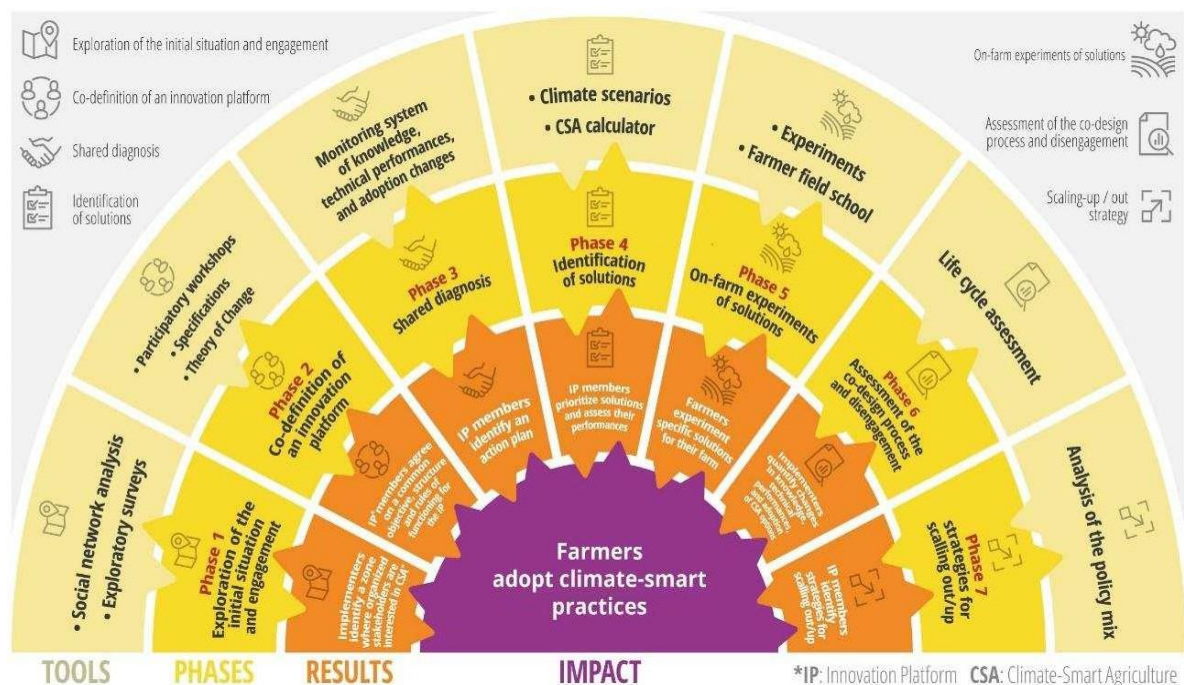


# Methodological Guide to Co-design Climate-smart Options with Family Farmers

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# Foreword

This methodological guide has been prepared under the framework of an action-research program with family farmers in the departments of Cauca (Colombia) and Gracias (Honduras), funded by Fontagro, the Agropolis Foundation, and the CCAFS Program (Climate Change and Food Security, [www.ccafs.org](http://www.ccafs.org)). Cauca is located in the Colombian Andean region and Gracias, in the dry-corridor area of Honduras. In the case of Colombia, the scenarios foresee a reduction in the yields of subsistence crops (maize, beans, cassava, and plantain) and cash crops, such as coffee and cocoa. The major issues facing the Honduran dry-corridor area include land degradation, erosion, and severe drought; projections of climate-change scenarios predict an increase in temperature and a reduction in rainfall. The goal of the project was to strengthen the ability of farmers to adapt to climate change through a participatory process. The basic assumption was that an innovation platform could support the generation and exchange of knowledge on climate change, thus identifying and implementing adaptation options suitable to the local needs of participating farmers.

The methodology set out in this document is aimed at all the people working with and within rural communities and may be used by: teachers to train the new farmers; agricultural engineers or rural development technicians; researchers, who could use it as an analytical tool; and institutions to develop actions or support public policies.

The purpose of the guide is to provide a methodology that allows co-building programs and actions to tackle and adapt to climate change with the communities.

# Introduction

Climate-smart agriculture (CSA) seeks to improve productivity for the achievement of food security (pillar 1: Productivity), to develop a better ability to adapt (pillar 2: Adaptation), and to limit greenhouse gas emissions (pillar 3: Mitigation). Technical and organizational innovations are needed to find synergies among those three pillars.

Innovation (its creation and its operation) is a social phenomenon. Many studies worldwide have shown that promoting a sustainable change and innovation within organizations has to be analyzed and implemented with stakeholders. Thus, the ability of local actors to tackle climate change and mitigate its effects will depend on their ability to innovate and mobilize material and non-material resources, to articulate links among national policies, not only between themselves, but also undertaking actions at the local level. To support stakeholders in the development of responses to this challenge, we propose the development of open innovation platforms, in which all local actors may participate. These platforms are virtual, physical, or physico-virtual spaces to learn, jointly conceive, and transform different situations; they are generated by individuals with different origins, different backgrounds and interests (Pali and Swaans, 2013).

Today, there are not many methodological guides to implement open innovation platforms to tackle climate change, nor to develop a systems approach to consider the socio-technical complexity of innovation processes.

