

# Component 3. Greenhouse Gas Inventory: Reporting for the Forest Sector

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# Outline

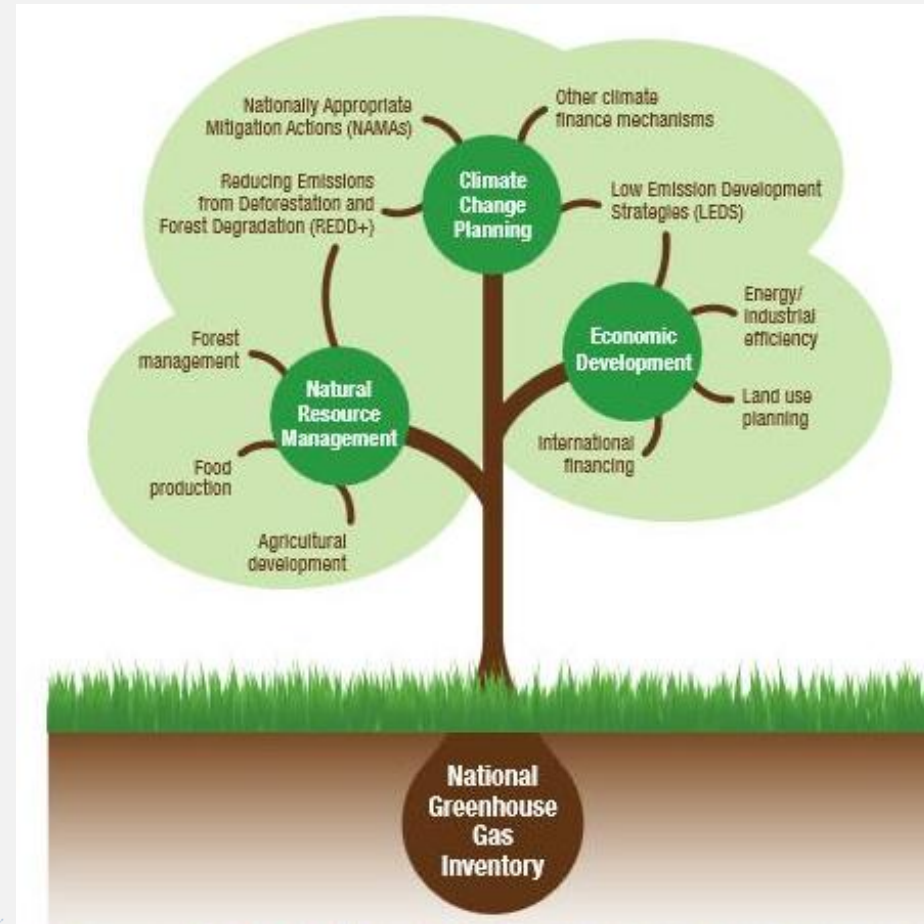
- Benefits/importance of the GHG inventory
- UNFCCC context for National Communications and Biennial Update Reports
- IPCC Methodology and Reporting Principles
- National GHG Inventory Systems
- Tools and Guidance for GHG inventory development



