TROPICAL AGRICULTURAL RESEARCH

AND HIGHER EDUCATION CENTRE

DIVISION OF EDUCATION

POSTGRADUATE PROGRAM

Analysis of local initiatives of agro-conservationist practices that contribute to neutralize the degradation of lands in the River Barranca Basin, Costa Rica

Graduation work submitted for consideration by the Division of Education and Postgraduate Program as a requirement to qualify for

Master in Development Practice

By

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Turrialba, Costa Rica
2019

This graduation work has been accepted in its present form by the Graduate School of CATIE and approved by the student advisory committee, as a requirement to opt for the degree of

Master in Development Practice

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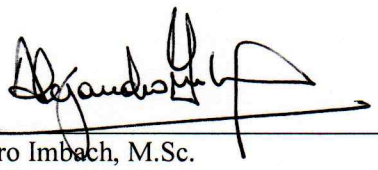

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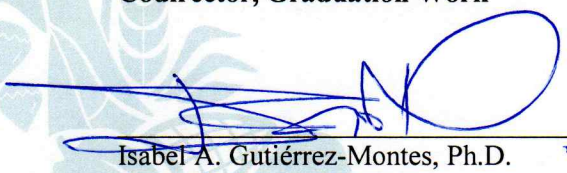

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ACKNOWLEDGEMENTS

I would like to extend my sincere thanks to all the professionals, experts and producers who contributed their experience and knowledge to this project, I was inspired. I appreciate the efforts that each one of you made.

Small Grants Program (SGP) of the United Nations Development Program (UNDP), Global Environment Facility (GEF), Advisory Commission on Land Degradation (CADETI), Ministry of Agriculture and Energy, and the Ministry of Environment and Energy.

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LIST OF ACRONYMS, ABBREVIATIONS AND UNITS

ADI	Community Development Associations
AEA	Agricultural Extension Agency
AED	Business Alliance for Development
ASADA	Community-based Association for Water Administration
ASP	Protected Wild Area
BC	Biological corridor
CACE	Cantonal Agricultural Center of Esparza
CADETI	Advisory Commission on Land Degradation
CATIE	Tropical Agricultural Research and Higher Education Center
EARTH	Earth University
EBAIS	Basic Equipment of Integral Health Care
FHN	Fundamental human needs
FMAM	Global Environment Facility
GEF	Global Environment Facility
INEC	National Institute of Statistics and Census
InfoAgro	Information System of the Costa Rican Agricultural Sector
INGENAES	Integrating Gender and Nutrition within Agricultural Extension Services
INTA	National Institute of Innovation and Transfer in Agricultural Technology
IUCN	International Union for Conservation of Nature
LDN	Land Degradation Neutrality
MAG	Ministry of Agriculture and Livestock
MEP	Ministry of Public Education
MINAE	Ministry of Environment and Energy
Msnm	Meters above sea level
ODS	Sustainable Development Goals
PAN	National Action Program
PES	Payments for Ecosystem Services
RUFORUM	Regional Universities Forum for Capacity Building in Agriculture
SGP	Small Grants Program
SINAC	National System of Conservation Areas
UCR	University of Costa Rica
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Program

ABSTRACT

Land is a natural resource that provides us with goods and services to live sustainably. However, its degradation is affecting, the livelihood and safety of 1,500 million people globally, especially rural communities, smallholder farmers, and the very poor. The impact is not an exception in Costa Rica that has 34 hydrographic basins, a privileged country worldwide in water resources. With the ratification of the United Nations Convention to Combat Desertification and Drought (UNCCD), Costa Rica undertook measures to develop a National Action Program (PAN) to combat and rehabilitate degraded lands in its territory. The Small Grants Program (SGP) supported with funding to local farmers, civil society and ministries through the establishment of a strategic alliance interconnecting them to provide technical and professional support to the producers of the River Barranca basin.

The methodology used in this study is based on action-participatory investigation, an inclusive research approach that seeks the full participation of people in the analysis of their own reality, to promote social transformation in favor of these people. The methodology is characterized by consultations with producers and other key local actors. Data collection tools applied are literature reviews, semi-structured interviews, focus groups, workshops and observation guide during the field phase. The synthesis of information uses descriptive statistics and then the triangulation of information obtained from the tools and finally that info is validated by primary direct actors.

The initiative implemented soil conservation techniques and was able to diminish land degradation by 27,560 linear meters, surpassing 22% of originally established target. A systematization of successful agro-conservationist practices and a technical practice manual was published to assimilate these initiatives in other basins.

Sustainable communities can be built only when all the key actors work efficiently and with a common goal. When civil society, private, and public institutions implement policies in an inter-institutional approach, resilience can be achieved in community development programs.

Key words: Neutrality of land degradation, Local initiatives, Biodiversity and ecosystem, livelihood, soil conservation, community development.

1 INTRODUCTION

The Republic of Costa Rica has 34 hydrographic basins in its 51,100 km^2 of territory, which makes it a privileged hydrological area worldwide (Mora *et al.*, 2004). The National Action Program (PAN) according to the Advisory Commission on Land Degradation CADETI (2004) developed technical series for the prioritization of degraded watersheds, under biophysical and socioeconomic indicators; systems that allowed the study to identify nine degraded areas that must be urgently intervened, namely; Jesús María, Barranca, Tárcoles, Parrita, Abangares, Drinker, Tusubres, Tempisque and Nicoya.

The Barranca River basin was identified as one of the basins in worse conditions. Small scale producers in this area face serious problems due to land degradation and low yields in their productive activities because of the excessive exploitation of land (Blanco 2015).

Livestock and agricultural crops are the principle activities carried out in this area without proper soil and water conservation techniques, according to UNDP (2018). Soil represents the most important production resource, since it supports the plants in the form of a permeable layer for the roots and is a kind of deposit for nutrients and water, so its management requires the adoption of practices for its conservation (Edwin 2013).

The Small Grant Program (SGP) recognizes that with the technical support from different institutions such as; the National System of Conservation Areas (SINAC), Ministry of Environment and Energy (MINAE), Ministry of Agriculture (MAG) -Agricultural Extension Agency (AEA) Naranjo, Earth University, University of Costa Rica (UCR)), Ministry of Public Education (MEP) and Cantonal Agricultural Center of Esparza (CACE) the project managed to strengthen capacities for conservation and sustainable production in the Barranca River basin.

This study responds to the request from the SGP (Annex 1), this institution is interested in systematizing the project. With evidence that validates the above assumptions, SGP and other key actors of the project could jointly present a proposal to the government of Costa Rica that may consider these local conservation initiatives in an equivalent manner to the payments for ecosystem services (PES), considering that they carry the same conservation philosophy. Currently, these payments are mostly focused on mitigation of greenhouse gas emissions, water protection for urban, rural or hydroelectric use, protection of biodiversity and scenic beauty; (FONAFIFO 2014) and (ONF 2018). And, finally, it is in the interest of SGP to document these successful projects to support the fulfillment of its mandate at a national and global level.

2 OBJECTIVES

2.1 General objectives

Analyze local initiatives of agro-conservation practices as alternatives that contribute to neutralize the degradation of lands in the River Barranca Basin, Costa Rica.

2.2 Specific objectives

1. Describe the local initiatives of agro-conservation practices that contribute to neutralize the degradation of lands.
2. Identify the impacts generated by agro-conservationist practices in obtaining global environmental benefits, the welfare of producing families and the community in general.
3. Identify the factors that have enabled or inhibited the implementation of these practices.
4. Identify lessons learned from these experiences and highlight successful practices to be promoted and implemented in other regions.

The guiding questions that enable critically exploring the topics that is addressed in this study, are designed in a manner consistent with the objectives (Table 1)

Table 1. Investigation guiding questions.

Specific objectives	Guiding questions
Describe the local initiatives of agro-conservation practices that contribute to neutralize the degradation of lands.	What is the background of the initiatives? What are the agro-conservationist practices implemented?
Identify the impacts generated by agro-conservationist practices in obtaining global environmental benefits, the welfare of producing families and the community in general.	What are the impacts generated? Environmental, social, economic and others. Could these practices be considered under PES, how?
Identify the factors that have enabled or inhibited the implementation of these practices.	Were there difficulties during the implementation of the practices? Which are? How did you overcome them? Factors; financial, resources, environmental, infrastructure etc.
Identify lessons learned from these experiences and highlight successful practices to be promoted and implemented in other regions.	What have been the strengths and challenges faced and how were they addressed them? What are the aspirations regarding land conservation?

3 REFERENCE FRAMWORK

The analysis of this systematization process revolves around five integral approaches to facilitate the understanding of different components that are interrelated to each other. The five integral approaches are shown in Figure 1.

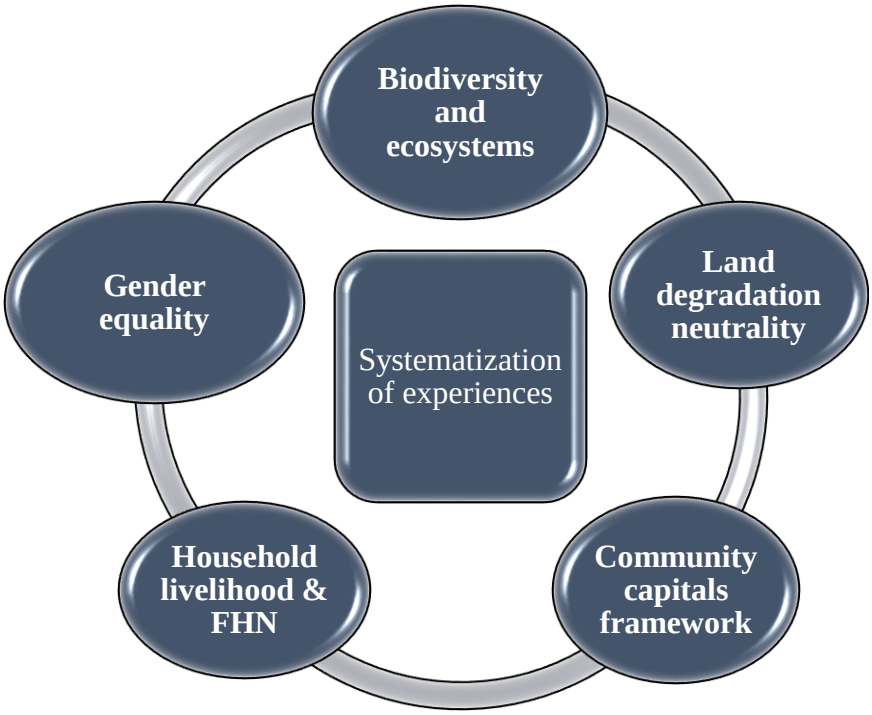


Figure 1 Schematic conceptual framework

3.1 Systematization of experiences

Two methodological proposals published by Acosta (2005) and Jara (2011) were consulted, which will serve as the basis for the design and application of the systematization procedures, highlighting that the process must be participatory, and its members must have lived the experiences to be systematize.

Systematization is a critical interpretation of one or several experiences, centered in a sequential order and reconstruction of events, which explain the logic of the processes lived in them: the numerous factors that intervened, how they related to each other and solutions applied to those uncertainties. The Systematization of Experiences produces significant knowledge and learning that make it possible to appropriate the senses of experiences, theoretically understand them and guide them towards the future with a transformative perspective (Jara 2011).

3.2 Biodiversity and ecosystems

The term "biodiversity" was introduced by Barney (1980) and is most commonly used to describe the number of species, recognition and classification of species for their variety and variability of living organisms

According to Swingland (2001) biodiversity is an attribute of an area and refers specifically to the variety within and between living organisms, biotic communities and biotic processes, whether natural or modified by humans. However, in this context we will focus on the definition of biodiversity as the variety of life on earth, including all organisms, species and populations; the genetic variations among them; and its complex sets of communities and ecosystems (UNEP 2018).

However, the concept of ecosystem according to Christian (2018) is largely a 20th century construct, although the roots can be traced back to the previous century. It has occupied a central position in modern ecology and environmental science. But also, Pirot *et al.* (2000) assumes that ecosystems are functional systems that comprise living and non-living components. Within them there are materials (humans, trees, fish, earth) that interact and in doing so, they consume or transform energy and materials. Ecosystems involve the interaction between plant and animal species, as well as their geophysical environment.

In this context, the above two definitions are combined as being a set of actions of management of the biosphere carried out by human beings to maintain the highest possible density of ecosystems, species and genes.

3.3 Land degradation neutrality

According to GEF (2018) land is a complex mixture of soil, water and biodiversity. Working together, these three elements create goods and services that provide a foundation for sustainable livelihoods and peaceful co-existence between peoples. Yet land degradation is putting the health, livelihoods and security of an estimated 1.5 billion people at risk.

The IUCN defines it as *"*A state whereby the amount and quality of land resources, necessary to support ecosystem functions and services and enhance food security, remains stable or increases within specified temporal and spatial scales and ecosystems". (Davies *et al.*, 2015).

One of the strategies and main emphasis that is proposed with the objective of achieving land degradation neutrality is the provision of technical support during the planning and monitoring phases of socioeconomic development projects, linking them to the dimensions of environmental sustainability. Mainly the LDN should be emphasized in the implementation process for the Sustainable Development Goals (SDG). SDGs 2, 3, 6, 11, 13, 14 and 15 refer to goals that require direct consideration of soil resources. The incorporation of planning and monitoring as a natural

resource will provide a pathway for the future activities of the SDG and will certainly stimulate the closer reach of the United Nations Convention to Combat Desertification on approaches to achieving their goals (UNCCD 2015) and (Tóth *et al.*, 2018).

3.4 Community capitals framework

According to the approach of community capitals framework, is denominated as resources that are invested to regenerate more resources and if well managed, contribute to the development of a community (Flora *et al.*, 2004).

According to Gutierrez-Montes *et al.* (2009) and Imbach (2016) capital (also called resources) can be classified as social, political, financial, natural, human, cultural and infrastructure; They are defined as follows:

- **Social capital:** are the "forms of horizontal relationship" of a community, manifested in existing organizations in them. This capital can be divided into social capital of attachment and bridge, which reflect the capacity of the groups to favor the internal cohesion of the community and outward relations, respectively.
- **Political capital:** these are the public institutions present in the community (regardless of physical presence) and that allow it to have a relationship at the State level to achieve its own objectives.
- **Financial capital:** are those related to the access and availability of money or sources that can generate it, such as banks, access to loans, etc.
- **Natural capital:** refers to a set of natural resources, the services that derive from them and their state of conservation, as well as the community's ability to access them.
- **Human capital:** human resources are the same people, their abilities, their health, their level of education, the knowledge that allows people to specify their livelihood strategies, their migrations, leadership capacity, etc.
- **Cultural capital:** They include the cultural characteristic aspects of the community or of the groups that compose it in terms of values and other aspects that constitute to a specific "cultural legacy" of the group. The "legacy" is constituted by the cultural contents that the older generations consider important to transmit to the youngest ones so that they can build their life strategies.
- **Capital infrastructure:** they include all the physical infrastructure to which one has access. It includes both the one that supports the vital services for the communities (schools, health posts, aqueduct, treatment of wastewater and garbage, telecommunications, electricity and others) as to the real estate that supports productive activities (systems irrigation, silos, deposits and others).

