

## **IMPACT ASSESSMENT PLAN**

### **Democratic Republic of São Tomé and Príncipe**

Smallholder Commercial Agriculture Project (PAPAC) and  
Participatory Smallholder Agriculture and Artisanal Fisheries  
Development Programme (PAPAFPA)

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## Introduction

This document lays out the strategy for assessing the impact, ex-post, of two linked rural development projects financed by IFAD in São Tomé and Príncipe (STP): the Participatory Smallholder Agriculture and Artisanal Fisheries Development Programme (PAPAFPA) and of the Smallholder Commercial Agriculture Project (PAPAC).

STP is a small tropical island nation located in the Gulf of Guinea. As of latest estimates (WB, UNDP 2015), 35% of the population lives in rural areas and the agricultural sector accounts for the country's second largest source of export revenues, after tourism, with cacao constituting the major crop. According to the literature (Cruz et al. 2015), smallholder farmers and labourers in rural areas in the tropics constitute most part of the world's poor and STP is not an exception in this regard: indeed, according to the UNDP Human Development Index two thirds of the population and 68% of smallholders live below the poverty line of US\$2 a day.

STP's main development constraints are linked to persisting level of poverty, economic vulnerability to external shocks, inadequate basic social services to the population, a weak business environment and infrastructure (AfDB 2015). The country's fragility is compounded by its insularity and reliance on external aid. STP economy is insufficiently diversified and vulnerable to external shocks given its narrow export base and high dependence on imports. The predominant land use regime is agroforestry, with an intermediate and most productive level which comprises banana, cacao and oil palm; however, the agro-ecologic conditions of STP make it almost impossible to grow cereals, legumes, sugar, food oils (except for palm oil) and the country needs to rely on imported commodities that often times are not accessible to poor smallholders limiting their access nutritious food (IFAD 2014). In light of this, in-country food security policies need to incorporate the accessibility dimension and aim at creating income opportunities for poorer households, supporting national production and especially exports. This dimension of creating income opportunities has been at the core of IFAD operations in STP in the last 30 years.

IFAD-supported projects in STP have succeeded in aligning with the country strategy for the rural sector as well as working in synergy with the objectives of other development agencies active in the country. The utilized approaches (value chains development) and interventions have been integrated in the national policies for the rural sector. The Smallholder Commercial Agriculture Project (PAPAC) and the Participatory Smallholder Agriculture and Artisanal Fisheries Development Programme (PAPAFPA) are fully aligned with national strategies and poverty reduction, rural development and food security as stated in the Second National Poverty Reduction Strategy 2012-2016.

The interventions evaluated as part of this impact assessment revolve around the development of certified and organic family plantations and the support of four export cooperatives which were created with the first project – PAPAFPA. The cooperatives in question comprise two in the cacao value chain, one in the pepper and coffee value chains, respectively. Both projects had a number of objectives such as increasing agricultural productivity, enhancing markets access and supporting producer's organizations, through the provision of trainings, small infrastructure, financial education and managerial support to the cooperatives.

PAPAFPA supported the development of a sustainable commercial smallholders agriculture of simple export value-chains (forming producers associations, within cooperatives and facilitating contracts with European buyers) for selected niche market products (organic and quality products). This

allowed to partially overcome the country specific geographical constraints, contributed to natural resources conservation, and promoted significantly higher free on board (FOB) prices – compared with the ones from other operators in the country – of which about 90% is transferred to target households and their associations/organizations. As a matter of fact, certification labels are increasingly utilized by both the civil society and the private sector to pursue social and environmental sustainability in supply chains for agricultural products. As part of the certification schemes, producers receive premiums and other benefits for following sustainability criteria while consumers and/or retailers pay a premium to be assured that producers meet these criteria (DeFries et al. 2017). The environmental concern is another major factor in favour of sustainable supply chains: most of the world biodiversity is located in the humid tropics and there is growing evidence that organic farming increases both agrobiodiversity and the diversity of wild species (Borron 2006).

PAPAFPA was implemented between 2003 and 2015 and achieved encouraging results. Therefore, IFAD and the government of STP agreed to continue supporting the cooperatives and included a larger number of beneficiaries through PAPAC, a project that was approved by Fund's Executive Board in September 2014 and entered into force in 2015 with an IFAD amount of US\$ 6 million (of which US\$3 million are in form of a grant). The project is expected to be completed at the end of 2019.

PAPAFPA and PAPAC have been acknowledged for good local implementation capacity combined with a successful strategy despite the country small size and limited available financing. The success of the interventions is demonstrated by the fact that the cooperatives created and supported by the projects are now close to full operational and financial autonomy – despite recent fluctuations in market prices, thus demonstrating resilience and sustainability. In particular, one of the cocoa cooperative exited the project in 2017 and it is completely self-sufficient. Despite the fact that the country is small and the scale of operations is limited, the innovation dimension and results achieved have the potential to provide great learning opportunities. For instance, PAPAFPA's main achievement has been the development of an original, adapted and efficient business model for the export of agricultural products, based on the pilot experiment of the organic cocoa export sector initiated by IFAD in early 2000s and developed with the support of the Government of STP through the strong involvement of a private partner (KAOKA). This model gave birth to the Cooperative of Exportation of Organic Cacao (CECAB) in 2004 and was then replicated in other value chains.

In light of this, this document lays out the strategy for an ex-post impact assessment of both the PAPAFPA and PAPAC projects and carefully assesses their impact on rural livelihoods. The aim of this impact assessment is to report on key outcome indicators identified in the projects' logical frameworks and rigorously examine the impact of the interventions against these indicators. This impact assessment will be conducted as part of the IFAD10 Impact Assessment Initiative (IFAD10 IAI), an initiative that responds to the growing demand to rigorously measure the impact of agricultural interventions and that aims at generating evidence from IFAD-supported projects. It will also generate useful lessons for the broader development arena given the paucity of rigorous assessments of agricultural interventions despite significant investments in this area (Winter et al. 2010, World Bank, 2011).

