

Annex 11 Monitoring and evaluation plans

Monitoring				
Data/Source	Collection Tool	Frequency	Indicator	Indicative Budget
<u>Measurement of emissions in the field and estimation of emissions according to the area of improved crops and livestock.</u> <u>National GHG inventories for agriculture in Colombia (if available for the targeted value chains).</u>	<u>Field observation visits</u> <u>Government data/records</u>	<u>Base, middle, end Line</u>	<u>M4.1 Tonnes of carbon dioxide equivalent (t CO2 eq) reduced or avoided (including increased removals) - forest and land use</u>	USD 190,000
<u>Primary data collection to estimate adoption technologies and</u> <u>Secondary data: annual datasets of some producer's associations; i) Rice: ENAM; ii) Fenalce, iii) Coffee Federation datasets (annual stats); iv) Fedepanela.</u>	<u>Field observation visits</u> <u>Survey/questionnaire</u> <u>Public expenditure reporting</u> <u>Government data/records</u>	<u>Base, middle, end Line</u>	<u>A1.2 Number of males and females benefiting from the adoption of diversified, climate resilient livelihood options (including fisheries, agriculture, tourism, etc.)</u>	USD 191,200
<u>Primary data collection about the status in terms of food security and</u> <u>secondary source: National Budget of Household expenses (ENPH) -DANE.</u>	<u>Field observation visits</u> <u>Survey/questionnaire</u> <u>Public expenditure reporting</u> <u>Government data/records</u>	<u>Base, middle, end Line</u>	<u>A2.2 Number of food secure households (in areas/periods at risk of climate change impacts)</u>	USD 191,200
<u>Primary data collection about the income different sources and their weight in the household economy.</u> <u>Secondary source: National Budget of Household expenses (ENPH) -DANE.</u>	<u>Field observation visits</u> <u>Survey/questionnaire</u> <u>Public expenditure reporting</u> <u>Government data/records</u>	<u>Base, middle, end Line</u>	<u>Percentage increase in household income from agricultural activities</u>	USD 191,200

Monitoring				
Data/Source	Collection Tool	Frequency	Indicator	Indicative Budget
<p><i>Plot data, capacity training, household behavior, farm production, modeling.</i></p> <p><i>Secondary data: annual datasets of some producer associations; 1) Rice: ENAM</i></p> <p><i>2) Cattle: datasets from FEDEGAN.</i></p> <p><i>3. Coffee Federation</i></p> <p><i>4. RENARE: datasets from national platform of GHG reduction projects.</i></p>	<p><i>Field observation visits</i></p> <p><i>Survey/questionnaire</i></p> <p><i>Government data/records</i></p> <p><i>GIS data</i></p>	<i>Annual</i>	<i>M9.1 Hectares of land or forests under improved and effective management that contributes to CO2 emission reductions</i>	<i>USD 190,000</i>
<p><i>Clear and precise data about information availability, capacity training, household behavior, farm production, and the incidence of extreme climate events, such as droughts and floods, among others.</i></p> <p><i>Secondary data: - Producers associations' reports about the use of their platforms.</i></p> <p><i>National reports of NDC implementation</i></p>	<i>Survey/questionnaire</i>	<i>Base, middle, end Line</i>	<i>A6.1 Use of climate information products/services in decision-making in climate sensitive sectors</i>	<i>USD 191,200</i>
<p><i>Monitoring and Evaluation reports, focus groups, stakeholder interviews, proposals made by the target groups to address climate topics.</i></p>	<p><i>Key informant interviews</i></p> <p><i>Surveys</i></p>	<i>Year 2 and 4</i>	<i>A7.1 Use by vulnerable households, communities, businesses and public-sector services of Fund-supported tools instruments, strategies and activities to respond to climate change and variability</i>	<i>USD 89,750</i>
<p><i>Clear data about information availability, producer knowledge, database of capacity trainings</i></p>	<p><i>Survey/questionnaire</i></p> <p><i>Other (please specify)</i></p> <p><i>Lists of training participants</i></p>	<i>annual</i>	<i>A8.1 Number of males and females made aware of climate threats and related appropriate responses</i>	<i>USD 89,750</i>
<p><i>Clear data about tools, innovations, technologies</i></p>	<i>Key informant interviews</i>	<i>Annual</i>	<i>Number of technologies and</i>	<i>USD 89,750</i>

