



# National Action Plan for Agriculture GHG Inventory Improvement

## Suriname 2022



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# National Action Plan for Agriculture GHG Inventory Improvement

## Suriname 2022

Prepared by:

Greenhouse Gas Management Institute in collaboration with  
the Ministry of Agriculture, Animal Husbandry and Fisheries (LVV)  
under the IICA GCF CARICOM AgREADY Project

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## Acronyms

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<b>AFOLU</b>	Agriculture, Forestry and Other Land Use
<b>BUR</b>	Biennial Update Report
<b>CC</b>	Climate Change
<b>CELOS</b>	Centre for Agricultural Research in Suriname
<b>DONDRU Climate Change</b>	Climate Change Knowledge Database Suriname
<b>FAOSTAT</b>	The Food and Agriculture Organization Corporate Statistical Database
<b>GBOS</b>	General Bureau of Statistics
<b>GHG</b>	Greenhouse Gas
<b>GIS</b>	Geographic Information System
<b>GONINI Portal</b>	National Land Monitoring system of Suriname
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>LVV</b>	Ministry of Agriculture, Livestock and Fisheries
<b>MOU</b>	Memorandum of Understanding
<b>NC</b>	National Communications
<b>NDC</b>	Nationally Determined Contributions
<b>NGHGI</b>	National Greenhouse Gas Inventory
<b>NIR</b>	National (GHG) Inventory Report
<b>QA/QC</b>	Quality Assurance/ Quality Control
<b>SBB</b>	Foundation for Forest Management and Production Control
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change

# 1. Introduction

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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

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The key sectors in Suriname's GHG inventory are the Energy and AFOLU sectors, with the sink in the Land sector leading to an overall sink for Suriname. The Second National Communication (SNC) indicated that the Land sub-sector was a sink of CO<sub>2</sub> (6 427 Gg CO<sub>2</sub>e) and the agriculture sub-sector emitted 654 Gg CO<sub>2</sub>e in 2008<sup>1</sup>. Subsequently, the inventory was updated and the Ministry of Agriculture provided information showing that the recalculated Agriculture emissions for 2008 were 480 Gg CO<sub>2</sub>e, and that these were reduced to 429 Gg CO<sub>2</sub>e in 2017.

Agriculture is a key sector of the economy, with its contribution to GDP estimated at 12%. Agriculture accounts for 10% of total export earnings and employs approximately 8% of the total labour force. Rice and bananas are the main crops, followed by fish and shrimp and then vegetables and fruits. The agricultural sector consists of approximately 10,000-12,000 smallholders who produce rice and bananas, poultry, cattle, pigs, and small ruminants, providing employment and income to some 17% of the economically active population. Most farms are small in scale and employment is part-time. Agriculture has been identified as a key sector in the NGHGI and is also included in Suriname's NDC targets. There is, therefore, a lot of focus on improving the agriculture inventory and tracking changes in this sector.

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<sup>1</sup> Office of the President of the Republic of Suriname, 2016. *Second National Communication to the United Nations Framework Convention on Climate Change*. Paramaribo, Suriname. <https://unfccc.int/resource/docs/natc/surnc2.pdf>



### 3. Objectives and Methodology

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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 Surinam'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 National Designated Entity for the UNFCCC in Suriname is the Ministry of Spatial Planning and Environment of the Republic of Suriname. There is no specific unit within the Ministry of Spatial Planning and the Environment responsible for inventory compilation, but the Ministry is working toward setting up such a unit.

For the AFOLU sector, the Foundation for Forest Management and Production Control (SBB) spearheaded the project with the support of the Ministry of Agriculture, Livestock and Fisheries (LVV), which was responsible for the compilation of the agriculture component of the inventory.