In addition, this study offers the advantage to assess the impact of value addition through organic certification programmes, an area that lacks rigorous assessments concerning the extent to which certification schemes can contribute to both social and environmental- friendly production (DeFries et al. 2017). Concerning this aspect, some literature (Kleeman, Abudai 2012; Jacobi et al. 2015) has argued that voluntary certification programs can rarely play a role towards sustainable development,



considering them merely marketing strategies, prompting the need of more rigorous analysis and independent evaluations of this kind.

The document is organized as follows: first we present PAPAFPA and PAPAC theory of change including the project background, targeting criteria, research questions, and relevance to the existing literature; secondly we present the impact assessment design followed by the identification strategy which include the sampling design and data collection plan. Finally we present the estimated budget and proposed timeline.

## Theory of change and main impact assessment questions

### PAPAFPA and PAPAC's theory of change

Through PAPAFPA and PAPAC the government of STP aims to address part of the country's constraints by developing and strengthening producers' associations organized in four cooperatives. Such cooperatives promote inclusive value chains development of niche market products as well as the professionalization of smallholder farmers. Figure 1 summarizes the theory of change for both projects by illustrating the causal mechanism through which project impacts emerge from inputs and activities. The theory of change mirrors the projects logical framework and was reconstructed with field staff and the project management unit (PMU) during an inception mission that was held in March, 2018. We decided to investigate the joint impact of the two projects since they revolve around the same type of interventions and PAPAC essentially consolidates PAPAFPA's activities. The inputs and activities that will be considered for this impact assessment comprise two components: (1) family plantation development, and (2) producers' organizations strengthening.

The development problems that are addressed by PAPAFPA and PAPAC are linked to the persisting high level of rural poverty and food insecurity in the country. As a matter of fact, these programs were designed with the primary objective to improve rural poor people's lives assuring food insecurity and increased revenues. More specifically, the constraints that targeted households in STP face are threefold and linked to 1) productivity, 2) commercialization and 3) ownership. Smallholders agriculture in STP is characterized by general levels of low productivity associated to small and/or disadvantaged/rough cultivation areas, little mastery of cultivation techniques, inadequate access to water and land abandonment. On the commercial level, smallholder farmers as well as producer organizations have to deal with low demand of high value crops in the formal market, competition in the informal market as well as lack of rural infrastructure, particularly related to access to water, storages and processing facilities. Finally, additional issues are related to insufficient knowledge of cooperativism and associativism at farmers' level and a lack of regulation of cooperatives at national level. These challenges have been exacerbated by climate change conditions that particularly affect tropical regions and small scale farmers that are constrained by limited adaptation opportunities (Borron 2006; Verchot et al. 2007).

Existing evidence suggests that organic agriculture can contribute not only to an ecological dimension of resilience – by protecting the soil, biodiversity and the climate overall, promoting sustainable use of local resources and enhancing diversity – but also to a social dimension – by enhancing social and human capital through endogenous agricultural knowledge (Speranza 2010). Aligned with the latter, - PAPAFPA and PAPAC have been pursuing objectives of increasing production and productivity, through quality enhancement related to organic commodities thereby improving resilience to climatic and monetary shocks.

Specifically, PAPAFPA was implemented between 2003 and 2015 and its objectives revolved around (i) building vulnerable rural people's capacities to develop economic activities – improving their access to new markets, through the development of new products – and the support to sustainable and niche value chains; (ii) strengthening rural services by financing productive infrastructure through a dedicated fund, the *Fonds d'Infrastructure communautaires* (FIC); (iii) supporting rural areas by reinforcing farmers organizations and their professional representation within Governmental

institutions (through the formation of value chains cooperatives, and the strengthening of FENAPA – the National Federation of Smallholder Farmers).

As part of the first component, PAPAFPA supported the creation and legalization of three value chains crops through four cooperatives: CECAB for organic cacao, CECAQ11 for quality cacao, CECAFEB for coffee and CEPIBA for pepper. All the crops are organic and fair trade certified by ECOCERT, a recognized control and certification body. Each cooperative supports a number of producers that are organized in associations/organizations. In addition, under the same component, PAPAFPA rehabilitated and densified the cultivated areas of cocoa, coffee and pepper, installed transformation and storage infrastructure, and provided the producers (of which **30% are women**) with trainings on agricultural production techniques as well as post-production, transformation and commercialization. In addition, for each cooperative a partnership with an international buyer was signed: CECAB established a partnership with KAOKA, CECAQ11 with Café Direct, CEPIBA with Hom&Ter/Agrisud and CECAFEB with Malongo. PAPAFPA also signed an expertise agreement with CIAT. Previous studies have shown that cooperatives can facilitate farmers' access to vertically integrated food supply chains (Wollini et al. 2010) and that market linkages interventions are more likely to succeed if sufficient support is provided through all stages in the value chain (Ashraf et al. 2011; Cavatassi et al., 2011).

Under the second component, the programme was responsible of reinforcing the availability of services to the rural areas through the operationalization of the *Fonds d'Infrastructure communautaires* (FIC) , a fund that was started by PNAPAF, another IFAD-supported project which closed in 2002. The aim of FIC was to assess the needs of rural people in terms of socio-economic infrastructure and provided rural areas with drinkable water installations, latrines, construction or rehabilitation of rural roads, agricultural irrigation, driers and storages. These types of interventions related to investment in infrastructure and road networks are usually associated with a positive impact on agricultural productivity and in particular on rural GDP and poverty reduction (Knox and Hess 2013).

Finally, under the last component, FENAPA, was reinforced and supported by increasing membership of PAPAFPA producers' associations and cooperatives. FENAPA contributes to providing dialogue with the government, organizes regional and national workshops and provides market information to producers and exchange programs to foster their skills.