3.5 Household livelihood and fundamental human needs (FHN)

A livelihood comprises of the capacities, assets (including the materials and social resources) and activities necessary to achieve a living. A livelihood is sustainable when it can cope and recover

from stress and maintain or improve its initial original state in the future, without deteriorating the natural resource base (Chambers and Conway 1991).

This approach is established in the concept of fundamental human needs by Max-Neef *et al.* (1986), and he defines fundamental human needs as the set of peoples' activities that are inevitable to satisfy their needs, well-being, live a dignified life that allows them to develop their abilities.

The proposal of fundamental human needs is subdivided into four large groups as indicated, Imbach (2012).

- **Basic needs;** These correspond to necessities for survival among people in a community.
- **Personal needs;** refers to all the personal and private necessities.
- **Environment needs;** refers to surrounding characteristics, whether natural or social.
- **Needs of action;** It refers to what people do.

3.6 Gender equity

Gender is understood as "a set of psychological, social and cultural characteristics that society differentiates between men and women". This assignation is related to the norms of behavior that society considers appropriate and learned from childhood, creating distinct roles between men and women. Often these differences create a gap in access to opportunities and resources, which puts women at a disadvantage position in society (Ramírez *et al.,* 2012)

Gender equality assumes that the different behaviors, aspirations and needs of women and men are considered, valued and promoted in the same way. This does not mean that women and men must become equals, indispensably their rights, responsibilities and opportunities do not depend on whether an individual is born male or female. Gender equality implies the idea that all human beings, men and women, are free to develop their personal abilities and to make decisions. (Cortés 2014)

However, to carry out an analysis with a gender equity approach, the series of tools prepared by Ludgate (2016), for the Integrating Gender and Nutrition within Agricultural Extension Services (INGENAES) was applied as a reference.

4 DETAILED METHODOLOGY

In this section, three fundamental aspects are developed: site description and the SGP project, the study focus, and finally the four stages that are developed with their respective descriptions.

4.1 Site description

This consists of the characterization of the investigation, area, socio-economic activities, the SGP project and the applicant organization profiling.

4.1.1 Characterization of the study theme

In this context of the basin in 2016, local organizations such as the Community Development Associations (ADI) Llano Bonito de Cirri Norte and Barranca, grouped more than 55 producers in two projects funded through the Small Grants Program (SGP-GEF-PNUD). The ADI of Barranca participated, 34 producers, 26 men and eight women, while that of Llano Bonito de Cirri Norte participated, 21 producers, 13 men and eight women.

Clarifying that the general objective of the project was: "To promote the recovery of degraded lands, where two districts were benefited namely San José and Cirrí and the following villages: Llano Bonito and La Palmita, San Antonio, Barranca, Palenque and Solís Street. The selection of participants was based on the diagnosis done by the Agricultural Extension Agency (AEA) – Naranjo which has more experience working in the region.

With the implementation of this project, producers participated in training courses and exchanged experiences in soil conservation techniques and practices in their farms in a theoretical and practical manner. Some of the soil conservation techniques that were implemented with the project were the following: hillside diches, contours drainage, shallow contour drainage, terraces and agroforestry systems. For the implementation of the project, two ADIs received a total financing of US $ 71,900. The ADI of Barranca received a donation amount of US $ 44,000 while the ADI of Llano Bonito de Cirri Norte received an amount of US $ 27,900.

The projects started in 2016 and ended in 2018 with positive results and exceeding the initial baseline. The ADI of Llano Bonito Cirrí Norte to date has made 10,670 linear meters of soil conservation work exceeding the goal of 8,200 meters that was initially projected. While the ADI of Barranca made 16,890 meters of soil conservation works exceeding the projected goal of 13,400 meters that was initially projected before starting the project. In both associations, 27,560 meters of soil conservation techniques have been executed

4.1.2 Characterization of the area

The River Barranca Basin belongs to the Pacific slope. The river originates in the central volcanic mountain corridor in Alajuela province, at an altitude of 2020meters above sea level (MSNM). It has an approximate length of 61.7km and empties into the Pacific Ocean in Puntarenas province (Mora Alvarado *et al.,* 2004). The river mouth is at 10km from the city of Puntarenas, with a bridge

belonging to route 23, which connects the city of Puntarenas to Caldera port, one of the main Costa Rican ports on the Pacific coast (Bergoeing 2011).

The River Barranca Basin covers an area of 479.14Km², is composed of 18 sub-basins. The main channel arises on the western slopes of Fila La Picada, the remaining main channels are originating from northeast to southeast in the middle and lower part of the basin. Most of the area of the basin is distributed in San Ramón canton, Naranjo, Palmares and Esparza. According to INEC (2012), the historical projection for 2020 is that the population of this basin would be 71,629 inhabitants of 63,903 in 2010 and directly depend on natural resources for their subsistence.

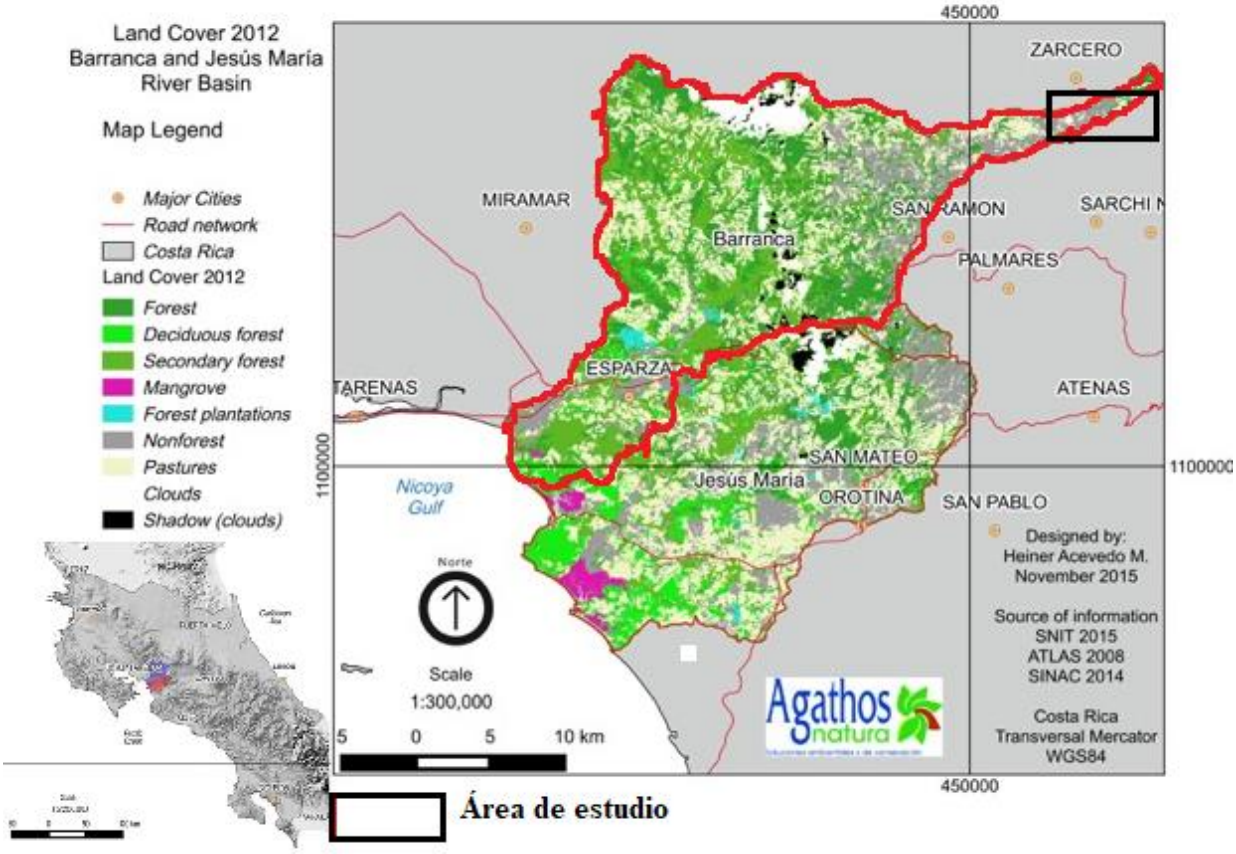


Figure 2. Location of the Barranca River Basin.

Source: Adapted from GEF (2016)

4.1.3 Description of socio-economic activities

The upper basin is occupied by coffee plantations, livestock, ornamental plants, sugarcane, tourism, forested areas and vegetables, generally occupied by small and medium producers. The upper and middle basin, there was poor design of productive units with very sloping slopes and without plant coverings, poorly worked slopes, incorrect drainage of water, un-engineered layout, cuts or terraces that produce gullies, constantly superficial ballasting wash and little maintenance.

All this increased the erosive processes, besides the producers did not have training, technical knowledge and financial resources to implement agro-conservationist practices that contribute to the mitigation of the problems (Infoagro 2007).

4.1.4 Characterization of the SGP project to be systematized

With the ratification of the United Nations Convention to Combat Desertification and Drought (UNCCD), Costa Rica undertook measures to develop a National Action Program (PAN) to combat and rehabilitate degraded lands. The SGP-, administered by the UNDP, financed through the Global Environment Facility (GEF), supported several organizations of this basin with financing initiatives that lead to the recovery of degraded lands, through the establishment of a strategic alliance with the Advisory Commission on Land Degradation (CADETI), MAG and other institutions, which provided technical and professional support to the producers of the basin.

The justification for qualifying this basin among areas under worse conditions was to increase its capacity for resilience, focuses on the high degradation of soils and the continued deforestation of forests. Also, ecological problems were considered, such as the sedimentation of the Caldera Port, as well as the need to improve the livelihood of the population, strengthening of the agricultural culture of coffee and fruit growing, and improve agrobiodiversity and biodiversity in general.

Specific objectives vs. Results of the SGP project

Table 2. Objectives and results of the SGP project

SPECIFIC OBJECTIVES	***RESULTS***
1. Train the producers of Barranca, in aspects of sustainable management and soil conservation with practical and theoretical methodologies, that lead to the environmental sustainability of their farms.	1.1. Trained producers and implementing soil conservation practices in their farms 1.2. Producers exchange knowledge and experiences through community days of learning.
2. Implement conservation practices that contribute to reduce soil loss and that allow sustainable management of farms in this community.	2.1. Producers of the community of Barranca applying soil conservation practices.

4.1.5 Organization which requested this study

Established in 1992, the year of the Rio Earth Summit, the Small Grants Programme (GEF) embodies the very essence of sustainable development by "thinking globally acting locally". By providing financial and technical support to projects that conserve and restore the environment while enhancing people's well-being and livelihoods, SGP demonstrates that community action can maintain the fine balance between human needs and environmental imperatives.

The mandate of the SGP is to facilitate direct access to GEF (Global Environment Facility) funds especially to vulnerable and in poverty conditions, and to local NGOs to implement sustainable development initiatives that are aligned with sustainable development focal strategies of the GEF:

- Biodiversity
- Climate change
- Land degradation
- Chemicals
- International waters (PPD-FMAM 2018)

4.2 Study approach

The methodology is based on a participatory-action research which is an investigative approach that seeks the full participation of people in the analysis of their own reality, this helps to promote social transformation in favor of these people. It combines two processes, that is learn and act (Jara 2012);

- **Research:** consisting of a reflective, systematic, controlled and critical procedure that aims to study some aspect of reality
- **The action:** besides being the purpose of the research, it represents a source of knowledge, while the actual accomplishment of the study is an intervention.
- **Participation:** where not only researchers or facilitators are involved, but also the community, considered as an active subject that contributes to knowing and transforming their reality

4.2.1 Methodological procedures

To achieve the objective of the study, a systematization process is designed that includes four stages, coinciding with the specific objectives. Figure 3 explains the general scheme of the analysis.

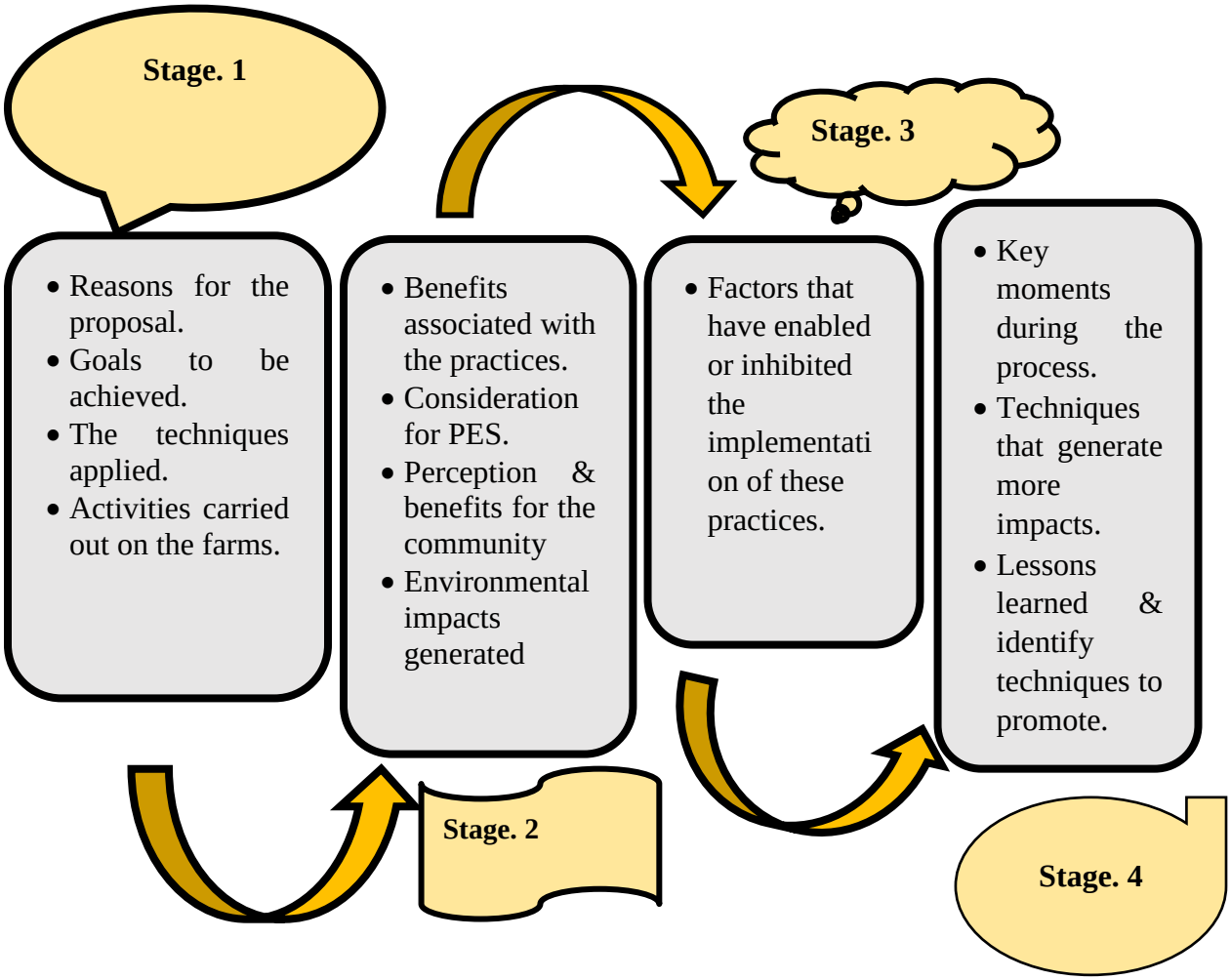


Figure 3. Sketch of the methodological process.

