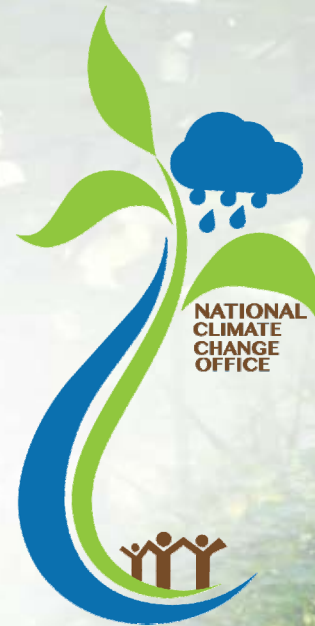


Belize's experience with the quality assurance of their national GHG inventories and benefits acquired

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Outline

- **Country Profile**
- **Brief History of GHG Inventories**
- **Stocktake of Most Recent GHG Inventory Management System**
- **UNFCCC QA Review of 3rd GHG Inventory**
- **Benefits of Enhanced QA Systems**
- **Conclusions and Way Forward**

Background

Geography:

- The national territory - 46,620 sq km (18,000 sq miles)
- Land area - 22,967 sq km (8,867 sq miles)
- Coastland- 280km
- Mainland - 95% of territory
- 1,060 small islands or Cayes - 5%

Climate: sub-tropical climate with two (2) distinct wet and dry seasons.

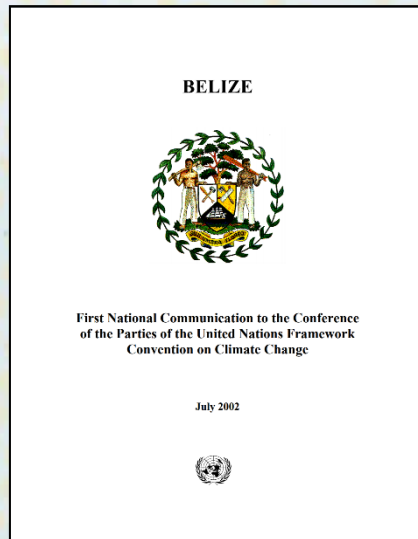
- Rainy season – June to November
- Dry season - November to May

Population profile: In 2017, there were approximately 374,681 persons living in Belize.

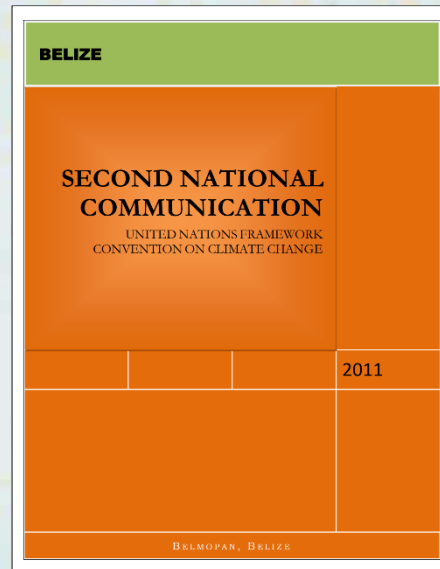
Economy: In 2017, Belize's GDP was BZE \$2,809.5 million dollars (USD \$1394.86 million). Two main sectors are the tourism and agriculture. The agriculture sector is driven by sugar, citrus and bananas contributing the most in that order. The tertiary industry is made up of several services within Tourism industry.



