



National Action Plan for Agriculture GHG Inventory Improvement

Trinidad and Tobago 2022



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National Action Plan for Agriculture GHG Inventory Improvement

Trinidad and Tobago 2022

Prepared by:

Greenhouse Gas Management Institute in collaboration with
the Trinidad & Tobago Environmental Management Authority
and the Ministry of Agriculture, Land and Fisheries
under the IICA GCF CARICOM AgREADY Project

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Acronyms

BUR	Biennial Update Report
CBIT	Capacity Building for Increased Transparency
CEC	Certificate of Environmental Clearance
CSO	Central Statistical Office
EMA	Environmental Management Authority
FAOSTAT	The Food and Agriculture Organization Corporate Statistical Database
GHG	Greenhouse Gas
IPPU	Agriculture and Industrial Processes and Product Use
KMS	Knowledge Management System
MEEI	Ministry of Energy and Energy Industries
MPD	Ministry of Planning and Development
MRV	Monitoring, Reporting and Verification
NC	National Communication
NDC	Nationally Determined Contribution
QA/QC	Quality Assurance/ Quality Control
UNDP	United Nations Development Programme

1. Introduction

The GCF-Readiness Project titled “Strengthening the foundation for a climate responsive agricultural sector in the Caribbean” (GCF CARICOM AgREADY, in short) is funded through a Grant Agreement with the Green Climate Fund (GCF) with The Ministry of Environment and Housing, The Bahamas as the lead National Designated Authority (NDA) and the Inter-American Institute of Cooperation on Agriculture (IICA) as the delivery partner.

The AgREADY project seeks to raise the profile of the agricultural sector in GCF’s climate financing prioritisation processes by positing an evidence-based and inter-sectoral argument that seats Caribbean agriculture as “low-emissions” and part of the solution for addressing climate change. The project logic is premised on a vision of developing “a climate responsive agricultural sector in the Caribbean that supports food security, livelihoods and uses natural resources sustainably” by addressing barriers of ineffective mechanisms and engagement with agricultural experts and stakeholders in GCF climate programming processes, policy gaps, and limited or fragmented data/information to inform climate risks planning, programming, and action in the sector.

The IICA-GCF Readiness Project targets nine countries (The Bahamas, Belize, Dominica, Haiti, St. Kitts and Nevis, St. Lucia, Saint Vincent and the Grenadines, Suriname, and Trinidad and Tobago) in the CARICOM sub-region, with specific activities related to the following objectives:

- To improve the enabling conditions to design, implement and evaluate options for enhanced climate action in the agricultural sector by strengthening policies, capacities, frameworks, methods and institutional arrangements for collecting, monitoring, measuring, reporting, verifying (MRV) and analysing agricultural and associated activity data from the sector.
- To increase the number of projects identified for development and investment in a pipeline of evidenced-based and bankable projects aligned with regional and national priorities as informed by climate risk assessments of the agriculture sector.
- To disseminate best practices for institutional capacity building, coordination, and pipeline development of more robust proposals for building climate-resilience along prioritised agricultural value chains, with a focus on cultivating the innovative capacity of the region’s youth.

2. Context

Trinidad and Tobago's national emissions largely result from the Energy and IPPU sectors. Agriculture sector emissions have not been included in the country's previous NDC commitment and were reported with some substantial gaps in the most recent national GHG inventory. There are plans, however, to include agriculture within the next economy wide NDC target and this is pushing actors within Trinidad and Tobago to increase MRV capacity within the agriculture sector and in responsible government departments.

The government of Trinidad and Tobago is currently undergoing a transition, with some key ministerial positions relating to the national GHG inventory coming under new leadership. The NDC goals and national GHG inventory could shift given the changes in leaders, and readers are advised to take particular care and check for more recent developments when referencing this report. This action plan is based upon the most up-to-date information available from published documents and interviews at the time of drafting.

3. Objectives and Methodology

The objective of this initiative was to develop a National Action Plan to improve the agriculture GHG inventory by:

- a) Assessing the status of the national agriculture GHG inventory
- b) Identifying areas for improvement
- c) Developing actions for taking the improvement plan forward
- d) Prioritizing the actions

A review of Trinidad and Tobago's latest available agriculture GHG inventory was completed to identify current institutional arrangements, data sources, data collection procedures, quality control and verification procedures, and tools utilised for inventory compilation. Any improvement plans suggested in the inventory reports or BURs and NCs were extracted and assessed. This information was used as a basis for discussions with national experts to determine what improvements are required to improve the agriculture GHG inventory compilation process in each country and improve agriculture emission estimates in the future. The synthesis of the results was framed in accordance with current situations of, and opportunities for, improving institutional arrangements, data sources, collection, quality control and verification procedures, and MRV and archiving.