# Importance and Benefits of Developing a National GHG Inventory

## High quality GHG inventories:

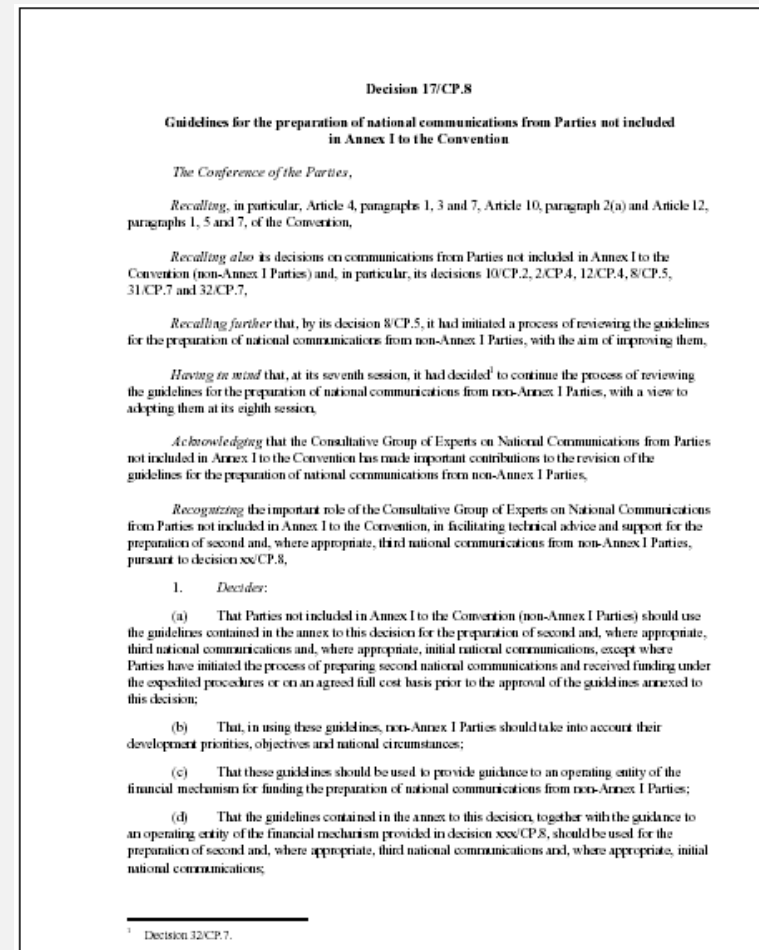
- are necessary to meet UNFCCC reporting requirements for National Communications and Biennial Update Reports
- are a valuable tool for developing policies and programs that address climate change and economic development
- help to identify strategies for improving a country's economy and managing natural resources
- **provide a foundation for MRV required for results-based climate finance**



Image, US EPA

# Decision 17/CP.8: The UNFCCC Basis for non-Annex I reporting

- Provides guidelines for Non-Annex I National Communications
  - scope of contents
- States that NAI countries should use 1996 IPCC Guidelines
- Encourages use of IPCC **Good Practice Guidance and Uncertainty Management** (2000 and 2003)





# What's included in the GHG inventory report?

- Estimates of anthropogenic emissions of CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O by sources and removals by sinks
- Information on methodologies used
- Information on the level of uncertainty associated with inventory data and their underlying assumptions, and description of uncertainty methodologies used
- Description of:
  - procedures and arrangements undertaken to collect and archive data for the preparation of national GHG inventories
  - efforts to make this a continuous process, including information on the role of the institutions involved

# Frequency of Reporting: Nat Comms and Biennial Update Reports (BURs)

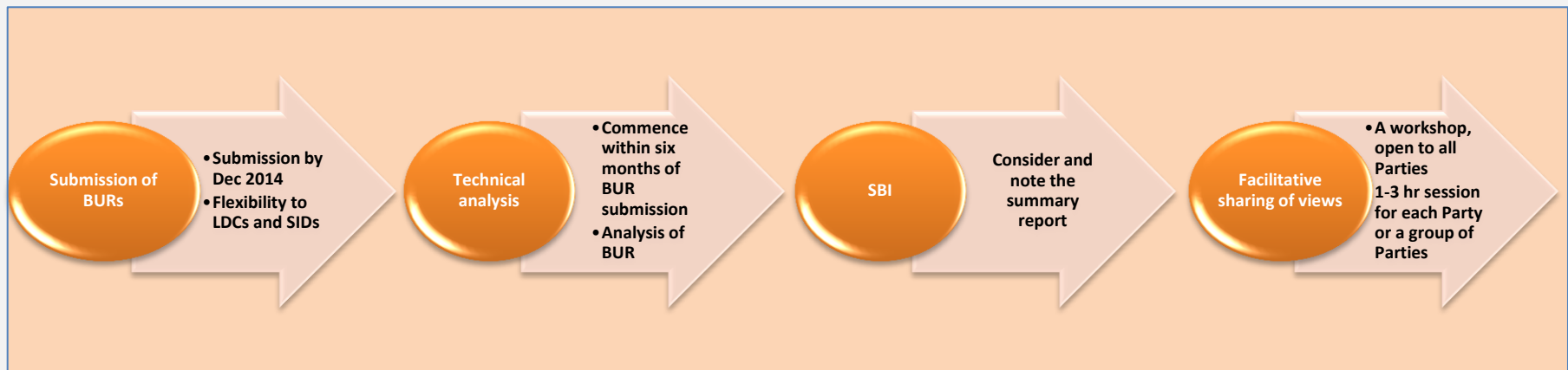
- By decision 1/CP.16, , the COP decided that non-Annex Parties should submit their national communications **every 4 years**.
- In the Durban outcome, it was further decided that NA-I Parties would submit BURs **every 2 years**
- The BUR serves as a summary of parts of the National Communication or interim report between NC submissions
- A BUR includes (but is not limited to):
  - **National inventory of GHG emissions and sinks**
  - Information on mitigation actions and their effects
  - Information on domestic MRV
- The first BURs are due by December 2014
  - Flexibility based on capabilities and level of support



