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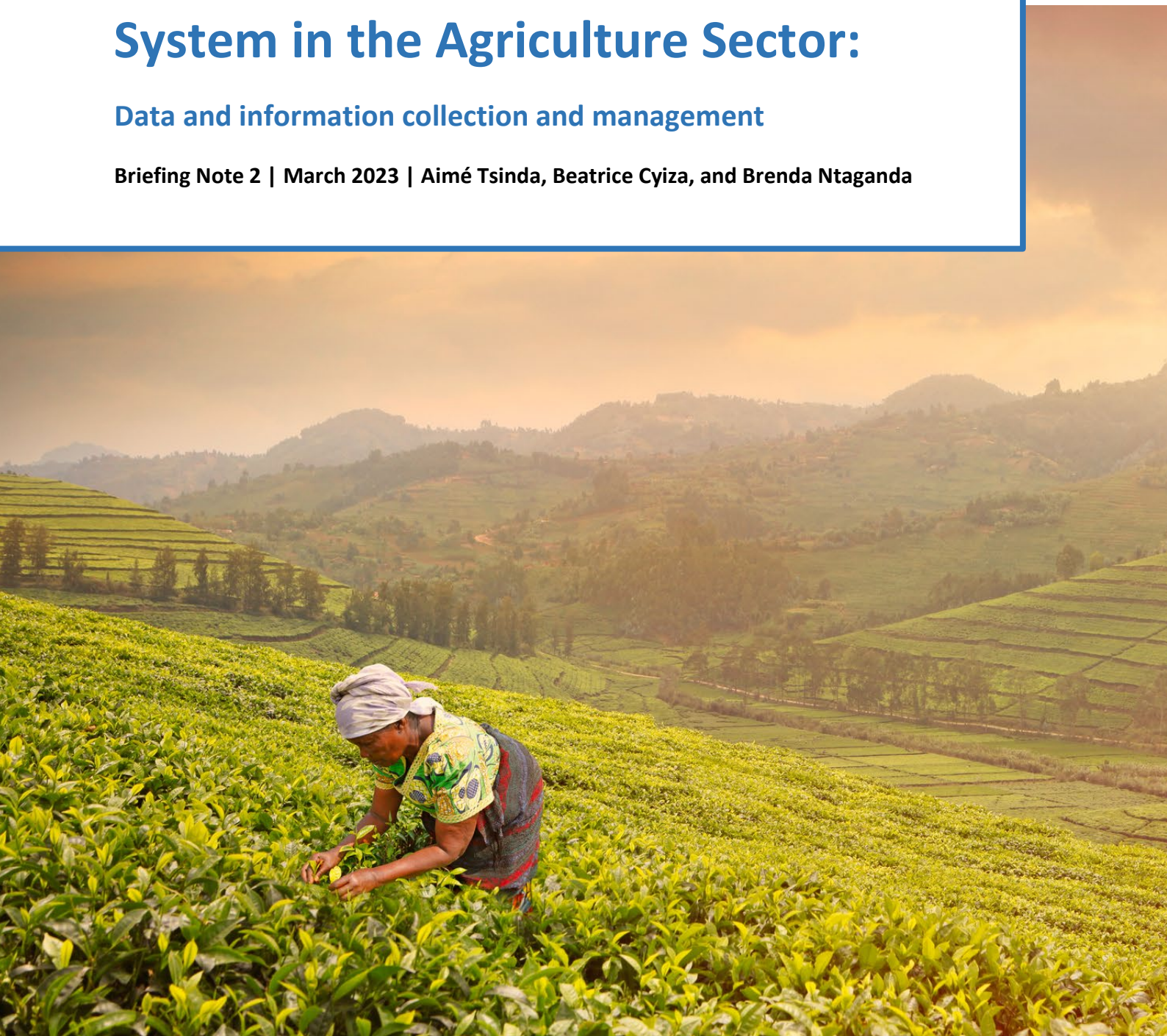
Rwanda's Climate Adaptation Monitoring, Evaluation, and Learning System in the Agriculture Sector:

Data and information collection and management

Briefing Note 2 | March 2023 | Aimé Tsinda, Beatrice Cyiza, and Brenda Ntaganda



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Briefing Note 2

Ministry of Environment
Department of Environmental and Climate Change
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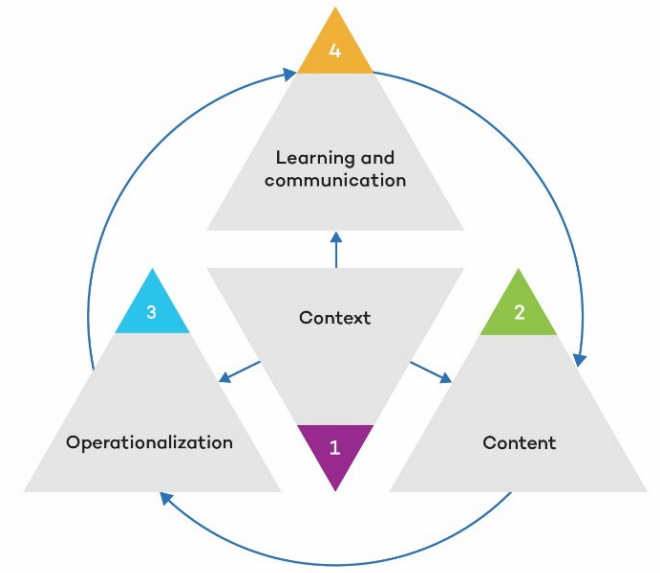
Foreword

The National Adaptation Plan Global Network is supporting the Government of Rwanda in the implementation of its roadmap to establish a monitoring, evaluation, and learning (MEL) system for climate adaptation, beginning with a pilot test of the MEL framework for Rwanda's updated nationally determined contribution (NDC) in the agriculture sector.

Progress on the implementation of MEL in the agriculture sector is set out in a series of briefing notes that follow the framework set out in the guidelines for MEL for the National Adaptation Plan process published by Deutsche Gesellschaft für Internationale Zusammenarbeit and the International Institute for Sustainable Development. The briefing notes address:

1. **Context:** Identifying the aims and objectives of the MEL system and setting out the policy context that guides it.
2. **Content:** Examining the indicators and types of information and data that are available (or not available) and need to be collected; clarifying the systems needed for data collection.
3. **Operationalization:** Elaborating on the institutional arrangements needed to implement the MEL system and identifying the resources available and needed to run the MEL system.
4. **Learning and communication:** Exploring how the information generated by the MEL system will be communicated, in which formats, and to which audiences (Price-Kelly, et al., 2015).

Figure 1. Building blocks of an adaptation MEL system



Source: Adapted from Price-Kelly et al., 2015.

This briefing note is the second in the series, and it examines the indicators identified to monitor adaptation action in the agriculture sector in Rwanda. In addition, the note reviews the information and data that are available (or not available) to report on NDC adaptation indicators as well as the information and data that needs to be collected to track progress on the identified indicators. The note clarifies the processes for data collection and analysis within Rwanda's adaptation MEL system.

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List of Abbreviations

BXW	banana Xanthomonas wilt
ENR	Environment and Natural Resources
ENR MIS	Environment and Natural Resources Management Information System
FAW	fall armyworm
GoR	Government of Rwanda
IWRM	Integrated Water Resources Management
MEL	monitoring, evaluation, and learning
MINAGRI	Ministry of Agriculture and Animal Resources
MINECOFIN	Ministry of Finance and Economic Planning
MIS	Management Information System
MoE	Ministry of Environment
MT	metric ton
NAEB	National Agricultural Export Development Board
NAP	National Adaptation Plan
NDC	nationally determined contribution
NGO	non-governmental organization
NISR	National Institute of Statistics of Rwanda
RAB	Rwanda Agriculture and Animal Resources Development Board
REMA	Rwanda Environment Management Authority

1. Introduction

This second briefing note examines the selected indicators for monitoring progress on the adaptation initiatives in the agriculture sector prioritized in Rwanda's nationally determined contribution (NDC) along with the systems established for data collection, management, and analysis. This analysis is a contribution to Rwanda's process to develop a monitoring, evaluation, and learning (MEL) system for adaptation, with an initial focus on the operationalization of the MEL system in the agriculture sector.

The note first reviews the priority adaptation actions in the agriculture sector in the NDC, the 10 indicators for tracking progress, and the baseline data collected for the indicators. Section 3 identifies the sources of information for tracking progress on the indicators, and Section 4 suggests possible improvements to the indicators. Section 5 reviews the data collection and management system and identifies potential improvements to the system. The conclusion identifies actions that could help fill gaps and address data and information needs and includes a suggested way forward.

