Food and Agriculture Organization
of the United Nations

June 28th
Lorenzo Maestripieri

EX-ACT

EX-Ante Carbon Balance Tool

June 28th

Lorenzo Maestripieri

Objectives and applicability

Differences with previous version

Building a carbon balance

EX-ACT

EX-Ante Carbon Balance Tool

The EX-Ante Carbon Balance Tool EX-ACT

An Excel based tool that quantifies in tCO2-e the amount of GHG released or sequestered from activities in the AFOLU* sector

Requires activity data on agricultural practices, resource use and land use change for a specific project

Based on the IPCC Guidelines for National GreenHouseGas Inventories (2006, 2014, 2019)

*Agriculture, Forestry and Other Land Use

Objectives of EX-ACT

Measure

Measure the impact of policies and projects that are being designed and impact the AFOLU sector

Manage

Manage the choice of activities to minimise their climate change impacts or maximise their mitigation potential

Monitor

Monitor projects and policies at any stage of completion to ensure they reach their climate targets

Mitigate

Mitigate climate change by reducing GHG fluxes and achieving local /national / global climate targets

Applicability

At country level

At region / district / parish level

At local project / farm level

Source of map: Prezi

Applicability

Nationally Determined Contributions

Portfolio analyses

Individual project analyses

Data needs

Takes into account activities

Deforestation, a-re/forestation, forest degradation, restoration of grasslands, livestock, cultivation of annual crops, cultivation of perennial crops, fertilization of crops, installation of buildings, installation of irrigation systems...

...that impact GHG fluxes...

CO_2, CH_4, N_2O

... or changes in carbon stocks

above-ground biomass, below-ground biomass, soil, litter & deadwood

GHG EMISSIONS & CARBON STOCK CHANGES

=

Carbon Balance in tCO_2-eq

Data needs

Activity data

Land use and livestock catering monitoring system

expressed in ha/year or heads/year

X

Emission factors

IPCC, forestry inventories, etc...

expressed in tonne/ha

=

Emissions

GHG appraisal

expressed in tonne/year

Data needs

Activity data
Land use and livestock catering monitoring system
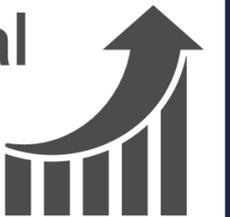
X

Emission factors
IPCC, forestry inventories, etc...

=

Emissions
GHG appraisal

expressed in ha/year or heads/year

expressed in tonne/ha

expressed in tonne/year

Negative balance: less emissions

Data needs

Activity data		Emission factors		Emissions
Land use and livestock catering monitoring system	**X**	IPCC, forestry inventories, etc...	**=**	GHG appraisal
expressed in ha/year or heads/year		**expressed in tonne/ha**		**expressed in tonne/year**

Negative balance: less emissions

Positive balance: more emissions

Objectives and applicability

Differences with previous version

Building a carbon balance

EX-ACT

EX-Ante Carbon Balance Tool

The modules

Description: geographical features and duration of the project

Cropland: annuals and pluriannuals, perennials and agroforestry, flooded rice

Forest degradation levels and fire occurrence

Coastal wetlands, coastal fisheries and aquaculture

Results

Description of project

Land-use changes

Cropland management

Grassland & Livestock

Forest management

Inland wetlands & Aqua.

Coastal wetlands & Fish/Aqua.

Inputs & Investments

Detailed results

Deforestation, Afforestation, Other Land Use Changes

Grassland degradation levels and livestock management

Inland wetlands and inland waterbodies

Inputs, energy, irrigation and infrastructure

Differences between EX-ACT v. 8 and v. 9

Methodology	EX-ACT v. 9 thoroughly follows the IPCC Guidelines for National GHG Inventories (2006, 2014, 2019)
EFs	Emission Factors and C stock values have been updated to reflect current state of the art
Data points	EX-ACT v. 9 includes more data points and flexibility in assessing activities, allowing for more precise GHG appraisals

