



National Action Plan for Agriculture GHG Inventory Improvement

Saint Lucia 2022



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National Action Plan for Agriculture GHG Inventory Improvement

Saint Lucia 2022

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Greenhouse Gas Management Institute in collaboration with the
the Ministry of Agriculture, Fisheries, Food Security and Rural Development in Saint Lucia
and inputs from the Ministry of Sustainable Development, Energy, Science and Technology

(Department of Sustainable Development)

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Castries, Saint Lucia
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Acronyms

BUR	Biennial Update Report
CC	Climate Change
DSD	Department of Sustainable Development
FAO	Food and Agriculture Organization
FOLU	Food and Land Use
GHG	Greenhouse Gas
GHGI	Greenhouse Gas Inventory
IPCC	Intergovernmental Panel on Climate Change
IPPU	Agriculture and Industrial Processes and Product Use
MOU	Memorandum of Understanding
NC	National Communication
NCCC	National Climate Change Committee
NDC	Nationally Determined Contribution
NEIS	National Environmental Information System
NFP	National Focal Point
SASAP	Sectoral Adaptation Strategy and Action Plan
UNFCCC	United Nations Framework Convention on Climate Change

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 prioritization 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 and 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 to inform climate risks planning, programming, and action in the sector.

The IICA-GCF Readiness Project targets nine countries (The Bahamas, Belize, Dominica, Haiti, Saint Kitts and Nevis, Saint. 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

Saint Lucia became a party to the United Nations Framework Convention on Climate Change (UNFCCC) in 1993 and submitted its Third National Communication in 2017¹ and its First Biennial Update Report in 2021.² The most recent GHG inventory report was completed in 2020 for the year 2018 with the GHG emission estimates being prepared following the 2006 IPCC guidelines.³

The total emissions excluding FOLU amounted to 736 Gg CO₂e in 2018, a 69% increase since 2000. Energy is the largest contributor to these emissions, with a total of 76.6%, followed by IPPU and Waste. The agriculture sector contributed only 3.7% towards the total GHG emissions (excluding FOLU), with enteric fermentation and manure management contributing 27.6% and 46.2% to the agriculture emissions respectively.⁴ Due to the low contribution of this sector, there are no mitigation targets for agriculture in the Updated NDC; however, a few adaptation actions are provided.⁵

1 Government of Saint Lucia, 2017. Third National Communication on Climate Change for Saint Lucia. Ministry of Education, Innovation, Gender Relations & Sustainable Development; Department of Sustainable Development. UNFCCC. THIRD NATIONAL COMMUNICATION _ SAINT LUCIA 2017.pdf (unfccc.int).

2 Government of Saint Lucia, 2021, Saint Lucia's First Biennial Update Report. UNFCCC Submissions. <https://unfccc.int/sites/default/files/resource/Saint%20Lucia%20BUR.pdf>

3 Department of Sustainable Development, 2020. Saint Lucia National Inventory Report. <https://unfccc.int/sites/default/files/resource/Saint%20Lucia%202020%20GhG%20Inventory%20revised%20Dec%202021.pdf>.

4 Department of Sustainable Development, 2020.

5 Government of Saint Lucia, 2021. Saint Lucia's Updated Nationally Determined Contribution communicated to the United Nations Framework Convention on Climate Change (UNFCCC). UNFCCC. [https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Saint%20Lucia%20First/Saint%20Lucia%20First%20NDC%20\(Updated%20submission\).pdf](https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Saint%20Lucia%20First/Saint%20Lucia%20First%20NDC%20(Updated%20submission).pdf).