Table 3. The 4 stages of this research and associated products.

Specific objectives	Stages	Products
Describe the local initiatives of agro-conservation practices that contribute to neutralize the degradation of lands.	Situation analysis	Document of analysis of agro-conservationist practices, satisfaction of livelihoods and FHN, capitals, gender equity, biodiversity and ecosystems
Identify the impacts generated by agro-conservationist practices in obtaining global environmental benefits, the welfare of producing families and the community in general.	Impact analysis	Impact mapping
Identify the factors that have enabled or inhibited the implementation of these practices.	Analysis of key factors	Mapping of key factors
Identify lessons learned from these experiences and highlight successful practices to be promoted and implemented in other regions.	Systematization of experiences	Proposal of successful practices to assimilate and design a technical poster

Next, each stage is developed identifying the tools, sources of information, contents and products.

After a preliminary stage with SGP officials, which consisted in farm visits and meetings with key actors of the project, parameters of the study to be systematized was defined. The systematization process considers primary information, which is critically triangulated with the review of secondary information.

4.2.2 Stage. 1 "Situation analysis"

It is necessary to understand the context previously; relevant historical facts, motives of the proposal, goals to be achieved, the techniques used, capital framework, livelihood and FHN, activities carried out in the farms in both the Barranca and Llano Bonito communities. This was done based on interviews with two presidents ADI (Annex 2), interview with MAG officials (Annex 3), direct observation guide (Annex 4), research and analysis of primary information. The matrix of this stage is detailed in (Table 3).

4.2.3 Stage. 2 "Impact analysis"

The analysis of the impacts of agro-conservationist practices on the direct actors. Mainly identifying the benefits associated with the practices, perceptions and benefits to the community, environmental impacts generated, biodiversity and ecosystem, land neutrality. For this analysis, the following tools were applied; interviews SINAC-CADETI-MINAE (Annex 5), interview with producers (Annex 6), community interview (Annex 7) and MAG focus group (Annex 8). Direct observation guide (Annex 4). The matrix of this stage is detailed in (Table 3).

4.2.4 Stage. 3 “analysis of key factors”

As mentioned above, a critical analysis was made about the factors that have made viable or inhibited the implementation of these practices and gender equity. The expected product in this stage is the mapping of the key criteria factors, the focus group tool was also applied to the Board of Directors of ADI (Annex 9), MAG official focus group (Annex 8), direct observation guide (Annex 4). The matrix of this stage is detailed in (Table 3).

4.2.5 Stage. 4 “Systematization of experiences”

Subsequently, the two methodological proposals of Acosta (2005) and Jara (2011) explained in the reference framework were used. It proposes "five phases" important to follow in the systematization of experiences:

- The starting point: The experience
- Systematization plan: Setting the object and focus of systematization, sources, procedures and time.
- The recovery of the lived process: Reconstruct history in order of happenings and classification.
- Background reflections: Analysis, synthesis and interrelations, critical interpretation and identification of learned lessons.
- The destination: conclusions, recommendations, proposal of successful practices to assimilate.

Table 16 shows the components in the technical data of the systematization of experiences are explained in detail.

The important axes in stage 4 are constructed from the key aspects prioritized in the situational analysis, impact analysis and analysis of key criteria. The conclusions and recommendations were addressed to the board of directors and the participation of some producer families (Annex 10). The various comments were also observed from the interviews conducted in the previous stages.

5 RESULTS AND ANALYSIS OF FINDINGS

The results and analysis in this research are presented in four stages, situation analysis, impact analysis, analysis of key criteria and the systematization of experiences.

5.1 Situation analysis

The situation analysis includes a critique of the project on historical milestones, motives of the proposal, techniques implemented, capital framework, livelihood and NHF.

5.1.1 Project historical milestones

Figure 4, shows the product of the reconstruction of the events and milestones that happened throughout the project and that were identified during the focus group with the Board of Directors of the ADI

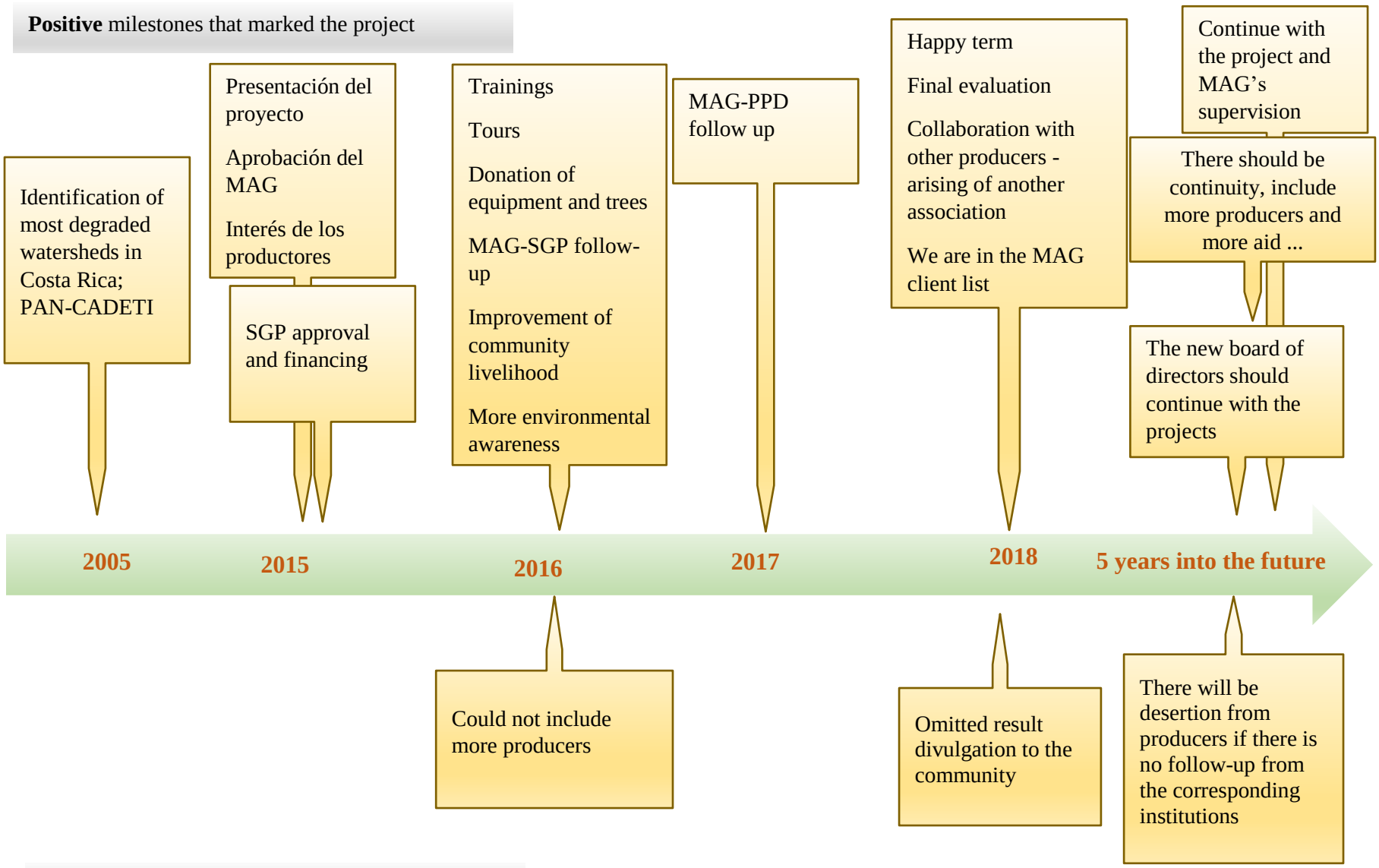


Figure 4. Participatively constructed timeline during a focus group with the ADI Board of Directors.

The upper part of the timeline are the events which impacted positively, while in the lower part are those which negatively impacted the project. These are key moments which impacted before and after the project and its impact on the community are:

2005: Identification of the most degraded watersheds in Costa Rica.

CADETI developed several techniques for prioritizing basins with degraded watersheds, using biophysical and socioeconomic indicators; systems that allowed identifying nine degraded areas that must be urgently intervened. The River Barranca basin was identified as one of the basins in worse conditions. Local producers in this area face serious problems due to land degradation and low yields in their productive activities because of the excessive exploitation of land.

2015: The genesis of the "agro-conservationist" project

MAG presented the project proposal before the community and invited producers to participate in the implementation of these initiatives. The producers showed interest in the project to improve the productivity of their farms among other benefits from the project such as the acquisition of equipment, inputs, trees and trainings. MAG and SGP approved the participation and financing of producers under the administration of their corresponding associations.

2016: Implementation phase of the project.

Producers received training on the development of organic fertilizers, soil conservation techniques and climate change, as well as a tour of experience exchange workshop. They also received the donation of equipment such as spray pumps, grass trimmers, etc. and fruit trees. MAG was pending to offer follow-up and technical support to the producers and the use of the equipment.

With the project strategies mentioned above, it was possible to establish more environmental awareness. That is, the use of agrochemicals was reduced, protecting water resources and improving the farm productivity simultaneously. This contributed to an improvement in the community relations through the channels of exchange of experiences, visits and follow-up offered by the ministries and institutions which participated directly in the project. On the other hand, there was considerable interest in project participation, however, it was not possible to include more producers due to the limited resources for implementation.

2017: Follow-ups and visits.

MAG and SGP were pending during the beginning until the end of the project, supporting producers in technical assistance as well as demonstrations in the field.

2018: End of the project.

At the end of the project, the association achieved 100% compliance with the objectives set with an evaluation considered highly satisfactory. This made the producers and ADIs happy to have fulfilled the project purpose. Which managed to create collaboration with other producers, leading to the creation of another association of fresh dairy, thanks to the success of the project. This means

that there is an improvement in the administration of the ADIs, for this reason MAG included their producers on their beneficiaries' lists. On the other hand, the general divulgation of the results of the project to the general community was omitted by project promoters.

5 years into the future

The five-year into future was constructed during the focus group with the ADI board of directors (Figure 5). Where the future is highlighted after having concluded the project.

Figure 5. Board of Directors-ADI during the construction of the future of the project.

Other observations that were made was the support and impact of the project which are very important for the ADI and their producers, so it would be beneficial to continue with the project. In addition, the presence of MAG in the community was prevailed during the project.

The ADI expects that there will be a continuity of the project, which will include the participation of more producers and more aid towards the community. Additionally, they also hope that the new ADIs will continue with projects related to improving the welfare of producers.

However, the association highlighted a possibility that there may be desertion of producers if there is no follow-up by the institutions in charge of the project. It is still difficult to measure the long-term impacts of the project such as improving the welfare producers. For this reason, it is essential that there be a monitoring program to be able to guarantee and measure the long-term impacts.

5.1.2 Soil conservation techniques implemented in the basin

Farm visits were made by MAG officials to obtain a diagnosis to determine the current situation and baseline in each of the beneficiaries' production systems. This activity was coordinated with each of the producers, thanks to this, they established conservation techniques that each of the producers had to implement.

Additionally, the verification of conservation techniques was agreed with producers. Later, a demonstration day of agricultural equipment and tools usage was carried out to determine which were the most suitable for the daily activities on their farms.

The following is a detailed description of the soil conservation techniques implemented in the project:

Hillside ditches

It is a larger slope ditch (length, 30 cm deep x 60 cm wide) that is built with the aim of isolating the production areas of high-volume runoff water, such as low water of roads, ditches of the road, or areas that collect large volumes of water. It must be a communal practice in a defined hydrological area and not an individual practice of a producer in his small property (Figure 6).

Figure 6. Contour drainage ditch in coffee and vegetables.

Contour drainage ditch

The ditches are trenches or channels excavated perpendicular to the slope to intercept and store the runoff water and some sediments. They are established together with live barriers in the upper slope of the slope to trap sediments and maintain the hydraulic capacity of the trench.

These hillside ditches are recommended when the slope of the terrain is 10% to 30% with a minimum soil depth of 50 cm. The unevenness of the hillside ditches can oscillate between 0% to 1%, the lower the level of water, the slower the transfer of water. Its dimensions are 20 cm deep, 40 cm wide, figure 7.

Figure 7. Hillside ditches in coffee and cypress plantation.

Shallow contour drainage ditch

Much of the runoff water that is collected in the ditches comes dragging nutritional soil sediments that should be utilized, so the hillside ditches can also be combined with drawers within their channels, so they can settle part of soil eroded and help infiltrate part of the water.

This technique is recommended when the slope of the terrain is from 10% to 30% with a minimum soil depth of 50 cm. The unevenness can oscillate between 0% to 1%, between lower unevenness the transfer of water is slower. Its dimensions are 30 cm deep, 20 cm wide (figure 8).

Figure 8. A producer demonstrated how to make a shallow contour drainage ditch on his coffee farm.

Live barrier

Live barriers serve as a containment to prevent sediments from entering the canal and ruptures in the hillside ditches and others; These barriers can be from Vetiver grass (*Chrysopogon zizanioides*). This practice consists in planting rows of perennial plants, of dense growth or of good tilling, which in a short time form an obstacle to the free sliding of the water, in the form of narrow strips, against the slope of the land following the curves at level or unevenness These strips are usually hard-stemmed, erect-bearing grasses.

This practice can be used in several types of terrains; from those with very low inclination, to those very inclined. If the inclination is from 0 to 15% the live barriers are planted individually as needed. In areas of greater inclination, the practice must be complemented with other practices of soil conservation, such as hillside irrigation ditches. The spacing between the barrier lines depends on the degree of the slope of the terrain, the greater the slope, the greater the number of live barrier lines (Figure 9).

Figure 9. Vetiver live barrier shown by a producer.

Individual terraces

They are platforms built perpendicular to the slope with a reverse slope to increase the water storage capacity. The cuts and fillings should be protected so that they do not overflow. It is recommended to protect the slopes with a live barrier at the top and sow grass or low grass on the side of the slopes. The terraces are very useful in areas where there are limitations with the terrain in terms of very steep slope, and there are not very appropriate areas to carry out productive activities.

In poor soils it is recommended to take advantage of the fertile layer when building the terrace. This is achieved by digging the top layer of the soil (10-20 cm.) Where the work is going to be built and piling up the earth above the terrace. At the end, the fertile soil is thrown back on the platform and matched well (figure 10).

Figure 10. Terraces for the sowing of vegetables.