The purpose of this manual is to provide a seven-step methodology to allow family farmers to co-build and adopt CSA options to tackle climate change in an open innovation platform (*Figure 1*):

1. The first phase (**phase 1**), known as “**exploring the initial situation and engagement**”, allows the identification of an area where the community and/or local stakeholders have an interest in developing practices to tackle climate change. This phase undertakes network analyses and/or exploratory surveys.
2. The second phase (**phase 2**) engages in “**co-defining the innovation platform**” through participatory workshops where members (interested local stakeholders identified in the first phase) agree on which are the objectives of the platform (what it means to tackle climate change) and how it will operate (who will be the facilitator?, how to work together?, how frequently will members meet?, among other questions).
3. The third phase (**phase 3**) develops a “**shared diagnosis**”, in which platform members characterize the strengths and weaknesses of their farms, the opportunities and barriers, as well as the main challenges they need to overcome in order to define an action plan combining trials, workshops, and exchanges (intra- and extra-area). During this phase, the project also defines a monitoring system of expected changes, including knowledge indicators, performance of identified technical solutions, and adoption rate.
4. The fourth phase (**phase 4**) involves “**identifying solutions**”, in which the platform members define the technical and organizational options they want to try. Projection tools, such as climate scenarios and a CSA performance calculator (including three dimensions:

productivity, adaptation, and mitigation), allow platform members to prioritize relevant solutions they can test under the specific conditions of their farms.

5. Testing identified solutions constitutes the fifth phase of the methodology (**phase 5**). We call it “**experimenting solutions on the farm**”. Platform members test new CSA options through participatory mechanisms, such as Farmer Field Schools (FFS).
6. The sixth phase (**phase 6**) is the “**assessment of the co-design process and disengagement**”. The data generated by the monitoring system defined in phase 3 are used to validate the ability of the process to meet the agreed objectives. For this purpose, changes in knowledge, performance, and adoption of technical options are quantified. Tools such as life-cycle analysis can provide insights into the environmental implications of options. At the end of this phase, stakeholders can decide whether it is worth to continue with a new cycle of the process (restarting at phase 3).
7. Finally, the last phase (**phase 7**) “**strategies for scaling out/up**”, offers an analysis of public policies and enabling conditions to identify tools (programs, subsidies, incentives, among others) that allow (i) more farmers to adopt CSA options, as defined in the platform (inside and outside the platform's area of intervention) and (ii) to leverage institutional enabling factors and to overcome limiting factors for the adoption of prioritized options in the platform's area of intervention.

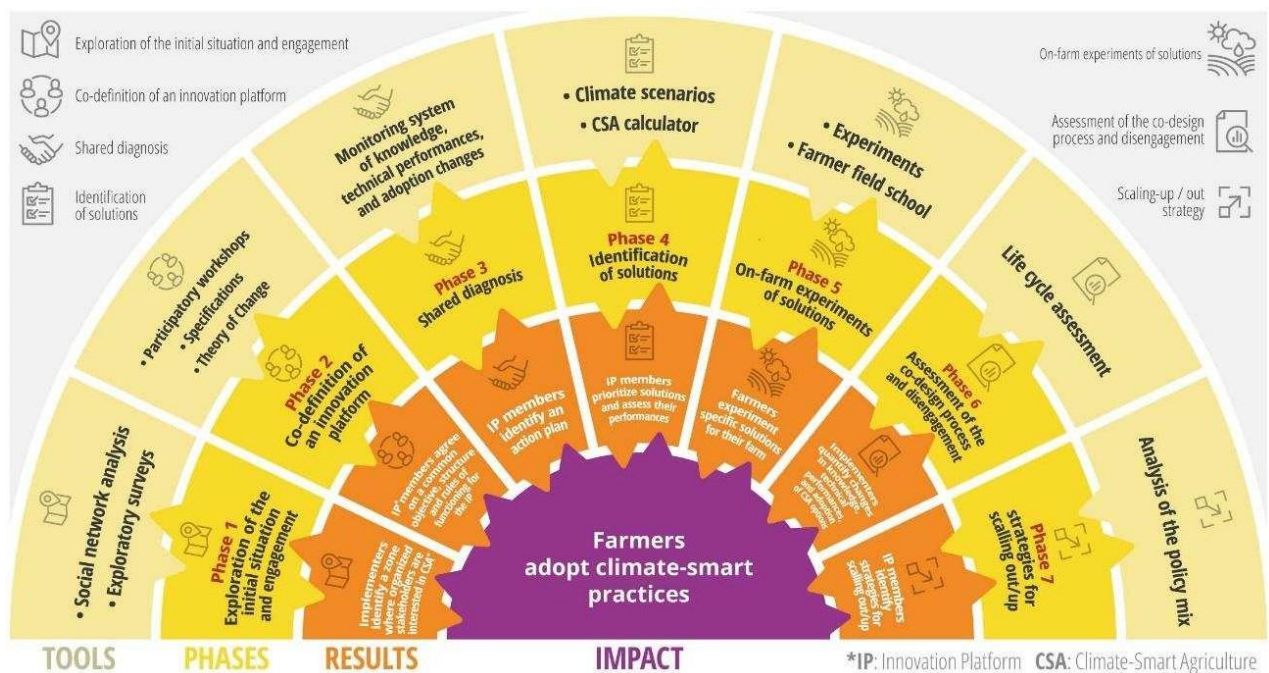


Figure 1: Phases of the methodology



## **Phase 1: Exploring the initial situation and engagement**



The first phase allows to identify and select an area where the community and/or local stakeholders have an interest in developing practices to tackle climate change.

As additional objectives, this phase intends to respond the following questions:

- What is the degree of diversity of farmers in the area?
- What CSA options do the farmers know and use already (initial diagnosis) and what new CSA options should be promoted (different than those already implemented)?
- What actor(s) (information sources) are recognized by farmers as support for the adoption of these options and are key stakeholders to be included in the platform?

### **1.1 Identifying an area of intervention**

The first step entails the identification of an area where the dynamics include small family farmers (whether individuals or partnerships), other stakeholders, such as NGOs, public extension services, academia, input suppliers, etc. Such stakeholders must be interested and committed to work specifically on climate change.