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 Saint Lucia'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 amendments are required to improve the agriculture GHG inventory compilation process and improve agriculture emission estimates in the future. The synthesis of the results was framed in accordance with current situations 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 for inventory compilation

4.1.1 *Current situation*

The Ministry responsible for Sustainable Development and the Environment, currently the Department of Sustainable Development, is responsible for compiling and submitting the National Communications and Biennial Update Reports, and by extension, the Greenhouse Gas Inventory, to the United Nations Framework Convention on climate change. The process is coordinated through the climate change team of the Sustainable Development and Environment Division and the cabinet-approved National Climate Change Committee (NCCC). The climate change team reports to the Permanent Secretary of the Ministry of Education, Sustainable Development, Innovation, Science, Technology and Vocational Training, which is the National Focal Point (NFP) for the Convention. The NFP communicates as necessary with the UNFCCC Secretariat. With the assistance of the wider climate change team, situated within the DSD, the Project Coordinator oversees the overall preparation of the NCs and BURS, including the GHG inventory report. The Project Coordinator also coordinates the technical teams for compilation, review and validation of the reports. Data providers supply information to the technical teams and the Project Coordinator.

There is a steering committee, chaired by the Department of Sustainable Development (DSD), which guides the overall planning, management and facilitates the inputs and outputs for the overall inventory. Representatives from the National Climate Change Committee (NCCC) guide the overall work of the GHG inventory. They are also involved in the data gathering and compilation of the GHG inventory. In addition, they benefit from GHG-related trainings and participate in reviewing and validating/approving the outputs of the inventory.

The agriculture inventory data is gathered and compiled by the Corporate Planning Division in the Ministry of Agriculture and the data providers include the Department of Agriculture, agriculture research organisations and FAO. The agriculture compiler is responsible for obtaining the data from the various data providers and there are no formal institutional arrangements for the data collection process.

External consultants assisted St Lucia in setting up their inventory calculation files and provided training for national experts to enable them to compile the inventory themselves going forward.

4.1.2 *Opportunities for improvement*

Reducing reliance on external consultants and building local capacity for inventory compilation is the suggestion for going forward. The training provided during the inventory compilation should allow this process to begin, but further training would be required to support the inventory as Saint Lucia transitions to compiling the inventory themselves. There was also only one crop specialist and one livestock specialist involved in the compilation process, therefore it would be important to train additional people to assist with inventory compilation, especially after the retirement of the one livestock expert, leaving a gap and with no other trained expert available to take over this component.

An improved awareness around the importance of the GHG inventory is vital. Awareness needs to be built at both the decision-making level (with those who can enforce change and allocate resources for the inventory) and at the technical level (with those actually involved in the inventory work). At the technical level, this could be achieved through meetings and trainings within the NCCC focused on GHG inventories and empowering different sectors to take ownership of

the inventory. A suggestion would be to develop a short presentation and/or document for policy makers, outlining the impacts of climate change on agriculture and the importance of the inventory and mitigation in the agriculture sector. This should also highlight the co-benefits of understanding and reducing emissions in the agriculture sector.

This should be complemented with discussions at the decision-making level to ensure that the proper institutional arrangements and resources are agreed upon and allocated. More specifically to agriculture, awareness must be built at the ministerial level rather than at the NCCC, where there would be a wider agricultural audience since the Ministry of Agriculture’s involvement in the inventory process is essential for mainstreaming certain actions. Having a climate change unit within the Ministry of Agriculture, which can coordinate all climate change activities (including inventory development) and liaison with the Department of Sustainable Development on the preparation and reporting of the inventory can also be beneficial. The Climate Change Unit can also be utilised to assist in the formalization of the data collection process and in mainstreaming the data collection into the work of the Ministry of Agriculture. For additional datasets, such as customs data, agreements could be set up with data providers through this unit to ensure a sustainable data collection process.

Table 1 shows the identified actions to improve the institutional arrangements for agriculture GHG inventory compilation process.