Given the encouraging results achieved, PAPAC (2015-2020) was conceived and designed to consolidate the activities undertaken by PAPAFPA towards reducing rural poverty and food security. As part of the inclusive value chain development, PAPAC aims at integrating and training 950 new farmers and continues to provide technical support to old producers (supported originally by PAPAFPA). The project focuses both on the support of family plantations development and on strengthening producer's organizations and cooperatives created under PAPAFPA. The substantial innovation that PAPAC introduced was enter in a contractual partnership with the cooperatives and have them carry out the activities to develop family plantations. In the context of family plantations development, similarly to PAPAFPA, PAPAC provided the creation, rehabilitation (through pruning, grafting and replanting), and densification of plantations (cacao, café, pepper), and provided smallholders with equipment and organic materials as well as technical trainings on improved and organic techniques and economic management. According to the literature these type of interventions that introduce organic farming are associated with higher tree and crop diversity, higher yields and incomes, more social connectedness and increased participation in trainings (Jacobi et al. 2015).

Under the second component, producers' organizations strengthening, PAPAC aims to consolidate the activities started under PAPAFPA in terms of strengthening the four cooperatives and their producers'

organizations through capacity and skills development trainings on financial and administrative management, strategic planning, trade strategies, international exchanges, juridical and commercial support. Under this component, the project also provides rural infrastructure and equipment such as driers, storages with fermentation boxes, irrigation structures and tracked vehicles.

These inputs and activities are expected to benefit project beneficiaries in the following ways. First, new and old producers are professionalised on a technical and economic basis and the production capacity of rural actors is reinforced. Secondly, as a result of producers' organization strengthening, upgraded rural infrastructure can improve products' quality facilitating their commercialization; the cooperatives are operationalized and have improved management and transparency practices through the trainings received. In addition, the contractual agreements between buyers and cooperatives establishes a minimum guaranteed price, allowing for greater flexibility and minimizing losses in case of the commodities' price falls. As a matter of fact, at the beginning of 2017 there was a major drop in international cocoa prices but through the minimum guaranteed price for organic and Fair Trade commodities, organic producers suffered the market shock to a lesser extent.

Ultimately, these interventions are expected to lead to increased productivity, income and food security for producers households while the four cooperatives and their associations will be institutionally stronger and financially profitable, and in a sustainable contractual relationship with both individual producers and international buyers. According to the relevant literature, organic farmers who use agro-ecological farming methods are expected to be more food secure, eat more diversified diets, have higher crops diversity and experience better health outcomes (Altieri, Funes-Monzote, and Petersen 2012).

Last, through the specific targeting gender empowerment impacts are also expected, although unintended, given the strong focus of both projects vis a vis including women producers in the producers' associations formation. Therefore, heterogeneous impacts conditional on the producers associations composition will also be explored in this impact assessment.

### **Some considerations about PAPAFPA and PAPAC's TOC**

Important additional aspects of this impact assessment concern both the identification of spillover effects to nearby areas leading to unintended positive or negative impacts, and providing the mechanisms and assumptions through which the causal mechanisms are contingent. Incorporating them into the impact assessment will help clarifying the processes that have shaped the observed impacts and will help developing a holistic picture of projects' impacts.

In this setting, considering PAPAC's project activities with regards to training farmers in production techniques, there is evidence that suggests that trained smallholders might share their knowledge with other producers outside the project area (Witt, Pemsil, and Waibel 2008). Other positive spillovers that were identified together with the stakeholders during the inception mission implied that the interventions led to a better organization at the community level and increased business opportunities even for farmers that did not belong to the cooperatives. In addition, according to the perceptions of beneficiaries, the rehabilitation of abandoned land resulted in a reduction of rural to urban migration. However, during the inception mission, cooperatives members also pointed out that an increase in production might also entail a decrease in quality, if this is not backed up by an improvement in rural infrastructure necessary for storage and processing and quality control.

In terms of assumptions, it was presumed that the activities were appropriate for the context of the country, there was demand and adoption of these activities and that beneficiaries did not face additional barriers such as extreme weather or external price shocks, to the intended impact being achieved.



As illustrated, PAPAC builds on what PAPAFPA implemented, therefore the two projects are deeply interconnected and revolve around the same types of intervention and objectives; PAPAC was designed to consolidate PAPAFPA components, in particular cooperatives strengthening contributing to sustainability. Most of the beneficiaries (producers) that were supported by PAPAFPA continue to be supported by PAPAC. In addition, despite 97% of the original funding and 61% of the additionally financed budget have been disbursed, PAPAC will close in 2020. It is also important to stress that evaluating the impact of PAPAC alone might be premature given that some of the crops supported take time to be productive and reach the full scale of production (i.e. pepper takes four years to start producing, rehabilitated cocoa about 18 months and up to 4 years to reach full-scale production, and coffee takes about three years).

**Figure 1: PAPAFPA and PAPAC theory of change**



## Project Coverage and beneficiaries

PAPAFPA and PAPAC were implemented nationwide in São Tomé and the independent region of Príncipe. The immediate PAPAC beneficiaries are the four cooperatives that were formed within PAPAFPA, that are then in charge of selecting producers and organizing them into organizations/associations. Although they follow similar requirements, each cooperative sets its own standards for inclusion. Generally, the requirements are the following: 1) having a plot in the community (the plot must be cultivated in the case of one of the cooperative, CECAB); 2) having space to build infrastructure, 3) having good social conduct, 4) not having applied toxic products in the last three years and last, 4) being a smallholder. PAPAC was designed to target 18,500 individuals of which 1/3 women heads of households and 1/3 young people; however the project was not able to include young people given a basic structural reason, their limited access to land which was a prerequisite to enter the cooperative and being eligible overall. Therefore as this was a key requirement, they ended up not being adequately targeted.

Figure 2: Project map



Source: IFAD (2014)

## Cooperative coverage

The cooperatives vary greatly in terms of size, number of producers, production and geographical coverage. Table 1 below illustrates the number of producers within each cooperative who received support from 1) PAPAFPA and continued to receive support under PAPAC and 2) new producers that were included in the project starting from 2015 under PAPAC (PAPAC only). PAPAC is currently supporting 3929 farmers; unfortunately it is not possible to estimate the total number of producers

supported since the inception of PAPAFFPA because some cooperatives did not keep the record of producers that exited the cooperative.