Identifying the area might be achieved through informal discussions with local actors or stakeholders with links to the area, or open meetings, individual surveys...

### **1.2 Analysis of the diversity of farmers**

To better adapt measures and proposals to the different farmer types from the area, the diversity of farmers within the area should be characterized taking into consideration their socio-economic characteristics, their perception of climate and the risk it poses to their household.

Such characterization can be conducted:

- Through participatory workshops involving stakeholders from the area,
- Complementary surveys addressed to farmers and other stakeholders from the area, and
- Mobilizing databases and existing studies.

The data required to conduct this study are detailed in Table 1. It is recommended to collect these data providing details for men and women to be able to consider the different perspectives of climate and the risk it poses, according to gender. Being acquainted with this difference is necessary, since men and women can have different access to technical information. Likewise, data on knowledge and use of CSA options will be collected to identify the strategies that are already available in the area.

	Data	Use of data
Socio-technical characteristics	Gender	Characterization of farmer types through factorial and cluster analysis
	Age	
	Educational level	
	Affiliation to groups	
	Ethnicity	
Perception of climate change	Perception of climate change	
	Experience with extreme climate events	
	Perception of the probability that climate change may affect the farm	
	Implementation of changes within the farm to address climate change	
CSA practices	Knowledge of identified practices because of their effect on adapting the farm (CSA options)	Characterization of knowledge networks of different farmer types
	Source(s) of technical information about these practices	
	Use/non-use of these practices within the farm	
	Reason/motivation to implement these CSA options (CSA pillars)	

Table 1: Data required for the characterization of the area

We suggest classifying farmers according to their perception of climate change. Drawing from the collected data, it is possible to conduct a factorial or cluster analysis, if the initial database is large enough (more than 30 farmers). This type of analysis can be performed with the help of software such as XLSTAT or R (free software).

This classification makes it possible to develop a differentiated strategy within the platform in the following phases to ensure the adoption of CSA options, according to the farmer profiles.

### 1.3 Identifying CSA options available in the area

It is important to identify CSA practices already known and being used by farmers. In this way, it is possible to define an appropriate strategy based on the interests of farmers (food security, adaptation, etc.) and this allows changes to be prompted. Identifying such practices helps to define the niche for the operation of the platform that may correspond to new CSA options not seen in the area, existing CSA practices with little adoption, existing practices with efficiency issues, or complementary practices (creating synergies).

### 1.4 Analysis of key stakeholders to include in the platform

It is important to consider engaging national, regional, or international stakeholders from the scientific, financial, or political fields in the innovation platform project to be able to share material and/or non-material resources and to implement the project. However, not everyone will play the same role. *Empowered* stakeholders are those who take part in defining, implementing, assessing, and promoting the project (i.e., the farmers, but they may also include other actors from the study area, depending on the platform's approach). Some stakeholders, which we call *allies*, can be involved in part of the project to work on some aspect(s) of the project (for instance, based on their expertise; an institution in charge of environmental issues). They may come and go throughout the life of the project. Stakeholders from within the *project environment*, who are not those empowered nor allies, but can be

mobilized at a certain time (local extension services, for instance). The *facilitator* plays a key role in coordinating the activities of different actors.

The identification of key stakeholders to include in the following phase can start by characterizing who are the actors that provide technical support on CSA practices already being used by farmers. The data on practices and information sources are analyzed. In parallel, a social network analysis can be performed for each type of farmer, which could allow visualizing key actors within networks.

This type of analysis may be conducted with Pajek (<http://mrvar.fdv.uni-lj.si/pajek/>), free software (see manual at <http://vlado.fmf.uni-lj.si/pub/networks/pajek/doc/pajekman.pdf>).

The identification of leaders may be complemented with a characterization of joint-work track records, **places where actors meet** (soccer fields, church, community centers...) and **the manner of convening** (day and a half – radio spot, door-to-door, through schools...). In the case of large territories, it becomes necessary to identify sub-territories where the actors usually meet or work together, and meetings should be organized at that level. This characterization can allow the supply of information on the forms of communication/exchange with stakeholders within the platform (meeting place, frequency of meetings).





## **Phase 2: Co-defining the innovation platform**

Co-defining the innovation platform is an important step within the innovation process. The quality of participation, mobilization of (most) local stakeholders, definition of objectives, development of governance, and clear operation rules are elements upon which relies the success or failure of the innovation platform.

Every innovation platform must address several challenges. In the first place, creating a common language that enable stakeholders to develop a joint project and an intervention strategy without forgetting that the platform should be an instrument conducting to the socio-technical and organizational learning required for the self-sustainment of stakeholders.

To meet challenges and ensure the sustainability of the platform, stakeholders should be mobilized and make sure they participate in the definition of what should be done and how it should be done. This point is essential and imperative in open collective innovation processes.

In this phase, four major challenges should be addressed through different meetings to define:

- “organizational myth”
- objectives
- governance
- operating rules

### **2.1 Definition of organizational myth**

All key stakeholders identified in phase 1 must be brought together in order to encourage the “ownership” of the project. This project must be summarized in a slogan or produce what we can define as an “organizational myth”. Indeed, studies on such changes within organizations and territories have shown that the formalization of an organizational myth is an important factor in the dynamics of change and innovation. For instance, the myth could be “The territory of Puca in Gracias innovates to turn climate change into an opportunity.”

### **2.2 Definition of objectives.**

The definition of objectives should take into account the three dimensions of the climate-smart agriculture concept: adaptation, mitigation, and food security and, on the other hand, the technical, social, and organizational dimensions. The intersection of these dimensions allows us to build a goal matrix (Table 2). Such matrix will also make it possible to prioritize and make objectives evolve. In the next phases, it will also be crucial to define technical solutions and measures to be tried.