In 2021 the Ministry of Agriculture began to institutionalise climate change by setting up a Climate Change Unit. This was a prerequisite for the implementation of the Readiness project<sup>2</sup>. The unit is being setup and a manager has been appointed. The unit is expected to contract the services of two specialists, namely a climate change specialist for agriculture, livestock and fisheries, and a GIS specialist. The Terms of Reference for these positions were drawn up last year (October), but the positions are yet to be filled. Two people have been identified pending approval from the Director. In addition, a new organogram for the institutional arrangements should be developed and submitted for formal approval to the Ministry of Internal Affairs. Once this unit is setup, one of its main tasks will be to compile the AFOLU GHG inventory.

The inventory was compiled in the IPCC 2006 software and an international consultant assisted in guiding and setting up the inventory in the software. The IPCC software requires a superuser password and sectoral passwords, depending on how it is setup. The superuser account was setup by the international consultant who trained a local consultant, coordinator of the inventory compilation process, to take over this role. Each sector lead was provided with a login and password for their sector so the sectors could be compiled individually in the software. The coordinator would then combine all sectors to create the overall inventory. The international consultant provided training on the IPCC software, so Suriname built some technical capacity through this process, but further capacity building would be required to move forward to a Tier 2 approach for agriculture.

LVV collected data from the various data providers which included the Statistics department of the ministry, the General Bureau of Statistics (GBOS), FAOSTAT, and national agriculture experts. There are no formal institutional arrangements for the data collection process.

#### 4.1.2 Opportunities for improvement

It would be important to continue to setup and formalise the Climate Change Unit in the Ministry of Agriculture and hire the two specialists to assist in compiling the AFOLU inventory. The clear definition of roles, responsibilities and reporting procedures for these specialists would provide a good basis from which the unit can operate. AFOLU sector inventory compilation training may need to be provided for the specialists. Developing a compilation manual, which outlines the process and data flows for the AFOLU compilation, would be useful for any new staff being brought on board.

<sup>2</sup> GCP/SUR/004/GCR—Improving the capacity of the Ministry of Agriculture of Suriname to build resilience to climate change in the agriculture sector.

In terms of data collection, it is suggested that key data providers are identified, and MOUs are drawn up with these organisations to formalise the data flows for agriculture. More detailed activities are discussed in section 3.2, but the formalization of the arrangements is included in this section.

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
Functioning Climate Change Unit in the LVV	Develop a new institutional organogram and obtain approval from the Ministry of Internal Affairs.
	Obtain permission from Director in LVV to fill the agriculture and GIS specialist positions in the CC Unit.
	Identify training opportunities for the Climate Change Unit staff.
	Identify financing to allow the staff to complete the training.
Formalised institutional arrangements for agricultural data collection	Identify key external data providers (see section 3.2), discuss data requirements with these data providers.
	Develop any required data collection templates or discuss how current data collection templates could be adjusted to incorporate relevant data.
	Draw up an MOU, along with a document detailing data requirement (what data, format, frequency, etc.), between the data provider and the Ministry to formalise data collection.
	Mainstream any internal data requirements into Agricultural policies and strategies (more detail provided in section 3.2).

## 4.2 Data sources and data collection procedures

### 4.2.1 Current situation

Suriname’s most recent inventory for 2000–2017 included estimates of emissions from all IPCC Agriculture sub-categories except lime application. Lime application is not a common practice in Suriname and, for inventory purposes, is therefore assumed to not occur (NO). All estimates utilise a Tier 1 approach due to the lack of data or a lack of disaggregation of data. Country specific data supplied by the statistics department of the Ministry of LVV (which compiles the data collected by agriculture extension offices) is used for the activity data for most sub-sectors, with emissions from urea and N fertilisers relying on international (FAOSTAT) data. For fertiliser data the import data does not disaggregate by fertiliser type, making it difficult to extract the amount of nitrogen in the fertilisers, therefore FAOSTAT data was utilised. There was also insufficient data to determine how much of the total fertiliser application was applied to rice cultivation. For this reason, the flooded rice component of the Direct N<sub>2</sub>O inputs from managed soils could not be separated out. Manure management data was obtained from expert opinion due to a lack of data, but this is often the case in developing countries.

