

**CD - REDD II REGIONAL WORKSHOP – QUITO,
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BY

LAWRENCE KOTOE

**ENVIRONMENTAL PROTECTION AGENCY,
GHANA**

Introduction

- Ghana has prepared its national greenhouse gas inventory (GHGI) report under the second national communication.
- The GHGI report is one of the reporting elements established under Article 4, paragraph 1(a) and Article 12, paragraph 1(a), of the Convention, which provides for each Party to report national emissions and removals to the Conference of the Parties (COP).
- The current GHGI seeks to report GHG emissions by source and removal by sinks on five major sectors; namely: energy, industrial processes, agriculture, land use land use change and forestry and waste.
- The major gases covered include: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and perfluorocarbons.

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- Though Ghana is reporting on 2000 as the base year for the GHGI under the second national communication, recalculation has been implemented for the entire time series from 1990 up to 2000 and 2006 because of availability of new dataset and methods.

Institutional arrangement for the national system

- The GHGI system in Ghana defines the institutional set-up and procedures for legitimate data collection, collation, analysis and archiving of all relevant information as input into the inventory.
- The institutional set-up includes; stakeholder institutions (such as government agencies, private and third party entities), with assigned mandates and the channel for data exchange and management.

Current institutional arrangement for data acquisition and management of the GHGI

- The Environmental Protection Agency (EPA) under the Ministry of Environment and Science and Technology, is the Lead National Institution (LNI) coordinating all technical climate change activities including the GHGI.
- The energy resources and climate change unit is the responsible office coordinating the GHGI process.
- The EPA has a designated Environmental Application and Technology (ENAPT) Centre to coordinate the implementation of the Greenhouse Gas inventory activities, (including the preparation of the inventory estimates, key source analysis, QA/QC, uncertainty management, documentation and archiving the inventory report in Ghana.

- An ad-hoc national inventory team, comprising experts from the various inventory sectors (energy, industrial process, agriculture, LULUCF and waste) was setup at the centre.
- The working team members are drawn from the following institutions among many others
- The mandate of each working team is to conduct a complete inventory of GHG emissions by sources and removals by sink according to the IPCC guidelines and guidance.
- Each working team has a leader who makes sure that the task of each team is undertaken in accordance with the IPCC guidelines and guidance.

- Leaders of the various working groups for the sectors are tasked to: carry-out identification and sourcing of key inventory dataset; prepare inventory estimates with supporting documents, make important decisions such as determining the appropriate level of disaggregation for data collection, decide which variables may require collection of enhanced input data, maintain standard of work at the group level.
- In addition to their assigned roles, experts from whose institution's data will be obtained are given additional roles to facilitate the sourcing of the data in-house.

QA/QC PROCEDURES

- Final GHG emission estimates, trends and key categories etc are presented to EPA for general QA/QC to be done.
- The QA/QC coordinators facilitate a two-layered review process to assess general correctness of the inventory-estimates, data choices, and emission factors and the consistency with IPCC guidelines and good practice guidance.

- The first layer of the QA/QC evaluation is an external review of the whole GHG by a third party in the country. The third party reviewers are selected from research and the academic institutions based on their requisite experience in the sector. Feedbacks from the first round of review are incorporated into the final estimates.
- International experts in GHGI undertake the second layer of the review if considered necessary. The review process is crucial to maintaining rigor and quality of the estimates, background assumptions and the methodologies used.
- The final GHGI is submitted to the Ministry of Environment Science and Technology (MEST) and to the UNDP for approval and incorporation into the national communication report

Overview of Ghana's Inventory preparation

- The preparation of the Ghanaian GHG emissions inventory is based on the application of the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, as elaborated by the IPCC good practice guidance.
- The compilation of the inventory is completed in four main stages:

- **Planning stage**

- Firstly, an inception workshop was organized for key national stakeholders to mainly undertake the following: raise awareness, solicit institutional support for the GHGI process, form various working teams, schedule tasks and responsibilities among working teams and discuss timelines for the GHGI.
- Secondly, the EPA organized a two-week technical training for the working teams on the Revised 1996 IPCC National Greenhouse Gas Inventories Guidelines and Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (IPCC, 2000, 2003).