Differences between EX-ACT v. 8 and v. 9

	Methodology	Values		Methodology	Values
Land Use Changes: deforestation, afforestation, OLUC	◯	✓	Inland wetlands & Inland waterbodies	✓	✓
Cropland: annual cropland, perennial cropland, flooded rice	✓	✓	Coastal wetlands, fisheries and aquaculture	◯	✓
Grassland & Livestock	✓	✓	Inputs, Energy, Irrigation and Infrastructure	✓	✓
Forest management and degradation	◯	✓	Results	◯	✓

- Objectives and applicability
- Differences with previous version
- Building a carbon balance

EX-ACT

EX-Ante Carbon Balance Tool

The tool at work

Source of map: EX-ACT tool - map conforms to United Nations World Map, May 2020

The tool at work

If country-specific data are available, please go to Tier 2: **Tier 2**

Type of vegetation that will be deforested	?	HWPs (tDM/ha)	Fire used? (y/n)	Final land-use after deforestation		Forested area (ha)			Deforested area (ha)		Total emissions (tCO2-e)		Balance
				Land-use type	Agroforestry system	Start	Without	With *	Without	With	Without	With	
Tropical moist deciduous forest		0	YES	Annual fallow	Please select	20.000	0	20.000 D	20000	0	11.681.935	0	-11.681.935 ▼
Please select		0	NO	Please select	Please select	0	0	0 D	0	0	0	0	0
Please select		0	NO	Please select	Please select	0	0	0 D	0	0	0	0	0
Please select		0	NO	Please select	Please select	0	0	0 D	0	0	0	0	0
Please select		0	NO	Please select	Please select	0	0	0 D	0	0	0	0	0
Please select		0	NO	Please select	Please select	0	0	0 D	0	0	0	0	0
Please select		0	NO	Please select	Please select	0	0	0 D	0	0	0	0	0
Please select		0	NO	Please select	Please select	0	0	0 D	0	0	0	0	0

Total deforestation (tCO2-e) 11.681.935 0 -11.681.935 ▼

*The selection of "D" corresponds to a default (linear) dynamics of change. Other selection options include "I" for immediate changes and "E" for exponential - please refer to the guidelines for further explanation of these assumptions.

The tool at work

Back

Type of vegetation that will be deforested	Above-ground		Below-ground		Litter		Dead wood		Soil carbon	
All units are in tC/ha	Default	Tier 2	Default	Tier 2	Default	Tier 2	Default	Tier 2	Default	Tier 2
Tropical moist deciduous forest	111,2		25,8		5,9		8,0		38,0	
Please select	0,0		0,0		0,0		0,0		0,0	
Please select	0,0		0,0		0,0		0,0		0,0	
Please select	0,0		0,0		0,0		0,0		0,0	
Please select	0,0		0,0		0,0		0,0		0,0	
Please select	0,0		0,0		0,0		0,0		0,0	
Please select	0,0		0,0		0,0		0,0		0,0	
Please select	0,0		0,0		0,0		0,0		0,0	

Use this part only if you want to refine the analysis at Tier 2

IPCC default values are provided for your information only; EX-ACT will use Tier 2 values automatically wherever specified.

The carbon balance

Summary GHG analysis

Continent — Central Africa
Country — Democratic Republic of the Congo
Climate — Tropical
Moisture — Moist