Information on the rice cultivation area was supplied by the statistics department of the Ministry of LVV. There was insufficient data to enable the disaggregation of the rice cultivation area into the different types of rice cultivation systems. There are two rice cultivation systems: irrigated rice cultivation (continuously flooded), and upland rice cultivation. However, there is no area data available for upland rice cultivation. There is no practice of applying organic fertilisers in rice cultivation in Suriname. Postharvest waste is burnt on the fields; however, stubbles remain after burning, and are then ploughed and regarded as organic amendments. Quantifying these additions is very difficult, so expert judgement is applied for this data. Rice emissions were calculated using Tier 1, as the IPCC 2006 tool only allows this approach.

The priority emission sub-categories for Suriname are, in order, (a) rice cultivation, (b) direct N<sub>2</sub>O from managed soil and (c) enteric fermentation.

No uncertainty data is reported as there was no such data available, and the skills were insufficient to obtain or process the information.

*Table 2: Data sources for Suriname agriculture GHG Inventory activity data*

Activity data	Data source
Livestock population numbers	
<i>Cattle</i>	Ministry of Agriculture, Livestock and Fisheries (LVV)
<i>Buffalo</i>	Ministry of Agriculture, Livestock and Fisheries (LVV)
<i>Sheep/Goats</i>	Ministry of Agriculture, Livestock and Fisheries (LVV)
<i>Swine</i>	Ministry of Agriculture, Livestock and Fisheries (LVV)
<i>Horses/mules/asses</i>	Ministry of Agriculture, Livestock and Fisheries (LVV)
<i>Poultry</i>	Ministry of Agriculture, Livestock and Fisheries (LVV)
Manure management data	Expert opinion
Lime consumption	Not occurring
Urea consumption	FAOSTAT
N fertiliser consumption	FAOSTAT
Crop residue data	Crop areas from GBS
Rice cultivation area and data	LVV for crop area

*Table 3: Categories included in the Suriname 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 <sub>4</sub>	E	Tier 1
3A2 Manure management N <sub>2</sub> O	E	Tier 1
3C1 Biomass burning	E	Tier 1
3C3 Lime application (CO <sub>2</sub> )	NO	
3C3 Urea application (CO <sub>2</sub> )	E	Tier 1
3C4 Direct N <sub>2</sub> O from managed soils	E	Tier 1
3C5 Indirect N <sub>2</sub> O from managed soils	E	Tier 1
3C6 Indirect N <sub>2</sub> O from manure management	E	Tier 1
3C7 Rice cultivation	E	Tier 1

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

#### 4.2.2 Opportunities for improvement

The dominant emission category for Suriname's agriculture GHG inventory is rice cultivation, which contributes just over 56% to the agriculture inventory. Based on this, it is suggested that further disaggregated data on nitrogen inputs and organic amendments to rice fields be collected. A system for gathering information from rice farmers, perhaps through extension officers, could be considered to improve data collection in the rice sector. Extension officers have a questionnaire which they currently use to gather information from rice farmers, so it is advised that this questionnaire be assessed to determine if additional questions could be added to accommodate the data required for the inventory. It would also be important to establish links with universities and research organisations (such as CELOS – Centre for Agricultural Research in Suriname at the University of Suriname) to at least indicate to them what type of data

is required and determine if any research projects could be established to collect such data, for example, the rate of amendment or fertiliser application to rice paddies. Funding could be sought on a project basis to determine an initial amendment rate or how much rice is being incorporated back into the soil. This is not a constant source of data, but for some activity data which does not change on an annual basis, scientific data collected at intervals could provide better estimates than expert judgement (or can be used to support expert judgement.)