4. Assessment of Current Status and Opportunities for Improvement

4.1 Institutional arrangements

4.1.1 Current situation

The Ministry of Planning and Development (MPD) has put together a Project Management team that is the coordinating entity for the national GHG inventory process. The MPD Project Management Team is supported by the Coordinating Entity Checklist, which provides guidance to develop a complete national GHG inventory.¹ The Environmental Management Authority (EMA) manages the National Climate Mitigation Measurement, Reporting, and Verification System (referred to as the “MRV System”) that structures the national GHG inventory process. A component of the MRV system, the Knowledge Management System (KMS) is used or envisioned to be used by government officials and non-government stakeholders to upload activity data and GHG emission calculations.² EMA acts as the compiler of the submitted materials to build the national GHG inventory and is working to increase capacity with staff completing Greenhouse Gas Management Institute’s diploma program in measurement, reporting, and verification.³

In the past, consultants were engaged to conduct the national GHG inventory. The consultant reported to a Steering Committee of stakeholders from the UNDP, academia, the Government, and sectoral experts, and the final draft inventory underwent QA/QC by an independent third party.⁴ Institutional structures are being strengthened and established as indicated by the improvement plans mentioned in Trinidad and Tobago’s First Biennial Update Report targeting capacity building within the MPD, EMA, and non-government sectoral experts.⁵ Although this work is underway, it is anticipated that consultants may continue to support the national GHG inventory process to support burgeoning internal capacities in subsequent inventory cycles.⁶

Unique to Trinidad and Tobago’s institutional arrangement throughout the region, is the engagement of non-government sectoral stakeholders who submit activity data and in some cases calculations as an integral component of building the GHG inventory. Although this is the current structure for gathering the data and compiling the national GHG inventory, the approach is still in development. The agriculture sector in particular presents challenges for this approach, given that large-scale agriculture is limited within Trinidad and Tobago and that small-scale farming stakeholders are not anticipated to be reached through this structure, due to the large amount of outreach and training that would be required.⁷ Local officers, from government agencies such as the Ministry of Agriculture, Land, and Fisheries provide support to both the CSO and stakeholders to gather and submit data for the national GHG inventory. In general, extension officers and other government officials that collect activity data employ extrapolation from their data collection and employ expert judgment to determine values for the sub-sector (e.g., livestock, agricultural soils).⁸ Further data is collected through the

1 Government of the Republic of Trinidad and Tobago, 2021. “First Biennial Update Report of the Republic of Trinidad and Tobago to the United Nations Framework Convention on Climate Change”. Ministry of Planning and Development, Multilateral Environmental Agreements Unit. <https://unfccc.int/documents/416010>

2 Government of the Republic of Trinidad and Tobago, 2021.

3 Sue-Ann Ramnarine (Environmental Management Authority), interview, July 6, 2022.

4 Government of the Republic of Trinidad and Tobago, 2021.

5 Government of the Republic of Trinidad and Tobago, 2021.; Ramnarine, 2022.

6 Ryan Deosoran (Consultant for Trinidad and Tobago), interview, March 18, 2022.

7 Deosoran, 2022.

8 Anjanie Logan and Asad Hosein (Ministry of Agriculture, Land, and Fisheries), interview, July 13, 2022.

Certificates of Environmental Clearance (CEC) of the Ministry of Agriculture, Land, and Fisheries, which are required for farming activities above specified thresholds (e.g., >250 poultry, >25 cattle, >other livestock) and are used to assess the occurrence of livestock activities.⁹

An ongoing CBIT project is developing a list of these “local officers” and assessing the gaps and providing recommendations to improve the institutional arrangements for MRV in the agriculture sector. One gap identified through an interview with Ryan Deosoran, a former QA/QC consultant that supported the most recent national GHG inventory, is that efforts to gather GHG inventory relevant data and perform calculations across government offices could be streamlined through enhanced coordination and collaboration.¹⁰ This finding was also confirmed by Sue Ann Ramnarine, a Technical Officer at the EMA, who was not aware of any government structures to support coordination and collaboration across government entities to conduct the GHG inventory process.¹¹

4.1.2 Opportunities for improvement

The institutional arrangements supporting the national GHG inventory process in Trinidad and Tobago can be improved and the Government is working to further institutionalize the GHG inventory structure. While government and non-government stakeholders may be familiar with the conceptual roles involved with the national GHG inventory, these roles and the entities responsible for fulfilling them would benefit from additional outreach and clarification.¹² Suggested improvements include clearer mapping of the GHG inventory process, as well as outreach that identifies stakeholder responsibilities and presents the flow of information between stakeholders, local government officers, and the EMA to constitute the national GHG inventory process. There is an opportunity to improve institutional arrangements within the agriculture sector through enhanced documentation. Outreach should be conducted to convey these documented roles to stakeholders to help clarify their roles and responsibilities in completing portions of the national GHG inventory. Multiple stakeholders identified the need for precise information regarding the type of data that is desired for collection to support the GHG inventory process.