Background: Belize's GHG Inventories

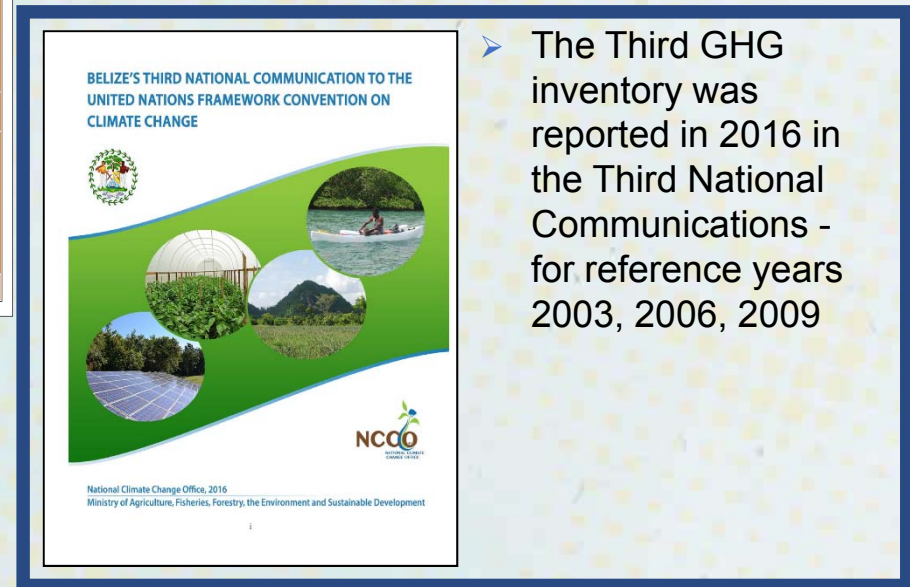


The First GHG inventory was presented in Belize's First National Communication in 2002 which reflected emissions by sources and removals by sinks for year 1994



- The Second GHG inventory was reported in the Second National Communications in 2011 for reference years 1997 and 2000 (GHG emissions for 1994 were re-calculated)

Note: GHG Chapters of these reports were all done through independent consultancies



- The Third GHG inventory was reported in 2016 in the Third National Communications - for reference years 2003, 2006, 2009

Stocktaking of existing structures and conditions for GHG Inventory

- **Before undertaking 4th National GHG Inventory, it was necessary to make substantial steps towards institutionalization of GHG Inventory Management System**
- **Increase Technical Staff and build capacity within entity responsible for climate change reporting (adaptation, mitigation, ghg coordinator, REDD+ Unit) (2017-2018)**
- **Engage UNFCCC to undertake a Quality Assurance exercise of Third National GHG Inventory (April 2018)**

Challenges of Current GHGI Management System

Data acquisition issues

- non-compatibility of data formats
- lack of metadata
- missing data
- data errors and inaccuracies
- data restriction and treatment of confidential data

Data update:

- who, when, what and how is not clear
- sharing network
- lack of priority to update

Methodological issues–

- no standardized QA/QC protocols
- application of generic approaches to address sector-specific problems,
- use of expert judgment in filling data gaps,
- use of tier 1 or default emission factors for all categories.

Process related issues–

- Limited understanding of IPCC Guidelines,
- No focus on QA/QC
- No defined roles for national experts and data providers

Quality Assurance of Belize's 3rd GHG Inventory by UNFCCC

- 1st of its kind in the Region, 2nd in the world
- Major Milestone towards improving QA/QC of Inventory
- 1 week workshop that generated a list of Urgent and Medium Term Recommendations
- Basis of Belize's Inventory Improvement Plan



