UNDP-GEF Regional Project

Greenhouse gas inventories in Africa: constraints and perspectives

CarboAfrica workshop
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Objective

The overall objective of the project is to strengthen the capacity of participating countries to improve the quality of their national greenhouse gas inventories (GHG) for their national communications.

14 participating Countries

- Benin
- Burkina Faso
- Burundi
- Côte d'Ivoire
- Gabon
- Gambia
- Ghana
- Guinée
- Mali
- Niger
- Nigeria
- Sénégal
- Tchad
- Togo

LULUCF relevance in the region

On average in the region, 55% of GHG emissions are from the LULUCF sector

LULUCF and Agriculture Input data have the highest uncertainty

LULUCF is specially cited for challenges regarding representative and historical activity data collection, and need for additional training on IPCC methods and software

LULUCF relevance in the region

- LULUCF Sector is important for many African countries
- Large areas of forest, savanna and grass land
- Many populations are relying on woody formations for fuel wood, charcoal and forest fruits
- Conversion of forested lands to crop lands and other land use
- Limited data for many countries

Priorities identified under the regional inventory project

Improve emission factors for :

Forest and Grassland Conversion (LULUCF)

Enteric Fermentation in Domestic Livestock (Agriculture)

Expected situation at end of Project

Quality of inventories improved

Institutional framework for inventories strengthened

Long-term strategies for inventories improvement elaborated

Improvement of data collection and management

Expected situation at end of Project

Emission Factors /Coefficients improved and disseminated

International network of information exchange put in place

Increased trained experts

Better sensitization of stakeholders

Technical peer review system implemented

Capacity building through regional and national workshops

1. GPG (Accra)
2. Inventory Process (Niamey)
3. EF (Bamako)
4. QC/QA (Libreville)
5. ALU Software (Banjul)
6. Peer Review (Abidjan)

Networking among GHG inventory experts for information sharing

Long term strategy to improve GHI

- Institutional measures are identified
- Difficulties related to expertise mobility

Peer review system

- Implemented through regional workshop
- More realistic to have it on cross country basis (Not enough of expertise)

Addressing some of the key problems

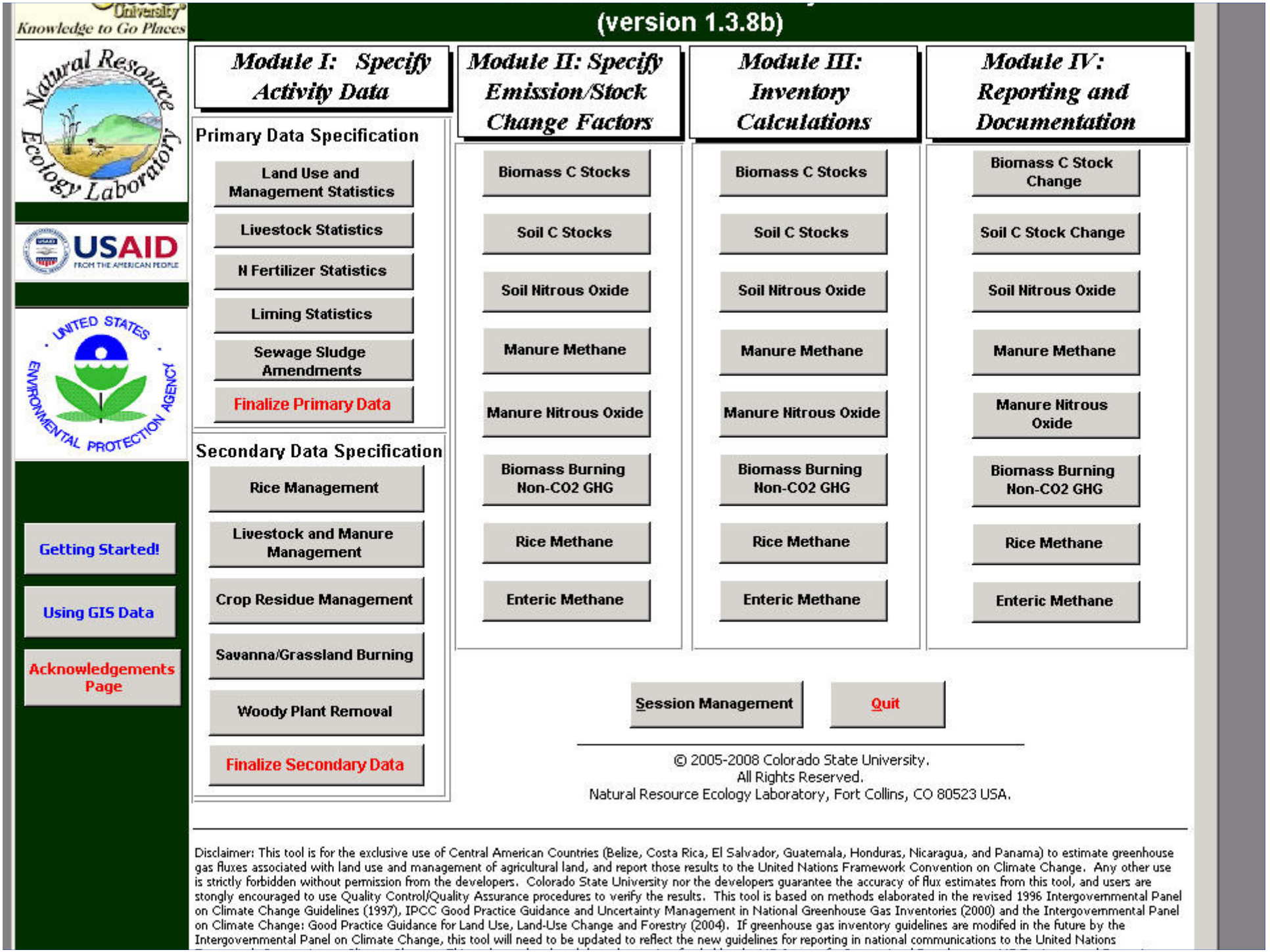
- Institutional arrangement at national level for data collection
- Capacity building at different levels
- Harmonization of data collection
- Involvement of technical departments at country level