The second most important category in terms of agriculture emissions is Direct N<sub>2</sub>O from managed soils, and the largest contributor to this was synthetic N fertilisers. It is noted that FAOSTAT data was utilised, as the fertiliser import data was not disaggregated by fertiliser type<sup>3</sup> making it difficult to determine the amount of N application. The suggestion would be to discuss the data requirements with the customs office and request that the imported fertiliser data be reported by fertiliser type. It was also noted that the General Bureau of Statistics (GBS) in Suriname reports imported fertiliser by nutrient type.<sup>4</sup>The Ministry of Agriculture indicated this data was only collected from 2014, but it may then be a source of data going forward. Through discussions with agriculture extension officers and data collectors (16/06/2022) and on inspection of the current data collection templates, it was found that fertiliser data was collected (per crop type, fertiliser type and amount) by extension officers. It appears that the data is collected but has not been previously reported in publicly available statistics reports. A meeting with the Head of the Department of Agricultural Statistics (17/06/2022) revealed that data is not centralised nor accessible for public or for internal use without formal permission. In addition, the crop extension officers will not collect livestock data as this is the mandate of another department. These discussions indicate that there is a lack of co-ordination amongst organisations collecting data. Close collaborations between the CC Unit, extension service and statistics department are required going forward to ensure that questionnaires meet the requirements for both production and climate change related analysis. This should be the case for all the categories in which GHGI are estimated.

Crop data (crop type, planted area, harvested area, production volume and area loss to disease/flooding/drought/seed loss) is also collected through agriculture extension services and can be utilised to determine amount of crop residues available for application to soils, as this is lacking. Additional questions added to the extension officer surveys is one way to collect the data, while another method maybe through a project-based study as mentioned above for rice cultivation data.

These would be the first two areas to focus on, but enteric fermentation follows closely behind Direct N<sub>2</sub>O emissions in terms of contribution. In addition, livestock produce manure which leads to further inputs of N to managed soils. Therefore, another suggestion would be to collect disaggregated livestock population, weight, feed intake data and feed digestibility for the key livestock categories. This will allow Suriname to move toward a Tier 2 for enteric fermentation and manure inputs to managed soils. The current livestock data survey used by the extension officers already includes disaggregated livestock category data for cattle and pigs, and collects data on milk production. The livestock department has a newly piloted system for collecting livestock registration data and this is expected to be rolled out over a wider area to collect future livestock data. This questionnaire has further disaggregation of the livestock categories and should be explored as a data source.

<sup>3</sup> Samoender, Iwan (Ministry of Agriculture). Interview.

<sup>4</sup> General Bureau of Statistics, 2020. 9th Environment Statistics Publication 2015-2019, Suriname.

Tier 2 data is difficult to obtain, but if this data cannot be obtained regularly (i.e., on an annual basis), it is suggested that a project-based approach be considered. In this case, a few pilot sites representing the range of management types for the key livestock could be sought and a study carried out over a period of time to collect data to enable the calculation of a Tier 2 emission factor. These emissions factors would not vary over time, unless the underlying data was collected annually, but it would allow for the determination of an initial country-specific factor which can be compared to the IPCC default factor. Along with this would come a need for capacity building on Tier 2 methodologies.

It would also be important to collect manure management data for these key factors. If a question can be added to extension officer surveys to accommodate this, then this is one way to obtain the data. Surveys should be conducted to explain what data is required going forward. The other is a project-based approach as is suggested for the Tier 2 emission factors. Funding could be sought to support a project where surveys were conducted to determine manure management practices used throughout Suriname.

Suriname is also planning to undertake an agricultural census soon. It is not yet sure what environmental aspects will be included in the questionnaire as the final version has not yet been prepared. The Department of Statistics are in the process of hiring a consultant to work with the FAO to develop the Agricultural Census questionnaire. It is therefore suggested that the CC Unit have a meeting with the census consultant to discuss the questions and determine if any additional questions could be added or reworded to obtain relevant information for the inventory.