- **Preparation stage**

- The preparation stage is central to the GHGI. The identification, reviews of data and its sources are implemented here. This is followed by data request, data collections and evaluation of all applicable source/sink categories. Quality control on activity data is embedded here to ensure early detection of errors.

- **Management stage**

- Activities embarked on at this stage are: documentation & archiving of all data, estimates, emission factors, methodologies and all reports used. QA/QC activities are also implemented here.

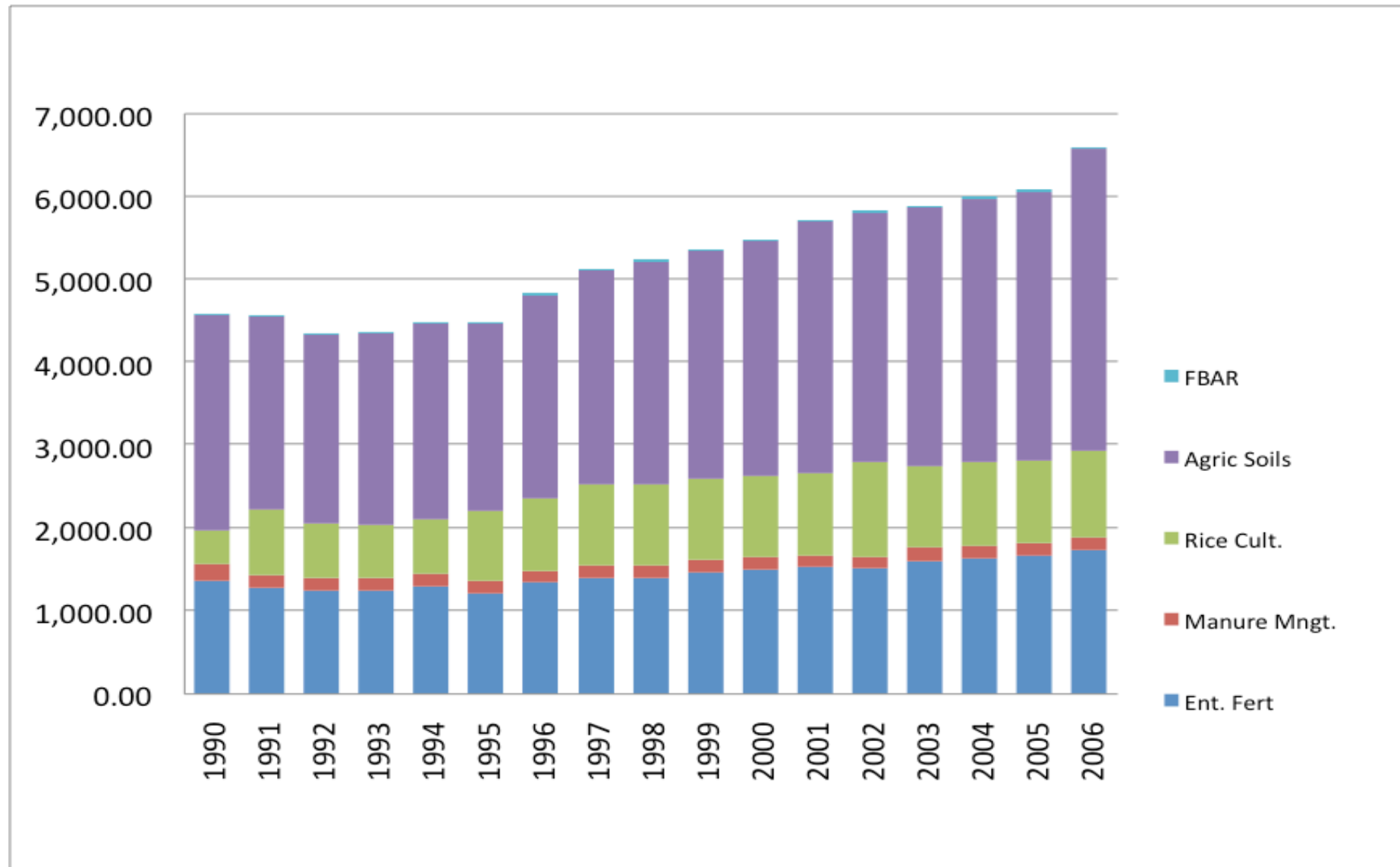
- **Compilation stage**

- This is the last stage of the inventory cycle and it involves the compilation of the GHGI report and further internal and external third-party review.
- Experts who were not directly involved in the GHGI process did the internal and external reviews. Review comments are incorporated before submission to the Ministry of Environment, Science and Technology and incorporation in the national communications.