Monitoring				
Data/Source	Collection Tool	Frequency	Indicator	Indicative Budget
<i>released or diffused by he different gremios and participant institutions</i>	<i>Field Observations</i>		<i>innovative solutions transferred or licensed to support low-emission and climate resilient development as a result of GCF support</i>	
<i>Clear data about producer/technicians' knowledge, database of capacity trainings</i>	<i>Survey/question naire</i> <i>Other (please specify)</i> <i>List of training participants</i>	<i>Base, middle, end Line</i>	<i>Percentage of farmers/technicians who perceived that their knowledge improved as a result strengthened and modernized agriculture extension system differentiated by gender.</i>	<i>USD 191,200</i>
<i>Clear data about the use of the information for taking decisions</i>	<i>Survey/question naire</i>	<i>Base, middle, end Line</i>	<i>Percentage of farmers that use as source of information for agroclimatic services (bulletins, early warning text messages, online information), those promoted by the gremios</i>	<i>USD 191,200</i>
<i>Clear data about information availability, producer knowledge, database of capacity training.</i>	<i>Survey/question naire</i> <i>Other (please specify)</i> <i>List of training participants</i>	<i>Annual</i>	<i>Number of farmers aware of and who know how to differentiate climate risks, their effects and related mitigation measures, differentiated by gender</i>	<i>USD 191,200</i>
<i>Clear data about material/varieties released, farm characteristic.</i>	<i>Survey/question naire</i>	<i>Base, middle, end Line</i>	<i>Area planted (in hectares) under the variety or using seeds recommended for the area</i>	<i>USD 191,200</i>
<i>Clear data about water practices, farm and producer characteristic, crop productivity.</i>	<i>Field observation visits</i> <i>Survey/question naire</i>	<i>Base, middle, end Line</i>	<i>Area (ha) under efficient water use practices</i>	<i>USD 191,200</i>

Monitoring				
Data/Source	Collection Tool	Frequency	Indicator	Indicative Budget
	<i>GIS data Survey/questionnaire</i>			
<i>Clear information about new (type, participants, products) business models to address climate topics</i>	<i>Key informant interviews Document review</i>	<i>Base, middle, end Line</i>	<i>Number of value chains developing novel and inclusive business models to boost climate resilient and low emissions agriculture</i>	<i>USD 89,850</i>
<i>Clear data about the project knowledge of the financial institutions, potential credits or programs.</i>	<i>Survey/questionnaire Document review Key informant interviews</i>	<i>Base, middle, end Line</i>	<i>Number of financial institutions aware of the project benefits and opportunities and involved in projects activities</i>	<i>USD 191,200</i>
<i>Clear data about farm production, climate shocks, crop losses</i>	<i>Survey/questionnaire</i>	<i>Base, middle, end Line</i>	<i>Percentage of crop loss due to climate effects, pest and diseases</i>	<i>USD 191,200</i>
<i>Clear data about management practices and incidence of pest and diseases</i>	<i>Survey/questionnaire</i>	<i>Base, middle, end Line</i>	<i>Reduced incidence of pests and diseases</i>	<i>USD 191,200</i>

Evaluation			
Type	Timing	Independent/Self-evaluation	Indicative Budget
<i>Process</i>	Monitoring and reporting	Self-Assessment	1,889,500
<i>Process</i>	Baseline data collection, during inception of the project	IndependentIndependentIndependent	210,000
<i>Process</i>	Mid-Term Line data collection within three years from the start of the project implementation (first quarter of the 3 year)	Independent	97,500
<i>Impact</i>	Years 4 and 5	Independent	100,000
<i>Process</i>	Final line data collection will be due within 9 months before the end of project implementation	Independent	210,000
<i>Outcome</i>	Mid-Term and Final-Line data analysis	Self-Assessment	526,500

In addition to the described indicators, we will collect basic information as productivity (ton/ha), farm, and household characteristic and context conditions (infrastructure, markets, policies).

1.1. Monitoring and Evaluation (M&E): General considerations

Key concepts

According to the World Bank¹, monitoring is a continuing process of collecting and analyzing routine information on specific indicators in order to assess the progress of a project or program's activities vis-à-vis specific goals. This process helps visualize and report how activities and resources are being implemented compared to expectations and whether any corrective action is required. This is an essential process in project implementation because it informs stakeholders and assists decision-making while the project is ongoing.