It is challenging to rely upon non-government stakeholders to perform GHG emission calculations due to potential inconsistencies in approaches used, the need for training, and stakeholders’ limited available time. For these reasons, it is advised that non-government stakeholders be relied upon to provide activity data, and officials from the Ministry of Agriculture, Land, and Fisheries, the CSO, and other relevant local government entities be trained to receive activity data, evaluate emission calculations to reproduce results submitted by non-government stakeholders, and calculate GHG emissions. Trinidad and Tobago’s GHG inventory process is envisioned to develop in this way, and it is suggested that they continue down this path through capacity building efforts. Capacity-building should target these government officials, training them to perform GHG emission calculations effectively and input their calculations within the KMS. Familiarity with these roles, and training to fulfil the responsibilities of the roles, would help to realise the distributed structure of Trinidad and Tobago’s non-government-stakeholder-reliant GHG inventory process. It would also increase the accuracy and reliability of GHG emission calculations to have them conducted by trained EMA, MPD, and other government staff. However, due to high levels of turnover anticipated for these government officials, it is suggested that training efforts should continue on an ongoing basis and accompany any hiring that occurs.

⁹ Trinidad and Tobago, 2006.

¹⁰ Deosoran, 2022.

¹¹ Ramnarine, 2022.

¹² Deosoran, 2022.

The EMA is seeking to increase capacity by training staff through the GHG Management Institute diploma programs in measurement, reporting, and verification (MRV).¹³ This is an important step towards building capacity that will support the improvement of the national GHG inventory process. Additional staff within the EMA would support the goals for improved GHG inventory data and compilation.

Table 1 shows the suggested actions to improve the institutional arrangements for the agriculture sector’s GHG inventory compilation process.

Table 1: Potential actions to improve the institutional arrangements for the agriculture GHG inventory compilation process

Goal	Actions	Priority (L/M/H) [#]
Mapping of GHG inventory process	Conduct outreach to identify and uncover all stakeholders involved with GHG inventory process consulting with the Ministry of Agriculture, Land, and Fisheries, as well as the Central Statistical Office.	H
	Survey stakeholders to uncover their roles and responsibilities.	
	Identify the flow of information and define entities’ roles in the GHG inventory process by building a diagram or “map” that outlines the GHG inventory process that is made publicly accessible.	
	Consider improvements to the existing structure that supports the GHG inventory process and identify valuable areas for further education to enhance technical capacity. Include these areas for future growth within the publicly accessible document.	
Documented roles and responsibilities for the GHG inventory team	Based upon the inventory process mapping and with the input of GHG inventory process stakeholders, establish roles with specified responsibilities for GHG inventory entities.	M
	Build drafted roles and responsibilities into the publicly accessible GHG inventory process document.	
	Continue to engage in outreach to GHG inventory process stakeholders to present the roles and responsibilities.	
	Host workshops on a recurring basis to provide training to GHG inventory process stakeholders, accommodating turnover in stakeholders, that is specific to each formalised role (can include multiple workshops or breakout groups for stakeholders with the same or similar role(s)).	
Train EMA and other government staff to act as agriculture inventory compilation team	When hiring staff to EMA and other relevant government agencies (who will engage in the GHG Inventory process) include GHG inventory compilation within their job description and responsibilities, and provide technical GHG inventory training such as the GHG Management Institute diploma in MRV.	M-H
	Formally assign staff to the tasks of GHG inventory compilation for each sector.	
	Locate training to increase staff technical capacity to reliably receive GHG data, interact with the KMS, and provide high-quality GHG inventory compilation on an ongoing basis.	
	Develop a training program/schedule and have staff engage in training to build their technical capacity.	

[#]L = Low, M = Medium, H = High

¹³ Ramnarine, 2022.

4.2 Data sources and data collection procedures

4.2.1 Current situation

In 2019 a pilot program was launched to pioneer Trinidad and Tobago's GHG inventory process and use of the KMS to gather data from stakeholders. This involved a concerted effort by the Steering Committee, the MPD Project Management team, and hired consultants to identify activity data and activity data providers. The MPD assisted the consultant in outreach to request data from the identified providers through the pilot program although limited data was available for the agriculture sector, and the EMA was not engaged in this work.¹⁴ The activity data sets are archived by the MPD Project Management team within the KMS to be made available for future inventory reporting cycles.¹⁵ Coordination between these government entities was identified as a gap regarding the handling and sharing of data from this pilot program.