	Adaptation	Food security	Mitigation
Technical			
Social			
Organizational			

Table 2: Goal matrix



Figure 2: Collective identification of problems caused by climate change in production systems in Honduras (Marlon Durón, DICTA)

### 2.3 Governance

The co-conception phase must envision and formalize project governance. The roles of different actor types should be identified (who wants to take part as an empowered stakeholder, ally, or from within the project environment? who wants to be the facilitator?). One rule of thumb is volunteerism, which may also be accompanied by voting. Commissions should be envisioned, where actors can participate and exchange knowledge more easily. This must not skip selecting representatives that will be able to speak on behalf of the collective body.

### 2.4 Operating rules

These are the general rules that the platform lays down to favor the participation of all, once the objectives have been set.

They particularly correspond to the rules of participation in activities and meetings.

The degree of participation depends on the type of actor (ally, empowered stakeholder, or from within the project environment). Participation requires that everyone engaged in

activities and meetings is able to provide his/her point of view, testimony, experience (particularly those marginalized and silent masses), and to facilitate that everyone can express him or herself.

These rules may include the minimum and maximum frequency of meetings, according to the type of actor, how will stakeholders be mobilized for activities and meetings, the type of activities allowed or not allowed within the platforms, how will decisions be made (voting, survey...), how will conflicts be managed, how will a stakeholder be replaced.

### Phase 3: Shared diagnosis



Diagnosis is conducted through workshops to lay down more specifically the action plan within the platform and the time frame, according to the objectives set in the previous phase.

#### 3.1 Action plan

The action plan contains the activities to be carried out in order to achieve the objectives set in phase 2. The same matrix (Table 2) may be used, but this time indicating the activities associated to the objectives. It may be a yearly or multi-year action plan, depending on the type of changes that need to be tried. Some changes do not achieve results in the short term, thus it is necessary to plan for several years. This action plan usually includes trainings on the issues that need to be developed and more exploratory exercises to prioritize solutions (phase 4), individual trials, field visits (phase 5), mid-term evaluations, and a final assessment (phase 6).

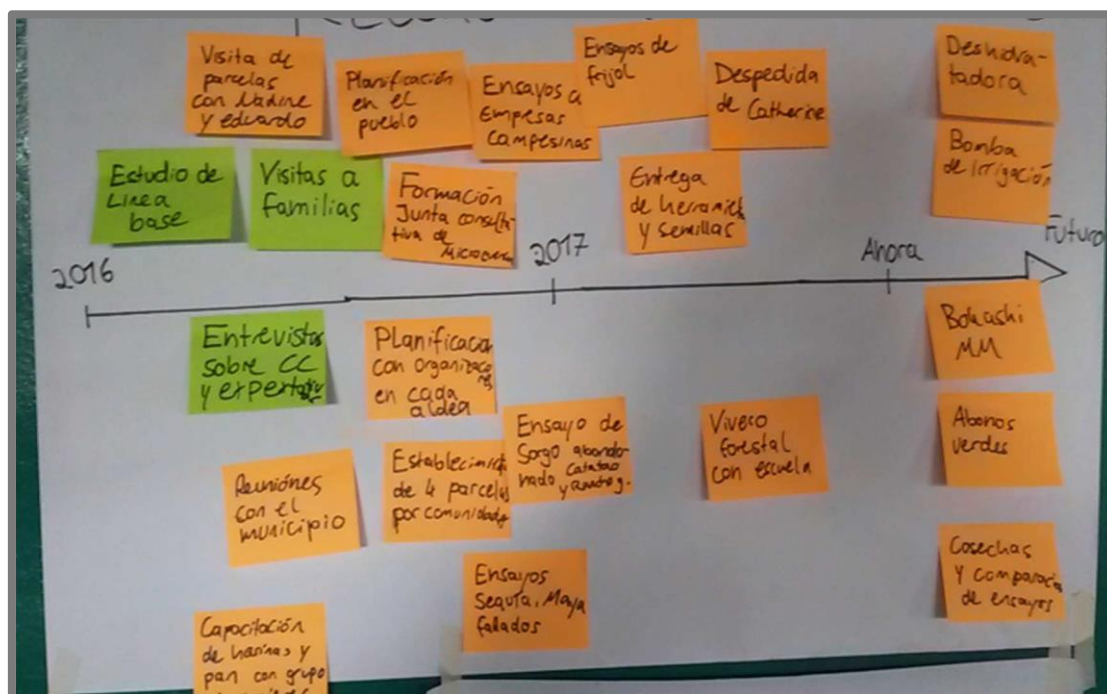


Figure 3: Action plan in Honduras

#### 3.2 Monitoring the action plan

This action plan has to be accompanied by both a technical and a social monitoring system to ensure the stages of the action plan are achieving the technical and social changes defined (Table 3).

One of the aims of this type of research is being able to generate changes in knowledge both on the part of stakeholders and the technical team, which will later generate publications and other kinds of communications. It is thus important to include indicators for this purpose, which will be measured before and after the first trainings on key concepts (language standardization).

Criteria	Evaluation indicators	Prospective tool
Changes in the institutional environment	Number of connections between farmers and other stakeholders	Social network analyses focusing on the connections among stakeholders
Information flow on technical and economic issues regarding practices among different stakeholders	Number of information flows on technical and economic issues regarding practices among different stakeholders	Social network analyses focusing on the information source
Changes in knowledge, attitude, and skills regarding climate change and new practices/practices (innovation)	Number of farmers that have changed their perception about climate change, attitudes, and have adopted new practices (innovation)	Baseline, surveys at key points of project dynamics (e.g., at the end of a plan cycle) on perception, attitude towards practices (will to use them), and adoption (implementation of a practice without support from the project), or on additional areas

*Table 3: Monitoring indicators for the platform*



## **Phase 4: Identifying solutions**

This phase prioritizes solutions showing to have positive effects on the farm, according to the CSA pillars. We then conduct an ex-ante quantification of the effects they might have on farms, in relation to the productivity, adaptation, and mitigation pillars.