On the other hand, **Evaluation** determines the project's relevance and pertinence in achieving its initial objectives. These objectives are measured by means of specific indicators, while trying to determine the degree of attribution and causality of the changes in these indicators to the interventions carried out as part of the project. Evaluation is also instrumental in generating information on lessons learned and policy recommendations for future decisions.

This process can be carried out periodically along with monitoring, and is known as Process Evaluation. Usually, an Impact Evaluation is carried out at the end of the project for an independent agency to analyze the difference in the results of interest with and without project implementation. Evaluation differs from monitoring, as it goes beyond establishing whether or not a specific goal was met and determines whether the changes are significant, attributable to the intervention, and sustainable.

According to the Organization for Economic Cooperation and Development (as cited in Ballard et al., 2010), an evaluation must report on the following criteria:

- **Relevance:** - the extent to which the activity is suited to the priorities and policies of the target group, participant and donors;
- **Effectiveness:** the extent to which an activity attains its objectives;
- **Efficiency:** the extent to which resources have been used efficiently;
- **Impact:** the positive and negative changes produced by the intervention; and
- **Sustainability:** the extent to which the environment created by the project can continue after completion.

Although their roles differ, monitoring and evaluation perform complementary functions. M&E is a process that allows measuring the progress and effectiveness of the different phases of project implementation, while identifying each activity's achievements, strengths and weaknesses in accomplishing expected results. M&E is a learning process during project implementation, which promotes evidence-based decision-making that plays a critical role in accountability processes.

The importance of a Monitoring and Evaluation system (M&E)

In this sense, an M&E system allows:

- Identifying activities and outputs that are performing well, detecting problems during the process and taking corrective action.
- Generating objective results that allow informed decision-making regarding activities.

¹ Available online at: <https://ieg.worldbankgroup.org/what-monitoring-and-evaluation>

- Ensuring the efficient use of resources and contributing to transparency.
- Evaluating to what extent the results are exclusively attributable to the project and how they can be sustainable.
- Converting project implementation experiences into lessons learned for the future.

Elements of a Monitoring and Evaluation (M&E) system

It is important to specify the following elements during the planning stage in order to establish an efficient M&E system:

- ✓ **Indicators:** Select quantitative or qualitative variables to measure progress in the M&E stage.
- ✓ **Data source and data collection plan:** Specify where and how the information will be collected to carry out M&E activities.
- ✓ **Monitoring plan:** Specify how monitoring will be carried out and its periodicity, provide detailed information on the indicators that will be used and how they will be reported.
- ✓ **Evaluation plan:** Define an evaluation design that will be used to measure changes, the methodology to be used and provide detailed information on the indicators.
- ✓ **Reports and dissemination methods:** Determine how the information from each of the reports will be analyzed, presented and disseminated.

The following section addresses these elements for the project's Monitoring and Evaluation system in further detail.

2. Monitoring and Evaluation System (M&E) for project performance

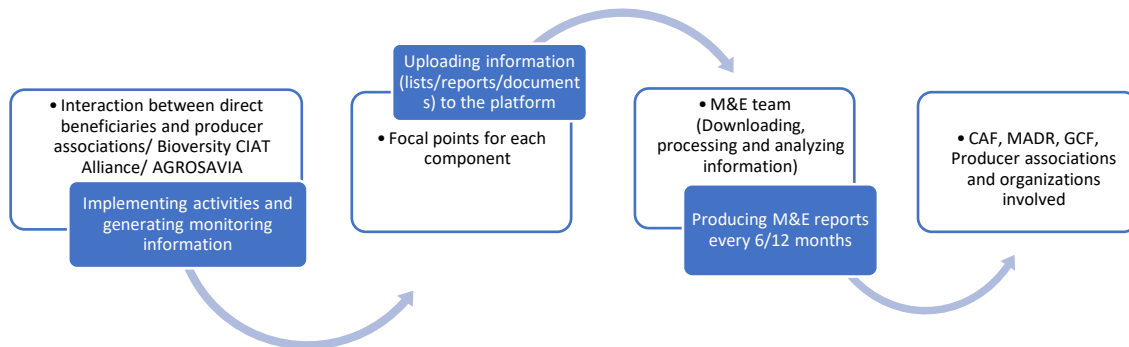
2.1. Organizations responsible for implementing M&E activities

The project was formulated by the Alliance Bioversity International and CIAT, with the support of MADR, AGROSAVIA and the Development Bank of Latin America (CAF), as the accredited entity of the Green Climate Fund (GCF). Besides these entities, producer associations and research centers related to each crop or agricultural product (listed above) will play a lead role.