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

Goal	Actions
Climate Change Unit within the Ministry of Agriculture	Develop a short presentation and document for policy makers to build awareness around the importance of the inventory, data collection and agricultural impacts.
	Arrange an awareness-raising meeting / workshop with the Ministry of Agriculture.
	Hold a workshop within the Ministry to discuss and develop a document outlining the structure of the CC Unit in the Ministry of Agriculture (include roles and responsibilities).
	Obtain agreement to set up such a unit in the Ministry.
	Identify staff and set up the CC Unit in the Ministry of Agriculture
	Dedicate some of the staff to data collection where their job would be to periodically collect data and make inventory updates.
	Develop data collection template to support the data collection process.
	Source funding to train the data collectors on the data collection procedures and templates.
Formalise the data collection process	Identify all data providers for the agriculture GHG inventory and draw up a data flow diagram.
	Discuss with each data provider the type of data to be provided and develop a document outlining data requirements, formats, frequency, etc of data.
	Develop a formal agreement for data provision and collection between the Ministry of Agriculture and each data provider and attach the data document to the agreement.
	Maintain a list of stakeholders and the agreements and when each agreement expires and archive this with the inventory.
	Provide the necessary training to stakeholders to ensure the data is collected correctly and that uncertainty data is included.
	Set up a data flow system for data to flow from the agriculture extensions to the inventory compiler and ensure all data requests are in place.
Trained agriculture GHG inventory compilation team	Develop a set of roles and responsibilities for the agriculture GHG inventory compiler and quality controller.
	Identify a team of agriculture specialists, particularly those at the Ministry of Agriculture, to undergo inventory training.
	Identify training opportunities (for inventory compilation, quality control, uncertainty, etc.) to train the inventory compilers.
	Source funding to ensure the team can participate in the training.

4.2 Data sources and data collection procedures

4.2.1 Current situation

Country specific data for livestock population was utilised for the period 2000 to 2010, but a lack of data after 2010 lead the compilers to extrapolate the data to 2018 using FAO trends. Manure management and lime consumption data were based on expert judgment for one year and then kept constant throughout the time-series. Crop data for the determination of crop residues was obtained from FAOSTAT. Synthetic fertiliser data is determined from customs import and export data and assumed that all the imported nitrogen fertiliser was applied to agricultural soils. In addition, the Ministry of Agriculture brings in fertiliser on a concession basis, and this data is recorded by the Ministry of Agriculture. The amount of urea applied was not able to be determined as there was insufficient disaggregation of the nitrogen fertiliser data.

The priority emission sub-categories for Saint Lucia are, in order, (a) manure management, (b) enteric fermentation and (c) direct N₂O from managed soils.

Table 2: Data sources for Saint Lucia agriculture GHG Inventory activity data

Activity data	Data source
Livestock population numbers	
<i>Cattle</i>	Ministry of Agriculture (2000-2010), while data was extrapolated for 2011-2018 using FAO trends.
<i>Buffalo</i>	NO.
<i>Sheep/goats</i>	Ministry of Agriculture (2000-2010), while data was extrapolated for 2011-2018 using FAO trends.
<i>Swine</i>	Ministry of Agriculture (2000-2010), while data was extrapolated for 2011-2018 using FAO trends.
<i>Horses/mules/asses</i>	Ministry of Agriculture (2000-2010), while data was extrapolated for 2011-2018 using FAO trends.
<i>Poultry</i>	Ministry of Agriculture (2000-2010), while data was extrapolated for 2011-2018 using FAO trends. FAO used to split layers and broilers.
Manure management data	Based on data reported by expert for the year 2000.
Lime consumption	Expert judgement.
Urea consumption	No data.
N fertiliser consumption	Customs import data/ Ministry of Agriculture.
Crop residue data	FAO.
Rice cultivation area and data	N/A.