### **4.1 Prioritization**

These solutions are prioritized during a workshop based on the same matrix used to define the objectives and then the activities (Table 2), only this time focusing on technical and organizational solutions. To fill in the matrix, it is necessary to articulate the knowledge of both the technical team and farmers from the area, with the results from phase 1, which have identified the CSA practices available in the area under study. A review of literature is equally necessary to look for innovative proposals.

### **4.2 Ex-ante effects of practices on CSA pillars**

After prioritization, an Excel-based calculator is used, which has the purpose of both performing an ex-ante evaluation of the effects of innovative practices on CSA pillars at the farm level and serving as a tool for discussion with farmers around changes to be implemented in their farms, under climate change scenarios.

In a simple way, the calculator estimates the yield of different farm components (Figure 4), and allows farmers to evaluate the effects of practices prioritized by platform members on the CSA pillars, at the household level.

When entering the data, the calculator conducts some simplified calculations using the parameters summarized in Table 4, which were extracted from the data of the area under study (baseline) and from literature.

To use the calculator, a farmer must fill in the following entries/boxes:

- Number of family members
- Adaptation practices from the plan being implemented
- Area cultivated with the main crops
- Possible presence of livestock
- Amount of fertilizers being currently used on crops (chemical and organic)



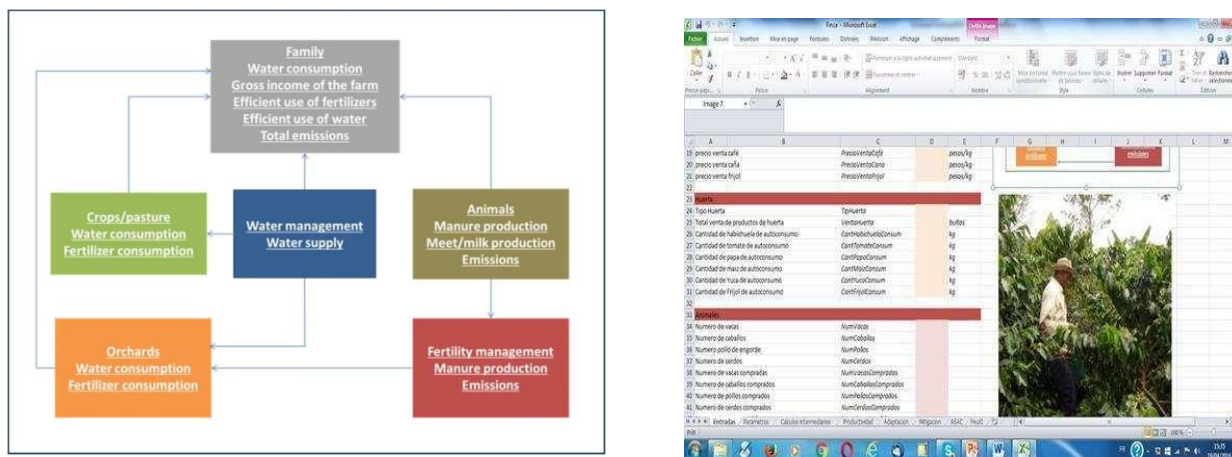


Figure 4: Excel model for a Farm (left) and Excel spreadsheet to fill in the information for each farm

Farm components	Parameters
Crops/pasture	Yield Nutrient requirements Water requirements Kilocalories (kcal) production Cost
Orchards	Yield Nutrient requirements Kilocalories (kcal) production Water requirements Cost
Water management	Water-storage capacity Cost of practice
Animals	Biomass consumption Water requirements Cost Manure production Emissions
Fertility management	Manure production Emissions
Family	Water consumption per capita Requirement of kilocalories

Table 4: Main model parameters

The calculator may be used individually or during a workshop, choosing volunteers to share the information of their farms and then discussing the results. The calculator is used with support from a facilitator. Producers are able to observe and compare their farms “with” and “without” the solution.

The calculator automatically generates graphs such as the one shown in Figure 5, which can be analyzed with the farmer, referring to the disaggregated data calculated at the crop or animal species level, usually more specific, which can help the farmer to determine the necessary adjustments to improve the farm results with respect to the three CSA pillars.

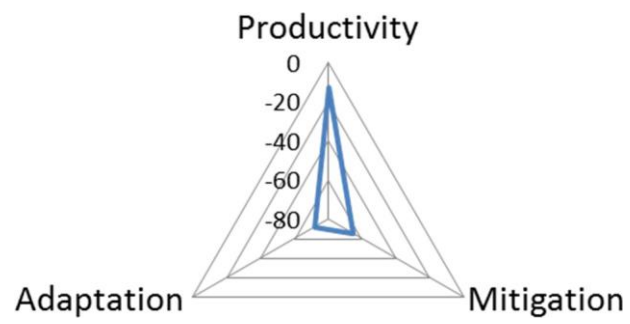


Figure 5: Comparative analysis of the situation before and after using the practice.



## **Phase 5: Experimenting solutions on the farm**

The purpose of this phase is testing and adapting the most promising technical solutions to the actual farm conditions in the area (Figure 6).

These solutions are grouped in “portfolios” to be able to benefit from the aggregated effect of the set of solutions, which is greater than the sum of each separate practice (for instance, varieties + the use of organic fertilizer + biopesticides). Experimental farmers are volunteering platform members representing the diversity of the area (see the classification made on phase 1). The farmer accepts to allocate a land plot and his/her labor to experimentation, while the other platform members can participate by purchasing the necessary inputs.