# International Consultation and Analysis (ICA)

- Modalities and guidelines for the ICA (two-step approach) also agreed in Durban

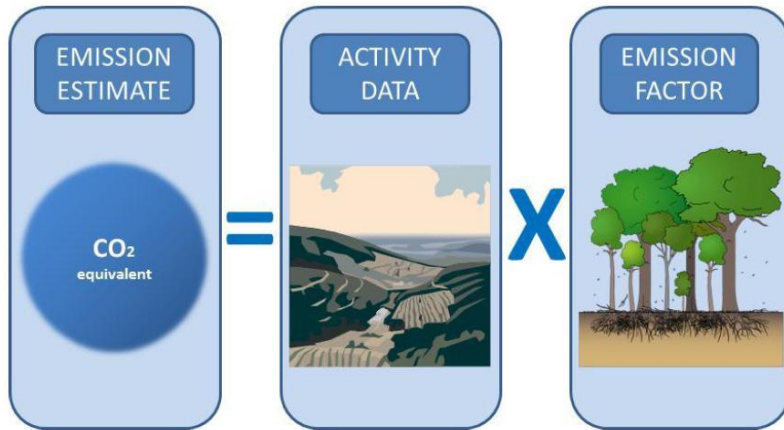
1. Technical analysis of BURs by a technical team of experts
2. Facilitative sharing of views



Image, UNFCCC



# GHG Inventory Estimation for the LULUCF Sector

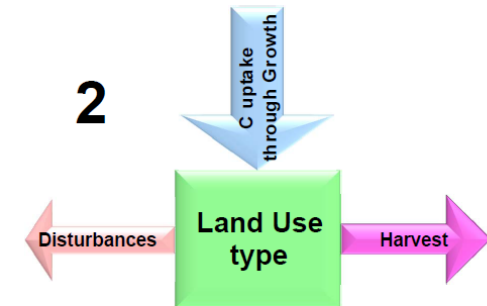


1



Difference between carbon stocks (Stock-Difference Method)

2



Sum of gains and losses (Gain-Loss Method)





# Sample UNFCCC Reporting Table: Forest and Grassland Conversion



Empowered lives.  
Resilient nations.

MODULE		LAND-USE CHANGE AND FORESTRY				
SUBMODULE		FOREST AND GRASSLAND CONVERSION - CO <sub>2</sub> FROM BIOMASS				
WORKSHEET		5-2				
SHEET		1 OF 5 BIOMASS CLEARED				
<b>STEP I</b>						
Vegetation types		A	B	C	D	E
		Area Converted Annually  (kha)	Biomass Before Conversion  (t dm/ha)	Biomass After Conversion  (t dm/ha)	Net Change in Biomass Density  (t dm/ha)  D = (B - C)	Annual Loss of Biomass  (kt dm)  E = (A x D)
Tropical	Wet/Very Moist					
	Moist, short dry season					
	Moist, long dry season					
	Dry					
	Montane Moist					
	Montane Dry					
Tropical Savanna/Grasslands						
Temperate	Coniferous					
	Broadleaf					
Grasslands						
Boreal	Mixed Broadleaf/ Coniferous					
	Coniferous					
	Forest-tundra					
Grasslands/Tundra						
Other						
<b>Subtotals</b>						