Table 3: Categories included in the Saint Lucia agriculture GHG inventory and the Tier level approach

Category	E/NE/NO	Tier 1/Tier 2
3A1 Enteric fermentation	E	T1
3A2 Manure management _{CH₄}	E	T1
3A2 Manure management N ₂ O	E	T1
3C1 Biomass burning	NE	
3C3 Lime application (CO ₂)	E	T1
3C3 Urea application (CO ₂)	NE	
3C4 Direct N ₂ O from managed soils	E	T1
3C5 Indirect N ₂ O from managed soils	E	T1
3C6 Indirect N ₂ O from manure management	E	T1
3C7 Rice cultivation	NO	

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

4.2.2 Opportunities for improvement

It is suggested that livestock data from 2011 onwards be collected so the time-series can be updated. This data will also be used to provide more accuracy in the split between dairy and non-dairy cattle. The Ministry of Agriculture, through its extension services, collects data on livestock population quarterly, and this data is also collected by life stage (i.e., age categories). Data is collected manually with paper and pen, after which this information is loaded into a computer (Google forms) which is then sent to regional heads for analysis. All data is analysed within the Veterinary and Livestock Services Division, and anyone requiring the information would need to send a formal request to the division. Automating the data collection process will minimise data collection time and reduce transcription errors. Using tablets will therefore improve this process and make it more efficient.

Existing data collection processes, such as censuses, agriculture extension or farmer registration systems, should be considered to determine if these can be modified to incorporate additional information required for the inventory. Saint Lucia's Agricultural Extension Services has eight regions with about three or four extension officers per region, so these can be used for data collection purposes. Saint Lucia's Sectoral Adaptation Strategy and Action Plan for the Agriculture Sector (Agriculture SASAP)⁶ proposes the setup of Climate Resilient Agriculture Demonstration Farms. These types of demonstration farms, or training centres, could be enhanced to include data collection and train farmers how to report relevant data for inventory purposes. Data could be collected (on livestock age classes, weights, feeding systems, manure management, and/or crop residues) as a case study to start building on and understanding some of the basic data and to enhance expert opinions. Training for data providers could be offered to build awareness of the data requirements. Most important is developing good relationships with farmers so that they understand the need for this data and can buy into the data collection process.

Manure management data was based on one expert opinion, so a survey (or census) could be conducted amongst farmers from different regions to get a more accurate assessment of the manure management systems across the country. Manure management data may not change on an annual basis, so this data could be collected approximately every five years. This can also be applied to crop residue management data.

A source for lime consumption data needs to be investigated. The data is indicated to be from expert judgement; however, the details of this are not provided. Transparency on reporting data sources can be improved, but going forward a sustainable data source for lime should be identified, possibly from lime sales data or customs data.

Although nitrogen fertiliser data is estimated from import and export data, it is not clear how much of this is used on croplands, as there are other applications such as golf courses. An alternate source of nitrogen fertiliser data should be sourced to provide more accurate estimates of the amount of nitrogen fertiliser actually applied to agricultural lands. Companies selling fertilisers may be identified and approached to assess whether they are able and willing to provide data on fertiliser sales and to whom the fertiliser is sold. In such cases, MoUs are suggested between parties to supply a sustainable source of data. Alternatively, a study can be conducted to determine the use of the nitrogen fertiliser inputs depending on the type of funding available. This data could provide some validation or opportunities for improving the current assumptions being made, despite it being a one-time event.

⁶ Government of Saint Lucia (2018). Saint Lucia's Sectoral Adaptation Strategy and Action Plan for the Agriculture Sector (Agriculture SASAP) 2018-2028, under the National Adaptation Planning Process. Department of Sustainable Development, Ministry of Education, Innovation, Gender Relations and Sustainable Development and Department of Agriculture, Fisheries, Natural Resources and Cooperatives, Ministry of Agriculture, Fisheries, Physical Planning, Natural Resources and Cooperatives.

The crop area and harvest data is taken from FAO, so it is suggested that more frequent censuses be conducted to obtain such data. In addition, agriculture extension officers could be considered for collecting more frequent data on the planted crop areas.