The Suriname GCF Readiness Proposal<sup>5</sup> indicated that the Government of Suriname (GOS) has “experience in developing and implementing national data systems in other sectors which can provide lessons learned and best practices which can be incorporated into design of a new data and information system for the agriculture sector.” The proposal points to the GONINI Portal and the Climate Change Knowledge Database Suriname (DONDRU Climate Change)<sup>6</sup> as examples. Part of the GCF Readiness project is to assess existing data systems, and design and operationalize databases for the agriculture. The newly proposed organogram, which is yet to be officially approved, suggests a data management unit residing directly under the Minister of LVV, where the data management system would sit. Actions going forward could be to ensure this data management system not only includes agro-hydrological data but also includes agriculture GHG inventory data, and to operationalize this data management system.

It is suggested that an awareness campaign amongst farmers, farmer organisations and extension officers be conducted to ensure everyone understands the type of data that needs to be collected and why. These training courses could be used to explain how the additional questions on the surveys should be answered.

To incorporate uncertainty into the inventory, capacity-building is required amongst the inventory team. In addition, this should be considered when collecting data rather than being an afterthought. Therefore, uncertainty data should be considered as data collection templates and systems are set up.

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<sup>5</sup> GCP/SUR/004/GCR–Improving the capacity of the Ministry of Agriculture of Suriname to build resilience to climate change in the agriculture sector.

<sup>6</sup> This Knowledge Database serves as the central platform for cluster-related data/information about climate change in Suriname. It aims to publish official and formal environmental data and information for national policy and planning.

In an interview, Mr. Samoender of the Ministry of Agriculture stressed that there was a need to develop inventory improvements plans, but more importantly to have these improvement plans taken up by policymakers. The requirements highlighted in an improvement plan need to be incorporated into strategic plans and policies to provide an enabling environment to collect improved data.

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

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

Goal	Actions
Improved crop and livestock data	Assess the current extension services questionnaire for rice farmers and determine whether a few questions could be added or reworded to accommodate agriculture inventory data requirements.
	Setup a stakeholder meeting with all relevant data collection departments to fully assess the current data collection templates and determine if any additional questions can be added to accommodate the climate change needs.
	Establish a close relationship between the CC Unit, extension service and statistics department to ensure that future questionnaires meet the requirements for both production and climate change related analysis.
	Setup a data flow system which allows the required data (for crops, livestock, and fertilisers) to flow from the relevant departments to the CC Unit.
Provide enabling environment to collect improved data	Incorporate an agriculture GHG inventory component into the data management system developed under the Readiness Project.
	Develop a manual and provide training to all users of the data management system.
	Operationalize the data management unit under the Ministry of LVV.
Improved nitrogen fertiliser data	Engage with the customs department to determine whether more disaggregated fertiliser data can be collected.
	Setup an agreement to obtain the customs data at regular intervals.
Improved data from agriculture census	Setup a meeting with the census consultant to assess the questions incorporated into the agriculture census.
	Work with the consultant to reword or incorporate any questions to improve the data for the inventory.
Build capacity within the inventory team to complete data analysis	Build the capacity of the CC team to be able to use splicing techniques to maximise use of various datasets.
	Build the capacity of the team to collect and complete uncertainty analysis by sourcing funding for training activities.
Increase data through GHG improvement research projects	Source funding for a GHG improvement projects such as: <ul style="list-style-type: none"> <li>• rice amendment application rates</li> <li>• livestock tier 2 emission factors</li> <li>• livestock manure management data</li> <li>• fertiliser application rates</li> </ul>
	Establish a mechanism to convey the research needs to these research entities (such as an annual meeting or regular newsletter). Utilise the MoUs the Ministry has with the University of Suriname and CELOS to formalise this arrangement. Ensure all MoUs are updated. Collaborate with them to complete the studies.
	Develop links with the Climate Change Knowledge Database and use this as a place to keep research related studies.
Build awareness amongst data providers and policy makers around the importance of data for climate change monitoring	Conduct awareness campaigns for data providers and utilise the materials provided in the IICA GCF CARICOM AgREADY project to build awareness amongst data providers.
	Develop material and hold an awareness campaign for policy makers to build awareness of data driven climate change policy and the importance of gathering data to track NDCs.