Agriculture Sector (IPCC Sector 4)

- Sector Overview
 - In this sector, methane and nitrous oxide emissions from animal enteric fermentation (4.A), manure management (4.B), rice cultivation (4.C), agricultural soils (4.D) and field burning of agricultural residues (4.F) were estimated from 1990 to 2006.
 - Methane emissions are the largest greenhouse gas from the agricultural sector followed by nitrous oxide.
 - Total emissions from the agricultural sector increased steadily from nearly 4.5Mt CO₂ eq. in 1990 to 5.5 Mt CO₂ eq. in 2000 and slightly further to 6.6 8Mt CO₂ eq. in 2006.

Trends of total emissions by categories in the agriculture sector (Gg CO₂ eq.)



- Within the sector, the largest source of emissions comes from Agricultural soils throughout the time series. This is primarily due to the increases in the applications of artificial fertilizers for agricultural production and from pasture, rangelands and grazing.
- The next largest contributor of agricultural emissions comes from enteric fermentation of domestic livestock. The emission levels maintained a continuous but gradual increase from 1990 to 2006.
- This is followed by emissions from rice cultivation and manure management respectively and similarly increased marginally over the time series

Methodology, AD and EF

- IPCC tier 1 methodology was adopted for the estimation of emissions from the agriculture mainly due to lack of detailed activity data and emission factors.
- Activity data sources were mainly from Ghana and completed with data from FAO.
- In addition, emission factors used were mainly default from IPCC.