Agroforestry systems

Agroforestry production systems are a series of systems and technologies for the use of land in which trees are combined with agricultural crops and / or pastures, depending on time and space to increase and optimize production in a sustained manner. These systems can contribute to solving problems in the use of natural resources due to the biological and socioeconomic functions that they fulfill (figure 11).

Figure 11. Agroforestry systems in a producer's farm.

Live fence

Live fences are a widespread practice within an agroforestry system consisting of rows of trees and shrubs that delimit the edges of a property or its internal divisions and in its trunks are fixed several strands of barbed wire or smooth. They are simple when they are composed of one or two species that serve the same purpose, they are pruned every 2 years and have high resprouting capacity. They may have two or more species of different heights and uses (timber, fruit, forage) and may include several rows (figure 12).

Figure 12. Cypress live fence.

Paddock system

Rotational grazing is a system that, if well planned, allows the pasture to be harvested at the optimum moment of quality and maximum production, without overgrazing the paddock.

Rest period: It is the time that a paddock needs to recover after the withdrawal of cattle and achieve the highest possible amount of excellent quality forage. A brief period reduces the volume of grass available, while a long one affects the quality and the use of the forage by the animals.

Period of occupation: It is when animals graze in a paddock. It depends on the type of grass, the climatic conditions (the drier, the fewer days of occupation) and the time of rest between two pastures. The optimum time to start grazing is when the lower leaves of the plant turn yellow. When the cattle trim and cut the grass, the stem and part of the leaves must remain, so that their recovery is possible, the soil cover is secured, and the propagation of natural vegetation is avoided.

When removing the animals, the pasture should be about 40 cm high. It is recommended that the period of occupation does not exceed 6 or 7 days since, after that period, the grass regrows and the animals could consume it even tender, deteriorating the pasture. The farm must have as many paddocks as possible, to use shorter occupation periods and make better use of improved pasture.

Animal load: It is the appropriate number of animals that graze a paddock during a specific occupation period and is expressed as "animal units per hectare" (AU / hectare), where an animal unit is equivalent to 400 kg of live weight. To calculate the load capacity, start from the amount of available forage, considering the average consumption of an animal unit (figure 13).

Figure 13. Paddock systems implemented by producers.

Fodder banks

Fodder banks are high densities of vegetation that offer food resources for livestock to have a diet balanced in energy and proteins, especially in the dry season. Generally, fast-growing plants are used, resistant to frequent pruning, which re-grow easily and give many leaves in the dry and rainy season.

Forage banks increase the availability and quality of forages in the dry season, allowing the cattle to produce more meat and milk and improving the producer's income. In addition, better nutrition prevents reproductive problems. These banks can be classified as energetic, protein and cut grasses (figure 14).

Figure 14. Fodder bank of forage grass.

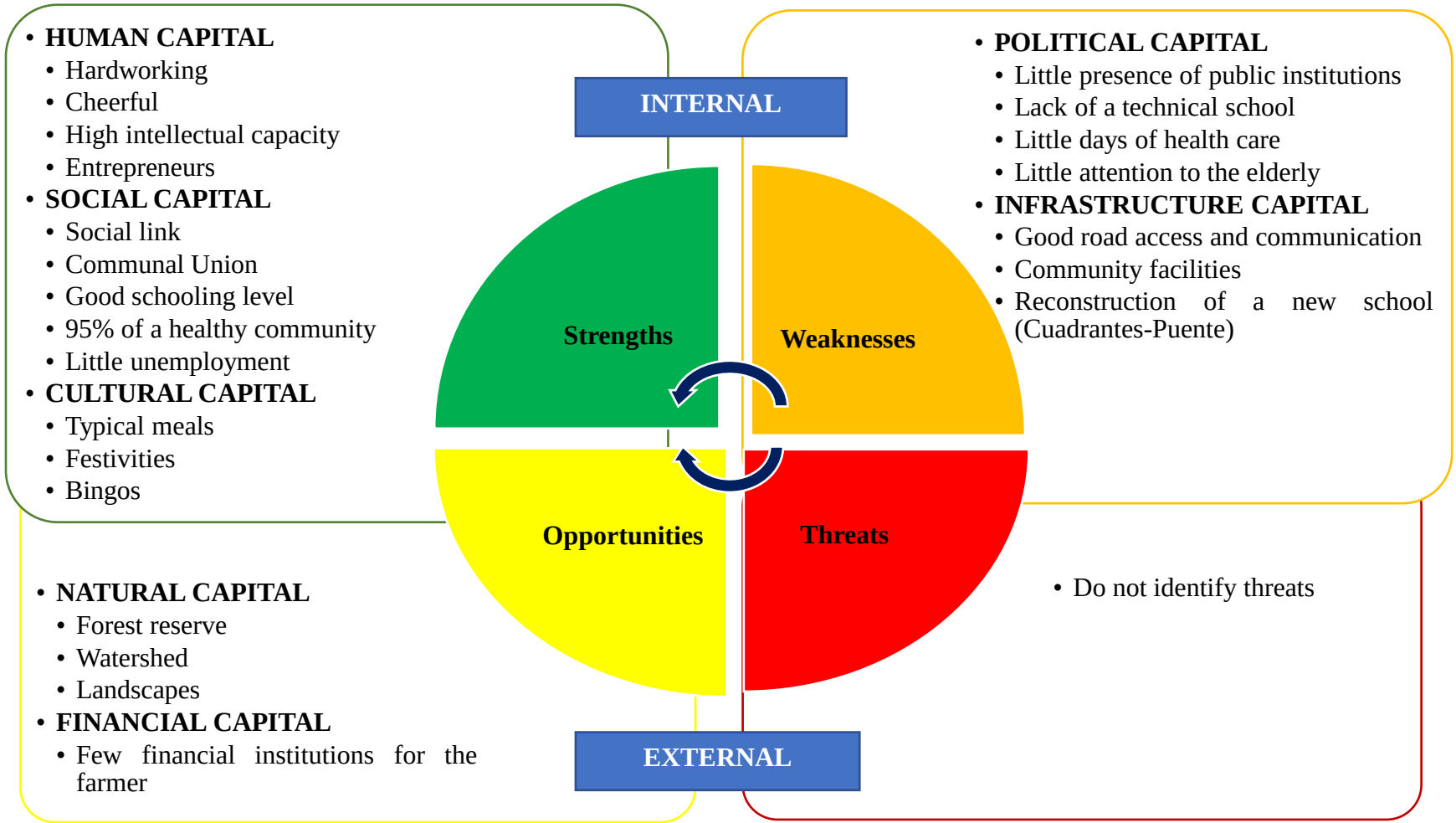
5.1.3 Capital framework and SWOT analysis of the basin.

The communities located in the River Barranca basin are occupied by small settlements just like other basins in Costa Rica. Most are rural communities which are engaged in productive activities such as agriculture, and small-to-medium-scale tourism. Both activities require considerable use of the resources available in communities. These resources are fundamentally vital for the development of rural existence.

SWTO analysis of community capitals.

Table 4 shows a SWOT analysis of the River Barranca basin community capitals.

Table 4. SWOT analysis of capitals of the River Barranca Basin 2019.



Human capital

The human capital in these communities are quite strong, since there is a connection and solidarity between families. And they are also characterized for being cheerful people, they help each other and welcome foreigners.

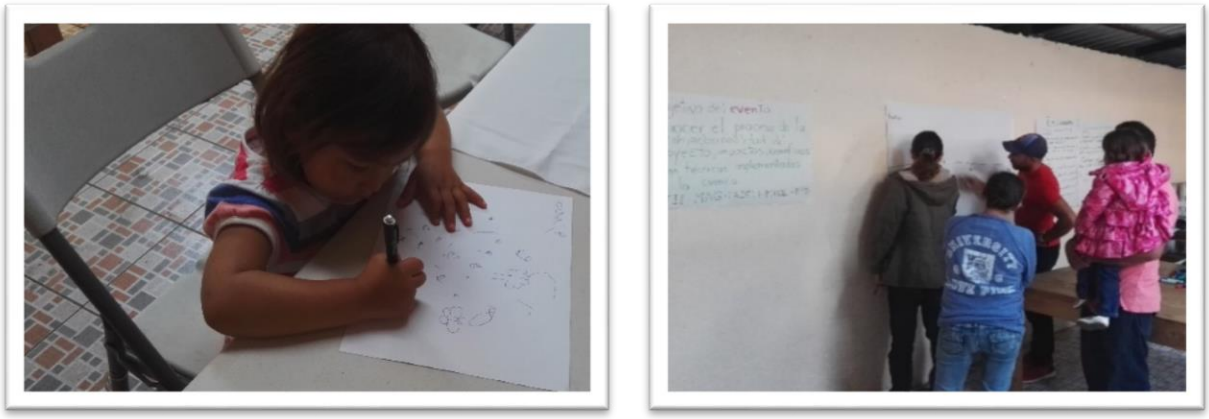


Figure 15. Workshop of Capital SWOT analysis.

Most people know how to write and read (figure 15). There is a significant level of entrepreneurship and they are mostly linked to small and medium scale agricultural production. They are also identified as working people who struggle to provide for their families. In addition, to possessing knowledge related to agriculture, mainly in coffee crops, vegetables and livestock.

Social capital

In these communities, social capital is closely related to human capital through a social link created by ADI leaders. The ADI projects themes in terms of recreation, social and economic development. This association presents different degrees of relationship, relevance, leadership, and cohesion capacity in the approach to some structural problems within the community (figure 16). The objectives of the ADI were created in a perspective that is designed to achieve solutions to common problems within all capitals.

There is a perceived form of horizontal relation of people and organization of those who offer support to the development in the region. This is evident in the state of infrastructure within the communities. In addition, it is essential to highlight the management of the project "agro-conservationist practices" that had a satisfactory final evaluation.

A strong communal union is perceived as well, people form groups of associations with the purpose of protecting natural resources and achieving a community development for all people.

There is less unemployment due to several social projects managed in different associations to stimulate the economy. This is also linked to the low youth population who mostly migrate to different areas to study.

The health in communities are considered good because there are no epidemics, and there are enough sources of nutritious food.

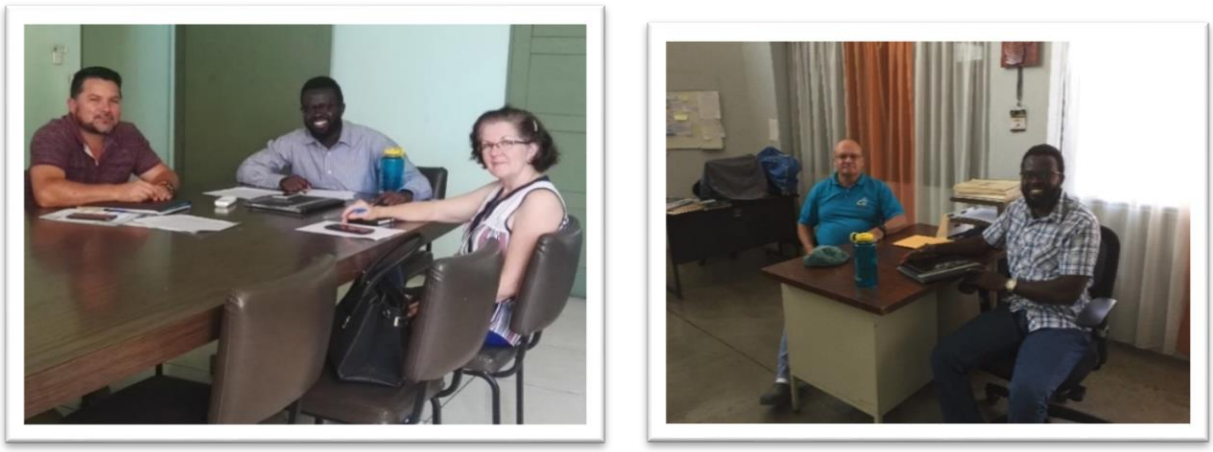


Figure 16. Interview with the president of ADI, MAG, CADETI and MINAE.

Cultural capital

Like the three previous capitals, these communities are strong in cultural capital. The religion that predominates is Catholic, where people profess their faith and strengthen their spirituality, through this way the population in general builds their collective identity (figure 17).

Figure 17. Catholic community church.

As for the cultural festivity, one of the most important is the celebration of the festivities and Christmas. Other events are also identified, such as the month of the virgin, of the saint, of the novena. Other activities that the community practices are linked to the agricultural production of the basin such as cheese fairs, buffers; and foods such as the sale of tamales, "*gallo pinto* and *casado*", a typical Costa Rican diet.

In the homes, the houses have traditional and religious ornaments of the Catholic faith. Families and associations do bingo in a collective way, as a strategy to collect aid either in monetary or personal terms. And sometimes the neighboring communities are invited to participate.

Political capital

According to the perceptions of the inhabitants, the presence of public institutions is perceived in an uncertain manner. The only public institution present in the communities is the health post (figure 18). This is because it has not been determined to which municipality the communities of Barranca and Cirri Norte belong. It was recently determined that the two communities belong to the municipality of Naranjo and not Zarcero. Due to the lack of concrete belonging there is little government intervention and as of recent some public institutions have started working in the region.

Figure 18. Health posts.

Infrastructure capital

In terms of road access and communication, these communities can be reached by asphalt roadways either through Naranjo or Zarcero. There is public transportation, but most families own a car. However, according to some interviewees and the observation guides indicated that due to the topography of the terrain with steep slopes, road suffer constant damage due to rains, which leaves them incommunicado in some occasions. In terms of access to basic services, these communities have electricity, potable water, telephony and Internet access. Most people have modern toilets (connected to a septic system). There is a school, health post (The EBAIS), community hall, sports court and association offices (figure 19).

Figure 19. Communal facility and sports hall.

Natural capital

The River Barranca basin, being part of a central volcanic corridor, has a great diversity of ecosystems and biodiversity of organisms such as wild animals, landscapes, springs and forest reserves (figure 20). Agricultural activity has diminished a great diversity of the ecosystems and biodiversity mentioned above. In addition, high slopes and wind accelerate erosion and loss of many soil microorganisms.

Figure 20. Landscapes and watersheds in the basin.

Financial capital

These communities do not have financial institutions. This limits the growth of agricultural marketing and financing required to stimulate development in general. The inhabitants must move to Naranjo, San Ramón or Zarcero to make financial transactions.

5.1.4 Community Livelihood and FHN in the basin.

The productive and reproductive community livelihoods are presented in addition to fundamental human needs and the participation of family members.

Productive and reproductive community livelihood.

The productive and reproductive livelihoods in the basin are explained in detail in table 5.

Table 5. Productive and reproductive community livelihoods

Type of livelihood	Type of activities	Activities
Productive	Agriculture	Coffee
		Vegetables
		Dairy production
		Cypress
	Sale of labor force	Labor on farms
		Household activities
	Services	Tourism (Amalia ranch)
		Teaching
		Restaurant
Reproductive	Household	Food in the house
		Housekeeping
		Take care of minors
	Education	Infantile education
		Attend trainings
	Membership	Practice a religion
		Attending groups; Dances and elderly
	Recreation	Sports
		Bingos
		Local celebrations

The productive livelihoods in these communities are largely dominated by coffee production. However, over time a combination system has been gradually adopted by producers, such as vegetables, dairy cattle and the planting of cypress. This arises from the instability of coffee prices at national and international level, and climate change phenomenon which has drastically reduced the profitability of coffee. For this reason, producers have diversified their sources of income to other activities.