2. Adaptation Interventions, Indicators, and Baseline Data in the Agriculture Sector

Rwanda's updated NDC includes six priority adaptation interventions in the agriculture sector and identifies 10 indicators to track progress on the implementation of the interventions (see Table 1).

The 10 indicators set out in the NDC to track the implementation of adaptation actions in the agriculture sector were developed through a comprehensive consultation process in which stakeholders achieved consensus. The consultation process to identify indicators considered:

- **Efficiency and cost-effectiveness:** An extensive review of the literature was undertaken to understand the types of indicators that could be tracked and reported on in an efficient and cost-effective manner.
- **Data availability:** The process encouraged the use of indicators for which information was already being collected, such as through the annual data collection processes of the Ministry of Agriculture and Animal Resources (MINAGRI) and processes to track progress on the implementation of the National Strategy for Transformation (NST-1).
- **Tracking adaptation progress:** The process differentiated between issues related to climate change adaptation and business-as-usual development.
- **Local and sector context:** The process chose indicators that complement or use information from the climate vulnerability and resilience assessment to understand impacts at the local and sector levels (Cook et al., 2020).

Table 1. NDC adaptation interventions and their corresponding indicators

NDC adaptation interventions	Indicators
1. Develop climate-resilient crops and promote climate-resilient livestock	1. Number of climate-resilient crop varieties developed 2. Percentage of farmers adopting climate-resilient crop varieties 3. Percentage of crossbreed livestock among national herd species
2. Develop climate-resilient post-harvest and value addition facilities and technologies	4. Capacity of storage constructed, in millions of metric tons (MT)
3. Strengthen crop management practices (disease prevention, diagnostics, surveillance, and control)	5. Number of farmers using surveillance tools (fall armyworm [FAW] database;[1] banana Xanthomonas wilt [BXW] app[2])
4. Develop sustainable land-use management practices	6. Area of land under erosion control measures and used optimally 7. Percentage of arable land (to the land area)
5. Expand irrigation and improve water management	8. Number of hectares under irrigation within the integrated water resources management (IWRM) framework
6. Expand crop and livestock insurance	9. Hectares of crops under insurance 10. Number of cows under insurance

Notes:

[1] The FAW database allows farmers to monitor and report on fall armyworm infestations and allows extension workers to calculate infestation levels and determine whether the spread of the worm is increasing or lessening. The app also features an advisory system that provides guidance to the user (Food and Agriculture Organization of the United Nations [FAO], 2018).

[2] This Android-based digital application helps farmers diagnose, control, and prevent BXM in banana plantations (International Institute of Tropical Agriculture, 2019).

Source: Ministry of Environment (MoE), 2020a.

The Ministry of Environment (MoE) and MINAGRI led a study that compiled baseline data for the 10 indicators for the six adaptation interventions in the agriculture sector (GoR, 2021b). Baseline values for each adaptation indicator in the agriculture sector were developed, drawing on information from a range of national and sectoral strategic documents, annual reports, and unpublished reports (see Table 2). The year 2020 was selected as the common baseline year based on data availability and consultations with key decision-makers. The list of relevant stakeholders for each indicator is provided in Table 2.

Table 2. Baseline values, targets for each climate change adaptation in the agriculture sector, relevant stakeholders, and sources of baseline data

Indicators (from Rwanda's 2020 NDC)	Baseline values for 2020 (information sources)	Targets (from the NDC implementation framework)	Relevant stakeholders for data collection[1]
Number of climate-resilient crop varieties developed	47 (MoE, 2021a, 2021b)	By 2025 and 2030, respectively, 100 and 200 climate-resilient varieties will be released, based on Vision 2050.	MINAGRI (Rwanda Agriculture and Animal Resources Development Board [RAB], National Agricultural Export Development Board [NAEB], private sector, non-governmental organizations [NGOs])
Percentage of farmers adopting climate-resilient crop varieties	22% (Season A) 12% (Season B) 15% (Season C) (NISR, 2019)	By 2025 and 2030, respectively, 50% and 90% of farmers will be using improved seed varieties.	MINAGRI (RAB, NAEB), MoE, Rwanda Environment Management Authority (REMA), private sector, NGOs
Percentage of crossbreed livestock among national herd species	58.5% (NISR, 2017)	Under development	MINAGRI (RAB, NAEB), private sector, NGOs
Capacity of storage constructed in MT	263,000 MT (MINAGRI, 2019)	In 2030, agro-processing facilities will increase storage capacity to 1,200,000 MT.	MINAGRI (RAB, NAEB), MoE, REMA, private sector, NGOs
Number of farmers using surveillance tools such as the FAW database and BXW app	2,000 farmers using surveillance tools (MINECOFIN, 2021b)	9,000 farmers using surveillance tools by 2025 and 18,000 farmers by 2030.	MINAGRI (RAB, NAEB), private sector, NGOs
Area of land under erosion control measures and used optimally	127,339.7 ha with radical terraces 958,777 ha with progressive terraces[1] (MINAGRI 2020)	142,500 ha of land with radical terraces, and 1,007,624 ha with progressive terraces by 2025.	MINAGRI (RAB, NAEB), National Land Authority, Rwanda Water Resources Board, Rwanda Forestry Authority, districts, private sector, NGOs