The CSO collects data used in the national GHG inventory process through the agricultural census. The last agricultural census was conducted in 2004.¹⁶ The CSO prioritises gathering information for the most relevant categories relating to livestock.¹⁷ Despite this, the First Biennial Update Report (BUR) 2021, identifies that cattle activity data relies upon the FAOSTAT database.¹⁸ The focus on livestock is expected to continue to be prioritised in subsequent inventories given the challenges associated with gathering information from small-scale farming stakeholders and the existing structure of CEC permitting and recordkeeping.

The priority emission sub-categories, in order, for Trinidad and Tobago are (1) indirect N₂O from managed soils, (2) enteric fermentation, and (3) biomass burning.

Table 2: Data sources for Trinidad and Tobago agriculture GHG Inventory activity data

Activity data	Data source
Livestock population numbers	
<i>Cattle</i>	FAOSTAT
<i>Buffalo</i>	FAOSTAT
<i>Sheep/Goats</i>	CSO
<i>Swine</i>	CSO
<i>Horses/mules/asses</i>	N/A
<i>Poultry</i>	FAOSTAT
Manure management data	FAOSTAT
Lime application	Insufficient data
Urea application	FAOSTAT
N fertiliser consumption	Not available
Crop residue data	FAOSTAT
Rice cultivation area and data	FAOSTAT

¹⁴ Ramnarine, 2022.

¹⁵ Government of the Republic of Trinidad and Tobago, 2021.

¹⁶ Central Statistical Office. 2022. Ministry of Planning and Development, Central Statistical Office of the Government of Trinidad and Tobago. Last accessed March 21, 2022. <https://cso.gov.tt/subjects/agriculture/>.

¹⁷ Deosoran, 2022.

¹⁸ Government of the Republic of Trinidad and Tobago, 2021.

Table 3: Categories included in the Trinidad and Tobago agriculture GHG inventory and the Tier level approach

Category	E/NE/NO	Tier 1/Tier 2
3A1 Enteric fermentation	E	Tier 1
3A2 Manure management CH ₄	E	Tier 1
3A2 Manure management N ₂ O	NE	
3C1 Biomass burning	E	Tier 1
3C3 Lime application (CO ₂)	NE	
3C3 Urea application (CO ₂)	E	Tier 1
3C4 Direct N ₂ O from managed soils	NE	
3C5 Indirect N ₂ O from managed soils	E*	Tier 1
3C6 Indirect N ₂ O from manure management	NE	
3C7 Rice cultivation	E	Tier 1

E = Estimated; NE = Not estimated; NO = Not occurring

*Indirect N₂O from managed soils is estimated in the First BUR (2021), however the values are not included in the total emissions for the GHG inventory, which indicates that there may be high uncertainty in the calculations.

4.2.2 Opportunities for improvement

One improvement identified by all interviewed stakeholders was the need for precise requests for data from GHG inventory stakeholders in language appropriate to farmers and landowners (e.g., “head of cattle”, not “CO₂e emissions”). This request builds upon the needs identified within the First BUR for additional training for stakeholders who are expected to report activity data through the KMS, especially the need to improve the formatting of submitted data.¹⁹ It is suggested that the KMS instructional manuals be enhanced to provide instruction for disaggregated emission categories to assist in implementing the 2006 IPCC guidelines.²⁰ This would help efforts to gather activity data, compile the GHG inventory, and build institutional memory.²¹ Training to present instructional manuals and the provision of technical assistance in their use should also be considered to improve the collection of activity data and ease the compilation of sub-sector emission sources.

Country-level activity data within the agriculture sector is gathered from stakeholders through the quarterly or bi-annual surveys by extension officers and the annual census process (although the census is less frequent in practice).²² Many categories of emissions within the national GHG inventory are not based upon national activity data because this information is not collected by the census. In some cases, activity data that could support the GHG inventory is collected but data collectors do not know where to submit their data or if their data was collected in the desired format or using appropriate methods.²³ The census could be revisited to ensure that national GHG inventory goals for activity data collection within the agriculture sector are represented effectively through the questions asked to stakeholders.²⁴ Furthermore, in practice, the census is not conducted at regular time intervals which represents a challenge to the accuracy of the national GHG inventory. Regular census and officer-collected data that specifically target the agricultural emission sources included in the national GHG inventory would improve the activity data and accuracy of emission calculations. Also, explicit identification of the methods that are acceptable to be used (e.g., extrapolation) and the format of specific types of data would help to clarify the uncertainty data collectors experience.

¹⁹ Government of the Republic of Trinidad and Tobago, 2021.

²⁰ Government of the Republic of Trinidad and Tobago, 2021.

²¹ Ramnarine, 2022.

²² Logan and Hosein, 2022.

²³ Logan and Hosein, 2022.

²⁴ Deosoran, 2022.

Table 4 shows the identified actions to improve the data sources and data collection procedures for the agricultural GHG inventory compilation process.