Inventory management

- Information system in many countries
- Information technology widely spread (archiving & storage)
- UNFCCC software, ALU (EPA)

QA/QC

becoming present in inventories


Knowledge to Go Places
(version 1.3.8b)
Module I: Specify Activity Data
Module II: Specify Emission/Stock Change Factors
Module III: Inventory Calculations
Module IV: Reporting and Documentation
Primary Data Specification
Land Use and Management Statistics
Livestock Statistics
N Fertilizer Statistics
Liming Statistics
Sewage Sludge Amendments
Finalize Primary Data
Secondary Data Specification
Rice Management
Livestock and Manure Management
Crop Residue Management
Savanna/Grassland Burning
Woody Plant Removal
Finalize Secondary Data
Biomass C Stocks
Soil C Stocks
Soil Nitrous Oxide
Manure Methane
Manure Nitrous Oxide
Biomass Burning Non-CO2 GHG
Rice Methane
Enteric Methane
Biomass C Stocks
Soil C Stocks
Soil Nitrous Oxide
Manure Methane
Manure Nitrous Oxide
Biomass Burning Non-CO2 GHG
Rice Methane
Enteric Methane
Biomass C Stock Change
Soil C Stock Change
Soil Nitrous Oxide
Manure Methane
Manure Nitrous Oxide
Biomass Burning Non-CO2 GHG
Rice Methane
Enteric Methane
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Natural Resource Ecology Laboratory, Fort Collins, CO 80523 USA.
Disclaimer: This tool is for the exclusive use of Central American Countries (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama) to estimate greenhouse gas fluxes associated with land use and management of agricultural land, and report those results to the United Nations Framework Convention on Climate Change. Any other use is strictly forbidden without permission from the developers. Colorado State University nor the developers guarantee the accuracy of flux estimates from this tool, and users are stongly encouraged to use Quality Control/Quality Assurance procedures to verify the results. This tool is based on methods elaborated in the revised 1996 Intergovernmental Panel on Climate Change Guidelines (1997), IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (2000) and the Intergovernmental Panel on Climate Change: Good Practice Guidance for Land Use, Land-Use Change and Forestry (2004). If greenhouse gas inventory guidelines are modifed in the future by the Intergovernmental Panel on Climate Change, this tool will need to be updated to reflect the new guidelines for reporting in national communications to the United Nations