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

Table 4: Potential actions to improve the data collection and data collection process for the agriculture GHG inventory compilation process

Goal	Actions
Mainstream annual collection of livestock and crop inventory data into the work of the Ministry of Agriculture	Utilise the materials developed through the GCF AgREADY project to sensitise farmers and extension officers to climate change, inventories, and data requirements.
	Adapt existing or utilise the developed data collection template for annual livestock population (with disaggregation by life stage), manure management, crop residue management, fertiliser and lime application data.
	Pilot the data collection templates at a regional training centre, adjust the templates as is necessary.
	Train extension officers on data collection procedures and how to complete the templates.
	Implement the data collection process.
Improved automation in the agriculture extension data collection system	Assess the feasibility of and barriers to moving towards a more automated data collection system through the introduction of tablets for data collection.
	Based on the outputs of the study, develop a plan for improving the data collection system.
Expand agricultural census questions to include some inventory relevant questions	Draft questions for agriculture stakeholders to respond to in the agricultural census that will improve the accuracy of data used to estimate livestock and soil emissions.
	Work with agricultural census implementers/ officers to integrate the questions into the census and ensure the completed census files and data will be accessible to the GHG inventory compilers for the agriculture sector.
Improved understanding and collection of fertiliser (including urea) data	Develop a list of companies supplying fertilisers to the region.
	Arrange meetings with the various companies, or conduct a stakeholder meeting, to express the importance of the fertiliser data, what data is required and how the data is utilised. This should be sure to include the type of fertiliser so that urea application data can be separated out to determine emission for this category.
	Set up agreements with the companies to obtain the relevant information. The agreement should specify the data, data formats and frequency of reporting (see further details in Table 1).
Improved data for perennial crops	Hold a meeting with agriculture extension officers to discuss current data collection on perennial crops.
	Present the data requirements for the inventory for perennial crops (area planted, area harvested, management practices, etc) and highlight the importance of the data.
	Develop a data collection process by combining needs with current data collection templates.
Develop a GHG inventory test data collection and demonstration site	Identify a climate resilient agriculture demonstration farm to enhance and incorporate data collection.
	Identify the actions on the farm which can be used to collect inventory relevant data and develop data collection templates specific for the activities (specifically aiming at including information on manure and crop residue management, livestock weights and feed information). This data could also be useful for other purposes.
	Develop an inventory calculation file to estimate emission from that demonstration farm.
	Hold an awareness session to highlight the activities and the importance of data collection.
	Collect data at regular intervals or whenever training is occurring (therefore can also train on data collection).
	Input data into the calculation file (which can be developed by the train inventory compilers) as it is obtained and develop emission estimates for the farm.
	Hold an awareness session which demonstrates the outputs and the relevance of the outputs to the farmers. It can also be demonstrated, using the calculation files, what the impacts would be should the management activities on the farm be changed.
Research project on manure and crop residue management	

4.3 Quality control and verification procedures

4.3.1 Current situation

The Department of Sustainable Development provides central quality assurance and quality control of the data, while external consultants conduct quality control at the sectoral level. For the agriculture sector, sources of data, emission factors, other factors and constants were all checked and referenced. Comments when compiling and checking were left directly in the compilation files with the initials of the commenter and the date, to document the QC process. FAO data was used for verification.

St Lucia also recently developed a QA/QC plan which provides centralised documentation of the inventory teams QA/QC activities. The QA/QC plan sets out the objectives, roles and responsibilities and activities for ensuring the GHG inventory is of the best possible quality.

The inventory applied various QA/QC steps:

- Cross-cutting QC: performed for all categories.
 - Recalculations: where available emissions/removal estimates have been compared to available estimates in the previous inventory and reasons for any changes have been explained.
 - Trend checks: sense checks on the time series to identify outliers.
- Cross-cutting QA: performed for all categories.
 - QA review: all compilation files were reviewed by someone not directly involved in the compilation of the emission/removal estimates.
- Sector-specific QA/QC: performed during the data collection and emission/removal compilation.
- Peer review and consultation: the inventory as a whole and sector-specific estimates have undergone peer review during a validation workshop.