Ref to Consolidated worksheet	Detailed review element	Question	Elaboration/clarification	Findings/recommendations
8.4.1 (2) 1) ① Livestock population characterization	Methodology	If an enhanced characterization is used, is there an expected relationship between digestibility, feed intake and growth (e.g., low digestibility leads to lower feed intake and reduced growth)? Is the feed intake calculated based on the equations from 2006 IPCC guidelines and	The feed intake is an important factor to calculate GHG emissions from this source. The 2006 IPCC guidelines and GPG provide the equations to calculate the feed intake.	The feed intake has not been calculated by the country due to Tier 1 methodology applied from the Revised 1996 Guidelines.
		What AD has been used? National statistics or other?	It is desirable to use national statistics. The Reviewer must check the features of the AD data (e.g. whether seasonal births and slaughters are included or excluded, or three years averages are used). If necessary, the Reviewer can compare AD data and FAO statistics.	<u>The country is encouraged to use the enhanced</u>
		Have annual population statistics taken into account seasonal births or slaughters? Has migration of livestock within or between countries lead to double counting or under counting of animals?		National statistics have been used and the necessary features have been taken into account. <u>The country should provide the information on how the features of AD (e.g. whether seasonal births and slaughters are included or excluded, or three years averages are used) have been taken into account by SiB (Statistics Institute Belize) in the next submission.</u>
8.4.1 (2) 1) ② Tier 2 method of Enteric fermentation	Emission factor	If a country-specific EF is used, are the data developed through the livestock characterization used for developing the EF?	The EF of Tier2 method must be consistent with the livestock characterization.	NA. The country used Tier 1 from Rev. 1996 Guidelines. <u>The issue will be solved when using 2006 GLs.</u>
8.4.1 (2) 1) ③ Manure management system	Activity data	Is the information on distribution of manure management systems based on statistics or other information? Is the distribution periodically updated to reflect changing practices?	The Party needs to use the country specific manure management system data affecting national circumstances based on statistics or other reliable sources.	The limited national statistics have been used. <u>The country should put effort to collect the complete AD through the census planned in 2018.</u>
8.4.1 (2) 1) ④ Other (manure management)	Indirect N ₂ O emissions	Has the Party reported indirect N ₂ O emissions from volatilization of NH ₃ and NO _x and from leaching/runoff during manure management?	Indirect N ₂ O emissions from volatilization and leaching/runoff are new categories in the 2006 IPCC Guidelines. If the party use 2006 IPCC Guidelines, these categories must be reported. If the Party does not report these categories, the reason must be provided.	<u>The country should provide the information on how indirect N₂O emissions have been calculated while using 2006 IPCC Guidelines or why not.</u>
		If indirect emissions are estimated, are these emissions included in the national total?	Indirect N ₂ O emissions from agriculture have to be included in the national total whereas those from other sources are not. There are two sources of indirect N ₂ O emissions in 3.D (agricultural soils), too.	
8.4.1 (2) 2) ① Conditions of rice cultivation	Methodology	Does the method used account for the various conditions of rice cultivation within a country?	Seasonal methane emissions are affected by variations in water management practices, organic fertilizer use, and soil type.	Yes. The area of rice production is quite limited. Two management regimes (irrigated and rainfed) and two sub-categories under the rainfed regime (flooded and drought prone) have been identified by the country. <u>The country should provide the consistent classification used for the areas under rice cultivation during emission calculation and provide it in the submission document.</u>
	Emission factor	Are the EFs specific or default IPCC? Are country specific EFs based on recent research results within the country? Have scaling factors been used?	The following rice production characteristics should be considered in developing EFs: Regional differences in rice cropping practices, Multiple crops, Ecosystem type, Water management regime, Addition of organic amendments, and soil type.	Only default EFs used. The country could elaborate specific EFs once KCA will have been applied.
8.4.1 (2) 3) ① Completeness	Direct emissions	Are all sub-categories estimated?	The significant sources of anthropogenic nitrogen inputs resulting in direct N ₂ O emissions from agricultural soils in GPG are: a) application of synthetic fertilizers; b) application of animal manure; c) cultivation of nitrogen-fixing crops; d) incorporation of crop residues into soils; e) soil nitrogen mineralization due to cultivation of organic soils; and (f) other sources such as sewage sludge, which should be included if sufficient information is available.	The following sub-categories have been estimated: a) application of synthetic fertilizers; b) application of animal manure; c) cultivation of nitrogen-fixing crops; d) incorporation of crop residues into soils using Rev. 1996 Guidelines. The country should provide information on how the other sub-categories have been considered in its next submission.
			N ₂ O emissions from pasture, range and paddock manure are to be reported in the agricultural soil category.	Done. However paddock manure does not exist in the country. The country should provide the information on this matter in the next submission.
	Indirect emissions	Are all sub-categories estimated?	In the 2006 IPCC Guidelines, direct N ₂ O emissions from mineralization/immobilization associated with loss/gain of soil organic matter are added as new category.	The country should provide the information on how the direct N ₂ O emissions from mineralization/immobilization associated with loss/gain of soil organic matter have been considered/estimated while using 2006 IPCC Guidelines in the next submissions.
			The significant sources of anthropogenic nitrogen inputs resulting in indirect N ₂ O emissions from agricultural soils in GPG are: a) volatilization of NH ₃ and NO _x ; b) leaching/runoff.	The indirect emissions from agricultural soils have been estimated for the atmospheric deposition of NH ₃ , NO _x and leaching. The country should provide the information on how other significant sources of indirect emissions according to the 2006 IPCC Guidelines have been estimated/considered by the Party in its next submission.
8.4.1 (2) 3) ② Nitrogen cycle	Consistency		If the Party uses 2006 IPCC Guidelines and calculates direct N ₂ O emissions from mineralization/immobilization associated with loss/gain of soil organic matter, mineralized/immobilized N is the activity data of indirect N ₂ O emissions from leaching/runoff.	NA.
		Is the estimated loss of N from manure management systems in line with estimated nitrogen loss due to volatilisation of N ₂ O, NH ₃ and NO _x , and if reported, loss of N through leaching from manure management?	N of gasses volatilizing in manure management must be excluded.	This has not been done due to the use of Rev. 1996 Guidelines. <u>The country should consider the exclusion of N gases volatilizing in manure management while applying 2006 IPCC Guidelines.</u>