**Table 1: Number of beneficiaries by cooperative**

| Cooperative        | PAPAFFPA e PAPAC | PAPAC only | Beneficiaries with double support |
|--------------------|------------------|------------|-----------------------------------|
| CECAB (cacao)      | 2139             | 214        | 51                                |
| CECAQ11 (cocoa)    | 1135             | 228        | 41                                |
| CECAFEB (coffee)   | 420              | 205        | 52                                |
| CEPIBA (pepper)    | 358              | 187        | 20                                |
| TOTAL <sup>1</sup> | 4052             | 834        | 164                               |

<sup>1</sup> The total does not account for beneficiaries supported by more than one cooperative

In terms of female inclusion, the average of female producers across cooperatives is 36%; the cooperative that has the highest proportion of female producers is CECAFEB with 38% of women, while the cooperatives with the lowest proportion is CECAB with 33% of female representation. Producers' associations within the cooperatives have all mixed composition in terms of gender (see Appendix I for the gender breakdown by cooperative and association). Unfortunately, most cooperatives do not have records of the age or birthdate of their producers, and this prevents us from assessing the inclusion of young people or assessing age differentials. Only CECAQ11 and to some extent CEPIBA were able to provide this information. According to the data, the average producer is 50 years old – 50 for CECAQ11 producers (1134 observations) and 46 for CEPIBA (99 observations).

**Table 2: Number of beneficiaries by cooperative that received support from two cooperatives**

|         | CECAB | CECAQ11 | CECAFEB | CEPIBA | Total |
|---------|-------|---------|---------|--------|-------|
| CECAB   | 0     | 10      | 25      | 16     | 51    |
| CECAQ11 | 10    | 0       | 27      | 4      | 41    |
| CECAFEB | 25    | 27      | 0       | 0      | 52    |
| CEPIBA  | 16    | 4       | 0       | 0      | 20    |

**Table 3: Number of female beneficiaries by cooperative**

| Cooperative | Producers | Female Producers | Percentage of Female |
|-------------|-----------|------------------|----------------------|
| CECAB       | 2139      | 715              | 33%                  |
| CECAQ11     | 1135      | 160              | 35%                  |

|         |     |     |     |
|---------|-----|-----|-----|
| CECAFEB | 420 | 160 | 38% |
| CEPIBA  | 358 | 130 | 36% |

The cooperatives cover different areas of the country. CECAB is located in the north, north-west, CECAQ11 in the centre-east, CEPIBA in the centre and north-east as well as in Principe, and CECAFEB is spread in the centre-north (Figure 2). Some communities were supported by more than one cooperative. Figure 2 displays the cooperatives geographical coverage and the number of beneficiaries in each community (see also Appendix II).

**Figure 3: Cooperatives geographical spread and number of beneficiaries**



Total number: 2139



Total number: 1135



Total number: 358



Total number: 420

Overall, the number of communities that benefited from the two projects is 108, including Príncipe, and the average number of beneficiaries in each community is 34, ranging from a minimum of one to a maximum of 129 producers. Table 4 illustrates the number of communities covered by each cooperative.

**Table 4: Number of comunidades by cooperative**

| Cooperative | Producers | N of Comunidades | Average N of producers by comunidade | Min | Max |
|-------------|-----------|------------------|--------------------------------------|-----|-----|
| CECAB       | 2139      | 44               | 49                                   | 1   | 129 |
| CECAQ11     | 1135      | 21               | 54                                   | 28  | 107 |
| CECAFEB     | 420       | 15               | 28                                   | 4   | 93  |
| CEPIBA      | 358       | 52               | 7                                    | 1   | 57  |

Cooperatives have struggled to provide production data disaggregated at farmers' level. However, we know that the average plot size of project beneficiaries is about 1.8 he for cocoa producers and 0.2 he for pepper and coffee producers. Table 4 illustrates the most recent production estimates for each cooperative.

**Table 5: Cooperatives' production levels**

| Cooperative    | Production (Tons) | Surface (he)               | Surface per capita (av. he) | Yield (Kg/ha) |
|----------------|-------------------|----------------------------|-----------------------------|---------------|
| CECAB (2018)   | 1200              | 4560                       | 2.1                         | 263           |
| CECAQ11 (2017) | 350               | 1800                       | 1.6                         | 194           |
| CECAFEB (2017) | 8.4               | 384 of which 94 productive | 1.1 / 0.2                   | 246           |
| CEPIBA (2017)  | 15                | 81                         | 0.2                         | 239           |

### Impact assessment questions

This impact assessment aims at answering a number of research questions which arise from an analysis of projects' theory of change. First it will investigate whether targeted households have achieved higher and more stable income, food diversity and security and greater market access through PAPAFA and PAPAC activities; second it will explore whether farmers are more resilient to climate and market shocks and if they experienced increased level of production through the several interventions provided by the projects. Third it will look at the sustainability of the associations within the four cooperatives, namely if they achieved financial and administrative self-sufficiency and if they are profitable and sustainable. In addition the impact of organic certifications on productivity levels as well as well-being indicators will be investigated at household and producers associations levels.

**Table 6: Research questions**

|                 | Impacts   |
|-----------------|---|
| Household level | <ol style="list-style-type: none"> <li>1) Do producers households experience greater and more stable incomes, food diversification, greater access to markets and increased agricultural productivity?</li> <li>2) Do we witness any evidence of gender empowerment, namely are women more involved in the productive workforce and households' decision-making? Has their income and production increased? Do they have larger control over their income and production? Do they have control over their sales?</li> <li>3) Are producers households more resilient to climatic and commodities price shocks?</li> <li>4) Does the cooperative structure prevent producers farmers from falling into poverty due to price volatility of exports?</li> <li>5) What is the impact of organic certification on production levels and household well-being?</li> </ol> |
| PO's level      | <ol style="list-style-type: none"> <li>6) Are producers associations within the cooperatives more resilient, financially and administratively viable and self-sufficient?</li> <li>7) Do producers within associations exhibit higher volumes of cacao, coffee and pepper exports?</li> <li>8) Do producers associations have increased access to both national and international</li> </ol>  |

market and improved food security through their inclusion into the cooperatives?