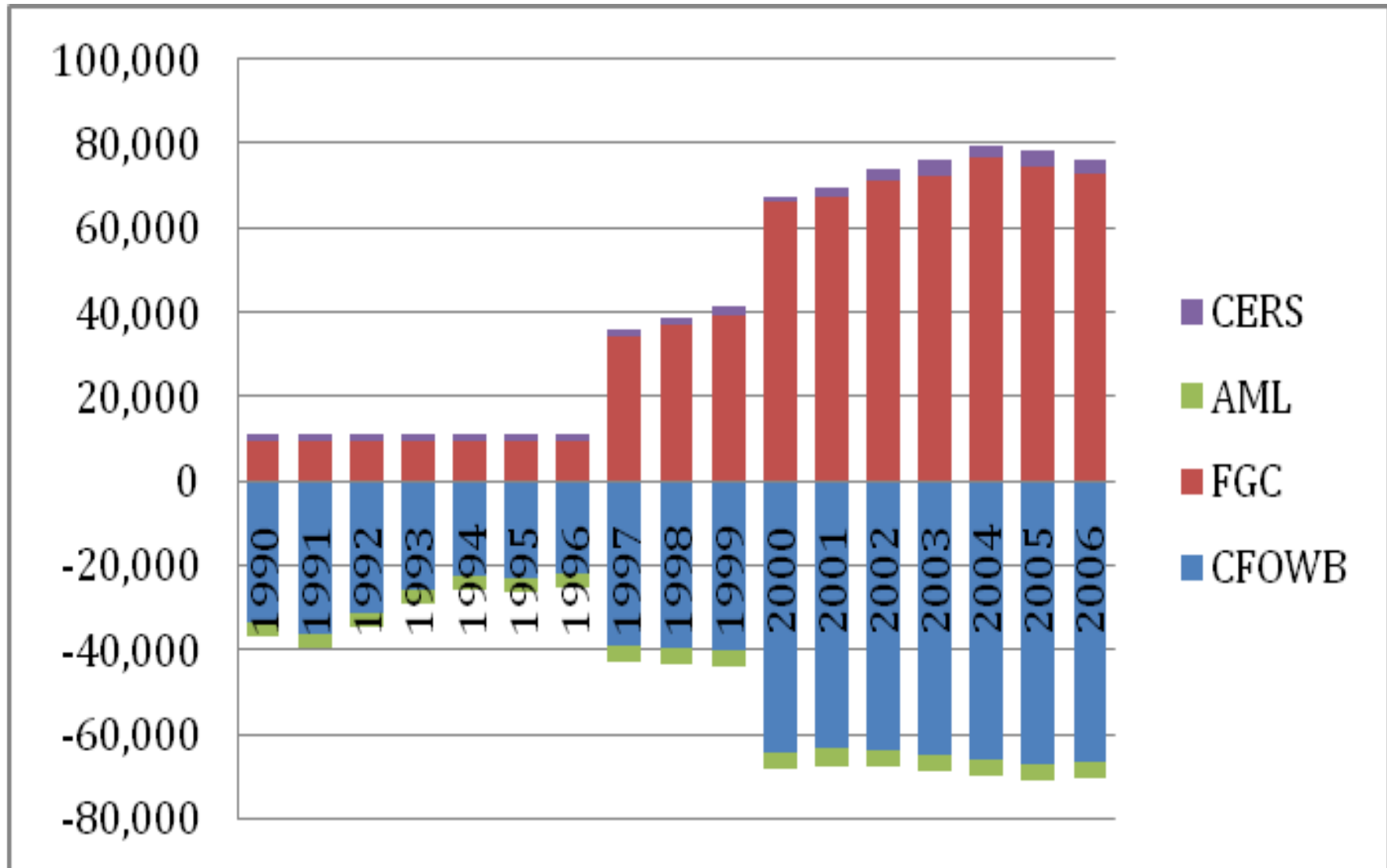
Planned Improvements

- The following areas in agricultural sector have been identified for near to long-term improvements:
 - Improving activity data coverage for production of pulses and consumption of synthetic Nitrogen fertilizer especially for transparency and completeness purposes.
 - In the long-term, develop and apply appropriate emission factors and higher tier methodology for key categories in the agricultural sector in order to reduce potential underestimation or overestimation.

Land Use Change and Forestry (IPCC Sector 5)

- Sector Overview
 - Between 1990 and 2000, net GHG removals from LULUCF decreased nearly by 96% from -26.1Mt CO₂eq to -1.04Mt CO₂eq.
 - It further decreased to 5.6Mt CO₂eq in 2006.
 - Net emissions from LULUCF constituted a sink from 1990 and steadily depleted to 7% in 2000.
 - After 2000, the sector contributed to emission sources, peak in 2004 and reduced marginally in 2005 and 2006.

Trends of total emissions by categories (Gg CO2 eq)



- Forest and grassland conversion through deforestation activities has been the major driver for the depletion of sinks and increases emissions in the sector.
- Some of the activities included: agricultural intensification predominantly in the middle deciduous areas, illegal logging, expansion of settlements, expansion of surface mining activities, regular field burning and policy failure.
- Though, the trends of contributing emissions from the sector increased from 2000, it is important to recognize that government and private sector plantation (managed areas) initiatives grossly impacted positively on the increases in the CO₂ removal capacity in Ghana.

Methodology, AD and EF

- In general, IPCC tier 1 methodology and emission or removal factors were used in the accounting of emissions in the LULUCF sector.
- However, there are some categories, particularly, forest and grassland conversion, where remote sensing methodologies were used for the retrieval of land cover units and the changes in them.
- Locally developed allometric equation especially for selected planted species (teak species) was also employed.
- Activity data were also retrieved from various local sources and completed with data from FAO.

Planned Improvements

- The following areas in the LULUCF sector have been identified for near to long-term improvements:
 - Improve activity data especially on forest and grassland conversion category (5B) from 1990 and 1997 to complete the recalculation. This will reduce potential underestimation or overestimation in removals/emissions
 - In the long-term, develop and apply appropriate emission or removal factors and higher tier methodology for key categories in LULUCF to reduce potential underestimation or overestimation and improve accuracy.

- Collect more country-specific data on lands under abandonment across the country and at also at eco-zones.
- Collect more data on non-forest trees especially avenue or village trees. In this inventory data on avenue trees are not captured.
- Develop or adopt appropriate methodology for estimating emissions from wetland including the potential methane emissions from the Akosombo dam. This is a potential source of underestimation.

THANK YOU