This phase has the following additional objectives:

- Measuring the effects of practices under actual conditions to validate them along with the evaluation methodologies used.
- Understanding the feasibility of practices.
- Understanding the features of the farms where synergies among the three dimensions of the CSA concept were observed.



*Figure 6: Trial to test drought-resistant bean varieties in Honduras (Marlon Durón, DICTA)*

### **5.1 measuring the effects of practices under actual conditions**

To generate knowledge for both the innovation platform members and the technical team, it is important to be able to compare the farmer's conventional practice with the new practice (having an experimental plot and a control plot, or comparing the experimental plot with previous data). For comparison purposes, it is good to have at least three or four farmers of the same type experimenting with the same technical solution.

These results will allow the adjustment of the calculator parameters and the measurements that may be carried out in the next phase. The farmer is able to find out if the practice allows an effective improvement compared to the conventional practice.

### **5.2 Understanding the feasibility of practices**

Here, the idea is to take into consideration factors not included in previous phases, but that may be key factors to the adoption process, such as the actual time required to apply such practice and its management.

### **5.3 Understanding the features of the farms where synergies among the three dimensions of the CSA concept were observed**

In this phase, it is possible to enter the data collected during the trials into the calculator to be able to evaluate what are the results under the three CSA dimensions, with real data.

## **Phase 6: Assessment of the co-design process and disengagement**



Generally, this assessment takes place at the end of the action plan defined in phase 3. This phase allows finding out if the initial objectives were met. If not, new trial cycles may be established adjusting the objectives set in phase 3. If they have been met, probably the technical team will undergo a disengagement process, in which case, it is assumed that local actors, particularly farmers, have all the tools they need to proceed independently and phase 7 may start making use of the lessons learned to scale out/up the process and reach more farmers.

Three types of ex-post assessment are recommended:

- Assessment of changes in the knowledge of stakeholders involved in the innovation platform
- Assessment of the interest of farmers in adopting the changes tried
- Assessment of environmental impacts

### **6.1 Assessment of changes in knowledge**

It is important here to measure the changes in knowledge at the beginning and at the end of the process. The same knowledge surveys conducted at the beginning of the research study must be re-run with the same farmers.

### **6.2 Assessment of the interest of farmers in adopting the changes tried**

Within a multi-year process, it is possible to measure the start of the adoption process. A distinction should be made between the trial process and the adoption process. It is considered as adoption at the moment a farmer decides to increase the initial experimental area or to invest his/her own resources to continue implementing the practice.

### **6.3 Environmental Assessment using the “LCA4CSA” methodology**

This step aims to determine if the adopted CSA options are driving the agricultural system towards a more sustainable and more resilient situation, from an environmental perspective. For this purpose, it becomes necessary to conduct quantitative assessments that take other environmental issues into consideration, in addition to climate change. The methodological framework, known as LCA4CSA (life-cycle analysis for climate-smart agriculture), was built upon a life-cycle analysis (LCA) for agricultural systems adapted to the CSA concept.

It was decided to use LCA as it may be applied to link environmental concerns to food security issues (Hayashi et al., 2005). The main advantages of LCA are: (i) it comprises all production steps, from the extraction of raw materials, to the farm gates, and up to the consumer or even disposal and recycling (cradle to gate or cradle to grave); (ii) it specifies the role of the system; (iii) it measures quantitative indicators by impact categories (avoiding the need for grades and facilitating the comparison between scenarios or different options to serve the same purpose); (iv) show the production step(s) or processes that contribute the most to each impact category; and (v) prevents a situation in which one environmental issue is solved while new ones are created (JRC, 2010).

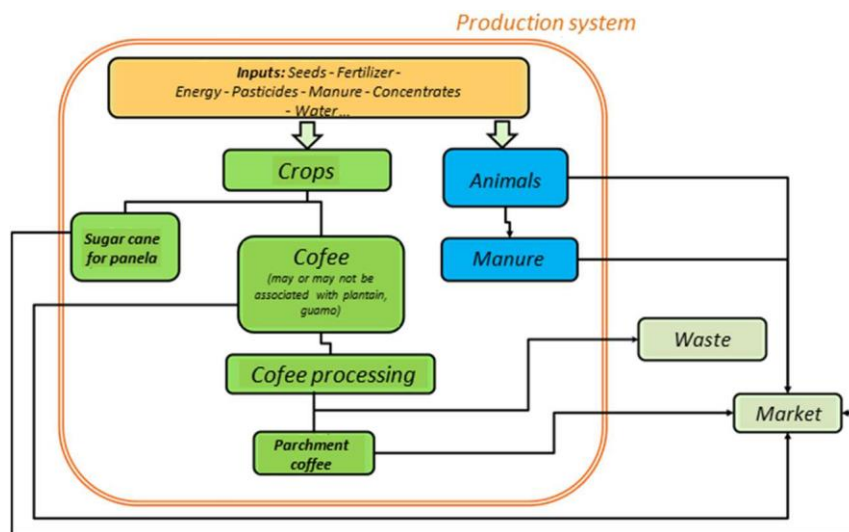


Figure 7: Example of a production system scheme

An inventory of all the resources employed and the resulting emissions from the use and manufacturing of inputs is carried out, including transportation, energy, and the extraction of required minerals (Figure 7). Surveys are conducted to collect specific data on all agricultural operations, as well as the products used in the farms trying the CSA options, describing the amount, origin, and composition. When machinery, buildings, and tools are used, they are also registered, taking into account the hours of use and how many times they were used in a year, as well as the energy consumption (electric power, gas, oil, heating, etc.). Other socio-economic indicators may also be related, for instance, hours of paid work, costs, and profits. Productivity indicators, such as edible kilocalories, are very useful. Methodological guides, such as AGRIBALYSE (Koch and Salou, 2016), are available to undertake the inventory.

