed by FAO as a suitable tool

A simple tool to provide rapid *ex-ante* estimations of the impact of agriculture and forestry development projects on GHG emissions and carbon sequestration, but using data already available *(cost-effective)* within classical formulation or evaluation of existing project.
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EX-ACT was continuously updated to adapt to the needs

One tool, several potentials

- Helping policy decision-making
- Putting forward externalities
- Helping to get additional funding
- Anticipating GHG and carbon impacts of agriculture and forestry activities in a development context
- Strengthening value chains
- A tools for teachers
Evaluating agricultural mitigation and scaling up climate-smart practices using the FAO EX-Ante Carbon-balance Tool

A Simple tool (Excel® file) and freely available

Default coefficients (tier 1 approach) are from widely accepted methodologies

Default agroecological zones and EF and coefficients
Evaluating agricultural mitigation and scaling up climate-smart practices using the FAO EX-Ante Carbon-balance Tool

A Simple tool (Excel® file) and freely available

Default coefficients (tier 1 approach) are from widely accepted methodologies

But the user have always use other values either from direct measurements either from other sources
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A Simple tool (Excel® file) and freely available

- **Start**
- **Description**
- **Land Use Change**
- **Crop production**
- **Grassland Livestock**
- **Land degradation**
- **Inputs Investments**

### 5 major categories

**2. Land Use Change**
- Deforestation
- Reforestation
- Other

**3. Crop production**
- Annual crops
- Perennial crops
- Irrigated rice

**4. Pasture and Livestock**
- Pastures
- Livestock

**5. Degradation**
- Forest
- Organic soils

**6. Investment and infrastructure**
- Inputs
- Energy
- Construction

### Localization

- **Soil**
- **Climate**

### Results

Gross and Net balance, results per ha an average per year

### Matrix of change

Default agroecological zones and EF and coefficients
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A Simple tool (Excel® file) and freely available

Since 2009, EX-ACT was used in more than 60 countries
Evaluating agricultural mitigation and scaling up climate-smart practices using the FAO EX-Ante Carbon-balance Tool

But also, since then other tools are available

Methods for the quantification of emissions at the landscape level for developing countries in smallholder contexts

Eleanor Milne\textsuperscript{1,2}, Henry Neufeldt\textsuperscript{1}, Todd Rosenstock\textsuperscript{1}, Mike Smalligan\textsuperscript{2}, Carlos Eduardo Cerri\textsuperscript{3}, Daniella Malin\textsuperscript{4}, Mark Easter\textsuperscript{1}, Martial Bernoux\textsuperscript{1}, Stephen Ogle\textsuperscript{1}, Felipe Casarim\textsuperscript{1}, Timothy Pearson\textsuperscript{4}, David Neil Bird\textsuperscript{5}, Evelyn Steglich\textsuperscript{6}, Madeleine Ostwald\textsuperscript{1}, Karolien Denel\textsuperscript{1} and Keith Paustian\textsuperscript{1}
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But also, since then other tools are available

All tools are based on the same methodologies (IPCC), But tools differs according to their aims and scope...

landscape-scale greenhouse gas assessment for agriculture and forestry

18 tools

Vincent Colomb¹, Ophélie Touchemoulín², Louis Bockel²,³, Jean-Luc Chotte¹, Sarah Martin¹, Marianne Tinlot² and Martial Bernoux³

Mean annual net GHG emissions for wheat sown on grassland in temperate conditions (mainly Europe).
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But also, since then other tools are available

All tools are based on the same methodologies (IPCC), but tools differ according to their aims and scope...

http://ird.t-t-web.com/

Greenhouse gas emission calculators
A selection guide

This selection guide is intended to help potential users select the most appropriate calculator for a landscape-scale greenhouse gas (GHG) assessment of activities in agriculture and forestry. It is based on a technical report published by FAO which includes appendices with all resource material and descriptions of the individual calculators.

The data for this guide is taken directly from the letter Colomb et al, Selection of appropriate calculators for landscape-scale greenhouse gas assessment for agriculture and forestry, Environmental Research Letters, 8, 015029, doi:10.1088/1748-9326/8/1/015029.

Click here for the multilingual version of the GHG calculator selection guide which takes account of any new information available...

The classification is based on the main aim of the assessment: raising awareness, reporting, project evaluation or product assessment.

To display the table of suitable calculators at the bottom of the page, select the main aim, at least one geographical area, activity and source and the time and skills available.