- 9) Are producers organizations led by women, as productive as the ones led by men?  
For producers organizations that are mixed, what is the within PO empowerment level?

# Impact assessment design

## Overall Approach

The impact assessment research design for PAPAFFPA and PAPAC will follow a mixed-method approach, consisting of both quantitative and qualitative data collection, in order to seize the full range of tangible and intangible impacts. It will collect quantitative data at the household and producers organizations levels, from both beneficiaries and non-beneficiaries communities, and will collect qualitative data from cooperatives leaders and producers organizations as well as the cooperatives technical specialists. The quantitative impact of the projects will be estimated and will constitute the focus of this impact assessment. The qualitative data collection will primarily serve the objective of informing the design of the quantitative questionnaires by delving into understanding targeting and inclusion criteria of target groups, implementation approaches, the main challenges faced by producers and the different value chains actors; the information obtained will be also used to triangulate the findings of the quantitative research and offer a deeper understanding of the projects results.

Therefore, in a nutshell, the impact assessment will focus on the two projects and three groups will be sampled: 1) beneficiaries of PAPAC and PAPAFFPA, 2) the new PAPAC beneficiaries, and 3) an external comparison group of similar producers in communities that are not part of the project. The first two will be drawn from targeted communities. In addition, the quantitative investigation will be composed of an household survey and a PO-level survey. The PO level survey will have as unit of analysis producers organizations and a sample of POs leaders will be interviewed<sup>1</sup>. The unit of analysis of the household survey will be smallholders farmers who are members of POs and individual producers in treatment communities.

The overall methodology of the quantitative analysis will consist of different stages. The first stage will entail the determination of counterfactual communities through expert-based knowledge and validation. Once treatment and control communities will be identified, an enumeration or listing of producers households within such communities will be conducted to determine the exact sample of treatment and control producers. Matching algorithms and other suitable estimators will be then implemented in order to determine a valid counterfactual at producers level within treated and control communities.

## Counterfactual identification at community level

There were three main data-related challenges that were encountered in the design of this impact assessment of PAPAFFPA/PAPAC. First, not all the cooperatives managed to provide the full list of producers beneficiaries, indicating the extent of support received. We were basically interested in obtaining list of producers organizations supported by both projects (1) PAPAFFPA and PAPAC or 2) PAPAC only. Second, there was no list of communities with similar characteristics to the treated communities, let alone a possible list of producers comparable to those who received treatment at baseline, by community. Finally, there was no baseline survey data that could inform power calculations and there was no national farmers registry that could be used to identify similar producers to be included in the comparison group.

Given the initial challenges, after the inception mission, where the evaluability and feasibility of the impact assessment was assessed, a second mission was conducted in order to consolidate the

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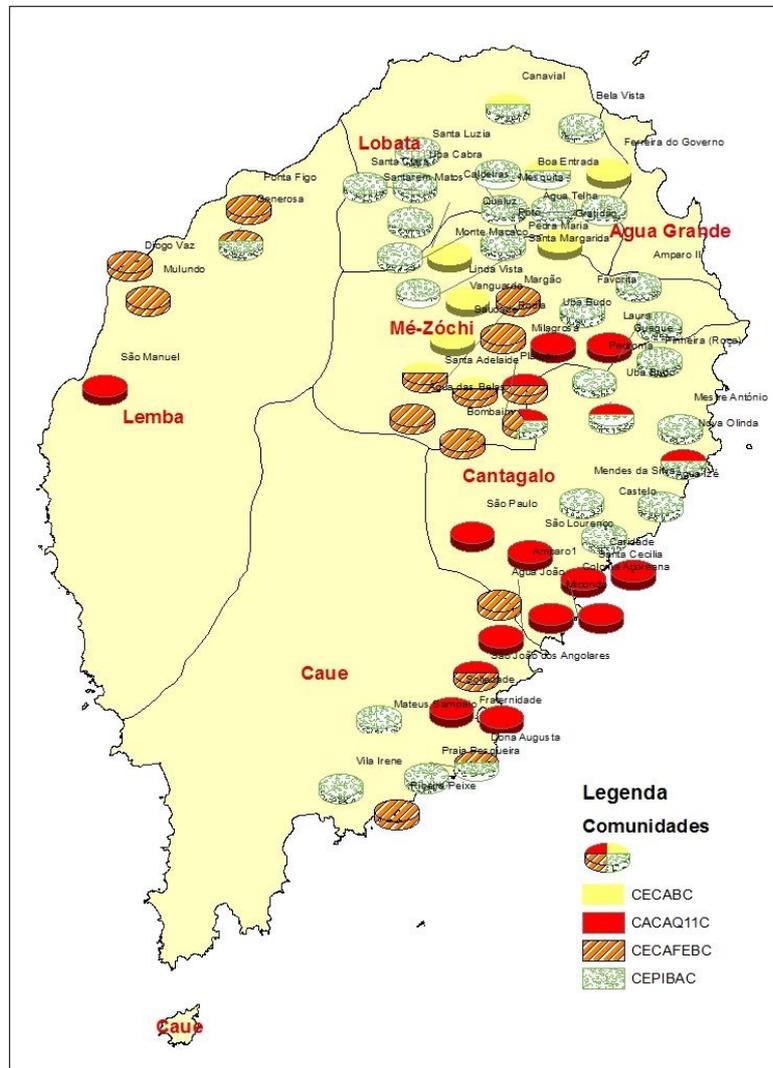
<sup>1</sup>The listing or enumeration in counterfactual communities will determine the exact typology of producers to be interviewed as part of the survey.

cooperatives' lists of beneficiaries and identify and validate, together with one of PAPAC M&E specialist and the cooperatives' leaders, the communities that could be used as potential counterfactual communities. Counterfactual communities were defined as the ones that would meet the cooperatives inclusion criteria e.g. with similar characteristics to the beneficiaries communities prior to the start of the projects. Such communities will be used to locate the counterfactual producers (the ones that will be part of the control/comparison group) through the enumeration or listing exercise.