As for the sale of labor power, there is an emerging source of work labor on the farms. The majority who offer these jobs are Nicaraguans and mainly in coffee farms, vegetables and dairy cattle.

Tourism services are very few in this area, there is only one place called Rancho Amalia which offers activities such as hiking, lodging and horse riding. Some women are engaged in teaching in neighboring communities.

For the reproductive livelihoods, they are mostly dominated and led by women, however, they have support from men and youths.

At home, activities are led by women. There is a combination of roles in providing food. The men are engaged in harvest and bringing food while women prepare it. Also, the care of minors and

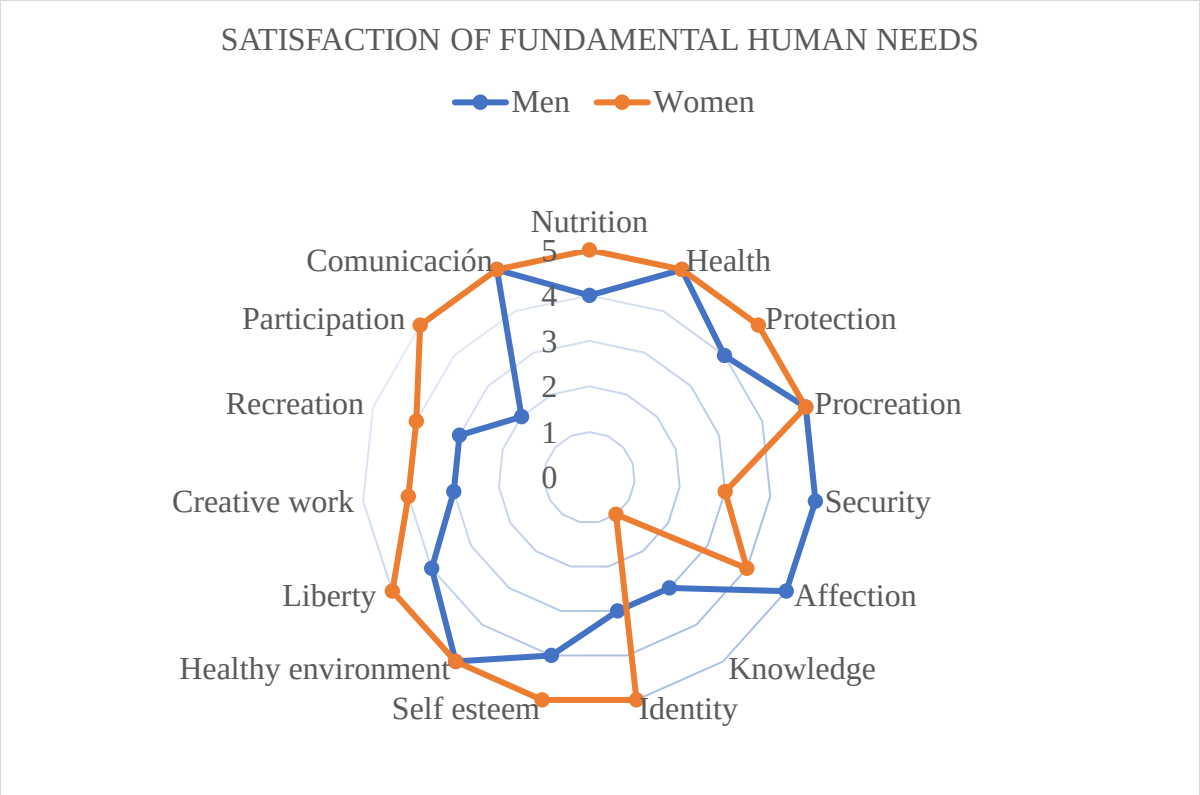
cleaning of the house are usually performed by women, there are exceptions in families where women participate in productive activities such as teaching and services.

In education, infants' study in community schools and then migrate to other neighboring regions to advance their studies. Most people have received training from public institutes such as MAG and EBAIS (Basic Equipment of Integral Health Care).

Fundamental human need

In table 6, shows a summary of the level of satisfaction of fundamental human needs.

Table 6. Satisfaction of fundamental human needs.



1. Dissatisfied 2. Partially unsatisfied 3. Acceptable 4. Good satisfaction 5. Completely satisfied

The level of satisfaction of FHN was elaborated in an emic way (perspectives within social groups) and etic (a critical analysis of scientific theories on the causes of different social and cultural behaviors of groups in societies).

Basic: women feel completely satisfied, more than men in terms of food, health, shelter and procreation. However, their level of satisfaction regarding safety is acceptable and men are completely satisfied.

The person: women consider that their level of satisfaction is quite higher than men in terms of identity, self-esteem and responsibility.

The Environment: the level of satisfaction is higher in women in terms of healthy environment and freedom, greater than that of men.

Action: women feel completely satisfied with creative and productive work, recreation, participation and communication more than men.

When analyzing the data, it is observed that the level of satisfaction of FHN of all the groups shows that women report a level of satisfaction of 52%, considering all details with the totality of combined groups. This is due to an inclusive empowerment of women's participation in leadership and decision-making in the community.

While men report 48% satisfaction level of FHN of all groups combined. This could be because men are quite busy with productive activities and struggling in diverse ways to provide food for their families.

5.2 Analysis of impacts

The analysis of impacts consists of a critical understanding of perceived benefits of techniques of agro-conservationist practices, impacts on biodiversity, ecosystems and finally impacts on land neutrality.

5.2.1 Perceived benefits of agro-conservationist techniques.

To producers

Hillside diches, contour and shallow drainage diches: Producers affirm that the hillside diches, contours and shallow drainage have improved the productivity in their farms in a very significant way. At the same time these practices have managed to reduce the loss of water and nutrients from soil. This means a reduction in the purchase of synthetic fertilizers and increases the purchasing power to provide for their families.

Live barriers: By using species that provide other products, for example, forage or cutting grass for animal feed, provides nutrition to animals. The practice also conserves the hydraulic structures of soil because of the plant roots.

Individual terraces: The terraces have a very high economic cost but their benefits to crops and producers are perceived in the long term. Increases soil fertility and decreases the purchase of fertilizers.

Agroforestry systems: The producers also affirm that, when diversifying the farm, they do not depend on a specific product. The effect of price fluctuations is minimum.

Live fences: Live fences guarantee greater sustainability in the production of goods and services, the farm benefits from contributions in organic matter and shade. In addition, they can obtain wood and firewood for use on the farm.

Paddock system: Rotational grazing increases efficiency and productivity of farms, compared to traditional grazing. The productivity of meat and milk increases per animal and per area, by using improved pastures of higher productivity and nutritional quality**.**

To the community

Organizational Strengthening

The ADI of Barranca and Llano Bonito implemented a productive project in the community for the first time, thus strengthening their capacities in technical and administrative areas. The members of the association feel more strengthened organizationally and administratively through the implementation of the project.

Improvement of living conditions

Occasional employment sources were generated during hiring labor to develop and maintain conservation works, because the producer require collaboration to carry them out. Through the project, several women from these communities were given occasional employment for preparation of food used in trainings, meetings and more, with the purpose of involving the entire community.

For organizations

With the implementation of this project, establishment of work alliances between MAG officials and producers is promoted and encouraged more closely.

5.2.2 Impacts on biodiversity and ecosystems.

Next, is a detailed analysis of the biosphere management actions carried out by producers to maintain the highest possible density of ecosystems, species and genes. In Table 7, Table 8, and Table 9. The SGP / GEF indicators applied to the project are observed.

Hillside diches, contours and shallow drainage diches: These techniques prevent soil erosion, loss of fertilizer and wear of plants. They also help to conserve soil moisture; hillside ditches cause more water to penetrate and remain in the soil for a longer period. In addition, they facilitate planting, composting, weeding, and harvesting, because the distances between them facilitate tillage.

Live barriers: It decreases speed of rainwater that cannot be filtered and reduces erosion in soil. Likewise, it helps to increase the filtration of water by conserving moisture in soil profile for a longer time.

Individual terraces: They reduce erosion by stopping and slowing down the speed of water. And facilitate accessibility of people to move within the farm.

Agroforestry systems: The contamination of soil and water is reduced by lowering intense application of chemicals and synthetic pesticides. At the same time, it increases the conservation

of biodiversity and interactions between species. Also, the diversification of farm with forest areas, live fences and windbreak curtains contributes to carbon fixation.

Live fences: It reduces soil degradation and its characteristics are improved by nitrogen fixation by leguminous plants and environmental pollution because trees fix carbon from the atmosphere. The pressure on forests to obtain wood is reduced, since live fences provide the farm with them. The conservation biodiversity is favored when living fences work as biological control.

Paddock system: By producing more fodder in certain areas of the farm, other areas are released to protect forests and rivers. Increases moisture and water infiltration in the soil, thanks to the vegetation cover offered by pastures. With rotation of the paddocks, there is less trampling and compaction and less soil degradation.

Contribution to Global Environmental Benefits

Table 7. SGP / GEF indicators applied to the project.

No	PROGRAM	PROJECTS	INDICATORS
I	Conservation of soils, forests and protected areas	1. Control of erosion	*27,560 meters of soil conservation techniques implemented surpassing the projected goal of 21,600 meters before starting the project.*
		2. Improvement of soil fertility	
		3. Landslide control	
		4. Recovery and restoration of degraded soils	*27.560m^2*
		5. Protection and recovery of riparian strips	*NA*
		6. Agroforestry and silvopastoral systems	*4.680 m^2*
		7. Management of protected areas and biological corridors	*1 Biological corridor (BC)*
II	Integrated management of water resources	8. Access, distribution and tariff regulation of water resources	*NA*
		9. Control of agricultural wastewater pollution	*NA*
		10. Monitoring the quality of water for human consumption	*NA*
		11. Water environmental services	*NA*
		12. Monitoring of participatory and inclusive ecological flow)	*NA*
		13. Efficient use of water in rural households	*NA*
		14. Protection and management of water sources, including land purchase	*NA*

		15. Management of water information	*NA*
		16. Research on groundwater	*NA*
III	Sustainable forestry and livestock production	17. Efficient technology for agricultural production and value chains	*NA*
		18. Promotion of forestry activity	*NA*
		19. Promotion of integrated farms	*55*
		20. Promotion of organic production	*Training and exchange of experiences 55 people*
		21. Development of agro-industry	*NA*
		22. Efficient technology for livestock production and value chains	*NA*
		23. Strengthening of aquaculture production	*NA*
		24. Promotion of bee production	*NA*
		25. Ornamental and medicinal production	*NA*
		26. Agricultural research	*NA*
IV	Risk management and climate change	27. Reduction of agricultural climate risk through irrigation systems	*NA*
		28. Identification of new plant and animal species with adaptation potential	*NA*
		29. Biological control of pests / diseases that arise from climate variability	*55 producers trained and exchanges experiences*
		30. Protection of water recharge zones	*NA*
		31. Water harvest	*NA*
		32. Avenues and flood control	*NA*
		33. Analysis of the climatic risk in coastal-marine strip	*NA*
		34. Climate risk warning system	*NA*
		35. Promotion of clean energy production	*NA*
V	Organization and management of agribusiness	36. Agribusiness management	*NA*
		37. Agribusiness organization	*NA*
		38. Microcredit	*NA*

		39. Information for marketing and commercialization	*NA*
		40. Promotion of Community Rural Tourism	*NA*
VI	Capacity building	41. Training in institutional management	*NA*
		42. Training in municipal management	*NA*
		43. Training in local management (community)	*2 integral development association*
		44. Training in agribusiness issues	*NA*
		45. Environmental education in schools and colleges	*NA*
		46. Environmental education and climate change in the community	*4 workshops on climate change: 55 participants*
		47. Strengthening coordination platforms	*ADI of Barrranca y Llano Bonito with other organizations coopebrisas, finca barranquilla, finca valentina*
VII	Basic services and environmental sanitation	48. Improvement of communal aqueduct systems (ASADAS)	*NA*
		49. Management and treatment of wastewater	*NA*
		50. Waste collection, handling and treatment	*NA*
		51. Protection and maintenance of rural roads (management)	*NA*

NA: the indicator does not correspond to the initiative implemented.

Biodiversity

Table 8. Impacts of biodiversity achieved.

ITEM	**VALUE**
1. Hectares of areas conserved by indigenous and local communities (ICCA)	*NA*
2. Hectares of conserved protected areas (in biological corridors or buffer zones of prioritized protected areas, basins, recharge areas of water sources)	*NA*
3. Hectares and types of important ecosystems that have improved their conservation status (in biological corridors or buffer zones of priority protected areas)	*1 CB*
4. Hectares of productive landscapes under sustainable management.	*55 HA*
5. Important species protected by the project	*NA*
6. Strengthening of Biological Corridors.	*NA*

7. Number of hectares under incentives ($) for their protection and conservation (PES) in biological corridors or indigenous territories.	*NA*
8. Hectares reforested or under natural regeneration	*NA*
9. Number of trees planted in areas of biological corridor, buffer zone of prioritized protected areas, including riverbanks and water sources	*NA*

NA: the indicator does not correspond to the initiative implemented.

Climate change

Table 9. Impacts of climate change.

ITEM	VALUE
1. Tons of CO2 avoided due to the implementation of low carbon technologies. • Renewable energy measures (biodigesters-solar cookers, etc.) • Low carbon transport practices (electric, gas, solar) • Measures for energy efficiency (solar panels, solar drying) • Others (used in production)	*NA*
2. Tons of CO2 avoided through better land use, fire management and the development of practices to help improve climate change	*NA*
3. Tons of CO2 fixed for protection and conservation of forests, better land use.	*NA*
4. Total, of biodigesters installed and in operation.	*NA*
5. Number of brigades constituted	*NA*
6. Number of men and women under groups organized as Brigades.	*NA*

NA: the indicator does not correspond to the initiative implemented.

5.2.3 Impacts for land neutrality

Regarding land neutrality, the following findings can be observed in table 10 and table 11. The project managed to surpass the originally planned goal, thanks to the efforts of producers. The awareness of protecting environment and producing healthy food was intensified.

In addition, most of the productive livelihoods in the basin are derived from the exploitation of the lands. This is being controlled in a more direct manner, where institutions such as CADETI and MAG innovate their programs and strategies to combat the degradation of lands in different basins.

Land degradation

In general, more than 55 hectares degraded have been restored in the basin within the project. To reduce erosion and provide more nutrients for land, the project achieved the planting of more than 760 trees. The planting of legumes has managed to fix nitrogen in the soil and balance the capture of carbon in the atmosphere.