Table 4: Potential actions to improve the data sources and data collection procedures for the agriculture GHG inventory

Goal	Actions	Priority (L/M/H) [#]
Guidance documents on data collection requirements and procedures	Develop guidance to ensure data collection requirements, procedures, acceptable methods, and desired formats are recorded and shareable in a comprehensive document for use by agricultural stakeholders, hired consultants, and government staff.	H
Enhanced agriculture data collection process	Evaluate data flows within the agriculture sector for livestock farming/sale, nitrogen fertiliser purchasing/usage, crop production/sale, including for categories that would expand the scope of categories included and quantified through the agricultural GHG inventory.	M
	Identify opportunities where activities and corresponding transactions occurring in the above inventory categories are recorded electronically. Where transactions are not recorded electronically, identify workable solutions for gathering additional national-level data for activities that do not yet involve electronic records.	
	Work with the entities recording transactions within the agriculture sector to establish a practice of sharing electronically stored and non-electronically stored data to inform the GHG inventory.	
	Provide tablets to extension officers and other staff collecting data that could be beneficial to the GHG inventory to allow for digital collection of data which would reduce the risk of human error. Additionally, ensure that computers are available for the input of activity data, collected manually by extension officers, into the KMS.	
Streamlined data submission by agriculture GHG inventory stakeholders	Draft simple guidance and stepwise instructions for GHG inventory stakeholders to contribute agricultural data either directly to the KMS or to an intermediary staff member who can input the data to the KMS.	M
	Conduct outreach to GHG inventory stakeholders to educate on the procedures in place to ensure consistent and successful input of activity data.	
	Host workshops to provide training to GHG Inventory stakeholders to facilitate stakeholder technical capacity to interact with the KMS by submitting data (in the correct format and units).	
To collect census data every 5-10 years	Collaborate with the CSO staff that conduct the agricultural census to build new questions or make changes to existing questions to align the census with data desired for the GHG inventory.	H
	Ensure access to the census data (once collected) is shared with the EMA via the KMS by coordinating with the CSO.	
	Use the KMS to backup census data relevant to the GHG inventory to ensure data is backed up to the cloud.	

[#]L = Low, M = Medium, H = High

4.3 Quality control and verification procedures

4.3.1 Current situation

In the most recent inventory cycle, the consultant was tasked with performing a first QA/QC check of the inventory.²⁵ EMA provides another layer of quality control and assurance in their role as the compiler of the submitted materials to build the national GHG inventory. A QA/QC checklist is available for the EMA and lives on the KMS.²⁶ One notable gap is that no internal QC checks were identified by activity data providers, although to some degree national databases (e.g., the Ministry of Energy and Energy Industries (MEEI) bulletin reports) allowed QC to occur for some non-agriculture sector activity data.²⁷

There is a structure in place for external bodies (possibly academic reviewers) to provide further quality assurance and verification of the national GHG inventory, however, this structure is yet to be used as it awaits finalization and the approval of formal verification bodies.^{28,29} There is a QA/QC protocol and guidance document that identifies management roles and is intended to assist sector leads and those conducting QA/QC, and a template is provided to ensure the QA/QC is properly tracked in the MRV system.³⁰

4.3.2 Opportunities for improvement

The primary opportunity for improvement is the need for entities involved with the MRV system's quality control and verification procedures to gain practical experience applying the guidance and templates provided. These entities will gain experience by doing the work within the MRV system and more specifically within the KMS. This will be gained over time once the system is operating and provided stakeholders understand their roles. The Project Management team will need to initiate this process. Those entities performing QC and verification will likely need assistance to begin their activities and support as questions arise while conducting their work. These measures should be planned into the QC and verification activities.

Given that QC checks were not included in the activity data submitted by agriculture sector stakeholders, additional outreach and training are needed to ensure this information is included. Training needs regarding QC checks for submitted activity data naturally overlap with the training needs regarding stakeholders' roles and responsibilities, in addition to training aimed at improving the process for submitting activity data through the KMS. One training workshop could effectively cover these three related training objectives.

²⁵ Government of the Republic of Trinidad and Tobago, 2021.

²⁶ Ramnarine, 2022.

²⁷ Government of the Republic of Trinidad and Tobago, 2021.

²⁸ Deosoran, 2022.

²⁹ Ramnarine, 2022.

³⁰ Government of the Republic of Trinidad and Tobago, 2021.

Table 5 shows the identified actions to improve the quality assurance and quality control procedures for the agriculture GHG inventory compilation.