The teams from the different institutions involved need to work together to implement the monitoring system. Therefore, the system will be implemented by the Alliance Bioversity-CIAT, led by the Foresight, and Applied Economics for Impact unit (FAE4Impact), in coordination with Agrosavia. This group will be in charge of collecting information from different sources and conducting periodic monitoring analyzes.

Furthermore, communication and collaboration among component leaders and the key actors of each producer association will be critical, since information on the activities they carry out (attendance lists, reports and others) will be required to process monitoring information.

Figure 2. Information flow between organizations



Source: Own preparation.

2.2. Information and data collection sources

Platform

The project considers the creation of a data storage platform to store all information related to activities implemented. For this, a focal point will be assigned for each focus area to help upload progress made. The platform will be designed based on the components and focus areas and will include different modules. Each producer association must have a focal point that consolidates the information and shares it with those responsible for each focus area in order to feed the platform twice a year or annually, depending on the type of indicator. This requires collaborative work between the institutions. This platform is designed to centralize the information that will aid the M&E process and will store it for future requirements. Once the platform is operational and constantly updated, the M&E team will be in charge of collecting the information derived from the platform and reporting it, in addition to the data that the field team will collect.

Focus groups and monitoring pilots

Besides the information on the platform, other primary information sources such as focus groups and monitoring pilots will be used for M&E purposes. These will be carried out in the project's second and fourth years. Focus groups will be mainly aimed at providing qualitative evaluations of interactions between people, in an effort to feed into and enhance the understanding of quantitative indicators (this methodology is explained in the next section). Additionally, during these two years, there are plans to collect beneficiary sub-sample data disaggregated by crop. This process is known as monitoring pilots and will help us obtain information on how the activities are progressing and how farmers are interacting with this information.

Along these lines, the following data will be used as sources to conduct periodic monitoring reports:

- Participation and attendance lists for training courses for extension technicians, provided by producer associations and those responsible for each component where the activities were carried out.

- Participation and attendance lists for activity sessions to share information and knowledge (internships, demonstration tours and experience exchanges, among others) to farmers (all crops) and/or people from the institutions involved.
- Participation and attendance lists for education and training activities (workshops, seminars, strengthening academic programs and training for scientists) to farmers (all crops) and/or people from the institutions involved.
- Report on the number of demonstration plots carried out per component. This information is provided by the producer associations and those in charge of each component.
- Data collected by the M&E team during baseline, midline and end-line assessments. Also, data collected from the monitoring pilots, which will be carried out at specific times to obtain information on beneficiary sub-samples.
- Individual reports from the directors of each component on the activities carried out every six months and/or annually.
- Individual reports from the producer associations on activities carried out every six months and/or annually.

Depending on the periodicity of the report, all available and necessary information will be collected and processed by the monitoring team. Data will be handled to ensure confidentiality. Once the information is available, it will be necessary to review the information and clean it as necessary before analyzing it. The information will then be analyzed and organized according to the indicators initially proposed (described below in this document). Finally, once the indicators have been calculated, the semi-annual/annual reports will be drafted and shared with the people involved in the project, who will receive feedback on the activities carried out.

2.3. Monitoring reporting system

Semi-annual reports

Throughout project implementation, the monitoring strategy will be applied with semi-annual reports, so that feedback can be provided to the different activities and corrective actions can be made while the project is in progress. These reports will be made based on the information collected from the sources mentioned above and a previously defined indicators guide. These monitoring reports must specify:

- Progress made vis-à-vis activities programmed in the work plan for that period, identifying achievements regarding outputs.
- Any difficulties, particularly of a technical nature, that were encountered while implementing the activities and an explanation of these difficulties.
- Recommendations to project managers on overcoming the difficulties identified and how the global agenda would need to be adjusted.
- Next steps and expectations for the next semester.

These reports will have a specific template and will provide concise and useful information. The reports will be presented to the MADR, CAF and GCF.

Reports

Annual reports will include year-long lessons learned based on the monitoring process and will highlight activities deemed as achievements by each component. This document will be very valuable for decision-making processes. The Mid-term and end-of-project report will be complementarians and include achieved outcomes vis-à-vis planned outcomes. This information will be disaggregated by gremios and by gender where appropriate.