[1] Radical and progressive terraces are climate adaptation strategies that deal with the adverse effects of climate change manifested by heavy rains and causing soil erosion. While the radical terraces are essentially designed to reduce soil losses through enhanced retention and infiltration of runoff, to promote permanent agriculture on steep slopes and to promote land consolidation and intensive land use, the progressive terraces are used as climate smart techniques to stabilize the soil to prevent soil erosion.

Indicators (from Rwanda's 2020 NDC)	Baseline values for 2020 (information sources)	Targets (from the NDC implementation framework)	Relevant stakeholders for data collection[1]
Percentage of arable land (to the land area)	59% (NISR, 2020)	Biological soil conservation practices of 150,000 ha by 2025. The targeted percentage has not yet been determined.	
Number of hectares under irrigation within the IWRM framework	63,742 ha (MINAGRI Annual Report, 2020)	102,284 ha to be irrigated by 2025; 200,000 ha to be irrigated by 2030.	MINAGRI (RAB, NAEB), MoE, National Land Authority, Rwanda Water Resources Board, districts, private sector, NGOs
Hectares of crops under insurance (by season)	9,834 ha (9,477 ha of rice and 357 ha of maize) (MINAGRI, 2020)	37,462 ha of crops insured by 2025. Maize: 16,244 ha Rice: 10,322 ha Banana: 928 ha Cassava: 975 ha Beans: 278 ha Irish potato: 2,785 ha Soybeans: 278 ha French beans: 975 ha Chili: 500 ha Tea: 4,177 ha 102,284 ha of crops insured by 2030.	MINAGRI (RAB, NAEB), banks, insurance companies, private sector
Number of cows under insurance	17,373 cows (MINAGRI, 2020)	585,792 livestock insured by 2025 including the following: Poultry: 464,100 Piggery: 23,205 Cows: 98,487.	MINAGRI (RAB, NAEB), banks, insurance companies, private sector

Note:

[1] MINAGRI is the entity with the primary responsibility for collecting information for each indicator. MoE and the REMA are implicitly involved as they play a key role in managing, analyzing, and reporting on the data.

Source: MoE, 2021a, 2021b; Ministry of Finance and Economic Planning [MINECOFIN], 2021a, 2021b; MINAGRI, 2017, 2019, 2020; MINECOFIN & MINAGRI, 2021; MINAGRI, 2018; NISR, 2018, 2020.

3. Systems for Collection and Management of Data for MEL of Adaptation

The updated NDC calls for periodic and timely data collection, analysis, and overall management to ensure efficient monitoring, evaluation, and reporting on adaptation (MoE, 2020a). Rwanda's current data management systems form an excellent basis for collecting and managing adaptation data, and could form part of the adaptation MEL system. Work is underway to use these systems for adaptation MEL data, and a separate data management system is not needed.

Six of the 10 agricultural sector climate change adaptation indicators listed in the NDC are monitored and reported on through MINAGRI's Management Information System (MIS): (i) percentage of farmers adopting climate-resilient crop varieties, (ii) capacity of storage constructed, (iii) area of land under erosion control measures and used optimally, (iv) number of hectares under irrigation within the IWRM framework, (v) hectares of crops under insurance, and (vi) number of cows under insurance.