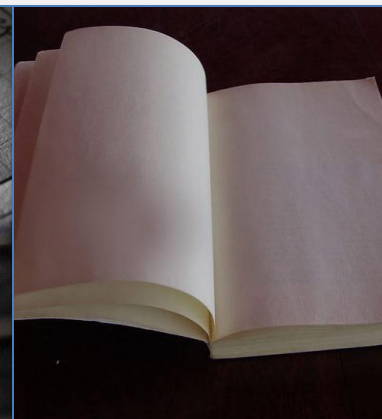
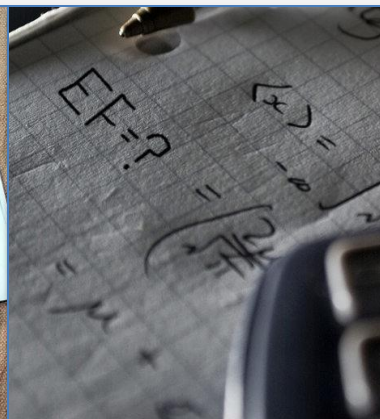
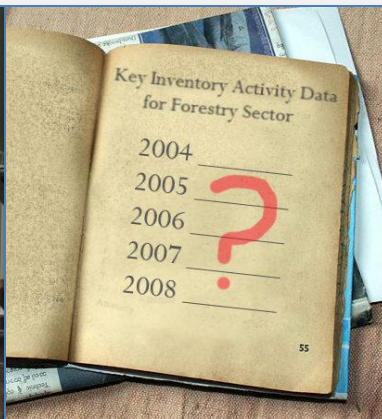
A		B		C		D	E	F	G	H	I	J	K	L	M	N
1		<b>TABLE NIR 1. SUMMARY TABLE</b>														
2		<b>Activity coverage and other information relating to activities under Article 3.3 and elected activities under Article 3.4</b>														
3																
4																
5		<b>Change in carbon pool reported<sup>(1)</sup></b>					<b>Greenhouse gas sources reported<sup>(2)</sup></b>									
6		Activity	Above-ground biomass	Below-ground biomass	Litter	Dead wood	Soil	Fertilization <sup>(3)</sup>	Drainage of soils under forest management	Disturbance associated with land-use conversion to croplands	Liming	Biomass burning <sup>(4)</sup>				
								N <sub>2</sub> O				N <sub>2</sub> O	N <sub>2</sub> O	CO <sub>2</sub>	CO <sub>2</sub>	CH <sub>4</sub>
8		Article 3.3 activities	Afforestation and Reforestation	R	R	R	R	R	NO			NO	IE	R	R	
9			Deforestation	R	R	R	R	R			NO	NO	NO	NO	NO	
11		Article 3.4 activities	Forest Management	R	R	R	R	NR	NO	NO		NO	IE	R	R	
12			Cropland Management	NA	NA	NA	NA	NA			NA	NA	NA	NA	NA	
13			Grazing Land Management	NA	NA	NA	NA	NA				NA	NA	NA	NA	
14			Revegetation	NA	NA	NA	NA	NA				NA	NA	NA	NA	
15		<sup>(1)</sup> Indicate R (reported), NR (not reported), IE (included elsewhere) or NO (not occurring), for each relevant activity under Article 3.3 or elected activity under Article 3.4.														
16		<sup>(2)</sup> Indicate R (reported), NE (not estimated), IE (included elsewhere) or NO (not occurring) for greenhouse gas sources reported, for each relevant activity under Article 3.3														
17		<sup>(3)</sup> N <sub>2</sub> O emissions from fertilization for Cropland Management, Grazing Land Management and Revegetation should be reported in the Agriculture sector. If a Party is not														
18		<sup>(4)</sup> If CO <sub>2</sub> emissions from biomass burning are not already included under changes in carbon stocks, they should be reported under biomass burning; this also includes the														
19																
20																
21		<b>Table NIR 1.1 Additional information</b>														
22		<b>Selection of parameters for defining "Forest" under the Kyoto Protocol</b>														



# GHG Inventory Reporting Principles: “TACC”

- **T**ransparency
  - Assumptions/methods are clear; inventory can be replicated
- **A**ccuracy
  - Reflect actual emissions and removals
- **C**onsistency
  - Differences in results reflect real emissions differences
- **C**ompleteness
  - All relevant sources, sinks and geographic areas
- **C**omparability
  - Methodologies and the reporting approach allows comparisons

# GHG Inventory Challenges faced by NA-I countries



**Small teams with limited resources and multiple responsibilities**

**Incomplete or non-existent activity data**

**Lack of country-specific emission and stock change factors**

**Insufficient documentation from previous inventories**

**Difficulty retaining expertise**

# What is a National Inventory System (NIS)?

*A national inventory system* incorporates all the elements necessary to:

- Estimate, report and archive GHG emissions and removals for energy, industrial processes, solvents, agriculture, LULUCF, waste

**Institutional  
arrangements**

**Legal  
arrangements**

**Procedural  
arrangements**

➤ **High quality GHG inventory that meets needs of policy-makers, researchers and public**



# What is a **Sustainable NIS**?

- Ability to develop **high quality inventory at regular intervals** (e.g., annually, every 2-4 years, etc)
  - Focus resources on most significant key sources
  - Sources of data: identify, appropriately archive and make regularly accessible
  - Continually improve emissions and removals estimates
  - Transparently document inventory process
    - an expert should be able to reproduce

**A complete and accurate inventory is the foundation for analysis of a range of energy and environmental issues, as well as MRV**



# An Effective NIS can streamline the three main phases of the inventory process

## 1. Inventory planning

- General rules of procedure
- Source-specific rules of procedure
- Workplan, budget, timeline
- Guidance manual
- Elaborating a QA/QC plan
- Inventory improvement strategy

## 2. Inventory preparation

- National inventory report
- Updated improvement strategy
- QA/QC

## 3. Inventory management

- Documentation
- Archiving
- Reporting to UNFCCC
- Awareness raising (national level)





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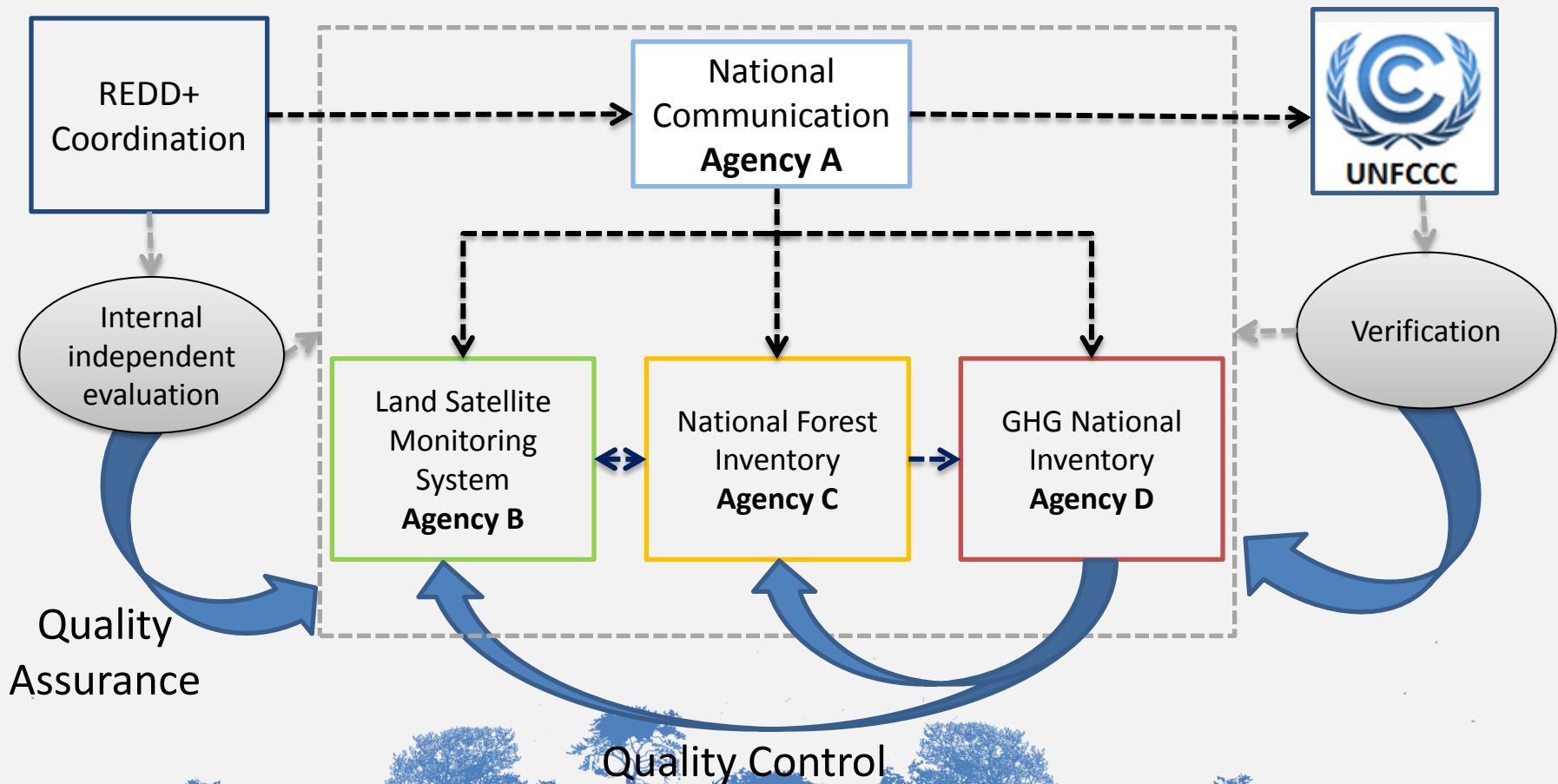
# Institutional Arrangements