## 4.3 Quality control and verification procedures

### 4.3.1 Current situation

International consultants reviewed the calculation files in IPCC software and provided quality control on the calculations. The Ministry of Agriculture, who collected the input data, ran quality checks on the input data and verified the data with FAO data. The inventory report and documentation were also checked by the international consultant.

Suriname does not have a QA/QC plan, so it is suggested that one be developed. This should outline the QA/QC process and the roles and responsibilities of the quality control coordinator and sectoral quality controllers. It should also outline the QA process.

### 4.3.2 Opportunities for improvement

It is suggested that more capacity be built to increase the number of staff with expertise in the compilation process so that quality control can be done utilizing national experts. It is also useful to have other sector experts understand the agriculture inventory so a sector compiler could conduct QC on another sector. Usually, the LULUCF and agriculture sectors go together, so it would be helpful to train the national LULUCF expert on the agriculture compilation as well. 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 QA/QC for agriculture inventory compilation	Develop a QA/QC plan for agriculture inventory compilation, which should include roles, responsibilities, and check lists
	Include a component on guidance for quality control of input data and selection of emission factors
	Operationalise the QA/QC plan

## 4.4 MRV and archiving

### 4.4.1 Current situation

Currently the agriculture inventory data is archived in the IPCC 2006 software and the inventory report provides all the methodology details. There is no overall archiving system for all files, supporting data, QC templates and reports.

### 4.4.2 Opportunities for improvement

The IPCC software holds all the data, and it is easily available for the next inventory compiler, provided the passwords are known. It is critical to ensure that passwords are kept within the Ministry or the coordinating institution so that if a staff member leaves, the data is still accessible by the next inventory compiler.

Another aspect of inventory compilation to take into consideration for Suriname is the IPCC software and how it is setup and used across the sectors. The inventory coordinator, who in the case of the latest inventory is a local consultant, is the superuser of the IPCC software. The super-user is the person that controls sector teams' access to the software and who controls the years for which sectoral leads can add data. It is, therefore, important that more than one person is trained on how to be a superuser and that the superuser login and password are archived, preferably within the Ministry of Spatial Planning and Environment, along with the rest of the inventory. Without this information the inventory data will be inaccessible. This also applies to the individual sector passwords.



The reference sources for activity data are not included in the IPCC software but are assumed to be in the inventory report.<sup>7</sup>The source references should also be incorporated into the IPCC software (there is a 'notes' sections for this purpose) so that the origin of each set of activity data is clear.

In terms of the National Inventory Report (NIR), it is suggested that a guidance document or a template on the structure, layout and content of the NIR be developed specifically for Suriname. The guidance could include details of the types of graphs and tables that could be included. The template could be setup for all sectors to ensure consistency. This document would ensure that all relevant UNFCCC requirements for the inventory are included but also meet the needs of Suriname.

The Ministry of Spatial Planning and Environment is setting up an online Knowledge Centre that will be used to register, monitor and archive all projects. It is therefore suggested that discussions be held with this Ministry to determine whether the inventory could be archived within this system.

Table 6 shows the identified actions to improve the quality assurance and quality control procedures 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
Transparent agriculture inventory calculation file	Incorporate data sources into the IPCC software files should the software continue to be used in future.
	Archive all IPCC software logins and passwords.
Archived IPCC software details	Create a document with all the software login and password details, along with a manual and archive this with the inventory.
Link the inventory with the online Knowledge Centre	Hold discussions with the Ministry of Spatial Planning to determine whether the inventory can be archived on the Knowledge Centre System, or how it could be linked to this system.

<sup>7</sup> The latest inventory report was still undergoing validation at the time this report was written so could not be fully assessed by the authors.