The MINAGRI MIS builds on the information set out in MINAGRI's annual reports and on the National Institute of Statistics of Rwanda's (NISR's) Seasonal Agriculture Surveys and Agricultural Household Surveys, which collect information to assist in tracking progress toward the targets of the Strategic Plan for the Transformation of the Agriculture in Rwanda (MINAGRI, 2018, 2020; NISR, 2017, 2020, 2022). Other sources of data for the adaptation MEL system include the Post-Harvest Facilities dashboard, the Cattle Registration System, the Nkunganire Information System, and the Catchment Restoration Opportunity Mapping Decision Support System (MINECOFIN and MINAGRI, 2021; MINAGRI, 2020; Nkurunziza, 2022; MoE, 2020b).

MoE operates the Results-Based Monitoring and Evaluation system, also referred to as the Environment and Natural Resources Management Information System (ENR MIS). This system was updated in 2022 to include the NDC Tracking Application, and is expected to track progress on the adaptation and mitigation indicators set out in the NDC.

The MoE and MINAGRI systems are based on the DHIS2 open-source platform,[2] which allows for easy configuration by system administrators, such as adding new data entry sheets, developing overviews of indicator data through dashboards and reports, and integrating the two systems (Gashugi et al., 2021). MoE plans to integrate information from the MINAGRI MIS with the ENR MIS with the aim of streamlining data collection efforts and ensuring that information on the NDC indicators in the agriculture sector is directly available in the MoE system.

Integrating the systems could take time, and information and data collection in the short term could be undertaken using a simple spreadsheet template. In 2022, MoE, with the support of the NAP Global Network, prepared and used such a template to collect data at the national and sectoral

[2]DHIS2 is an open-source web-based platform that is available at no cost. It is a tool for collecting, validating, analyzing, and presenting aggregate and individual statistical data, used mainly for health information management activities. It is a flexible user interface that that allows the user to design the contents of a specific information system without the need for programming (DHIS2 Documentation, 2022).

levels on the agriculture indicators (see Appendix 1). MoE tested the use of this template with actors in the agricultural sector and received feedback on the template during stakeholder consultations (MoE, 2022).

The initial monitoring of the progress of NDC implementation in the agriculture sector used this template to collect data on outputs and progress toward targets. Information was available to monitor progress toward most expected outputs, but identifying progress toward expected outcomes was challenging.[3] To evaluate the outcomes and impacts of the implementation of the adaptation actions, one of the first steps was collecting information on projects that may have contributed to achieving the desired adaptation outcomes, including project names, implementing agencies (lead and co-implementers), budgets, progress (activities, outputs, and outcomes), and learning.

Ideally, MINAGRI and relevant stakeholders would enter information about the NDC indicators into the template, which would be shared with REMA to arrange for the data to be validated. Once the data is validated and approved, it would be uploaded or entered manually by MoE into the NDC Tracking feature of the ENR MIS.

In addition, a specific template to collect qualitative data and information about project-level adaptation actions carried out by NGOs and the private sector was developed and tested at a stakeholder consultation workshop held in October 2022 (see Appendix 2).

Work is still needed to set out the specific steps and responsibilities for verifying the collected data and to establish the approach to data quality oversight; these endeavours are expected to be led by NISR (MoE, 2020a).

[3] The Government of Rwanda's *National Monitoring, Evaluation and Learning Guidelines* define outputs as the first level of results that emerge from undertaking activities in the short term, while outcomes form the second level of results and refer to medium term impacts (MINECOFIN, 2021). In regard to adaptation actions and indicators, an example is increasing irrigation actions. In the short term, this adaptation actions results in the output of an increased area of irrigated land measured by hectares. Over the medium term, the output should lead to the outcome of decreased climate vulnerability of farmers and more resilient crops, which could be measured by increased crop productivity.

4. Assessment of Indicators

This section reviews the 10 adaptation indicators in the agriculture sector set out in the NDC and offers suggestions to improve these indicators based on best practices and expert advice. The indicators set out in the NDC are quantitative and provide information on the progress of implementation for various actions as well as monitoring progress toward the achievement of expected outputs and targets.

While the indicators provide a means to monitor progress on the priority adaptation actions in the agriculture sector set out in the NDC, they could be improved in order to better assess progress on adaptation outcomes. For example, the Paris Agreement calls for climate action to be gender-responsive (United Nations, 2015), and the Gender Action Plan highlights the need to integrate gender-related considerations into adaptation plans and actions (United Nations Framework Convention on Climate Change, 2019). Under the NDC implementation framework and Rwanda's national MEL guidelines, gender-related elements are to be integrated into monitoring, evaluation, and reporting cycles (MINECOFIN, 2021a, 2021b). While Rwanda recognizes gender-related considerations in its NAP process, there is limited evidence that context-specific gender issues are considered in the NDC indicators.