Scope of the assessment
Select all the activities concerned
- Temperate crops
- Tropical and equatorial crops
- Rice cultivation
- Grassland
- Dairy cattle
- Other livestock
- Field trees, hedges, agroforestry
- Perennial farming (orchards, vineyards)
- Horticulture, greenhouse crops
- Forestry
- Any

Select all the sources concerned
- Infrastructure CO₂
- Fossil fuel and electricity CO₂
- Soil N₂O emissions from fertilizer and manure
- Enteric methane
- Methane from manure
- N₂O from N-fixing plants
- N₂O from residues
- Off-farm emissions (fertilizers, imported food)
- Burning biomass, GHG other than CO₂
- Methane from rice paddies
- Change in soil C stocks, direct LUC
- Change in biomass C stock (above and below ground), direct LUC
- Change in soil C stocks due to change in management practices ( tillage, residues)
- Methane from peat land
- Off farm processing (mainly CO₂, but also HFC, PFC etc.)
- Transport CO₂
- Renewable energy production (solar panels, windmills, biofuels, etc.)
- Any

Speed and ease of use
Time required for assessment
- **** less than a day
- ***
- ** more than a month
Ease of use
- **** no specialist skills
- ***
- ** formal training required
Capturing synergies between rural development and agricultural mitigation in Brazil

Giacomo Branca\textsuperscript{a,b}, Helga Hissa\textsuperscript{c}, Mara Cristina Benez\textsuperscript{d}, Katia Medeiros\textsuperscript{e}, Leslie Lipper\textsuperscript{b}, Marianne Tinlot\textsuperscript{f}, Louis Bockel\textsuperscript{f}, Martial Bernoux\textsuperscript{g,e}
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Example of application

The Santa Catarina Rural Competitiveness Project (SC Rural)

The project concerns 936 micro-catchments. Total area of lands receiving support for improved agricultural systems and natural resources conservation and management totals **661,000 ha**

**Balance over 20 years (positive values are net emissions, negative are sinks or avoided emissions)**

A wide range of “activities”

**Improved annual crop mgt: +1.7**

C-sequestration = - 0.5 Mt CO₂eq
But inputs = + 2.2 Mt CO₂eq

With all other activities:
A co-benefit of 0.92 t CO₂eq ha⁻¹ yr⁻¹
Evaluating agricultural mitigation and scaling up climate-smart practices using the FAO EX-Ante Carbon-balance Tool.

Way forward

Version 6 released TODAY
### Evaluating agricultural mitigation and scaling up climate-smart practices

**Title:** FAO EX-Ante Carbon-balance Tool

#### Way forward

**Version 6 released TODAY**

### 3.3. Системы затопляемых рисовых полей

Используйте данную часть только если вы хотите уточнить анализ, используя коэффициенты Уровня 2

(значения по умолчанию представлены в ознакомительных целях, в то время как EX-ACT будет автоматически использовать значения Уровня 2 там, где указано)

<table>
<thead>
<tr>
<th>Системы рисовых полей другого вида (перестройка умополчания Уровень 2)</th>
<th>Уровни удаления почвенного углерода</th>
<th>Объем сожженной соломы (т CO₂/га)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Рисовые поля после обезпеченения</td>
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<td>5.5</td>
</tr>
<tr>
<td>Перестроенные в ОУП</td>
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<td>5.5</td>
</tr>
<tr>
<td>Конопля на бывшем рисовом поле</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Сбор данных

**Запись:** 1. Ведутся испытания на Чанге

**Запись:** 2. Система CO₂

**Запись:** 3. Оценка потенциала

**Запись:** 4. Оценка результатов

**Запись:** 5. Оценка эффективности

**Запись:** 6. Оценка целесообразности
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Inclusion of a “Blue Carbon” module

2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands

Methodological Guidance on Lands with Wet and Drained Soils, and Constructed Wetlands for Wastewater Treatment

Edited by
Takashiro Hiroshih, Thelma Krop, Kyoko Tamabe, Nalin Srivastava, Baxanuwen Amarpanar, Maya Pakula and Tiffany Tromble

Task Force on National Greenhouse Gas Inventories
Evaluating agricultural mitigation and scaling up climate-smart practices using the FAO EX-Ante Carbon-balance Tool

All material are available on the EX-ACT website: http://www.fao.org/tc/exact/ex-act-home/en/
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E-learning module will be released soon
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Thank you for the attention