## 5. Overall action plan for improving Suriname's agriculture sector GHG inventory

Table 7: Comprehensive action plan for improving Suriname's agriculture sector GHG inventory

Goal	Actions	Priority (Low-L/ Medium-M/ High-H)	Timeline		
			Year 1	Year 2-3	Year 3-5
1. Formalizing the Climate Change Unit in the LVV	Develop a new institutional organogram and obtain approval from the Ministry of Internal Affairs.	H			
	Obtain formal assignment from HR of LVV to fill the agriculture and GIS specialist positions in the CC Unit.				
	Identify training opportunities for the Climate Change Unit staff.				
	Identify financing to allow the staff to complete the training.				
2. Formalised institutional arrangements for agricultural data collection	Draw up a data flowchart and identify key external data providers, discuss data requirements with these data providers.	M			
	Draw up an MoU, along with a document detailing data requirement (type of data, format, frequency, etc.), between the data provider and the Ministry of agriculture to formalise data collection.	M			
	Mainstream any internal data requirements into agricultural policies and strategies.	M			
3. Improved crop and livestock data	Assess the current extension services questionnaire for rice farmers and determine whether a few questions could be added or reworded to accommodate agriculture inventory data requirements.	M			
	Setup a stakeholder meeting with all relevant data collection departments to fully assess the current data collection templates and determine if any additional questions can be added to accommodate the climate change needs.	H			
	Establish a close relationship between the CC Unit, extension service and statistics department to ensure that future questionnaires meet the requirements for both production and climate change related analysis.	H			
	Setup a data flow system which allows the required data (for crops, livestock, and fertilisers) to flow from the relevant departments to the CC Unit.	M			
4. Provide enabling environment to collect improved data	Incorporate an agriculture GHG inventory component into the data management system developed under the Readiness Project.	M			
	Develop a manual and provide training to all users of the data management system.	M			
	Operationalise the data management unit under the Ministry of LVV.	H			
5. Improved nitrogen fertiliser data	Engage with the customs department to determine whether more disaggregated fertiliser data can be collected.	M			
	Setup an agreement to obtain the customs data at regular intervals.	M			

6. Improved data from agriculture census	Setup a meeting with the census consultant to assess the questions incorporated into the agriculture census.	H			
	Work with the consultant to reword or incorporate any questions to improve the data for the inventory.	H			
7. Build capacity within the inventory team to complete data analysis	Build the capacity of the CC team to be able to use splicing techniques to maximise use of various datasets.	H			
	Build the capacity of the team to collect uncertainty data and complete uncertainty analysis by sourcing funding for training activities.	H			
8. Increase data through GHG improvement research projects	Source funding for a GHG improvement projects	M			
	Establish a mechanism with research institutes or universities to convey the research needs to these research entities (such as an annual meeting or regular newsletter). Utilise the MoUs the Ministry has with the University of Suriname and CELOS to formalise this arrangement. Ensure all MoUs are updated.	M			
	Develop links with the Climate Change Knowledge Database and use this as a place to keep research related studies.	M			
9. Build awareness amongst data providers and policy makers around the importance of data for climate change monitoring	Conduct awareness campaigns for data providers and utilise the materials provided in the IICA GCF CARICOM AgReady Project to build awareness amongst data providers.	H			
	Develop material and hold an awareness campaign for policy makers to build awareness of data driven climate change policy and the importance of gathering data to track NDCs.	H			
10. Improved QA/QC for agriculture inventory compilation	Develop a QA/QC plan for agriculture inventory compilation, which should include roles, responsibilities, and check lists	L			
	Include a component on guidance for quality control of input data and selection of emission factors	L			
	Operationalise the QA/QC plan	L			
11. Transparent agriculture inventory calculation file	Incorporate data sources into the IPCC software files should the software continue to be used in future	H			
	Archive all IPCC software logins and passwords.	H			
12. Archived IPCC software details	Create a document with all the software login and password details, along with a manual and archive this with the inventory.	H			

## 6. References

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General Bureau of Statistics. 2020. "9th Environment Statistics Publication 2015-2019". Suriname.

Office of the President of the Republic of Suriname. 2016. "Second National Communication to the United Nations Framework Convention on Climate Change". Paramaribo, Suriname. <https://unfccc.int/resource/docs/natc/surnc2.pdf>

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