4.3.2 Opportunities for improvement

In the last inventory, Saint Lucia developed a QA/QC plan and QC checks and procedures. Since these are newly developed, no further improvements are required at this stage, simply to continue to implement this plan in the future. To keep up these efforts, which were assisted by an external consultant, more capacity building is required for national experts, so that there are at least two national experts for agriculture. This way they can provide quality checks for each other's work and quality control can be completed within the country instead of relying on international consultants. Capacity building has been included in the actions in Table 1. A document providing a list of quality checks specifically for the agriculture sector would be useful for providing guidance both to the compiler and the quality controller.

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
Improved QC for agriculture inventory	Draw up a checklist of the specific checks to be completed for the agriculture inventory.
	Provide further training to inventory compilers on QA/QC processes

4.4 MRV and archiving

4.4.1 Current situation

All key documents for the inventory process are archived by the Department of Sustainable Development and on Saint Lucia's National Environmental Information System (NEIS) and the MRV Portal at the end of the inventory cycle. Inventory compilers send the information to the Department of Sustainable Development, where the data is then archived.

4.4.2 Opportunities for improvement

Moving forward, it is important that the MRV System is maintained. The inventory co-ordination team should have a person responsible for archiving to ensure that all appropriate documents, data, QC sheets and contacts are archived throughout the inventory compilation process. An archiving checklist should be compiled at the beginning of the cycle to provide guidance for the archive manager.

Currently, the MRV Portal contains an improvement plan section which can house the GHG Inventory Plan. It keeps an account of the lead individual, resources needed, description of the improvement, status of improvement, lead organization, etc. In the future this could be updated to monitor progress.

An additional aspect which could be included into the MRV system is a log of all the training activities (what training, when it occurred, etc) that take place and who is involved in the training. This way, a list of experts is developed so the inventory team knows who they can draw on to assist with certain aspects (such as quality control or reviewing) of the inventory.

Table 6 shows the identified actions to improve the archiving system for the agriculture GHG inventory compilation.

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

Goal	Actions
Archiving manual for agriculture	Develop a checklist of the types of documents and files that need to be archived for the agriculture inventory.
	Compile a short archiving manual which describes the archiving system (including file names, folders, etc)

5. Overall action plan for improving Saint Lucia's agriculture sector GHG inventory

Goal	Actions	Responsibility	Priority (H/M/L)	Timeline (S/M/L)
Climate Change Unit within the Ministry of Agriculture	Develop a short presentation and document for policy makers to build awareness around the importance of the inventory, data collection and agricultural impacts.	MOA/MOSD	H	M
	Arrange an awareness raising meeting/workshop with the Ministry of Agriculture.			
	Hold a workshop within the ministry to discuss and develop a document outlining the structure of the CC unit in the Ministry of Agriculture (include roles and responsibilities).			
	Obtain agreement to set up such a unit in the Ministry			
	Identify staff and set up the CC unit in the Ministry of Agriculture			
	Dedicate some of the staff to data collection, where their job would be to periodically collect data and make inventory updates.			
	Develop data collection template to support the data collection process.			
Formalise the data collection process	Source funding to train the data collectors on the data collection procedures and templates.	SLU/MOA	H	S
	Identify all data providers for the agriculture GHG inventory and draw up a data flow diagram.			
	Discuss with each data provider the type of data to be provided and develop a document outlining data requirements, formats, frequency, etc. of data.			
	Develop a formal agreement for data provision and collection between the Ministry of Agriculture and each data provider and attach the data document to the agreement.			
	Maintain a list of stakeholders and the agreements and when each agreement expires and archive this with the inventory.			
	Provide the necessary training to stakeholders to ensure the data is collected correctly and that uncertainty data is included.			
Trained agriculture GHG inventory compilation team	Setup a data flow system for data to flow from the agriculture extensions to the inventory compiler and ensure all data requests are in place.	MOA/GCF	H	S
	Develop a set of roles and responsibilities for the agriculture GHG inventory compiler and quality controller.			
	Identify a team of agriculture specialists, particularly those at the Ministry of Agriculture, to undergo inventory training.			
	Identify training opportunities (on inventory compilation, quality control, uncertainty, etc) to train the inventory compilers.			
Mainstream annual collection of livestock and crop inventory data into the work of the Ministry of Agriculture	Source funding to ensure the team can participate in the training.			
	Utilise the materials developed through the GCF AgREADY project to sensitise farmers and extension officers to climate change, inventories, and data requirements.			
	Adapt existing or utilise the developed data collection template for annual livestock population (with disaggregation by life stage), manure management, crop residue management, fertiliser and lime application data.			
	Pilot the data collection templates at a regional training centre, adjust the templates as is necessary.			
	Train extension officers on data collection procedures and how to complete the templates.			
Improved automation in the agriculture extension data collection system	Implement the data collection process.	MOA/FAO/PROJECTS/GCF	M	M
	Assess the feasibility of and barriers to moving towards a more automated data collection system through the introduction of tablets for data collection.			
	Based on the outputs of the study develop a plan of improving the data collection system.			