Total areas (ha) 21,000

Project duration (in years)
Implementation 3
Capitalization 17
Period analysis 20
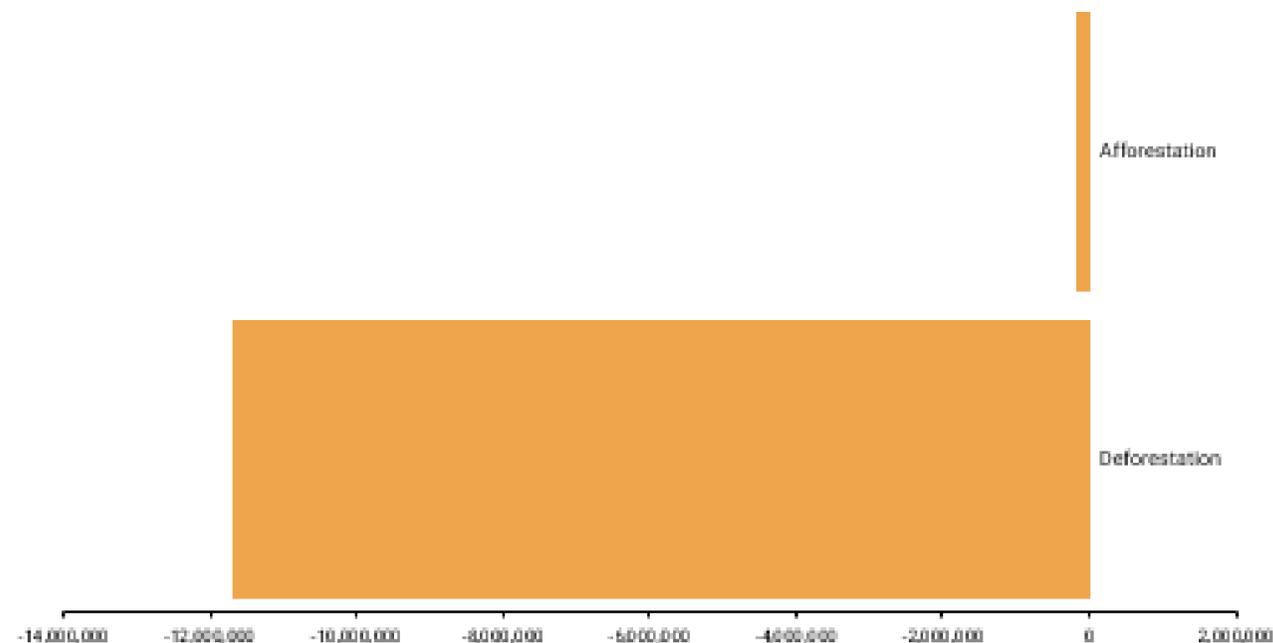
Results presented here include GHG fluxes on mineral and organic soils
See further down for detailed results on organic soils

MITIGATION POTENTIAL

-11,852,774

tCO₂-e

+ = Source / - = Sink

Net fluxes, in tCO₂-e

BALANCE
WITH
WITHOUT

Carbon-balance, in tCO₂-e

Afforestation
Deforestation

Share of the balance per GHG, in tCO₂-e

OTHER
CH4
N2O
CO2 SOIL
CO2 BIOMASS

The carbon balance

Project name							
Continent	Central Africa	Project duration (in years)		Total area (ha)	21,000	Global warming potential (100 yrs)	
Country	Democratic Republic of the Congo	Implementation	3	Mineral soil	21,000	CO_2	1
Climate	Tropical	Capitalization	17	Organic soil	0	CH_4	34
Moisture	Moist	Period analysis	20	Waterbodies	0	N_2O	298

GROSS FLUXES
In tCO_2-e over the whole period analysis

SHARE PER GHG OF THE BALANCE
In tCO_2-e over the whole period analysis

AVERAGE ANNUAL EMISSIONS
In tCO_2-e/yr

PROJECT COMPONENTS		WITHOUT	WITH	BALANCE	CO_2 BIOMASS	CO_2 SOIL	N_2O	CH_4	OTHER	WITHOUT	WITH	BALANCE
Land use changes	Deforestation	11,681,935	0	-11,681,935	-10,721,397	-463,980	-102,704	-393,854		584,097	0	-584,097
	Afforestation	0	-170,839	-170,839	-147,640	-23,199	0	0		0	-8,542	-8,542
	Other land-use	0	0	0	0	0	0	0		0	0	0
Cropland	Annual	0	0	0	0	0	0	0		0	0	0
	Perennial	0	0	0	0	0	0	0		0	0	0
	Flooded rice	0	0	0	0	0	0	0		0	0	0
Grasslands & Livestock	Grasslands	0	0	0	0	0	0	0		0	0	0
	Livestock	0	0	0			0	0		0	0	0
Forest mngt.		0	0	0	0	0	0	0		0	0	0
Inland wetlands		0	0	0	0	0	0	0		0	0	0
Coastal wetlands		0	0	0	0	0	0	0	0	0	0	0
Inputs & Invest.		0	0	0		0	0		0	0	0	0
Total emissions, tCO_2-e		11,681,935	-170,839	-11,852,774	-10,869,037	-487,179	-102,704	-393,854	0	584,097	-8,542	-592,639
Total emissions, tCO_2-e/ha		556.3	-8.1	-564.4	-517.6	-23.2	-4.9	-18.8	0.0			
Total emissions, tCO_2-e/ha/yr		27.8	-0.4	-28.2	-25.9	-1.2	-0.2	-0.9	0.0	0.0	0.0	0.0