From an initial list of 90 communities potentially eligible to be a valid counterfactual, we found out that only 36 never benefited from either PAPAFA or PAPAC and could therefore be considered pure control communities. Of the remaining 54, 14 were identified as counterfactual communities by more than one cooperative - therefore double-counted; 14 had to be excluded as they overlapped with the intervention domain of other cooperatives; 26 received support from a cooperative but there were less than 20 producers that benefited from inclusion - hence they could qualify as low intensity communities. This group is effectively made of new CEPIBA communities that entered the project after 2015 and therefore should not have experienced any impact from the projects yet, besides organizational ones, since pepper plantations take many years to become productive (See Appendix III for the full list). Figure 4 below shows the distribution of control communities.

We determined that the exact number of communities where to conduct the enumeration/listing exercise amounts to **144** communities, a number that include the 108 beneficiaries community plus **36** "pure" control communities.

#### **Figure 4: Control communities by cooperative**



## Enumeration/Listing Exercise

As part of the impact assessment and prior to the quantitative data collection, we plan to conduct a detailed enumeration/listing of producers households in treatment and control communities. Namely, we will conduct an inventory of producers households in communities where the projects took place (PAPAC and PAPAFFA) and in similar communities that were not targeted by both projects but that qualify as being eligible. After the communities identification and validation exercise that RIA conducted together with the PAPAC M&E specialist, we determined that the producers' listing will take place in 144 communities.

This enumeration/listing will serve as the starting point for sampling producers households across the communities of interest. Household listing is a fundamental part of an household survey because it allows to randomly select the required number of households from the eligible population within the three groups (notably 1) beneficiaries of PAPAC and PAPAFFA, 2) the new PAPAC beneficiaries, and 3) an external comparison group of similar producers in non-projects communities. Due to time and budget concerns household listing will be conducted in parallel to the qualitative data collection and should not exceed three weeks. A set of screening questions will aim at making the listing more time efficient by filtering out ineligible producers prior to the listing itself. The producers' households listing questionnaire will capture mostly eligibility criteria and treatment intensity, notably, whether

the producer is a smallholder, age and sex, cooperative membership status, membership duration (“time into the cooperative”), main value chain (cacao, coffee and pepper), crops grown in the past 5 years; parcel rehabilitation (a dummy variable indicating yes/no), number of plantations (by grafting status), the year when the cultivation of the main value chain started, location through geo-referencing (GPS), other dummy variables indicating the producer status vis a vis 1) whether the producer has ever benefited from the support of a cooperative<sup>2</sup>; 2) whether the producer left the projects’ cooperative; 3) whether he/she is member of FENAPA 4) willingness to join a cooperative; 5) willingness to join a producer association; 6) whether they are members of producers associations (formal); 7) whether they are part of producers groups (informal); 8) whether they submitted a request to join treated cooperatives. Last, three questions will assess treatment heterogeneity (interventions received as part of the projects support). These last set of questions are essential to assess treatment distribution.

## Constructing counterfactual groups

The purpose of establishing a valid counterfactual is to consider what the outcomes would be in the absence of both projects. Given the fact that it is not possible to study the same community over time both with and without the project, the control group should ideally be selected in similar eligible communities that have similar pre-programmes/projects characteristics to the ones of the communities targeted as part of PAPAFA and PAPAC.

The determination of eligible communities through expert based knowledge and validation along with the data collected as part of the enumeration/listing of producers’ households is key to inform the identification of a valid counterfactual at PO and household level. In absence of random assignment, the counterfactual is normally mimicked statistically. Therefore, an appropriate counterfactual identification requires both a sound understanding of the project implementation and of eligibility criteria.

Specifically, there could be two options for the selection of a control group: 1) new or recent members of producers organizations that just entered the cooperatives (this is a valid control as long as such groups have just been formed and have not received any interventions<sup>3</sup>); 2) members of producers organizations, or better, individual producers, that are not part of the cooperatives but reside in non-project communities.

The key determining factor in determining an appropriate counterfactual is the knowledge of the eligibility criteria of the different cooperatives’ producers. Recall that PAPAFA and PAPAC were implemented at cooperative level which were in turn, in charge of organizing producers in associations. The four cooperatives, as of today, have supported 3926 producers, grouped in 86 producers’ associations spread over 108 communities nationwide including Principe. Counterfactual producers need to meet the eligibility criteria, according to the value chain in question. Such eligibility criteria varied according to the cooperative itself and can be summarized as follows:

| Cooperative   | Eligibility Criteria             |
|---------------|----------------------------------|
| CECAB (cocoa) | - Having a plot in the community |

<sup>2</sup> This question is necessary as not all the cooperatives have record of producers that were members and exited it.

<sup>3</sup> Through the listing we will ascertain “time into the cooperative”, which can provide some insights on the eligibility of new members as potential controls. The viability of the first option will be assessed in order to avoid potential contamination.

|                  |  |
|------------------|--|
|                  | <ul style="list-style-type: none"> <li>- The plot must be cultivated</li> <li>- Space to build infrastructure at association level</li> <li>- Good social conduct</li> <li>- Not having applied toxic products in the last three years</li> <li>- Prioritize poor smallholder</li> </ul>   |
| CECAQ11 (cocoa)  | <ul style="list-style-type: none"> <li>- Having a plot in the community</li> <li>- The plot must be cultivated</li> <li>- Space to build infrastructure at association level</li> <li>- Farmer should have access to the community</li> <li>- Not having applied toxic products in the last three years</li> <li>- For associations: minimum 11-15 producers</li> <li>- Membership must be approved by the cooperative general assembly</li> </ul> |
| CECAFEB (coffee) | <ul style="list-style-type: none"> <li>- Producer must be a smallholder with interest in growing organic coffee</li> </ul>   |
| CEPIBA (pepper)  | <ul style="list-style-type: none"> <li>- Qualify as a poor rural farmer (priority to women and young people)</li> <li>- Qualify as owner of a plot (either cultivated and not cultivated)</li> <li>- Be a motivated farmer</li> <li>- The cooperative supports and distributes vegetal material corresponding to an area of 0,25 ha within PAPAC (it used to be 1.25 for PAPAFFA)</li> </ul>   |

## Estimating models

The identification strategy for the quantitative data collection will employ a quasi-experimental design to identify a valid counterfactual based on specific observable characteristics measured ideally at baseline across the units of interest.