Table 5: Potential actions to improve the quality assurance and quality control for the agriculture GHG inventory compilation process

Goal	Actions	Priority (L/M/H) [#]
Formalise and document the procedure for GHG inventory QA/QC and verification	The QA/QC and verification process must be formally established either by policy, regulation, or internal EMA/MPD policy and practices. Resources should be provided to support a QA/QC coordinating entity and to fairly compensate QA/QC and complete the verification work.	M
Approve external entities to provide GHG inventory verification	For verification to occur, the process of approving external entities to provide verification must be defined. Either the verification bodies or the responsible entity for approving verification bodies should be defined by regulation or policy.	M
	The requirements for approval should be identified and made publicly available, and the process for assessing a prospective verifier's qualifications should similarly be made publicly available.	
	All approved verifiers should be listed on a government website, identified in the GHG inventory, granted appropriate access to the KMS, and must submit their work for archiving in the KMS to enhance transparency.	
Ensure there is support for entities conducting QA/QC	Identify GHG inventory experts available to provide support to QA/QC implementing entities.	M
	Hire(or assign the role to an existing entity, provided their workload is reduced to accommodate this additional responsibility) at least one GHG inventory expert (can be a consultant) familiar with the national MRV system who can: <ul style="list-style-type: none"> • - Provide support to QA/QC and verification implementers on an as-needed basis. • - Review a sample of the QA/QC and verification work and provide training to help the QA/QC and verification entities resolve any issues. 	
	Record common questions and challenging areas that arise through QA/QC and verification efforts and develop a frequently asked questions (FAQ) resource document as well as noting the areas to target for future technical training.	
Staff trained on agricultural data QC processes	Develop training materials to complement the template guidance and provide hands-on training to staff who will perform QC on the submitted agricultural GHG inventory data.	M
	If possible, utilise real-world data so that workshop / training activities can directly progress the GHG inventory effort.	

[#]L = Low, M = Medium, H = High

4.4 MRV and archiving

4.4.1 Current situation

The MRV system within Trinidad and Tobago is used to conduct the national GHG inventory and allows for MRV to occur throughout the process. It was designed to allow various stakeholders to upload activity data and complete compilation tasks via the KMS (a component of the MRV system).³¹ Templates for the MRV system guide stakeholders to input key information consistently. In most cases, experience with the KMS is limited.³² Two trainings in 2022 were held to familiarise GHG inventory stakeholders in Trinidad and stakeholders in Tobago with the KMS.³³ The First BUR identifies goals to provide capacity-building training to support stakeholders' familiarity with the functions of the MRV system and outreach to increase the use of the MRV system.³⁴

The archived activity data of past national GHG inventories from 2001 and 2013 was not available for the authors of the First BUR, which identifies a gap in archiving that should be addressed to improve the national GHG Inventory process over time.³⁵ A process document was developed in 2022 by the EMA to structure and standardise recordkeeping practices within the KMS.³⁶

4.4.2 Opportunities for improvement

Data archiving through the MRV system is evidently being clarified and improved through the EMA's efforts to develop a recordkeeping practices document. The KMS can function as a centralised data archiving system to improve future national GHG inventories, allow for auditing and external verification or review, and provide for the re-evaluation of past inventories. For this to happen the system needs to be used by sufficient stakeholders, data storage must be secure, and archival procedures documented in line with the recordkeeping practices document.

Data archiving makes it possible for GHG inventorying, typically described as a cycle, to build upon the previous iterations and improve over time. Centralised data storage through the KMS or other structures would support a national GHG inventory process by providing compilers with the previous activity data and calculations to build upon and can identify the type of information that was previously provided by an entity so that it can be requested in the current inventory cycle. Capacity building and training efforts with government and non-government stakeholders should target user interaction with the KMS system and standardised data archiving procedures. Additionally, for government inventory compilers at the EMA, instructions could be documented to access previous years' data.

The data archiving process, like the functionality of the KMS system, will need to provide varying levels of access to the diversity of stakeholders involved in Trinidad and Tobago's GHG inventory process (e.g., activity data supplier, GHG inventory compiler, QA reviewer, verifier, administrator). The stakeholders who are expected to provide inputs through the KMS need training (ideally in-person or virtual with screen share click-through of functionality) and support as they learn their identified roles and to assist in identifying errors through their initial interactions with the KMS.

Table 6 shows the identified actions to improve the quality assurance and quality control procedures for the agriculture GHG inventory compilation.