3. Process Evaluation

Process evaluation differs from periodical monitoring processes that focus on some indicators mainly related to project development. Typically, monitoring focuses on inputs, activities, and outputs, although it can sometimes consider outcomes, for example, when it assesses the progress of program objectives. In the case of this project, the process evaluation will be under the responsibility of the Bioversity–CIAT Alliance, through its Forecasts, Applied Economics and Impact Evaluation unit (FAE4Impact).

3.1. Methods

In this context, it is suggested that the process evaluation be carried out at three levels: (a) micro or household level (producers and their households); (b) at the meso or organizational level with a focus on producer associations; and (c) at the macro level, in terms of influence on policies related to climate change.

3.1.1 Micro level. In the evaluation at the producer and household level, the basic question is: What is the impact of the program intervention on the results identified? This implies comparing a person with and without the intervention (the other characteristics/variables must remain constant). However, as this is not possible, methodologies have been developed to establish a valid control group. Selection bias² is the main problem encountered in identifying the treatment and control groups. To control this type of effects, we suggest collecting panel-type data (three collection cycles: baseline, midline and end-line) to mitigate these biases and combine basic data analysis, such as descriptive statistics and qualitative analysis, with other quasi-experimental techniques, such as propensity score matching with difference-in-differences using the panel, as well as using instrumental variables³. According to the GCF, an independent agency will carry out an external impact evaluation at the end of the project. It will use the data collected in the baseline, mid-term, and endline. However, the project M&E team will use the data to estimate the indicators for the monitoring and evaluation process.

A baseline will be established⁴ on the first year (beneficiaries and controls), to assess the status of the target population in each crop and as a reference to compare the measurements that will be made later and confirm the starting point of the indicator defined in the proposal. This information will be built using available databases on crops and it will be complemented with data collected through surveys conducted directly with beneficiaries. For each crop, there will be a statistically representative sample of the regions where the interventions will be carried out. It is estimated that between 800 and 1000 observations/surveys will be applied for each participating producer association, including the treatment and control groups. Mid-way through the project, a midline will be established, focusing on the treatment group/beneficiaries, to evaluate the adoption of the technologies and provide suggestions to achieve the final objectives of the project. In the last year, the formats used for the baseline will be applied to both the treatment and control groups. This will enable assessing whether there were any positive or negative changes that are attributable to the project (end-line).

² Selection bias is understood as the non-random selection of the group of beneficiaries.

³ The idea behind "instrumentation" is to find an observable exogenous variable or variables (instruments) that influence the participation variables but do not influence the outcome of the program to be implemented. This method is useful when it is not possible to estimate the impact using the control group as a suitable 'counterfactual group' (World Bank, 2010).

⁴ The baselines are independent for each producer association and will be applied once information dissemination activities begin with farmers belonging to each association.

The quantitative analysis will be supplemented with a qualitative analysis that seeks to understand the processes and their results, especially those related to empowerment or knowledge adoption. These types of studies are usually carried out through quantitative monitoring, which may not capture the complexity of context-specific and interrelated aspects, often assuming a "linear progression and details milestones to be attained" (Jupp et al., 2010: 16). While predominantly quantitative M&E methods can provide insight into complex change processes by "capturing evidence of those aspects of empowerment which deal with skills and training – capacity building – and are also useful in capturing evidence relating to increases in women's economic assets" (Carter et al., 2014: 340), this approach is less useful when it comes to capturing intangible changes and perceptions. Therefore, a qualitative approach allows for a more refined description and understanding of the changes. There are many methodological challenges to selecting indicators to measure empowerment or knowledge adoption, such as making decisions regarding the inclusion of intrinsic or instrumental aspects, context-specific or universal, individual or collective aspects, and/or including psychological factors, to name a few (Narayan, 2005). One of the main challenges of monitoring and evaluation research is "to measure empowerment or knowledge adoption across the diversity of interventions that organizations implement, while being sensitive to the diversity of context across different regions cultural factors" (Bishop and Bowman, 2014: 263).