The inventory is then translated into impact indicators associated to the natural environment, human health, and human resources (CCI, 2010). Methods to assess the environmental impact are available as software and databases; currently, the most comprehensive are SimaPro and Ecoinvent, respectively (PRE, 2017; Wernet et al., 2016). The impacts to be assessed, models, and indicators are also described in the ENVIFOOD protocol (Food SCP RT, 2013). Impact categories usually taken into consideration are: climate change (greenhouse effect), (stratospheric) ozone depletion, human toxicity, respiratory inorganic compounds, ionizing radiation, photochemical ozone creation (at soil level), acidification (soil and water), eutrophication (soil and water), ecotoxicity, land use, depletion of resources (mineral, fossil, and renewable energy resources; water).

To facilitate understanding, we can take mineral nitrogen fertilizers used in production, as an example. The inventory takes into account the type, brand, amount, composition, and type of application of these inputs. Emissions are also calculated from the extraction of the required minerals, manufacturing, transport, and emissions from product use. Part of the nitrogen content is not used by the crop nor retained in the soil, and it will be released as nitrates. Other part of the fertilizer leaks as gas and forms nitrogen oxides and dinitrogen monoxide. These molecules are then translated into categories in the impact analysis, as greenhouse effect, human toxicity, acidification, and land and marine eutrophication, responsible for impacts such as eutrophication.



In the case of LCA4CSA, after a first analysis, the list of impact categories may be reduced in a participatory way. A workshop with platform members is a useful opportunity to exchange major environmental concerns about the local and regional reality. It is recommended to assign at least one impact category for each environmental compartment (air, water, biota, sediments) (Fränzle et al., 2012), maintain those impact categories that are most important to agriculture (global warming, acidification, eutrophication, toxicity, land use, water use, energy use, particles emitted), in particular, those related to the use of pesticides, fertilizers, energy, land, and water resources (Notarnicola et al., 2017). If a category was not selected by stakeholders participating in the platform, but it has considerable importance, it must be maintained and included in discussions. Biodiversity is a category not yet well-defined in LCA. Other indicators, such as the number of vascular species present, could be used.

The results are used to analyze the different CSA options within the platform and see the changes in the indicators, which show the importance of reducing impacts and/or links among categories (reducing one impact might increase another one). The assessment may be carried out at the farm or crop system level to have an overview that implicitly includes the possible interactions among components. LCA4CSA also allows identifying critical points where emissions are originated.

Figure 8 shows an example of the application, where the impacts of emissions produced in the farm may be distinguished (technical operations for weeding, fertilizing, etc.), as well as the contributions of fertilizers (manufacturing and transport of those inputs), fuel and energy used mainly in coffee processing (it includes the production and transport of those fuels). Options to substitute the main source of contamination (in this case, chemical fertilizer substituted by compost) may be evaluated and the results can be discussed in the innovation platform.

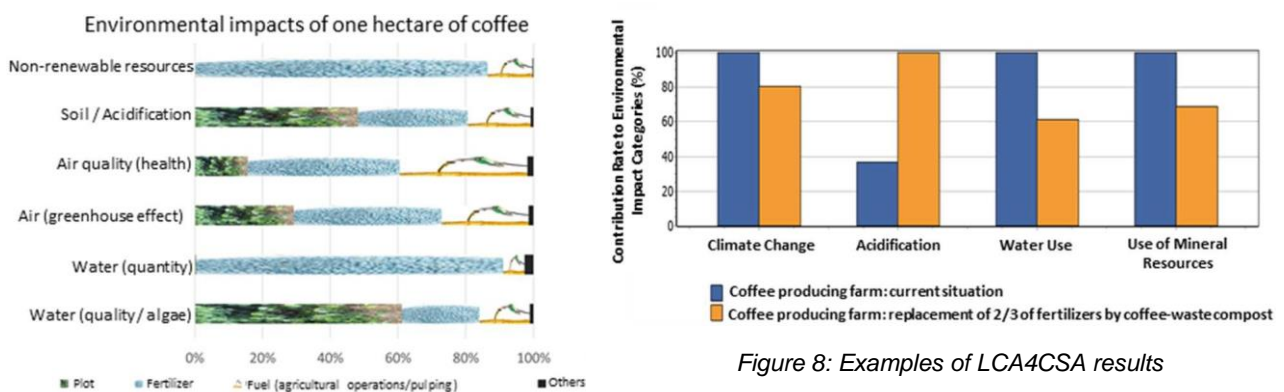


Figure 8: Examples of LCA4CSA results



## **Phase 7: Definition of scaling-out/up strategies**

In this phase, it is necessary to consider scaling out/up both the open platform and the solutions tested to other territories. This phase is based on the lessons learned in the previous phases. To be able to convince new stakeholders to support scaling out/up the process and solutions, it is necessary to show that phases 1 through 6 achieved relevant technical and social changes (highlighting the importance of the monitoring and evaluation process). Thus, this phase allows going from co-construction of CSA options to large-scale innovation.

The main objective is to link platform outputs with the specific agendas of decision-makers and public administration. Phase 7 can be implemented by the implementers of the innovation platform, but it requires the involvement of stakeholders, both public and private (producers' organizations, NGOs, companies), which work at a larger scale, or researchers / experts with more knowledge and abilities regarding the institutional and policy analysis (to define the scaling-out/up strategy). These new stakeholders can provide support to the generalization process for the adoption of CSA options in the area of intervention and other areas.

This work may entail: 1) a local scaling process, which consists of promoting the adoption of CSA options in the territory of the innovation platform, 2) an expansion process, which consists of the adjustment or creation of an enabling institutional environment at the regional or national level to promote the adoption of CSA options.