³¹ *Government of the Republic of Trinidad and Tobago, 2021.*

³² *Deosoran, 2022.*

³³ *Ramnarine, 2022.*

³⁴ *Government of the Republic of Trinidad and Tobago, 2021.*

³⁵ *Government of the Republic of Trinidad and Tobago, 2021.*

³⁶ *Ramnarine, 2022.*

Table 6: Potential actions to improve the MRV and archiving for the agriculture GHG inventory compilation process

Goal	Actions	Priority (L/M/H)*
Increase use of the KMS system amongst GHG inventory stakeholders	From the documented list of GHG inventory roles and responsibilities and the list of attendees from 2022's KMS-orientation workshops, identify the entities and other relevant GHG inventory stakeholders who will use the KMS system.	M-H
	Schedule (as needed) workshop(s) to provide training to the identified entities on an ongoing basis (annually or bi-annually)	
	Provide training to GHG inventory data suppliers, GHG inventory compilers, and QA/QC and verification entities to present the use of the KMS and introduce guidance materials on an ongoing basis to maintain capacity despite staff turnover amongst stakeholders.	
Standardise use of the KMS	Develop standardised guidance for each GHG inventory role and build these guides, and the recordkeeping document, to be what is presented through the trainings and workshops.	L

*L = Low, M = Medium, H = High

5. Overall action plan for improving Trinidad and Tobago's agriculture sector GHG inventory

Goal	Task	Responsibility	Priority (L/M/H) [†]	Timeline (S/M/L) [†]
Mapping of GHG Inventory Process	Conduct outreach to identify and uncover all stakeholders involved with GHG inventory process consulting with the Ministry of Agriculture, Land, and Fisheries, as well as the Central Statistical Office.	EMA (lead)/MALF/ Department of Agriculture (Tobago)/CSO	H-10	S
	Survey stakeholders to uncover their roles and responsibilities.	EMA/MALF/ Department of Agriculture (Tobago)/ Large Farmer Associations/ CSO/Relevant stakeholders based on outreach above	M-6	M
	Identify the flow of information and define entities' roles in the GHG inventory process by building a diagram or "map" that outlines the GHG inventory process that is made publicly accessible.	EMA in consultation with MALF, Department of Agriculture (Tobago) and other stakeholders identified in outreach	M-5	M
	Consider improvements to the existing structure that supports the GHG inventory process and identify valuable areas for further education to enhance technical capacity. Include these areas for future growth within the publicly accessible document.	EMA in consultation with MALF, Department of Agriculture (Tobago) and other stakeholders identified in outreach	L-3	L
Documented roles and responsibilities for the GHG inventory team	Based upon the inventory process mapping and with the input of GHG inventory process stakeholders, establish roles with specified responsibilities for GHG inventory entities.	EMA	M-5	M
	Build drafted roles and responsibilities into the publicly accessible GHG inventory process document.	EMA	M-4	M
	Continue to engage in outreach to GHG inventory process stakeholders to present the roles and responsibilities.	EMA in consultation with MALF, Department of Agriculture (Tobago) and other stakeholders identified in outreach	M-4	M
	Host workshops on a recurring basis to provide training to GHG inventory process stakeholders, accommodating turnover in stakeholders, that is specific to each formalised role (can include multiple workshops or breakout groups for stakeholders with the same or similar role(s)).	EMA (lead) with MALF, Department of Agriculture (Tobago) and other stakeholders identified in outreach	L-2	L
Train EMA and other government staff to act as agriculture inventory compilation team	When hiring staff to EMA and other relevant government agencies (who will engage in the GHG Inventory process) include GHG inventory compilation within their job description and responsibilities, and provide technical GHG inventory training such as the GHG Management Institute diploma in MRV.	EMA/MALF/ Department of Agriculture (Tobago)/ CSO/Other stakeholders identified in outreach	H-8	L
	Formally assign staff to the tasks of GHG inventory compilation for each sector.	EMA/MALF/ Department of Agriculture (Tobago)/ CSO/Other stakeholders identified in outreach	H-8	S
	Locate training to increase staff technical capacity to reliably receive GHG data, interact with the KMS, and provide high-quality GHG inventory compilation on an ongoing basis.	EMA/MPD	M-4	M-L
	Develop a training program/schedule and have staff engage in training to build their technical capacity.	EMA/MALF/ Department of Agriculture (Tobago)/ CSO/Other stakeholders identified in outreach	M-6	M-L
Guidance documents on data collection requirements and procedures	Develop guidance to ensure data collection requirements, procedures, acceptable methods, and desired formats are recorded and shareable in a comprehensive document for use by agricultural stakeholders, hired consultants, and government staff.	EMA	H-8	M