A mixed-methods approach was chosen as it allows for depth and breadth of analysis, while shedding light on the systemic connections between the decisions and experiences of individuals from particular social contexts. The level of interaction between qualitative and quantitative standards is that the latter are embedded in the former. In other words, the research draws emphasis on qualitative methods, while quantitative methods are assigned a secondary role. The reason for prioritizing qualitative research is that it works well in exploring understudied processes and relevant variables that have yet to be identified (Marshall & Rossman, 2011). Furthermore, it is a great approach for addressing "how" questions, examining and articulating processes (Pratt, 2009: 856). The objective of research is to discover the processes and possible mechanisms that enhance and hinder empowerment or knowledge adoption, instead of describing only the final results. A qualitative approach allows focusing on social relations, exploring how different actors negotiate, resist, fight and support the conditions of empowerment and disempowerment. Quantitative data plays a secondary role, since its indicators do not measure empowerment *per se*, but rather provide complementary information to the analysis of qualitative data.

The data collection methods include focus groups, semi-structured interviews and surveys. The main objective of conducting semi-structured interviews is to capture the profound meaning of experiences, perspectives, and motivations in participants' own words (Marshall & Rossman, 2011). It also offers the opportunity to expand and clarify issues derived from other methods. Focus groups are used to increase the breadth of information, focusing data on specific topics while capturing group interactions that are not possible with other methods. Focus groups provide information on complex behaviors and motivations that result from the group effect (Morgan, 1996). For focus groups and semi-structured interviews, this research will use a combination of purposive, snowball, and segment sampling to select participants by crop. Finally, standardized survey data using representative random sampling provide information to support the qualitative analysis..

3.1.2 Meso level. (Strengthening producer associations on climate change) uses a qualitative and quantitative analysis based on semi-structured interviews with key actors and discussion groups in each of the producer associations involved. Representative surveys will also be applied to producer associations' technicians regarding their perception of the information received and its use.

3.1.3 Macro level. It includes the project's possible analysis on changes in government climate change policies, at different national, departmental or local levels. A review will be carried out to assess the policies designed at the different levels and this evidence will be supplemented with information generated by key informants.

3.2. Data collection

In general, data collection is often the most expensive part of an evaluation, regardless of whether the field work is outsourced or done in-house. We suggest hiring a firm to collect quantitative data, to avoid any bias caused by conflicts of interest. However, the project's M&E team will be responsible for designing the collection instrument and conducting training. Data collection will be done through devices and will feed the project's information platform. Independent firms will be hired to collect baseline, midline and end-line data.

4 Monitoring, Reporting and Verification of GHG emissions reduction

Measurement, reporting and verification (MRV) of progress in climate change initiatives has become one of the most important strategies to demonstrate the transparency and effectiveness of mitigation actions. MRV is a reliable and useful planning tool for countries that need reliable information on their emissions and actions, both locally and nationally.

An MRV system allows standardizing and verifying processes for measuring, monitoring, collecting and managing data, and reporting on climate change related information. This information is necessary to demonstrate compliance with national and international goals, and to ensure the quality and consistency of data reported. The MRV system must monitor GHG emissions and the implementation of mitigation measures and their impact on reduction. Furthermore, the MRV must monitor climate change management financing. Likewise, this system must follow up on the adaptation measures undertaken by the country, and also monitor, report and evaluate the implementation and impact of these measures.

In the context of the CSICAP project, the objective of the MRV system is to monitor progress and results of mitigation actions that will be implemented in nine crops nationwide: rice, maize, potatoes, panela cane, bananas, plantains, , , and livestock production systems. These actions include the adoption of agronomic management technologies and low-carbon transformation processes that will be massively implemented.

The guiding principles for a transparent MRV framework are also useful, among others, for the preparation of the National Inventory of Greenhouse Gases (INGEI), national communications, the BUR and other reports generated as part of Colombian MRV. These guiding principles are reliability, comparability, consistency, accuracy, completeness, comprehensiveness, relevance, and transparency, in addition to avoiding double counting. Detailed descriptions are listed in the table below.

4.1 Data collection

The general objective of MRV is to identify and evaluate the impact of the adoption of low-carbon technologies in the agricultural sector, by:

- Generating primary information on emissions from soil management and enteric fermentation in conventional production systems and sustainable systems in the main producing regions of each crop in the country.
- Improving and ensuring quality information on GHG emissions and reductions associated with the implementation of mitigation actions in the project implementation areas.
- Providing timely information to monitor the progress of the different commitments regarding mitigation.
- Building capacities in producer associations for the preparation of GHG inventories.
- Improving transparency and accountability to build trust between donors and recipients and increase the effectiveness of mitigation actions.
- Increasing the visibility of efforts and reporting to different actors on the impact of mitigation measures.