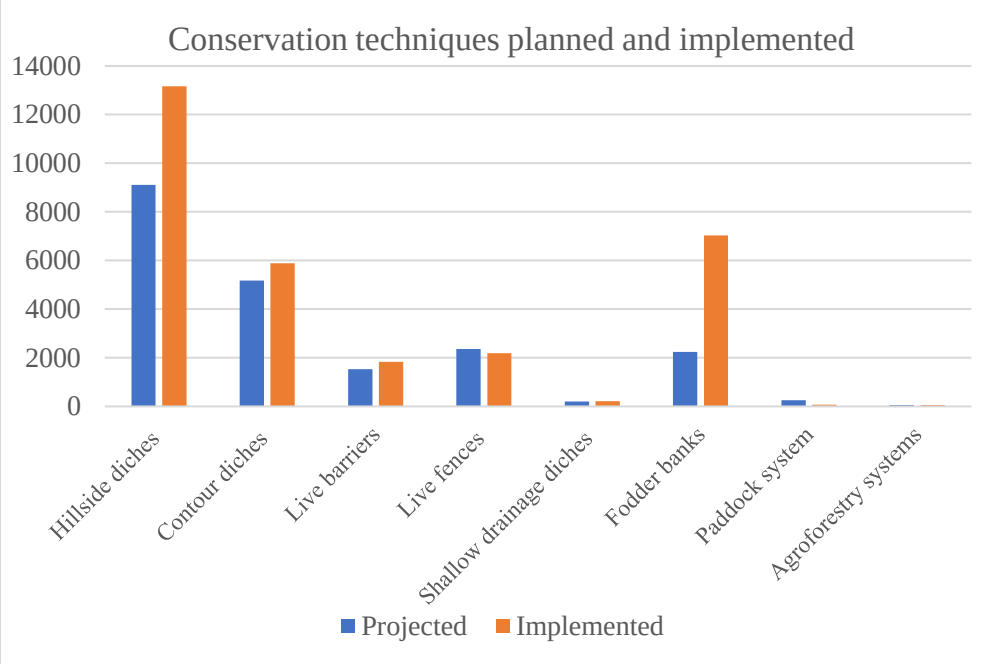
Table 10. Impacts of land neutrality.

ITEM	VALUE
1. Hectares of land where sustainable forest management is applied, sustainable agricultural practices and water management, or under integral farms and agroforestry systems.	*55 HA*
2. Hectares of land Neutralized in its degradation or rehabilitated.	*55 HA*
3. Number of communities that develop practices of sustainable land use and forest management.	*2*
4. Number of trees planted in the Jesús María and River Barranca Basins.	*760*
5. Number of women participating in agricultural training.	*16*

Indicators achieved

Thanks to this project, 27,560meters of soil conservation works have been executed over the projected goal of 21,600meters before start of the project. In table 11, the indicators reached of different conservation techniques are shown.

Table 11. The conservation techniques elaborated by producers.



5.3 Analysis of key criteria

The analysis of key criteria for the success of the project consists in a critical observation about the dynamics of project management, gender equity and sustainability in the project.

5.3.1 Dynamics of the project management

In terms of project management, there was extensive planning and technical support from MAG. This ministry was directly involved to solve low productivity challenges. In the same way they were responsible for managing trainings and tours to different areas.

During the project execution, there was effective communication between the MAG and producers. Thanks to this dedication of both parties, the final evaluation of the project did not register any challenges or difficulties during the execution of the conservation works.

The following characteristics of the association can be highlighted, which allowed the success of the project: Teamwork and priorities of activities and projects to be carried out.

5.3.2 Gender equity

The participation of women has been a fundamental pillar in the project. SGP requires the participation of women in their projects to improve the welfare of producing families. In addition, it must be recognized that the two associations were led by women during the execution of the project.

In table 12, regarding distribution and gender roles are shown with some dominations and similar activities. However, it can be identified that both men and women participate in productive and reproductive livelihoods. Most productive activities are led by men while reproductive activities are led by women.

Since the productive livelihood is dominated by men, it is important to understand that men mostly own land titles in these communities. Although there are exceptions of some women who own land and lease men to produce them.

Table 12. Productive and reproductive activities carried out by men and women.

Type of livelihood	Type of activities	Activities	Men	Women	Boys	Girls
Productive	Agriculture	Coffee	✓		✓	
		Vegetables	✓		✓	
		Dairy production	✓		✓	
		Cypress	✓		✓	
	Sale of labor force	Labor on farms	✓		✓	
		Household activities		✓		✓
	Services	Tourism (Amalia ranch)	✓	✓	✓	✓
		Teaching		✓		
		Restaurant		✓		
Reproductive	Household	Food in the house		✓		✓
		Housekeeping		✓		✓
		Take care of minors		✓		✓
	Education	Infantile education			✓	✓
		Attend trainings	✓	✓		

	Membership	Practice a religion	✓	✓	✓	✓
		Attending groups; Dances and elderly	✓	✓	✓	✓
	Recreation	Sports			✓	✓
		Bingos	✓	✓	✓	✓
		Local celebrations	✓	✓	✓	✓

5.3.3 Project sustainability.

The project managed to strengthen the dimensions of sustainability: social, economic and environmental. Tables 13, table 14 and table 15 show the various aspects of sustainability dimensions.

Social dimension

The following organizational aspects in the basin were improved:

- The community development organization is strengthened in the implementation of a productive project.
- A greater union and relationship between producer families was promoted, through the implementation of the initiative.
- The ADI of Barranca and Llano Bonito is equipped with agricultural tools that will allow it to work more efficiently and in accordance with the needs of the Board of Directors and the affiliates.

Environmental dimension

The project managed to implement 27,560 m of conservation works, which reduces soil erosion and reduces the use of agrochemicals. This is to promote greater density of species in the ecosystem.

Economic dimension

- It is expected that, with the equipment provided, the producers can save on labor, to carry out some tasks of the farm and that they are in keeping with conservation.
- The producers to obtain the necessary equipment for their farm, together they contributed.

Table 13. Community livelihoods and sustainable development (all projects).

ITEM	VALUE
a. Number of people from the participating communities (disaggregated by gender) * mandatory for all projects.	*16 women* *39 men*
b. Number of families that benefit from the project and improve their living conditions.	*55 producers*

c. Number of sustainable initiatives developed within the Biological Corridor.	*55 coffee, livestock, and vegetable production initiatives*
d. Number of linkages generated / strengthened through community rural tourism projects.	*1 dairy producción ASONALAC*
e. Family income / initiative for sales of sustainable products generated by the project and / or community rural tourism activities.	*NA*

NA: the indicator does not correspond to the initiative implemented.

Table 14. Empowerment (all projects).

ITEM	VALOR
1. Numero de ONG o CBO conformadas o registradas.	*1*
2. Número de personas indígenas apoyadas directamente.	*NC*
3. Número de mujeres que dirigen el proyecto que son apoyadas directamente.	*2*
4. Numero de estándares de calidad/marcas alcanzadas o mecanismos financieros innovadores puestos en practica	*NC*
5. Cofinanciamiento Total adicional en efectivo y en especie obtenido para la sostenibilidad, aumento de escala y replicabilidad del apoyo del PPD.	*NC*
6. Número de convenios con organizaciones gubernamentales para el desarrollo de programas de capacitación específicos para mujeres.	*6*

NA: the indicator does not correspond to the initiative implemented.

Table 15. Influence on policies, Capacity Development & Innovation (all focal areas).

ITEM	VALUE
1. Number of consultation mechanisms established in the framework of the Rio Conventions.	*NA*
2. Number of innovations or innovative technologies developed or applied.	*NA*
3. Number of regional or local policies influenced (level of influence 0-1-2- 3-4)	*NA*
4. Number of national policies influenced (level of influence 0 - 1 - 2 - 3 - 4)	*NA*
5. Number and type of alliances established with local governments / authorities.	*NA*
6. Number of strategic / territorial management plans established in biological corridors.	*NA*
7. Number and type of microcredit and financing mechanisms available for men and women producers.	*NA*

NA: the indicator does not correspond to the initiative implemented.

5.4 Systematization of experiences of agro-conservationist practices

The systematization is a combination of findings in situational analysis, impact analysis and analysis of key criteria. It is based on the experiences of agro-conservationist practices, the experiences oriented to the project were taken from 2015, one year before the project, until 2018, and 5 years later projection.

5.4.1 Objective and the systematization axis

Table 16 shows a summary of the systematization data sheet.

Table 16. Technical data sheet of the systematization of experiences.

Local initiatives of agro-conservationist practices as alternatives that contribute to neutralize the degradation of lands in the River Barranca Basin, Costa Rica, during the VI Operational Phase of the SGP (2016-2018).	
Object *What is going to be systematized?*	Local initiatives of agro-conservationist practices as alternatives that contribute to neutralize the degradation of lands in the River Barranca Basin, Costa Rica, during the VI Operational Phase of the SGP (2016-2018).
General objective *Why systematize these experiences?*	• Analyze local initiatives of agro-conservation practices as alternatives that contribute to neutralize the degradation of lands in the River Barranca Basin, Costa Rica.
Specific objectives How to achieve the general objective?	• Describe the local initiatives of agro-conservation practices that contribute to neutralize the degradation of lands. • Identify the impacts generated by agro-conservationist practices in obtaining global environmental benefits, the welfare of producing families and the community in general. • Identify the factors that have enabled or inhibited the implementation of these practices. • Identify lessons learned from these experiences and highlight successful practices to be promoted and implemented in other regions.
Systematization axes What central aspects of these experiences are we interested in systematizing?	• Local initiatives of agro-conservation practices. • Impacts generated by agro-conservationist practices to the actors involved. • The factors that have enabled or inhibited the implementation of these practices. • Lessons learned from these experiences highlight successful practices to be promoted and implemented in other regions.

5.4.2 Reconstruction of the techniques implemented.

Next, Table 17. shows the specific objectives, expected results, goals achieved and the implemented conservation techniques

Table 17. Matrix of expected and achieved results of the project.

Specific objectives	Expected results	Indicators	Base line	Goals	Achieved goals	Activities performed
Objective 1: Train producers in aspects of sustainable management and soil conservation with practical and theoretical methodologies that lead to the environmental sustainability of their farms.	1.1.- Trained producers and implementing soil conservation practices in their farms.	Producers trained in conservation practices: hillside diches, contours, shallow drainage contours, organic fertilizers, calcium carbonate, agroforestry systems, individual terraces.	0	55	55	Before initiating the project, coordination meetings were held with the community development association of Barranca and Llano Bonito, once the project was approved. A training workshop on the importance of soil conservation and climate change was developed by the AEA-MAG
		3 training courses	0	3	12	1. Farm diagnostics (55 participants) 2. Demonstration of conservation works (55 participants). 3. Demonstration use of equipment (55 participants). 4. Climate change with PPD (55 Participants) 5. Precision agriculture (55 participants). 6. Nutritional requirements of coffee (55 participants). 7. Demonstration of advanced technology agricultural products (55 participants). 8. Agrarian public defense (55 participants). 9. Importance of soil conservation and climate change (55 participants).

						10. Efficient management practices for dairy production, including pasture management / production, biofertilizer production, soil management, dairy activity records (30 participants), 11. Assembly to inform about the results of the project (55 people) 12. Meeting with Charles Dixon PPD coordinator (56 people)
	1.2.-Producers exchange knowledge and experiences through community days of learning	Learning tour	0	2		1. COOPEBRISAS (44 participants) 2. Organic fertilizers and seedling production (44 participants) 3. Nuevo Zarcero Finca Valentina (44 participants) 4. Finca Barranquilla (32 participants)
Objective 2: Implement conservation practices that contribute to reducing soil loss and that allow an integral management of the farms of the communities	2.1.-Producers of the communities of San Antonio, Barranca, applying soil conservation practices.	Quantity Sustainable production practices that are applied (slope ditches, guard channels, organic fertilizers, calcium carbonates, individual terraces and others.).	0	5		Group demonstrations and individual consultancies were carried out in the elaboration of conservation techniques. The producers managed to implement in their farms the techniques learned during the trainings. Hillside diches, contours, live barriers, gully protection, drainage, among others were elaborated. Fifty-five farm visits were made by MAG technicians to obtain a farm diagnosis to determine the current situation and baseline in each of the beneficiaries' production systems. This activity was coordinated with each of the producers and the MAG technicians participated.
		Hillside diches (meters)	0	9115	13165	The farmers managed to execute 27,560 meters of soil conservation

		Individual terraces (meters)	0	150		techniques surpassing the projected goal of 21,600 meters that was had before starting the project.
		Fodder banks	0	2240	7030	
		Live fences (Pore, black wood, etc.) (meters)	0	2355	2190	
		Paddocks (numbers)	0	255	70	
		Shallow contour drainage (meters)	0	5175	5882	
		Live barriers (meters)	0	1525	1835	
Purchase of equipment and machinery						After the demonstration day, a visit was made to the commercial establishments to obtain four quotations of the required equipment. A meeting was held in conjunction with the MAG technicians to analyze the offers and determine the commercial house in which the equipment would be purchased. The equipment and materials were purchased, and a meeting was scheduled with all the participants of the project to deliver the corresponding ones to each one of them.

5.4.3 Lessons learned and recommendations of systematization process.

The systematized experiences are analyzed, and lessons learned, and recommendations are developed, from each experience considering the interviews, focus groups, workshops and observation guides made in this study.

Lessons learned in the project

Producers

- Producers learned the importance of protecting the environment, since the improvement in their productivity depends directly on the proper functioning of natural resources and their impact to influence effects of the phenomenon of climate change.
- Land degradation affects the availability of nutrients in soil, which affects the productivity of crops and low harvests.
- The importance of water is also highlighted, and with the implementation of conservation works, the misuse of water for irrigation was reduced.
- The use of cultural and sustainable methods of weed and pest control for a small producer is cheaper than the purchase and application of agrochemicals.
- They learned that conservation works should not be carried out and at the same time apply chemicals. A producer with micro benefit recommended that less herbicides should be applied to see the impacts of conservation techniques.

"Water is the main source of life, but a long time ago grandparents had to bring it far from the wells, but now the community has accessibility via tubes." Testimony of a producer.

Producers also affirm that the techniques implemented in the project have increased productivity and awareness to conserve the ecosystem. The producer Elioma López Salazar has more than 25 years of not applying herbicides on his farm.

Community development associations

- The associations learned that a social and inter-institutional project has the capacity to solidify the relationship between local producers, the state and civil society. Which can be planned inclusively to ensure the welfare of the communities.
- To execute a rural development project, leaders must have discipline, order and commitments.
- Empowerment, the farmer felt the importance of the work they do.
- The union, collaboration, fellowship and trust are very important, we observed a team working to achieve a common objective.
- They learned the importance of protecting the environment and the repercussions it has to the entire basin and the planet.

Ministries and civil society

- Local associations should be empowered to improve on the management of natural resources available in their communities.

- Conservation techniques should be implemented in zones and basins under the same characteristics and problems, in addition to offering continuous technical assistance to producers.
- Development initiatives make more sense when the request comes from local stakeholders and when they appropriate the activities in their farms.