Goal	Task	Responsibility	Priority (L/M/H) [†]	Timeline (S/M/L) [†]
Enhanced agriculture data collection process	Evaluate data flows within the agriculture sector for livestock farming / sale, nitrogen fertiliser purchasing / usage, crop production / sale, including for categories that would expand the scope of categories included and quantified through the agricultural GHG inventory.	EMA in coordination with MALF & NAMDEVCO & Department of Agriculture (Tobago)	M-4	M-L
	Identify opportunities where activities and corresponding transactions occurring in the above inventory categories are recorded electronically. Where transactions are not recorded electronically identify workable solutions for gathering additional national-level data for activities that do not yet involve electronic records.	EMA / MALF / Department of Agriculture (Tobago) / Large Farmer Associations / CSO / Relevant stakeholders based on outreach above	M-6	M
	Work with the entities recording transactions within the agriculture sector to establish a practice of sharing electronically stored and non-electronically stored data to inform the GHG inventory.	EMA / MALF / Department of Agriculture (Tobago) / Large Farmer Associations / Relevant stakeholders based on outreach above	M-6	M
	Provide tablets to extension officers and other staff collecting data that could be beneficial to the GHG inventory to allow for digital collection of data which would reduce the risk of human error. Additionally, ensure that computers are available for the input of activity data, collected manually by extension officers, into the KMS.	MALF / Department of Agriculture (Tobago) / Stakeholders identified in outreach	M-6	S
Streamlined data submission by agriculture GHG inventory stakeholders	Draft simple guidance and stepwise instructions for GHG inventory stakeholders to contribute agricultural data either directly to the KMS or to an intermediary staff member who can input the data to the KMS.	EMA	M-6	M
	Conduct outreach to GHG inventory stakeholders to educate on the procedures in place to ensure consistent and successful input of activity data.	EMA	M-6	M
	Host workshops to provide training to GHG Inventory stakeholders to facilitate stakeholder technical capacity to interact with the KMS by submitting data (in the correct format and units).	EMA	M-5	M-L
To collect census data every 5-10 years	Collaborate with the CSO staff that conduct the agricultural census to build new questions or make changes to existing questions to align the census with data desired for the GHG inventory.	EMA / CSO	H-8	S
	Ensure access to the census data (once collected) is shared with the EMA via the KMS by coordinating with the CSO.	EMA / CSO	H-7	S
	Use the KMS to backup census data relevant to the GHG inventory to ensure data is backed up to the cloud.	EMA	L-2	L
Formalise and document the procedure for GHG inventory QA/QC and verification	The QA/QC and verification process must be formally established either by policy, regulation, or internal EMA / MPD policy and practices. Resources should be provided to support a QA/QC coordinating entity and to fairly compensate QA/QC and verification work completed.	EMA / MPD	M-6	M
Approve external entities to provide GHG inventory verification	For verification to occur, the process of approving external entities to provide verification must be defined. Either the verification bodies or the responsible entity for approving verification bodies should be defined by regulation or policy.	EMA	M-5	M
	The requirements for approval should be identified and made publicly available and the process for assessing a prospective verifier's qualifications should similarly be made publicly available.	EMA	M-5	M
	All approved verifiers should be listed on a government website, identified in the GHG inventory, granted appropriate access to the KMS, and must submit their work for archiving in the KMS to enhance transparency.	EMA	M-5	M

Goal	Task	Responsibility	Priority (L/M/H) [#]	Timeline (S/M/L) [*]
Ensure there is support for entities conducting QA/QC	Identify GHG inventory experts available to provide support to QA/QC implementing entities.	EMA /stakeholders identified during outreach	M-7	M
	Hire (or assign the role to an existing entity provided their workload is reduced to accommodate this additional responsibility) at least one GHG inventory expert (can be a consultant) familiar with the national MRV system who can: <ul style="list-style-type: none"> - Provide support to QA/QC and verification implementers on an as-needed basis. - Review a sample of the QA/QC and verification work and provide training to help the QA/QC and verification entities resolve any issues. 	EMA	M-6	M
	Record common questions and challenging areas that arise through QA/QC and verification efforts and develop a frequently asked questions (FAQ) resource document as well as noting the areas to target for future technical training.	EMA	L-3	S-L
Staff trained on agricultural data QC processes	Develop training materials to complement the template guidance and provide hands-on training to staff who will perform QC on the submitted agricultural GHG inventory data.	EMA	M-6	M
	If possible, utilise real-world data so that workshop/training activities can directly progress the GHG inventory effort.	EMA	M-6	M
Increase use of the KMS system amongst GHG inventory stakeholders	From the documented list of GHG inventory roles and responsibilities and the list of attendees from 2022's KMS-orientation workshops, identify the entities and other relevant GHG inventory stakeholders who will use the KMS system.	EMA	H-8	S
	Schedule (as needed) workshop(s) to provide training to the identified entities on an ongoing basis (annually or bi-annually)	EMA	M-5	M-L
	Provide training to GHG inventory data suppliers, GHG inventory compilers, and QA/QC and verification entities to present the use of the KMS and introduce guidance materials on an ongoing basis to maintain capacity despite staff turnover amongst stakeholders.	EMA	M-5	M-L
Standardise use of the KMS	Develop standardised guidance for each GHG inventory role and build these guides, and the recordkeeping document, to be what is presented through the through trainings and workshops.	EMA	L-2	S

[#]L = Low (1-3), M = Medium (4-6), H = High (7-10)

^{*}S = Short term (within 1 year), M = Medium term (completed within 2 years), L = Long term (completed within 4 years)

6. References

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