The enumeration/listing exercise will determine the pool of potential producers in treatment and control communities. Once the listing data will be collected, producers households will be allocated in three groups: 1) (old) beneficiaries of PAPAC and PAPAFFA, 2) the new PAPAC beneficiaries, and 3) an external comparison group of similar producers in communities that are not part of the project. This latter group might encompass farmers that have expressed willingness to join the cooperative (farmers that submitted a request to the cooperative in question and are under consideration) or farmers that are willing but not part of the cooperatives. Given this setup, with 3 groups of interest, we follow the multivalued treatment effects approach by Cattaneo (2010) to estimate the impact of the projects. This method allows researchers to estimate the treatment effects when there are more than one level of treatment among the individuals in the sample. Further, it allows researchers to compare treatment effects on outcomes between each pair of treatment levels. In our setting, our estimation strategy allows us to differentiate long-term versus short term impacts,

as these are embodied effectively by the two groups of old beneficiaries of PAPAC and PAPAFA versus new PAPAC beneficiaries.

We follow the description of the identification strategy in Haile et al. (2017), which describes the estimation of the multivalued treatment effects (Cattaneo, 2010). As the first step, we construct the conditional probability model to predict the likelihood of households  $i$  ( $i = 1, \dots, N$ ) being in each treatment level  $\omega$  according to their definition (0 if control producers, 1 if PAPAC only, and 2 if PAPAFA/PAPAC). Thus, we can write down the likelihood function as follows:

$$T(\omega) = \begin{cases} 1 & \text{if } \Gamma_{\omega}'\mathbf{Z} + \epsilon > 0 \\ 0 & \text{if otherwise} \end{cases}, \quad (1)$$

where  $\omega = 0,1,2$ ,  $\mathbf{Z}$  is an  $n \times m$  matrix of household attributes where there are  $m$  ( $m = 1, \dots, M$ ) attributes, and  $\epsilon$  is the error term. If we assume that the error term  $\epsilon$  is *i.i.d.* and follows the logistic distribution, we can use the multinomial logit model to estimate the probability that household  $i$  is in treatment level  $\omega$  according to the following model:

$$P(W = \omega | Z) = P(\omega) = \frac{\exp(\Gamma_{\omega}'\mathbf{Z})}{1 + \sum_{j=1}^2 \Gamma_j' \mathbf{Z}} \quad (2)$$

where 1, 2,  $W$  represents the indicator of treatment status, and  $\mathbf{Z}$  is the matrix containing household-level covariates. Note that according to this specification, we assume that selection is largely based on observable characteristics of the households, and that there is sizable common support between the conditional probability densities of the households in all treatment levels.

Similar to the traditional impact evaluation setting, we define our evaluation problem as a potential-outcome model with three groups. Suppose each household  $i$  can be classified in one of the three groups  $\omega$ , the potential outcome model can be written as follows:

$$y_i = \sum_{\tau=0}^2 T_i(\omega) y_i(\omega), \quad (3)$$

where  $\omega$  indicates the treatment level that each household belongs to,  $T_i(\omega)$  is a dummy variable indicating which is 1 when household  $i$  belong to the various groups  $\omega$ , and is equal to 0 otherwise, and  $y_i(\omega)$  is the outcome of interest for each group  $\omega$ .

Using a linear specification, we can derive the potential outcome equation in the matrix notation from the potential outcome model as follows:

$$\mathbf{Y} = \mathbf{B}_{\omega}'\mathbf{Z} + \epsilon, \quad (4)$$

where  $\mathbf{Y}$  is an  $n \times 1$  column vector of outcomes of interest, and  $\mathbf{X}$  is an  $n \times k$  matrix of observed household-level characteristics which may contain some of the elements in  $Z$  where there are  $k$  characteristics ( $k = 1, \dots, K$ ). Given the potential outcome framework, we can write the vector  $\mathbf{G}_i = (\omega, y(\omega), \mathbf{X})'$  for each household  $i$  which assumes to be *i.i.d.* (independent and identically distributed) drawn from the matrix  $\mathbf{G}$ . Thus, we assume that the potential outcome of household  $i$  for each treatment level  $\omega$ , denoted as  $\{y_i(0), y_i(1), y_i(2)\}'$  is *i.i.d.* drawn from  $\{y(0), y(1), y(2)\}$ .

Adopting the two-step generalized method of moments approach, Cattaneo (2010) presents two estimators of multivalued treatment effects: inverse probability weighting (IPW) and efficient-influence function (EIF). In the first step, both of these estimators estimate the generalized propensity scores. Then in the second stage, inverse probability weights are calculated to recover the parameter

estimates for the potential outcome model in Equation (4). A notable difference between the IPW and EIF estimators is that while the IPW estimator models treatment assignment following Equation (1), the EIF estimator includes an augmentation term in the potential outcome model to account for the fact that the model may be incorrectly specified. As a result, the EIF estimator contains the doubly-robust qualification that will yield consistent treatment effects estimates if the model is specified correctly (Cattaneo, 2010; Tan, 2010).

In this study, we present two sets of results from both estimators for comparison purposes. In addition a sensitivity analysis to different estimators will also be conducted.