Recommendations to ministries and civil society

- Producers need the government to help them in the following ways: by providing projects and laws that protect farmers. To achieve food security, the voice of producers must be heard.
- Producers expect that ministries work collectively to produce food and at the same time preserve the environment, and not working in isolation, since production and conservation are fundamental.
- With the implementation of this project, the establishment of alliances between MAG officials and producers is promoted and encouraged more closely.

Future challenges

- The conservation works carried out in the farms of producers will receive the respective maintenance.
- The AEA will continue to offer technical assistance regarding soil conservation and other issues.
- The sustainability of the conservation works that were carried out with the implementation of the initiative will be measured in the long term.

5.4.4 Proposal of successful practices to promote.

A by-product of the present investigation is the elaboration of a proposal of systematization of successful practices to promote and a technical manual with MAG. Based on the systematization of the applied techniques, lessons learned to achieve neutrality in land degradation. The two products are published by SGP and MAG with the objective that these practices are implemented in other basins with the same characteristic.

In the livestock sector, the fodder banks had quite remarkable results of 68% more than projected. However, the producers affirm that other conservation techniques such as live barriers, fodder banks and paddock system gave positive results at the same time.

However, the project had more scope in the implementation of the hillside diches. They reached 31% more than projected. This is because there was a lot of participation of the coffee producers, since this basin is dominated by this crop, as well as the vegetables. Which indicates that this technique is essential and important to improve water management in their farms.

Therefore, all the techniques applied in each productive activity whether in livestock or agriculture show positive results (table 11). Each technique must be evaluated independently as a separate case and not as a whole. Because not all producers are engaged in the production of coffee, vegetables and livestock at the same time.

6 THE SCOPE AND LIMITATIONS OF RESULTS

- The scope of this study is greatly based on a sequential and structural axis in the objectives, which allowed easy flow in the research during field work phase.
- There was an initial visit to SGP projects. This was done to define the parameters of the research and visiting local actors before signing a memorandum of understanding.
- It was not possible to reunite all direct stakeholders on the same platform to both debate with producers at the same time share opinions on the conclusive results of the research.
- The main limitation of this work was that it was not possible to observe all the conservation works implemented, because the time when the field work was carried out, it coincided with the harvest season. Most of the efforts are concentrated on harvests instead of the maintenance of the techniques implemented.

7 CONCLUSIONS

From the work carried out, the following conclusions can be highlighted:

- In the River Barranca basin, communities are strong in human, social and cultural capital. This is because they are communities with small populations and most people know each other or have a family relationship. The communities do not have any financial entity, according to the SWOT results, the financial capital corresponds to the list of threats. However, communities see it as an opportunity to take advantage of.
- The main economic activity in the basin is the production of coffee. However, because of climate change and the instability of coffee prices nationally and internationally, producers have diversified their productive livelihoods. This gave rise to the production of vegetables, cypress and livestock, among other activities such as the sale of labor power, teaching services and food sales.
- Fundamental human needs, as far as women are concerned, are observed to be sufficiently strengthened and empowered more than men, in terms of all the basic NHF groups. Women are empowered and actively participate in decision-making in communities.
- The initiative helped to reduce the loss of soil through the implementation of conservation works carried out by producers that amount in terms of 27,560 linear meters, exceeding the target set. This value represents 22% of positive results achieved to neutralize land degradation.
- By reducing land degradation, the project strengthens awareness of good management and management of biodiversity and ecosystem present in these communities.
- The AEA-MAG developed 55 farm plans and offered technical support to each producer for a year and a half.
- There was a significant participation of women and their relationship with other producers during the implementation of the initiative. It was achieved that 29% of women participated (in absolute values of 16 women). It is important to note that the project was developed under the leadership of women as presidents of these associations.
- After the training received, the producers obtained the skills to perform soil conservation and maintenance on their farms.
- Thanks to the donation of tools such as chainsaws, atomizing pumps, manual pumps, and others, producers can carry out conservation work in a more technical way, contributing to the improvement of the environment and the productivity of their farms.
- Through the training and exchange of experiences, the knowledge and skills of the participants were strengthened in diverse topics related to coffee production, livestock, vegetables, climate change, soil degradation, conservation works, and others.
- The producers who were participants in the project are now part of the list of MAGs beneficiaries, therefore, a constant follow-up to the conservation works is expected.

8 RECOMMENDATIONS

Recommendations to local associations

- Prepare a preliminary and comprehensive study of forming cooperatives/associations, to expand the scope of small producers.
- Diversify your sources of income, preferably combine agricultural production with some service simultaneously. This would allow them to take advantage of the large dominant tourism sector in the country. Also, reduce the effects of low performance caused by climate change.
- Conduct a value chain analysis to promote local economies to improve their competitiveness. The productive chain refers to the production, transformation, marketing and consumption functions carried out by different actors (people, formal or informal organizations). While the value chains are oriented by demand and seek the competitiveness of the chain as a system, with a vision of economic, social and environmental sustainability.
- Invest in youths living in rural areas, providing them with attractive opportunities to generate income.
- Change the paradigm of parents not to undermine agriculture before youths, because it includes production and technology, but also cultural, social relations, interaction with nature, etc.
- Promote sustainable production, which consists in conserving and improving natural resources. Use an ecosystem approach that is based on the contribution of nature to the growth of crops and apply appropriate external inputs at the right time and in the right amount.
- Maintain the essence and purpose of partnership formation in addition to teamwork and inclusive leadership. This will help to continue operating towards a successful direction in the execution of the projects at the same time fulfilling a common objective.
- Keep conservation works clean and active. The cost of maintaining them constantly is lower compared to doing them again during the rainy seasons. In addition, it helps to get used to the culture of conservation.

Recommendations to ministries and civil society

- Ministries should involve technology and youth participation in their development and conservation programs. Agriculture is becoming highly technological. Therefore, requires less labor. This trend is causing economic pressure in some regions, which in turn causes young people to move to urban areas.

- Promote the union between conservation of natural resources and development through productive, conservative and economic policies at sectorial and national level
- Find a balance between conservation and development, the two activities go together. MAG and MINAE must work together to ensure that communities improve their well-being and food security, while making responsible use of natural resources.
- Improve state policies to support youth enterprises. In the Barranca basin, more agricultural colleges are needed than the academic ones. Adequate and timely education is a fundamental strategy for the development of rural areas.
- CADETI, SINAC and MINAE must increase their visibility and presence in these communities. Increase its staff so that they can support more in the Barranca basin. In addition, to approach communities as they must raise awareness about their mandates and obligations.
- Promote rural tourism, since it is a viable activity not only for rural farm entrepreneurs. Through this activity, sociocultural and ecological benefits are created for communities and the country.
- Clarify the origin of the project and that all ministries and institutions appropriate it in an equitable manner. Since in the Sixth Operative Phase was carried out between CADETI and SGP, however, MAG offered more technical assistance. In this case, the participation of MAG was very significant compared to the others, and producers received several visits from them and were responsible in the execution phase.
- Make political efforts and seek sources of funds to finance these conservation works because the concept of PES of FONAFIFO fund does not cover the concept of soil conservation.

Recommendations to the practitioners of development and biodiversity conservation

- Coordinate with the applicant organization to provide clear information about the context in which the study will be carried out and sign a memorandum of understanding.
- Separate the cultural orientation and professional training of the facilitator from a practical reality in a different study field. This separation will enable the study to flow and take advantage of the knowledge of local actors.
- Target key and specific actors, although the data collection tools are important and very helpful. That will help triangulate and synthesize the right information easily in less time.
- Be willing to modify methodologies if necessary, without hesitation since learning is a dynamic and continuous process.

9 LESSONS LEARNED

- The facilitator must adjust to the language of the area. Being foreigners there are many terms that do not conform to the reality of the country where the study is being applied. It is important at least one meeting prior to the interventions to adjust the data collection instruments to the local language.
- The activities to be carried out must match the schedules of the community where you are going to work. In the case of producers, you must consider the working times of each one of them in the field.
- We can build sustainable communities only when all the key actors work efficiently and with a common goal. When private institutions, civil society and public institutions implement policies in an inter-institutional approach, resilience can be achieved in community development programs.
- Successful organizations are those that are flexible with their adaptation and capacity to assume changes and face them in a positive and proactive way. The organizations that learn are those that are willing to assume new roles and responsibilities and that are technically in continuous advancement and training.
- The following key elements should be considered for generational succession:
  - **Education:** relevant to open minds, develop skills and abilities.
  - **Innovation:** essential to access market opportunities with greater potential.
  - **Self-generation of income:** through business projects, to increase the supply of jobs, improve the quality of life of adolescents and their families, in this way contribute to breaking of the viscous circle rural poverty and contribute to the development of local economies
- Invest in the development of strategies for organizational and business strengthening; that is, quality training and technical assistance. Separate teaching-learning methodologies and approaches by differentiating the functions of managers and technicians. Create knowledge from experience, keeping in mind the conceptualization and theoretical structuring, as well as the analysis and practice to finally reach an appropriation with the use of applied tools, which must be validated and adjusted.

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11 ANNEXES

Annex 1. Memorandum of understanding between the practitioner, PAPDC and SGP-UNDP.

1. Entre el Programa Académico de Práctica del Desarrollo y la Conservación (PAPDC) de la Escuela de Posgrado del CATIE en Turrialba, Costa Rica; Programa de Pequeñas Donaciones, Programa de las Naciones Unidas para el Desarrollo (PPD-PNUD) de San José, Costa Rica y Tom Okot se acuerda la siguiente carta de entendimiento como referencia inicial para la realización del Trabajo de graduación de Tom Okot como requisito para obtener el grado de Máster en Práctica de desarrollo en la Escuela de Posgrado del CATIE.

2. Esta carta expresa las intenciones y entendimientos iniciales de los que la acuerdan, y la misma podrá ser modificada a medida que avanza el Trabajo de graduación, previa notificación y acuerdo de las partes. Cuando las modificaciones lo ameriten, las mismas serán anexadas a esta Carta como evidencia de lo acordado.

3. A la fecha de firma de la carta el PPD-PNUD ha manifestado su interés en que Tom Okot realice su Trabajo de graduación sobre el tema Sistematización participativa de iniciativas locales de prácticas agro-conservacionistas, como alternativa que contribuye a la neutralidad de la degradación de las tierras, en la Cuenca del Río Barranca, Alajuela, Costa Rica, el cual es necesario para la organización solicitante para avanzar en sus actividades a favor de la conservación y el desarrollo local.

4. Los datos de identificación y contacto de la persona que representa a la organización solicitante en este proceso son: **a. Charles Dixon**

b. Coordinador Nacional

c. Oficentro La Virgen #2, de la Embajada Americana 300m Sur y 200m Sureste. Pavas, San José

d. (506) 2296 1544 ext. 2137

e. charles.dixon@undp.org

5. Este Trabajo se realizará entre enero y junio de 2019 y en el transcurso del mismo el estudiante entregará a la organización solicitante los siguientes productos:

a. Un reporte corto de máximo 10 páginas de la sistematización participativo-denominada Sistematización participativa de iniciativas locales de prácticas agro-conservacionistas, como alternativa que contribuye a la neutralidad de la degradación de las tierras, en la Cuenca del Río Barranca.

b. Colaborar con el MAG para la elaboración de una ficha técnica para los productores basado en la sistematización de sus técnicas locales, lecciones aprendidas.

c. Además de los productos antes descritos, el estudiante debe entregar a la Escuela de Posgrado, un informe del trabajo de graduación siguiendo los lineamientos y requisitos académicos estipulados en el reglamento interno para este fin.

6. Como contribución a la realización de este trabajo, la organización solicitante se compromete a proporcionar los siguientes apoyos **a. Apoyo en traslados locales**

b. Introducción a los actores locales

c. Convocatoria a eventos

d. Apoyo en viáticos (a determinarse)

7. Por su parte el estudiante se compromete a realizar el trabajo en el tema solicitado, a involucrar a la organización en el diseño de su Trabajo, a consultar los ajustes y cambios que fuesen necesarios al mismo,

a respetar los estilos de trabajo y normas de la organización y a entregar los productos comprometidos en el plazo acordado y con el mayor nivel de calidad posible.

8. El PAPDC se compromete a apoyar la preparación del proyecto de Trabajo de graduación con sus especialistas, con la participación de otros expertos del CATIE o de terceras organizaciones cuando sea necesario, a acompañar a distancia la realización del trabajo de campo (entre los meses de enero a marzo 2019) y a asesorar la etapa de procesamiento de la información y preparación y entrega del Informe de Trabajo de graduación y de los otros productos que se han comprometido (entre los meses de abril y junio 2019).

9. El PAPDC está representado por su Coordinadora Académica, cuyos datos de identificación contacto son los siguientes:

a. Nombre: Felicia Ramírez Agüero

b. Posición o cargo en la organización: Coordinadora Académica MPD - MPC

c. Dirección física: Escuela de Posgrado. CATIE. Turrialba 30501. Costa Rica

d. Dirección postal: Sede Central CATIE. Cartago,

Turrialba, 30501. Costa Rica

e. TE. (506) 2558 2115

f. Dirección de correo electrónico. framirez@catie.ac.cr

10. A los fines de la operación específica del Trabajo de graduación, el PAPDC estará representado por la codirección del trabajo de graduación del estudiante (Alejandro Imbach y la codirectora Angela Diaz), cuya responsabilidad es orientar dicho trabajo.

11. El Trabajo de graduación se realizará, desde el punto de vista académico, bajo la normativa específica que define el Reglamento de Escuela de Posgrado. Entre otros puntos, dicha normativa establece los siguientes puntos: el TG será asesorado y supervisado por parte de un Comité formado por al menos dos profesores del CATIE; la fase de campo del Trabajo se realizará entre los meses de enero y marzo de 2019 (siendo excepcionalmente posible adelantar o retrasar estas fechas en dos semanas u otro plazo que se acuerde específicamente entre las partes); la fase de análisis de la información y elaboración del Informe Final y otros productos especificados se realizará entre abril y junio de 2019; la información incluida en el Informe de Trabajo de graduación es considerada y tratada por la Escuela de Posgrado como información pública y el mismo se encontrará accesible a cualquier interesado en formato físico y digital través de la Biblioteca Orton del CATIE.

12. Esta carta podrá ser modificada a requerimiento de cualquiera de las partes, previo acuerdo de las partes restantes. Dicha modificación podrá ser agregada como anexo a esta Carta a los fines de registro del nuevo acuerdo.

En conformidad con lo expresado anteriormente esta carta es firmada por las distintas personas involucradas el día 5 de setiembre-2018

A fines de facilitar el acuerdo, la firma de las partes puede ser reemplazada por un correo electrónico dirigido a las otras partes en la que manifiesta la conformidad; dicho correo será anexado a la presente carta.

Charles Dixon	Tom Okot	Felicia Ramírez Agüero
PPD-PNUD	Estudiante MPD/MPC	Coordinadora Académica

Annex 2. Interview Community Development Association (president ADI).