The indicators are a framework for initial data collection, and the tracking of progress on the indicators is a first step in improving our understanding of how the Rwandan people and systems are adapting to climate change in the agriculture sector. With that in mind, here are suggestions for improving the indicators:

1. **Number of climate-resilient crop varieties developed:** This indicator does not provide information about the area planted with climate-resilient crop varieties. Additional indicators could help to address these gaps: area (in hectares) planted with climate-resilient crop varieties and assessments of the productivity of the climate-resilient crops, such as yield per hectare.
2. **Percentage of farmers adopting climate-resilient crop varieties:** The percentage of farmers using climate-resilient crop varieties provides a good indication of the uptake of these varieties. However, the current data only tracks the number of maize farmers using improved seeds (Gashugi et al., 2021). Additional information could be collected on the percentage of farmers adopting other climate-resilient crop varieties, such as rice, beans, legumes, tea, coffee, and other major crops. This would provide deeper insights into crops and areas that need additional support and resources. An agro-diversity perspective would involve looking at the extent to which farmers are diversifying their livelihoods and then tracking this over time. Simpson diversity indices[4] could be used as measures of agro-diversity, with assessment and data collection undertaken through yearly impact surveys. In addition, this indicator could be improved through disaggregation by farmers' gender.

[4] This is a measure of diversity which takes into account the number of species present, as well as the relative abundance of each species. As species richness and evenness increase, so diversity increases.

3. **Percentage of crossbreed livestock among national herd species:** This indicator is not included in MINAGRI's MIS. RAB undertakes surveys that can provide information to track this indicator, but they are not undertaken on a regular basis (Gashugi et al., 2021). RAB could potentially compile this information when collecting data on the number of cattle at the district level. Further, crossbreed livestock may demonstrate improved traits but may not necessarily show improved climate resilience. Disaggregation by animal type would provide further insights and is in line with global best practices (GoR, 2021b).
4. **Capacity of storage constructed, in metric tonnes:** This indicator could potentially be improved by disaggregating capacity by commodity type.
5. **Number of farmers using surveillance tools, such as the FAW database, BXW apps, and so on:** This indicator is not tracked in the MINAGRI MIS. The surveillance tools to be tracked need to be clearly identified, and approaches to track this information should be clarified. Data on farmers using these tools should be disaggregated by gender.
6. **Area of land under erosion control measures and used optimally:** An outcome-based indicator—area of productive land lost to soil erosion—could help determine whether interventions to control erosion result in reduced climate vulnerability.
7. **Percentage of arable land (to the land area):** A more appropriate indicator could be the area of degraded arable land.
8. **Number of hectares under irrigation within the IWRM framework:** This indicator does not provide information about the irrigation which is not formally under the IWRM. An indicator on improving irrigation efficiency would be more inclusive and help to increase adaptive capacity.
9. **Hectares of crops under insurance:** This indicator makes it possible to track the expansion in the uptake of crop insurance, but the data should be disaggregated by crop type. As well, the uptake of insurance should be tracked by the farmers' gender (women and men).
10. **Number of cows (or other livestock) under insurance:** The indicator is not currently tracked under MINAGRI's MIS and there is a need to add it on MIS. Further, a more improved indicator could be suggested to track the number of animals insured by livestock type (such as goats, sheep, pigs, and chickens in addition to cows).

5. Needs and Gaps in Data Collection

Significant progress has been made to operationalize the adaptation MEL system in the agriculture sector. MoE is responsible for the adaptation MEL system, which includes collecting and managing data and information. Here, we discuss gaps and needs in the data collection and management process.