- Consist of a set of formal arrangements (e.g., regulations, MoUs, etc.) that rules the flow of resources, data, information, among elements of the NIS

- Objectives:

1. To provide the financial and human resources as well as legal authority to ensure that NIS functions will be entirely and efficiently performed
2. To set up the framework of provisions which rule those functions

# Illustration of Institutional Arrangements



# Tools and Guidance for GHG inventory development

- UNFCCC NAI GHG inventory software
  - <http://unfccc.int/naiisapp>
- IPCC 2006 Software
  - <http://www.ipcc-nggip.iges.or.jp/software/index.html>
- Agriculture and Land Use (ALU) Tool
  - <http://www.nrel.colostate.edu/projects/ALUsoftware/>
- Consultative Group of Experts (CGE) Training Materials
  - [http://unfccc.int/national\\_reports/non-annex\\_i\\_natcom/training\\_material/methodological\\_documents/items/349.php](http://unfccc.int/national_reports/non-annex_i_natcom/training_material/methodological_documents/items/349.php)
- Handbook: Managing the National GHG Inventory Process (UNDP-GEF, 2005)
  - <http://ncsp.undp.org/document/managing-national-greenhouse-gas-inventory-process>
- US EPA Template Workbook: Developing a National GHG Inventory System
  - [www.epa.gov/climatechange/Downloads/EPAactivities/Complete-Template-Workbook.doc](http://www.epa.gov/climatechange/Downloads/EPAactivities/Complete-Template-Workbook.doc)

**ALU Inventory Software**



STEP 1					
	A	B	C	D	E
	Area Converted Annually (kha)	Biomass Before Conversion (t dm/ha)	Biomass After Conversion (t dm/ha)	Net Change in Biomass Density (t dm/ha)	Annual Loss of Biomass (kt dm)
Tropical Moist, Short Dry Season	1717.219	20	8	12	20606.628
Tropical Moist, Short Dry Season	10.191	5	0	5	50.955
<b>Subtotals</b>	<b>1727.41</b>				<b>20657.583</b>

*Generates detailed reports*

*Land Use  
Cover Soils  
and Climate*

*National  
Agriculture  
and Forestry  
Statistics*

*IPCC  
Defaults  
or Country-  
Specific*



# Example: ALU Tool

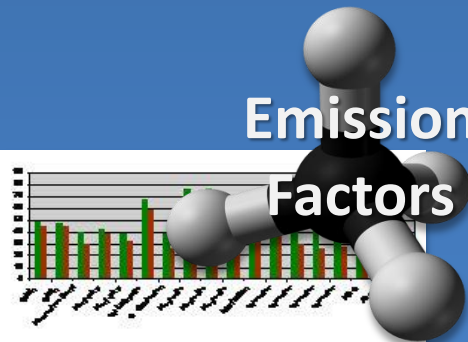
**Geographic  
Information  
Systems**



**Management  
Activity Data**



**Emission  
Factors**





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# Concluding Remarks

- In addition to UNFCCC commitments, a greenhouse gas (GHG) inventory can be a valuable tool for developing policies and programs that address climate change and economic development
- GHG inventories provide a foundation for MRV for results-based finance
- Results can be achieved using different strategies, methodological approaches, and tools
- National inventory systems are foundation for complete and rigorous inventories
- Documentation and archiving are critical success factors for the sustainability of the system
- Inventory development is an iterative process – improving over time



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**THANK YOU FOR YOUR ATTENTION!**