Goal	Actions	Responsibility	Priority (H/M/L)	Timeline (S/M/L)
Expand agricultural census questions to include some inventory relevant questions	Draft questions for agriculture stakeholders to respond to in the agricultural census that will improve the accuracy of data used to estimate livestock and soil emissions.			
	Work with agricultural census implementers / officers to integrate the questions into the census and ensure the completed census files and data will be accessible to the GHG inventory compilers for the agriculture sector.			
Improved understanding and collection of fertiliser (including urea) data	Develop a list of companies supplying fertilisers to the region.			
	Arrange meetings with the various companies, or conduct a stakeholder meeting to express the importance of the fertiliser data, what data is required, and how the data is utilised. This should include the type of fertiliser so that urea application data can be separated out to determine emission for this category.			
	Set up agreements with the companies to obtain the relevant information. The agreement should specify the data, data formats and frequency of reporting (see further details in Table 1).			
Improved data for perennial crops	Hold a meeting with agriculture extension officers to discuss current data collection on perennial crops.			
	Present the data requirements for the inventory for perennial crops (area planted, area harvested, management practices, etc) and highlight the importance of the data.			
	Develop a data collection process by combining needs with current data collection templates.			
Develop a GHG inventory test data collection and demonstration site	Identify a climate resilient agriculture demonstration farm to enhance and incorporate data collection.			
	Identify the actions on the farm which can be used to collect inventory relevant data and develop data collection templates specific for the activities (specifically aiming at including information on manure and crop residue management, livestock weights and feed information). This data could also be useful for other purposes.			
	Develop an inventory calculation file to estimate emission from that demonstration farm.			
	Hold an awareness session to highlight the activities and the importance of data collection.			
	Collect data at regular intervals or whenever training is occurring (therefore can also train on data collection).			
	Input data into the calculation file (which can be developed by the train inventory compilers) as it is obtained and develop emission estimates for the farm.			
	Hold an awareness session which demonstrates the outputs and their relevance to the farmers. It can also be demonstrated, using the calculation files, what the impacts would be should the management activities on the farm be changed.			
Research project on manure and crop residue management				
Improved QC for agriculture inventory	Draw up a checklist of the specific checks to be completed for the agriculture inventory.			
	Provide further training to inventory compilers on QA/QC processes			
Archiving manual for agriculture	Develop a checklist of the types of documents and files that need to be archived for the agriculture inventory.			
	Compile a short archiving manual which describes the archiving system (including file names, folders, etc.).			
Database of agriculture inventory experts	Develop a list of capacity building activities, along with participants and dates, and keep this updated. From this create a list of experts along with their area of expertise.			

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

*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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