+ = Source / - = Sink

The carbon balance

Project name			
Continent	Central Africa		
Country	Democratic Republic of the Congo		
Climate	Tropical		
Moisture	Moist		

Project duration (in years)	
Implementation	3
Capitalization	17
Period analysis	20

Total area (ha)	21,000
Mineral soil	21,000
Organic soil	0
Waterbodies	0

Global warming potential (100 yrs)	
CO_2	1
CH_4	34
N_2O	298

GROSS FLUXES
In tCO_2-e over the whole period analysis

SHARE PER GHG OF THE BALANCE
In tCO_2-e over the whole period analysis

AVERAGE ANNUAL EMISSIONS
In tCO_2-e/yr

PROJECT COMPONENTS		WITHOUT	WITH	BALANCE	CO_2 BIOMASS	CO_2 SOIL	N_2O	CH_4	OTHER	WITHOUT	WITH	BALANCE
Land use changes	Deforestation	11,681,935	0	-11,681,935	-10,721,397	-463,980	-102,704	-393,854		584,097	0	-584,097
	Afforestation	0	-170,839	-170,839	-147,640	-23,199	0	0		0	-8,542	-8,542
	Other land-use	0	0	0	0	0	0	0		0	0	0
Cropland	Annual	0	0	0	0	0	0	0		0	0	0
	Perennial	0	0	0	0	0	0	0		0	0	0
	Flooded rice	0	0	0	0	0	0	0		0	0	0
Grasslands & Livestock	Grasslands	0	0	0	0	0	0	0		0	0	0
	Livestock	0	0	0			0	0		0	0	0
Forest mngt.		0	0	0	0	0	0	0		0	0	0
Inland wetlands		0	0	0	0	0	0	0		0	0	0
Coastal wetlands		0	0	0	0	0	0	0	0	0	0	0
Inputs & Invest.		0	0	0		0	0		0	0	0	0
Total emissions, tCO_2-e		11,681,935	-170,839	-11,852,774	-10,869,037	-487,179	-102,704	-393,854	0	584,097	-8,542	-592,639
Total emissions, tCO_2-e/ha		556.3	-8.1	-564.4	-517.6	-23.2	-4.9	-18.8	0.0			
Total emissions, tCO_2-e/ha/yr		27.8	-0.4	-28.2	-25.9	-1.2	-0.2	-0.9	0.0	0.0	0.0	0.0

+ = Source / - = Sink

EX-ACT team

Economic and Policy Analysis of Climate Change (EPIC) programme

Agrifood Economics Division (ESA)

EX-ACT@fao.org

Via delle Terme di Caracalla

00153 Roma - Italia

www.fao.org

http://www.fao.org/in-action/epic/en/

Downloading EX-ACT

- Go to the website: http://www.fao.org/in-action/epic/ex-act-tool
- Go to the EX-ACT page
- Register online
- Click on the confirmation link you receive on your personal e-mail
- Login and download the tool(s) of your interest
- Try the EX-ACT_Other version first, as it is optimised for non-english operating systems

REGISTER to download the EX-ACT tool or **LOGIN**

Technical requirements

EX-ACT v.9 requires MS Excel version 2011 or newer

EX-ACT – ENGLISH is destined for English language based operating systems, which use "," as a system separator.

EX-ACT – OTHER uses ";" as a system separator to accommodate non-English OS, yet, it still requires English version of MS Excel. For users that have non English OS and do not have access to English MS Office suite, use of Office 365 is highly recommended.