The basic principle of the methods is based on the analysis of stakeholders, as well as an institutional and policy analysis (Grimble and Wellard, 1997; Reed et al. 2009). The basic assumption is that the institutional environment is an important driver of practice adoption by farmers (but not the only one).

In this guide, we focus on formal institutions. Such institutions are led by actors that must be clearly identified.

For the scaling process, the method aims to identify the institutional potential and the barriers for a wider adoption of CSA options, from a multi-level approach. To do this, this phase consists of four steps:

- 1) Mapping policies and actors;
- 2) Analyzing bottlenecks in the implementation of policies;
- 3) Analyzing the services required to facilitate the adoption of practices by farmers;
- 4) Proposing possible changes or adjustments of policies that could foster the adoption process, using the information collected in phases 1, 2, and 3, but also in phase 1 of the wider method (classification of perception and adoption by farmers and key stakeholders in the area under study).

## 7.1 Mapping policies and actors

Based on a systematic review of the policy documents at the national level, this first step consists in the identification of a set of policies and instruments affecting the adoption of CSA options. The main difficulty at this point is defining the scope of the policies to be considered. Since CSA covers the climate change and productivity issues, the first policy area to take into consideration are climate change policies (INDP, national strategy on climate change, adaptation to climate change and/or mitigation plan) with a focus on agricultural practices. The second policy area should be agriculture and food security (national strategy for agricultural development, food security plan). However, other policy areas could also be taken into consideration, such as environmental, water, and social policies.

Along with the reviews of policy documents, public stakeholders involved in the implementation of policies and instruments should also be identified (ministries, local representations of the ministries), as well as non-governmental actors (NGOs, unions, donors) who are committed to the adoption of CSA by farmers.

## 7.2 Analyzing policy implementation and interventions

The second step entails identifying bottlenecks in policy implementation and interventions. This step is based on interviews with stakeholders responsible for policy implementation and providing support to farmers. These interviews should aim at identifying human, financial, and institutional bottlenecks. Special attention should be paid to the assessment of the relationships among actors, with the purpose of identifying synergies and tensions among actors and those interventions that could limit the effectiveness and efficiency of policy implementation and support to farmers.

This should focus on the actual implementation of the policy in the specific area where the innovation platform is operating and the intervention on this area. The results of these two first steps can be summarized in a policy and intervention matrix that allows summing up the information and assessing bottlenecks in implementation, as well as synergies and tensions among institutions, which could affect the adoption of potential CSA options (Figure 9).

Interaction and Intervention Analysis and Mapping Matrix		NATIONAL LEVEL					LOCAL LEVEL			OTHER INITIATIVES		
		CC			Agri	...	CC	Agri	...	CC	Agri	...
		Instr .1	Instr .2	Instr .3								
1. General features of the tool	Objectives, mode of action, target population, target territory, practices considered...											
2. Features of the implementation	Degree of implementation, bottlenecks (institutional, financing), synergies, tensions											
3. Implications on factors of the decision-making process of farmers	Degree of knowledge and use, ability to influence adoption decisions, gap between supply and producer needs											

Figure 9: Policy environment and intervention matrix

The vertical analysis of this matrix allows characterizing the implementation of specific instruments. The horizontal analysis of this matrix allows identifying the synergies and tensions among all the stakeholders and instruments.

### **7.3 Analyzing the demand and supply of services**

This step allows identifying the lack of services at the local level (for instance, the lack of specific funding options to support the adoption of CSA options). It is based on the information collected in phase 1 regarding key stakeholders providing technical support on CSA practices. This information can be complemented during workshops with farmers to establish the demand and supply of services for technical changes tried and validated during phases 5 and 6. This information is useful to establish strategies, especially regarding the development of new local services (to fill gaps) and for a better coordination in the provision of services by different stakeholders, as well as the complementarity of the supply of different services enabling the adoption of CSA options.

### **7.4 Definition of scaling-out/up strategies**

Based on the results of previous phases, a strategy should be defined to scale out/up and discuss with local actors (to scale out at the local level) and/or national stakeholders (to scale up). This discussion is held during a workshop to present the results of the analyses.

It is worth noting that the earlier we inform and engage those stakeholders from the public or private sector, or donors (at the local level or higher) in the activities and the innovation platform process (phase 1), the higher the probability of ensuring the creation of a sound partnership to define and implement the progressive scaling strategy.

## Conclusion

Adapting agriculture to climate change is a multi-dimensional and complex process, where changes in knowledge, technical changes, and changes to the institutional environment must take place. For these reasons, it is necessary to use a participatory and systems approach as the one proposed in this guide. The innovation platform is the core of the process. It requires a clear identification of the stakeholders making up the platform, a clarification of their roles, commonly agreed objectives, i.e., the general operating rules. Generating local and scientific knowledge is a key factor to identify appropriate solutions to tackle climate change, ensure the process is on the right track, and to convince new stakeholders of scaling out/up their results. For these reasons, we propose to articulate a variety of methodologies for the analysis of key stakeholders, knowledge changes on the part of farmers regarding climate change, as well as the results obtained with the practices (in terms of food security, resilience, and greenhouse gas emissions) within an enabling policy environment. The different methodologies are used in the seven complementary phases of this guide. This proposal was tested in Honduras and Colombia, but it is not intended as a rigid scheme. It may be adapted to the capacities of the supporters of new platforms and to different contexts.

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# Annexes

[Annex 1: Baseline Survey \(phase 1\)](#)

[Annex 2: CSA Calculator Survey \(phase 4\)](#)

[Annex 3: LCA4CSA Survey \(phase 6\)](#)

[Annex 4: Policy Implementation Survey \(phase 7\)](#)