- **Timing of data collection:** MoE officials stressed the importance of operationalizing the adaptation MEL framework through regular reporting on each adaptation indicator at the output level, with an initial focus on the agriculture sector. The timing of data collection—which could be quarterly, annually, or every two years—should be determined by the type of information being collected and the intended use of the data. Rwanda's National Monitoring, Evaluation, and Learning guidelines, for example, call for the monitoring of policies through an annual report on progress (MINECOFIN, 2021a, p. 17). In addition, the timelines for data collection and analysis should coincide with reporting requirements and policy updates.
- **Data collection templates:** MoE initially collected data on adaptation NDC indicators in the agriculture sector from MINAGRI and RAB using an agreed-upon reporting template. This data-sharing template specified the kind of data, the scope, the measurement units, and departmental responsibility (see Appendix 1). In the short term, before the MINAGRI MIS and ENR MIS are integrated, this template could be used to collect information that is then entered manually in the NDC Tracking feature of the ENR MIS.
- **Legal framework for collecting adaptation data in the agriculture sector:** To enable regular and efficient data collection, MoE and REMA could encourage NDC adaptation actions in agriculture to be mainstreamed into the MINAGRI *imihigo* (performance contracts). This could be done through the Environment and Climate Change Checklist that is annexed to the Planning and Budget Call Circulars issued by MINECOFIN as part of its national budgeting process.
- **Management information system:** The aim over the next two years should be to have the data inputted directly to the MoE server or database through a web-based portal. MoE intends to work toward a synchronized ENR-MINAGRI MIS system to collect and manage the information on the NDC indicators in the agriculture sector.
- **Linkages to established data collection and reporting processes:** A variety of systems in Rwanda collect data that could be relevant for the adaptation MEL system. Effort is needed to review and understand this data and to determine whether it can help MoE report on adaptation. Examples include the Catchment Restoration Opportunity Mapping Decision Support System for erosion tracking (MoE, 2020b), and reporting on the Convention on Biological Diversity, the Sendai Framework on Disaster Risk Reduction, and the Sustainable Development Goals.
- **Considering complementary information from climate vulnerability risk assessments:** Progress on the implementation of adaptation actions tracked through the MEL system could be complemented by findings from Rwanda's assessments of climate change vulnerability that were conducted in 2015 and 2018 and planned for 2023 (UNECA and REMA, 2015; REMA, 2019). In the agriculture sector, vulnerability indicators in these assessments included changes in agricultural production and irrigation access and crop

diversity at the household level. Analyzing the data collected under the adaptation and vulnerability indicators could improve understanding about whether and how adaptation measures are changing Rwanda's vulnerability to the impacts of climate change.

- **Evaluating and assessing progress on outcomes:** The NDC indicators are well designed to track progress at the output level, but they do not capture the assessment of progress at the outcome level. Work is required to move from tracking indicators and monitoring outputs (which is a needed first step for which excellent progress has been made in Rwanda) to evaluating adaptation outcomes and analyzing indicator data to understand how adaptation actions are affecting vulnerability and resilience outcomes. This likely will require the integration of qualitative methods such as interviews, expert input, and case studies to explain how the indicators relate to and provide information about adaptation outcomes.

6. The Way Forward

The MoE has taken initial steps to collect data to monitor progress on the implementation of the priority NDC adaptation interventions in the agriculture sector. Effective operationalization of the adaptation MEL system will require continued effort to establish systems to collect and manage data and to analyze the information to inform decision-making and feed into reporting. To move forward, action is required on the following:

- Integrating the MINAGRI MIS with the Results-Based Monitoring and Evaluation/ENR MIS to avoid scattering the efforts related to tracking NDC indicators.
- Using spreadsheet templates for data collection in the short term. MINAGRI could extract relevant NDC indicator data from the MINAGRI MIS and other sources and enter them into a template that is also made available to REMA and MoE.
- Reviewing how the servers and data collection processes work for other monitoring and evaluation systems and identifying lessons for the adaptation MEL system.
- Examining the timing of inputting and collecting data on indicators, drawing on the experience of joint sector reviews and other relevant processes.
- Examining whether additional information is available for revised indicators and determining how easy it would be to collect that information.
- Exploring the integration of adaptation MEL needs into the annual Environment and Climate Change Checklist that is annexed to the Planning and Budget Call Circulars.
- Examining data collected through potentially related processes—such as international agreements and climate vulnerability and risk assessments—to determine whether this data can inform and complement the assessment of the effectiveness of adaptation action.
- Identifying options for the evaluation of adaptation outcomes, including qualitative methods.
- Identifying relevant stakeholders to provide information on adaptation interventions and activities.
- Exploring the opportunities to incorporate data from additional sources, such as the Centre for Geographic Information Systems and Remote Sensing at the University of Rwanda and the Rwanda Space Agency.
- Documenting the data collection and reporting process in the agriculture sector so that it can be used as a reference for other sectors (such as water resources, land-use management, forestry, housing and human settlements, health, transport, mining, energy, and disaster risk reduction).