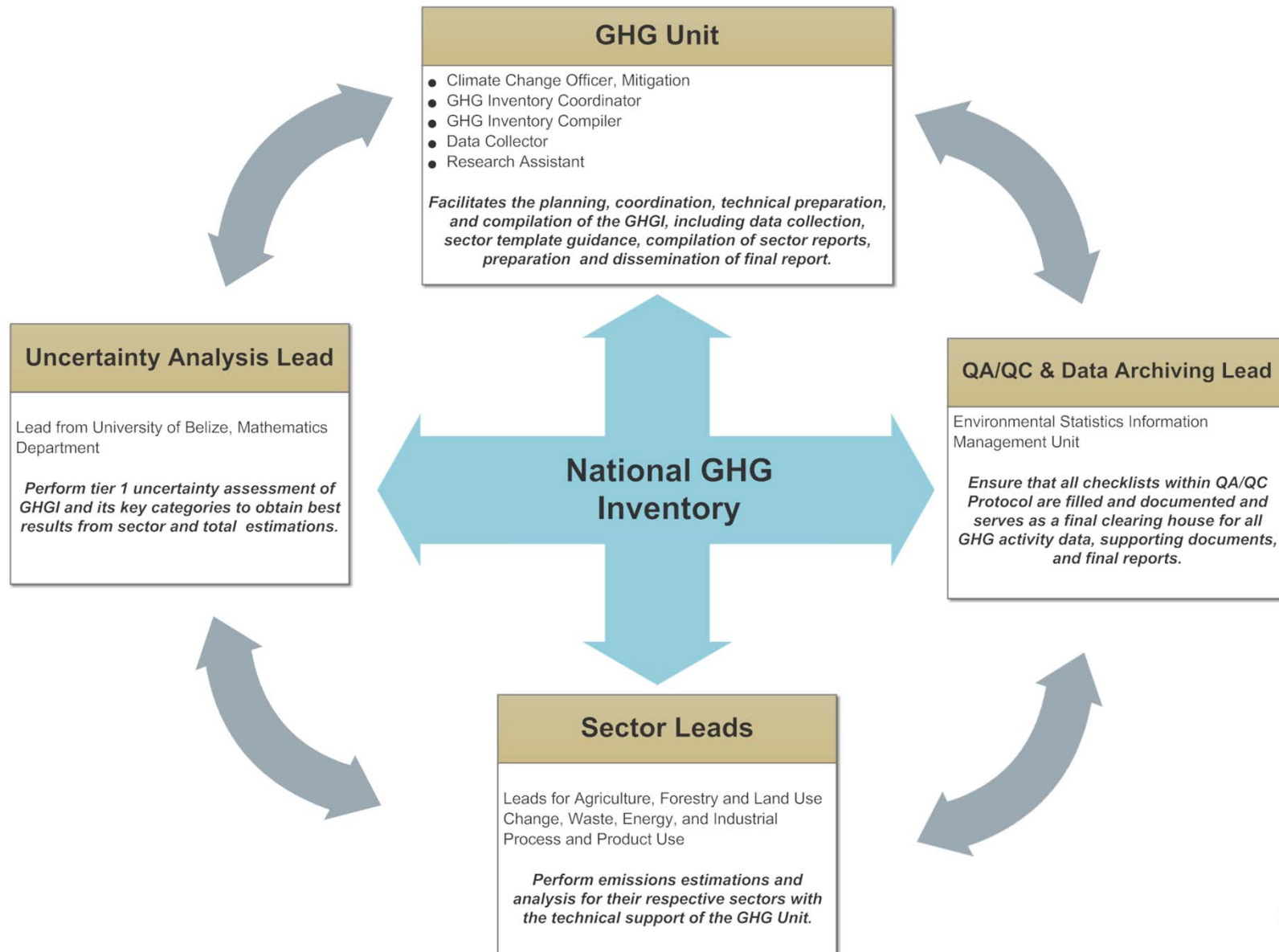
Activities undertaken to Enhance GHG Inventory Management Systems