Nombre de entrevistados (puesto)_____

Firma del entrevistados

Feche: lugar:

1. Cuál es la incidencia que tienen la Asociación de productores (a qué tipo de producción se dedican) para la comunidad de Barranca/Cirri norte llano bonito
2. La Asociación cuenta con un Plan de Desarrollo, ¿plan de acción para desarrollar sus miembros y la comunidad?, si no cuenta, ¿cuál es la razón?
3. ¿Qué tipo de capacitaciones han recibido para el fortalecimiento de la asociación?
4. ¿Cómo conocieron el PPD y lograr ganar su financiamiento? ¿Cuál fue el origen para participar en el proyecto financiado de PPD? ¿Qué problema querían solucionar?
5. ¿Cuáles son los impactos de sus iniciativas?
6. ¿Qué técnicas aplicaron y recomiendan a sus comunidades vecinos y por qué?

Annex 3. Interview Ministry of Agriculture and Livestock -MAG-Naranjo.

Nombre de entrevistados (puesto): Firma del entrevistados:
Feche: lugar:

1. ¿Cómo apoyan a los productores agropecuarios en la Cuenca del Río Barranca?
2. ¿Tienen fondos disponibles para los productores agropecuarios?, ¿Cómo los productores pueden acceder a estos?
3. ¿En qué estado se encuentra el proceso de recuperación de tierras en la cuenca de Río Barranca?
4. ¿Qué avances pueden evidenciar y cuáles son los impedimentos respecto a la recuperación de la degradación de suelos en la cuenca?
5. ¿Se realizan evaluaciones del estado de conservación de esta zona?, ¿Cada cuánto?, ¿Quién lo hace?
6. ¿Cuáles son las acciones a futuro que se pretenden tomar como MAG en esta cuenca?
7. ¿Existe algún tipo de restricción en el uso de los recursos naturales en esta cuenca?, ¿Cuáles?, ¿Cuáles son los mecanismos de control del MAG sobre esta actividad?
8. ¿Como es la gestión de pago por servicios de ambientales, el rol principal del MAG y como los interesados puedan accederlos?
9. ¿En cuanto a la Ley 7779, ¿(Ley de Uso, Manejo y Conservación de Suelos) se podría considerar iniciativas de conservación por PSA y cómo?

Annex 4. Observation guide of the communities and the Basin.

PROTOCOLO DE OBSERVACIÓN LA CUENCA RÍO BARRANCA
OBJETIVO: Identificar los enfoques integrales del proyecto; equidad de género, marco de capitales, medio de vida y biodiversidad y ecosistema.
INSTRUCCIONES DE USO: Esta herramienta es para usarla durante la gira, es una guía estructurada de los elementos a observar y estar atentos, que pueden ampliar nuestras percepciones como practicantes durante el trabajo de campo en la comunidad.
Sección I. Datos generales
1. Nombre de la comunidad: _____

2. Nombre del observador: _____

3. Fecha: ____ / ____ / _____ a ____ / ____ / _____

Sección II. Guía de Observación		
	Lista de Observación ***Capital humano***	**Observaciones (incluir percepciones generales)**
1	Certificados de capacitación o diplomas de estudio expuestos en las paredes de los hogares	
2	Habilidades y destrezas más comunes de los pobladores de la comunidad.	
3	Distribución de los roles productivos y reproductivos en la familia.	
4	Condiciones de inequidad de los pobladores de la comunidad.	
	Lista de Observación Capital Social	**Observaciones (incluir percepciones generales)**
6	Roles de los niños, jóvenes, hombres, mujeres y adultos mayores en la comunidad.	
7	Participación en organizaciones (gorras, etiquetas, espacios para reunión de comités)	
8	Participación de los pobladores en actividades colectivas, comités y eventos productivos, culturales y recreativos.	
	Lista de Observación Capital Cultural	**Observaciones (incluir percepciones generales)**
9	Construcción de iglesias, templos, altares, figuras religiosas.	
10	Manejo de un idioma diferente al castellano.	
11	Publicidad acerca de eventos recreativos, culturales, deportivos.	
12	Presencia de sitios para recreación	
13	Presencia de adornos tradicionales.	
	Lista de Observación Capital Infraestructura	**Observaciones (incluir percepciones generales)**
14	Agua/ Alcantarillado	
15	Electricidad	
16	Recolección de basura	
17	Teléfono, internet	
18	Centro de Salud (estado)	
19	Centro comunitarios / salón de reuniones (estado)	
20	Tienda	
21	Escuela	
22	Colegio	
23	Acueducto comunal	
24	Vías de acceso (estado)	
25	Presencia de infraestructura productiva (sistema de riego, invernadero, establos, centro de beneficio, lechería, trapiche, hidroeléctrica)	
26	Parques y lugares de reunión de la comunidad	
27	Estado y ubicación de las viviendas	
	Lista de Observación Capital Financiero- Productivo)	**Observaciones (incluir percepciones generales)**
27	Presencia de instituciones financieras (bancos, cajas rurales, cooperativas, líneas de créditos para mujeres, jóvenes etc.)	
	Lista de Observación Capital Político	**Observaciones (incluir percepciones generales)**
28	Presencia de pancartas o banderas de partidos políticos	
29	Oficinas, representantes de las instituciones gubernamentales y no gubernamentales presentes.	
	Lista de Observación Capital Natural	**Observaciones (incluir percepciones generales)**
30	Estado del bosque circundante	
31	Trabajos asociados a la restauración de la naturaleza (reforestación, prácticas bioculturales).	

32	Placas, letreros invitando a respetar el entorno en espacios naturales y de interés común	
33	Crianza o comercialización de especies silvestres en la comunidad o en los hogares.	
34	Valoración la orografía, topografía o relieve, de la zona.	
35	De ser posible identificar algunas especies de árboles o animales. (jilguero y bosque galería)	
36	Ubicación y estado de las fincas	
	Observaciones generales	

	Observaciones
Presencia y porcentaje de cultivos	
Presencia de microorganismo en las fincas	
Presencia y porcentaje de cobertura vegetal	
Presencia y porcentaje de bosques	
Degradación por sobre uso de la tierra	
Degradación por monocultivo	
Degradación por deforestación directa	
Presencia y condición de los ríos aledaños a los centros poblados	
Manejo de residuos	
Observaciones generales sobre fauna silvestre	

Annex 5. Interview Ministry of Environment and Energy (MINAE).

Nombre de entrevistados (puesto):
Fecha: lugar:

1. ¿Cuál es la categoría de protección ambiental de la Cuenca del Río Barranca?
2. ¿Se realizan evaluaciones del estado de conservación de esta zona?, ¿Cada cuánto?, ¿Quién lo hace?
3. ¿Cuáles son las principales amenazas para la conservación de esta cuenca?
4. ¿Cuáles son las principales acciones de conservación que se han implementado para esta cuenca?
5. ¿Cuáles son las acciones a futuro que se pretenden tomar como MINAE en esta cuenca?
6. ¿Existe un uso de los recursos naturales en esta cuenca? Si es así, ¿con qué intensidad?, ¿Cuáles son los efectos de estas actividades sobre la biodiversidad?
7. ¿Existe algún tipo de restricción en el uso de los recursos naturales en esta cuenca?, ¿Cuáles?, ¿Cuáles son los mecanismos de control del MINAE sobre esta actividad?
8. ¿Existe leyes de uso de recursos naturales diferentes para alguna población en la cuenca (indígenas)? ¿Cuáles?, ¿Cuáles son los mecanismos de control del MINAE sobre esta actividad?
9. ¿Como es la gestión de pago por servicios de ambientales, el rol principal del MINAE y como los interesados puedan accederlos?
   ¿En cuanto a la Ley 7779, ¿(Ley de Uso, Manejo y Conservación de Suelos) se podría considerar iniciativas de conservación en la Cuenca de Río Barranca por PSA y cómo?

¿Cómo los pequeños productores en la Cuenca de Río Barranca que están implementado prácticas de conservación podrían aplicar por los servicios de PSA?

Annex 6. Interview with producer families.

Nombre de entrevistados: Firma del entrevistados:
Feche: lugar:

1. ¿De cuantas personas está compuesta su familia y de que sexo son?

A. Hombres_____ B. Mujeres_____ C. Niños_____ D. Niñas____ E. Adultos mayores____

2. ¿Cuál es la principal fuente de ingreso de la familia?
   Producción agropecuaria, Comercio Jornalero, Servicio de alquiler Remesas, Empleado Otro: cual
3. ¿Cuál es su grado de satisfacción en cuanto a la gestión e implementación de prácticas de conservación del proyecto
   No, Poco, Regular, Mucho, Totalmente, No sabe no responde
4. ¿Cuál practicas te gustó y recomendarías a sus vecinos y por qué?
5. ¿Qué cambiarias en las técnicas de conservación?
6. ¿Qué técnicas mejorarías y cómo?
7. ¿Como la implementación de estas técnicas en su finca has cambiado su vida?

SATISFACCIÓN DE LAS NECESIDADES HUMANAS FUNDAMENTALES			
GRUPOS	**DETALLE**	**ESTADO ACTUAL**	
		Hombres	**Mujeres**
BASICAS	Alimentación		
	Salud		
	Resguardo (vivienda y vestimenta)		
	Procreación		
	Seguridad (física, social, legal)		
DE LA PERSONA	Afecto (familia, amigos)		
	Conocimiento (experiencia, capacitación, estudio)		
	Identidad (pertenencia, espiritualidad, autoconocimiento)		
	Autoestima y responsabilidad		
DE ENTORNO	Ambiente saludable (aire, agua, naturaleza)		
	Libertad (derechos y deberes, posibilidad de decidir)		
DE ACCION	Trabajo creativo y productivo		
	Recreación (descanso y diversión)		
	Participación (organización, solidaridad, equidad)		
	Comunicación (con otras personas, información, transporte)		

1. Insatisfecha 2. Parcialmente insatisfecha 3. Aceptable 4. Buena satisfacción 5. Completamente satisfecha

Annex 7. Interview with the communities.

Nombre de entrevistados (puesto): Firma del entrevistados:
Feche: lugar:
¿Cuáles son los recursos naturales con los que cuenta su comunidad y cuáles considera que son importantes? ¿Por qué?
¿Cuáles actividades productivas contaminan el ambiente? ¿Qué hace con su basura? ¿Cuál es su destino final?
¿A dónde van las aguas servidas? ¿Conoce sobre la degradación del suelo en la cuenca? ¿Cómo te afecta?
¿Qué actividades productivo realiza dentro de la cuenca?
¿Se perciben algún tipo de contaminación y cuáles?

¿Se perciben la degradación de suelo, cambio climático y perdida de la biodiversidad? ¿haces algunas medidas para mejorar el estado de ellos? ¿Cuáles?
¿Conoce la asociación de productores que están implementando prácticas para reducir la degradación de suelo, cambio climático y perdida de la biodiversidad en sus fincas?
¿Estas técnicas tienen algún impacto percibido en la comunidad? ¿Cuáles?
¿Implementas algunas de estas técnicas de conservación en su finca? ¿Cuáles y por qué?

Annex 8. Focus group Ministry of Agriculture and Livestock -MAG-Naranjo.

Objetivo general del evento: Conocer las practicas enseñadas, las mejoras, su posición y visión general para la Cuenca de Río Barranca.

ACTIVIDAD	DESCRIPCIÓN	TIEMPO
Entrega de papel y lápiz para escribir su identificación	Elaborar papel de identificación de los participantes	5 minutos
Dinámica de presentación	**El amigo secreto** Establecer un clima de compañerismo e integración. Haciendo un sorteo con nombre de cada uno en un papelito donde se van a escoger al lazar un papelito a cada uno y luego se dirigen hacia la persona correspondiente (ALFORJA 1984)	15 minutos
Temas asociados ¿Cuáles son las prácticas agro-conservacionistas implementadas? ¿A qué tipo de producción/fincas se aplicó estas iniciativas? ¿Qué beneficios percibe de estas prácticas? ¿Cuáles son los impactos ambientales generados? ¿hubo dificultades durante la implementación de las practicas? ¿Cuáles son? ¿Como los superaron? Factores; financiero, recursos, ambiental, infraestructura etc.	**Mapa participativo** 1.- En un papelógrafo, los asistentes dibujarán un círculo que represente la cuenca identificar las practicas agro-conservacionistas enseñados a los productores Identificar las oportunidades de mejora y lecciones aprendidas Identificar los factores que han viabilizado o inhibido la implementación de las prácticas. La vision del MAG estos practicas	30
Cierre del grupo focal	Se agradecerá la presencia de los participantes y se realizará la firma de la hoja de asistencia.	5 minutos

Annex 9. Workshop community development association.

Objetivo general del evento: Conocer las practicas enseñadas, las mejoras, su posición y visión general para la Cuenca de Río Barranca.

ACTIVIDAD	DESCRIPCIÓN	TIEMPO
Entrega de papel y lápiz para escribir su identificación	Elaborar papel de identificación de los participantes	5 minutos
Dinámica de presentación	**El amigo secreto** Establecer un clima de compañerismo e integración. Haciendo un sorteo con nombre de cada uno en un papelito donde se van a escoger al lazar un papelito a cada uno y luego se dirigen hacia la persona correspondiente (ALFORJA 1984)	15 minutos

Temas asociados ¿Cuáles son las prácticas agro-conservacionistas implementadas? ¿A qué tipo de producción/fincas se aplicó estas iniciativas? ¿Qué beneficios percibe de estas prácticas? ¿Cuáles son los impactos ambientales generados? ¿hubo dificultades durante la implementación de las practicas? ¿Cuáles son? ¿Como los superaron? Factores; financiero, recursos, ambiental, infraestructura etc.	**Mapa participativo** 1.- En un papelógrafo, los asistentes dibujarán un círculo que represente la cuenca identificar las practicas agro-conservacionistas enseñados a los productores Identificar las oportunidades de mejora y lecciones aprendidas Identificar los factores que han viabilizado o inhibido la implementación de las prácticas. La vision del MAG estos practicas	30
Cierre del grupo focal	Se agradecerá la presencia de los participantes y se realizará la firma de la hoja de asistencia.	5 minutos

Annex 10. Participatory validation workshop.

ACTIVIDAD	DESCRIPCIÓN	OBJETIVOS	TIEMPO
Presentación de los participantes	Nombre y organización que representa	.	15 minutos
Socialización de las obras implementadas y sus resultados	Se socializa los resultados obtenidos en las entrevistas, visitas a las fincas y guías de observación. En este mismo momento se busca que los participantes participen y sean quienes confirmen o acuerpen los resultados obtenidos.	Validar la información referente a los beneficios e impactos de la degradación de tierras	20 minutos
Lecciones aprendidas y recomendaciones	**Mapa participativo** Para la construcción de las lecciones aprendidas y las recomendaciones se utilizan dos papelógrafos en los que se dibujara lecciones aprendidas. identificar los impactos de las practicas agro conservacionistas enseñados a los productores Identificar las oportunidades de mejora Identificar los factores que han viabilizado o inhibido la implementación de las prácticas. Recomendaciones para los instituciones y ministerios	Construir las lecciones aprendidas y recomendaciones del proceso en el proyecto	30
Cierre	Se agradecerá la presencia de los participantes y se realizará la firma de la hoja de asistencia.		5 minutos