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Appendix A. Data Collection Template

Table A1. Adaptation NDC indicators in the agriculture sector—Example of Output 5: Crop management practices strengthened

Item	Data/information	Source of information
Expected outcome	Increased productivity, nutritional value, and resilience through sustainable, diversified, and integrated crop, livestock, and fish production systems that operate in a gender-responsive and climate-resilient manner.	MoE, 2020
Expected output	Strengthened crop management practices (disease prevention, diagnostics, surveillance, and control).	MoE, 2020
Indicator	Number of farmers using surveillance tools—fall armyworm (FAW) database, banana Xanthomonas wilt (BXW) app.	MoE, 2020
Baseline	2,000 farmers in 2019 and 2020.	Final baseline report, MoE 2021a
Target	9,000 farmers using surveillance tools by 2025 and 18,000 farmers by 2030.	MINECOFIN, 2021b
Actual status in 2021	2,356 farmers (329 youths, 1,072 men and 975 women) were mobilized to manage FAW. 200 extension agents were trained in FAW management. 4,500 farmers were registered into BXW application by farmer's promoters, and 4,000 farms were diagnosed.	MINAGRI, 2022
Names of projects contributing to progress on indicators	Crop Intensification Project/integrated plant protection and pest management; farmers with BXW disease application controlled and tested.	
Lead	Rwanda Agriculture and Animal Resources Development Board (RAB) (lead); MINAGRI.	
Budget execution (2020–21)	Rwandan Francs (Rwf): 402,424,970.	
Actual activities	1. Mobilization campaigns on pest management. 2. Training of frontline extension agents on FAW. 3. BXW management using Android BXW app. 4. Surveillance for major pests and diseases in bananas (BXW, thrips, banana bunchy top virus, etc.). 5. Training of farmers on how to identify, diagnose, control, and prevent BXW on banana farms and provide best agronomic practices by using the BXW application. 6. Monitoring and control of pests and diseases for crops.	RAB, MINAGRI

Item	Data/information	Source of information
Actual outputs	5,301 frontline extension agents trained on major pests and disease management and on safe pesticide use and handling. Total diagnoses: 5,800. Total BXW occurrence: 1,055. Total users reached: 3,039.	Source: ICT4BXW (information and communication technologies for BXW)
Outcomes	Increased agricultural productivity and nutritional value through pest and disease management.	Based on insights from MINAGRI; no assessment conducted
Impacts	Availability of food commodities in quantity and quality across the country.	Based on insights from MINAGRI; no assessment conducted
Lesson learned	As pests and diseases increase as the climate changes, proper and effective control is required on a timely basis to reduce negative impacts on productivity.	Based on insights from MINAGRI

Appendix B. Proposed Data Collection Template

Table B1. NGO and private-sector adaptation action in the agriculture sector

Item	Example or guidance
Sector	Agriculture
Type of adaptation activity or intervention	Indicate the focus of the activity implemented—for example, improved seeds, irrigation, erosion control.
Appropriate or relevant NDC indicator	Indicate which of the 10 NDC indicators in adaptation or agriculture are relevant to the adaptation activity or intervention: 1. Number of climate-resilient crop varieties developed 2. Percentage of farmers adopting resilient crop/ varieties 3. Percentage of crossbreed livestock among national herd species 4. Capacity of storage constructed in metric tons 5. Number of farmers using the surveillance tool (fall armyworm database, banana Xanthomonas wilt apps, and so on) 6. Area of land under erosion control measures and used optimally 7. Percentage of arable land (to the land area) 8. Number of ha under irrigation within Integrated Water Resources Management framework 9. Ha of crops under insurance 10. Number of cows under insurance
Short description of the activity or intervention	Provide a short description of the adaptation activity or intervention contributing to the chosen indicator.
Status of the activity or intervention	Indicate the status of the activity or intervention (completed, ongoing, or planned).
Progress achieved per year	Indicate the progress achieved on the indicator for each year.
Outcomes and impacts	Indicate potential outcomes and impacts.
Learning	Provide any lessons learned and any areas of improvement.
Description of costs	Provide the total cost (FRW) to achieve the project's adaptation targets.
Planned next steps	Include new activities planned for the upcoming year.
Contact information	Provide name and contact information (telephone and email).

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