- Further development of Institutional Arrangements for GHG Inventory Process
- Capacity Building in IPCC 2006 Guidelines to GHG Team, National Experts, Data Providers in GHG Inventory development
- Development of Inventory QA/QC Plan & Inventory Improvement Plan
- Stakeholder Analysis to identify technical & capacity needs
- Development of Data Management Procedures and Archiving Protocol

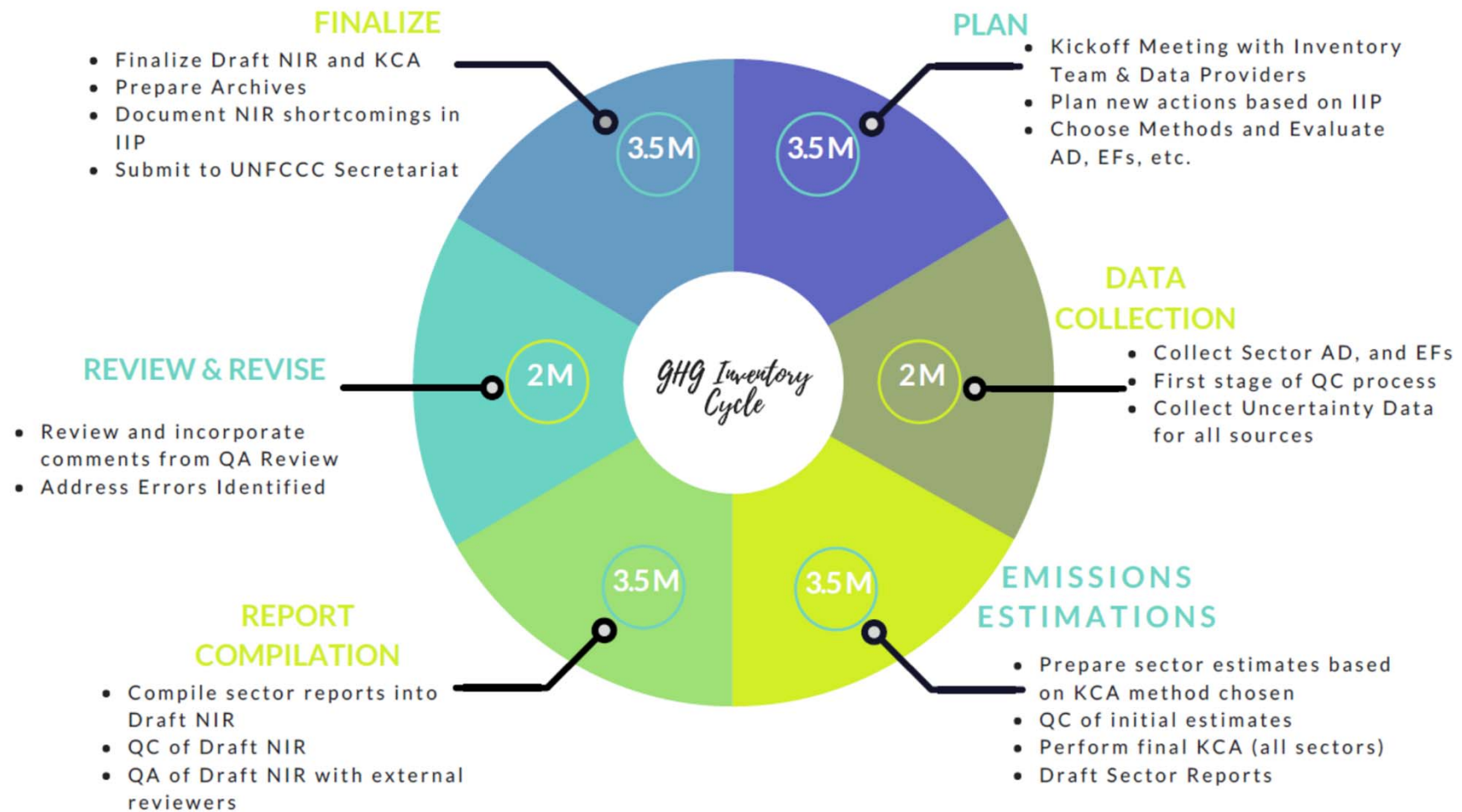
Institutional Arrangements for GHG Inventory Process