4.2 Activities

The methodologies to estimate GHG emissions and removals associated with the implementation technologies will follow the IPCC guidelines (2006 and 2019), the methods that IDEAM uses for the construction of National Communications and BURs, as well as the protocols, more detailed methods and models developed in the component 2.2.

Since project activities largely consider community behavior change, the MRV system establishes a **monitoring** mechanism that will include:

- The generation of emission factors: prior to the massive implementation of mitigation technologies, pilot plots will be implemented according to productive typology, prioritized region, cultivation and prioritized mitigation practice, in order to evaluate the performance of the mitigation potential of the practices compared to conventional production systems. The emission factors of mitigation technologies will be collected in the framework of the component 2 (Activity 2.2.2 and Activity 2.2.5), during 1 and 2 years of implementation of the project, including the incorporation of rational use of fertilizers and bioproducts (potatoes, maize, rice, panela, banana and plantain), optimization of irrigation systems (rice, potato, plantain and banana), conservation agriculture (potato and maize), use of harvest residues (maize, banana), low-emission planting materials (rice), optimization of processing systems (panela), water harvesting (rice, panela and plantain, intensive and non-intensive silvo-pastoral systems, pasture rotation, scattered trees in pastures, and hedges fodder (for livestock).
- Survey and counting protocol: once the massive technology implementation process begins, survey and counting process will be carried out annually. The surveys will enable identifying the productive typology of each intervened producer and the activity data of each property in order to generate the inventory of emissions by intervention. The survey to collect activity data will be implemented during massive technology implementation in the framework of component 2 (Activity 2.2.7).

- Protocol for the evaluation of technology performance: the protocol includes technical visits to each producer to collect information related to inputs used, performance, areas, among other parameters.

The monitoring mechanism will define measures to monitor:

- Management and progress of project activities and strategies.
- Reduction of GHG emissions per hectare and head of cattle.
- The contribution to the sector's sustainable development.

The **Report** process present the results of the consolidated and analyzed information in the monitoring activity. This procedure is carried out by an experienced professional in GHG inventories who, in communication with focal points of component 2, receives and consolidates the information generated in the pilot systems, and during the massification of technologies.

The presentation of reports will be carried out using standardized formats and a well-defined institutional framework which will be in accordance with those adopted by IDEAM in the preparation of the reports presented to the UNFCCC. Input data will be collected and reported every year, and information and methodologies will be verified every year.

The **verification** will be done as an independent verification process of the accuracy and reliability of the reported information or of the procedures used to generate the reporting and monitoring information. Verification also provides quality assurance and control that improve the entire MRV system.

First party verification (internal): In verification, a review of compliance with mitigation goals and objectives is made at different scales, and allows quality assurance, information control and a review of compliance with reduction goals and objectives of GHG emissions. The assumptions and methodology used to estimate GHG emissions and removals at the technology level in each crop are verified according to the IPCC guidelines.

Third party verification (external): The results will be submitted to an "international consultation and analysis" developed by a team of experts. Despite being a transversal component, the verification actions will take place after the presentation of the annual reports, in order to corroborate compliance with the MRV principles and, if applicable, generate adjustments and corrections; This element constitutes a fundamental tool for feedback and improvement of the system over time.

4.3 Scope

According to the proposed guidelines for the Monitoring, Reporting and Verification (MRV) System for Colombia, the MRV of the CSICAP project will focus on measuring emission reductions according to the emissions baseline scenario. The project will report data on emissions savings as well as methodologies, coverage and activities, and all quantitative and qualitative information reported for mitigation measures will be verified.

Suggested indicators:

- Hectares established or intervened with mitigation measures.
- Number of producers adopting mitigation actions.
- Productive indicators (ton/ha).

- Gross GHG emissions per unit area and per animal unit in agricultural systems: Aggregate emissions, over a period of one year, of the six GHG categories of agricultural activity in the pilot farms.
- Carbon absorption in agricultural sinks: Amount of carbon absorbed and stored in the production system intervened with mitigation actions.
- Net GHG emissions (balance) per unit area: The net sum of gross GHG emissions and carbon removals in a given area.
- Emission intensity per unit produced: Net emissions of the system per unit produced.

5 References

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