Problems identified by countries

- Most values used in INC are default values from IPCC
- Predominance of Informal sector
- Most data are estimated from old surveys
- Inconsistencies and lack of coherence in data provided by different sources
- Gaps for some years
- Some data don’t have national coverage
- Lack of forest survey

Problems identified by countries

- Data Format, data are not directly usable for GHGI (crop residue)
- Seasonal migration of animals
- Biomass estimate
- Fraction of total savanna area burnt annually
- Combustion ratio
- Height diameter measurement

Improvement through the Regional Project

- Different studies (Manual of procedures)

- Using tier 2 for enteric fermentation

Non lactating cows emit more than lactating cows (opposite to IPCCC default factors)

- Carbon content of plants of 0.40

- From 151 samples of wood an average of : 0,7 tons/m3 (SIEF, PROGEDE, 2002)

Grain / Straw ratio

Millet =0.35 average Bambey

F. Ganry et L. Cisse dans Bilan hydrique agricole et sécheresse en Afrique tropicale
De François-Noël Reyniers, Laomaibao Netoyo Ed John Libbey Eurotext, Paris 1994 p. 262-272

Rice =1 for non fertilized and 0.83 for fertilized rice

IRAT 1968 : Un type d'aliment du bétail trop négligé en zone tropicale : les sous produits de récolte
C. Agr. Pr. Pays Chauds 1968 -1. Cultures fourragères p. 75-82.

Nitrogen content of cattle manure from different locations in the Sudan Savanna Zone of Ghana

Source: Soil Research Institute – CSIR (1999)

Location	Nitrogen Content (%)
Baku - East	1.45
Baku - West	1.12
Bolgatanga	1.30
Bongo	1.53
Kasena-Nankana	1.32
Builsa	1.33
Mean	**1.34**
CVC (%)	**28**

Résultats (en % de la biomasse sèche) des analyses (C) effectuées sur les différents compartiments des 4 principales espèces (Kaire, 2006)

Espèce	Compartiment	Etat	C%	N%
Combretum geitonophyllum	Feuilles	Biomasse sèche	40	1.18
Combretum geitonophyllum	Rameaux	Biomasse sèche	40	0.32
Combretum geitonophyllum	Tiges	Biomasse sèche	39	0.16
Combretum glutinosum	Feuilles	Biomasse sèche	38	1.48
Combretum glutinosum	Rameaux	Biomasse sèche	38	0.29
Combretum glutinosum	Tiges	Biomasse sèche	40	0.45
Terminalia macroptera	Feuilles	Biomasse sèche	38	1.15
Terminalia macroptera	Rameaux	Biomasse sèche	40	0.18
Terminalia macroptera	Tiges	Biomasse sèche	38	0.16
Piliostigma thonningii	Feuilles	Biomasse sèche	40	1.55
Piliostigma thonningii	Rameaux	Biomasse sèche	39	0.37
Piliostigma thonningii	Tiges	Biomasse sèche	40	0.23

Carbon content of woody species can be obtained by multiplying woody carbon by 0.5 in the Sudanian sub zone and by 0.8 in the Sahalian sub zone.

(Breman, H., Kessler, J.J.,1995. Le rôle des ligneux dans les agro-écosystèmes des régions semi-arides)
(Caims et al., 1997. Root biomass allocation in the world's uplands forest, Oecologia 111, 1-11)

Addressing some of the key problems

- Use of satellite images, where feasible to improve LULUCF
- Development or adaptation of countries specific EF
- EF improvement through funding of regional research projects (i.e. burnt areas, methane from rice cultivation, quantity of nitrogen lost by denitrification)

Experience learned from the Regional Project

- It is easier to improve activity data
- Harmonization is necessary at national level
- Uncertainty from AD seems to be greater than those from EF
- Having a national unit in charge of GHG inventory is a good start for a sustainable inventory system.

Improvement needed

- conversion Coefficients
  - Carbon content of plants
  - C/N Ratio of plants
  - Aboveground biomass and belowground biomass
  - Annual growth rate of forests and savannas
  - Biomass Fraction burnt
  - Biomass Fraction oxidized


ESA

Savanna - Sudan