- **Roles & Responsibilities of all Team Members**
- **Identification of New Roles**
- **Timeline for Activities**

Modular Changes to Institutional Arrangements



GHG Inventory Cycle



Capacity Building in GHG Team and Data Providers – IPCC Online Training

28 Participants:

12 from GHGI Team

11 Data Providers (incl. private sector):

- PUMA Energy
- CPBL
- LIC
- BSI
- SIRD
- Customs & Excise Dept.
- BEL

1 sector expert

4 Academia



Greenhouse Gas Management Institute

GHGMI's IPCC Guidelines courses are a dynamic and resource-efficient means for ministry staff to develop the prerequisite knowledge for reporting under the UNFCCC and Paris Agreement.

These courses are designed to equip learners with the knowledge to succeed in reporting under the Paris Agreement.

501 IPCC: Introduction and Cross-Cutting Issues (pre-requisite)



8 Lessons & Quizzes + 1 Exam + Course Evaluation

511 IPCC: Energy

8 Lessons & Quizzes + 1 Exam + Course Evaluation

521 IPCC: Industrial processes and other product use

9 Lessons & Quizzes + 1 Exam + Course Evaluation

531 IPCC: Agriculture

7 Lessons & Quizzes + 1 Exam + Course Evaluation

541 IPCC: Forestry and other land uses

8 Lessons & Quizzes + 1 Exam + Course Evaluation

551 IPCC: Waste

6 Lessons & Quizzes + 1 Exam + Course Evaluation



GHG Inventory QA/QC Plan & Inventory Improvement Plan

- Describes the overall QA/QC system in place in Belize for the preparation of the GHG Inventory submission contained in the NC and the BUR.
- Entails procedures & activities to be performed by the various entities involved.
- Designed for use for inventory preparation, uncertainty analysis, and QC including sector team leads, data providers and those involved in the GHG Inventory calculations.

NIIP

- Presents actions Belize has identified to develop its national GHG inventory system with a view to improving the quality of the GHG Inventory submitted
- GHG Inventory development and improvement cycle in Belize
- Inventory planning, preparation and management cycle

Quality Assurance of 4th GHG Inventory May 2019



- **~50% Panelist participation from those who attended UNFCCC Peer Review**
- **Of Sector Expert Panelists, >70% have had interaction with IPCC Guidelines via formal training within the past year**
- **Generation of a highly technical recommendations and commentary during Peer Review of 4th National GHG Inventory**
- **Improvements made aligned with those made in UNFCCC External review**

Benefits of QA to GHG Inventory Management Systems

Direct

- **Clearly defined quality indicators to guide and track GHG Inventory Preparation (data acquisition to reporting)**
- **Improved confidence of GHG emission estimates**
- **Fosters a transparent process for national counterparts to both contribute and interact with National Estimates, and likewise benefit from what is reported**

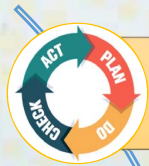
Indirect

- **Persistent stakeholder involvement in data collection, NIR/NC/BUR processes have led to enhanced cooperation in data provision, validation, etc.**
- **Increased understanding of TACCC principles, and quality requirements for Inventory Preparation**
- **Steady increase in capacity within state and non-state stakeholders in GHG Inventories, among other climate change related activities**

Summary

- the QA workshop was very helpful to detect/identify issues pertaining to key elements; eg: IA, TACCC, archiving, QA/QC, treatment of data
- the QA workshop has assisted the country to develop an improvement plan (NIIP) that incorporates the issues mentioned above, and a time line for their implementation. The improvement plan needs to be supported and implemented in order to improve future GHG inventories;
- the guiding principles of the QA criteria for review of GHG Management systems raise the bar for future reviews.

Conclusions and Way Forward



Institutionalize the GHG Inventory Process, and NC/BUR Process



Improve quality of activity data reported (integrate country specific data) – Tier 2 – Tier 3 Approach



REDD+ Activities and its own strategy and MRV component



Systematic involvement of stakeholders in Climate Change Activities (means of monitoring actions, progress, etc)



Build capacity within Government, Private Sector, NGO's, etc., NIR, V&A, Mitigation Actions



MRV Framework for Climate Change Activities



**NATIONAL
CLIMATE
CHANGE
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Thank You!

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Sustainable Development, Climate Change, Solid Waste**

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