The heterogeneity of treatment effects will also be explored through additional analysis, which will explicitly factor in gender, age and initial income of producers across the three main value chains.

## Addressing potential selection bias

The estimators presented above factor in selection on observables and determine a valid counterfactual. Given that this is an ex-post impact assessment, e.g. designed at project completion, possible selection bias driven by non-random selection of PAPAFA and PAPAC beneficiaries is a plausible risk. Through the assessment of programme documents, discussions with programme staff and field visits we found that the determination of eligible communities to receive PAPAFA and/or PAPAC followed a mixed approach, both demand driven – where interested farmers submitted an application – and a more objective assessment of needs and capacity of producers to be selected for inclusion by the cooperatives. Producers in STP were informed about the existence of PAPAFA and PAPAC and the possibility to submit an application directly to one (or more) cooperative in order to be included and receive projects interventions. After receiving the application, cooperatives leaders conducted a needs assessment and assessed whether the producer met the eligibility criteria. Each cooperative has its own criteria that will be described in detail in the next section.

Previous reviews of certification programs have highlighted the paucity of studies that rigorously accounted for selection bias in their impact identification strategy. In particular, the most recent systematic review (DeFries et al. 2017) was able to identify only 16 papers that satisfied all the eligibility criteria, including low risk of selection bias<sup>4</sup>. These studies focused on banana, coffee and tea, but no papers met the criteria as far as our crops of interest. Consequently, this study, has potential to fill an important gap in the literature by estimating impact through rigorous counterfactual based methods.

## Potential spillover effects

In our setting, the setup of the project interventions that revolved around farmers professionalization in organic cultures and cooperatives financial and administrative strengthening, can produce large spillover effects among households within communities that were supported by PAPAFA and PAPAC. Spillovers beyond the communities that were not exposed to any of the projects interventions are less likely. Indeed, producers might share the knowledge obtained through trainings to their neighbour and peer farmers, who would be considered as spillovers farmers. In addition beneficiaries can share the benefits of belonging to a cooperative and stand together, therefore encouraging other farmers to meet the requirements to access a cooperative and apply for it. Therefore, a possible strategy

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<sup>4</sup> According to the study, selection bias can occur if treatment and control groups are not comparable in terms of biophysical, socio-economic (e.g. preferential bias to participate in certification programs, access to markets) or other characteristics. The authors argue that methods that address the risk of selection bias are those that involve the construction of a credible counterfactual group, and these are: propensity score matching, difference-in-difference, among others.

would be to specifically collect data among a group of producers (indirect beneficiaries) within targeted communities to measure the extent of spillovers in terms of knowledge diffusion, uptake of technology and any other unintended impacts on non-beneficiaries farmers within targeted communities. In order to do so, since an enumeration/listing exercise will enumerate producers households within targeted and non-targeted communities, a possibility would be to include a sample of indirect beneficiaries in our impact assessment to explicitly investigate the presence and impact of spillover effects in treated communities. However, this strategy would require a larger sample size and direct costs implications. Therefore, we will assess the feasibility of this after the enumeration exercise. If this won't be possible, we will only explore direct impact through the quantitative surveys and explore the extent of spillover effects by using information collected as part of the qualitative surveys. In addition a strategy to avoid contamination from spillovers, would be to select the counterfactual households located sufficiently far away from the treatment ones to exclude the possibility of contamination. The choice of outside communities in the possible determination of the counterfactual producers should circumvent this challenge.

## Sampling and data collection

### Key Indicators

In terms of the specific indicators that will be measured to answer the research questions previously listed Table 6 outlines the primary impact outcomes followed by other household and PO-level indicators.

**Table 7: List of key impact indicators and their intended measures**

| Indicator               | Measure   | Source                       |
|-------------------------|---|------------------------------|
| Agricultural production | Increased yields by crop– comparing organic vs. non-organic; certified vs. uncertified  | Quantitative HH Survey       |
| Income                  | Amount of income, disaggregated by source according to LSMS method<br>Crop income   | Quantitative HH Survey       |
| Asset ownership         | Asset index by household including number of durable assets, livestock, land holding size and hh characteristics  | Quantitative HH Survey       |
| Food security           | Number of meals per day, Food Insecurity Experience Scale (FIES) <sup>5</sup>   | Quantitative HH Survey       |
| Nutrition               | Dietary Diversity Index score <sup>6</sup>  | Quantitative HH Survey       |
| Resilience              | Exposure to shocks, severity to shocks, ability to recover and adaptive capacity indicators   | Quantitative HH Survey       |
| Empowerment             | Participation in HH decision making<br>Women's control over income, production, assets and sales<br>Women Empowerment Index (Five domain of empowerment only) | Quantitative HH Survey       |
| Sustainability          | Financial and administrative autonomy of producers households   | Quantitative HH / PO Surveys |
| Improved market access  | Increased value and quantity of production sold per value chain<br>Increased volume of exports<br>Reduced transaction costs<br>Improved prices                | Quantitative HH, KII, FGD    |

**Table 8: List of additional indicators and their intended measures**

<sup>5</sup> <http://www.fao.org/in-action/voices-of-the-hungry/fies/en/>

<sup>6</sup> <http://www.fao.org/3/a-i1983e.pdf>

| Indicator                                      | Measure   | Source                           |
|--|---|----------------------------------|
| <b>Household Level</b>                         |   |                                  |
| Post harvest loss                              | Reduction of post harvest losses  | Quantitative HH Survey           |
| Adoption                                       | Binary indicator on technology uptake<br>Extent of adoption of improved organic techniques  | Quantitative HH Survey           |
| Crop Rehabilitation                            | Extent of rehabilitation (no. of plantations that were rehabilitated)   | Quantitative HH Survey           |
| Certifications                                 | Ha of land certified  | Quantitative HH Survey           |
|  |   |                                  |
| Vulnerability and environmental sustainability | Adoption of risk management and adaptation strategies to climate change<br>Reduced exposure to climatic and international market price shocks | Quantitative HH Survey, FGD, KII |
| <b>PO-level</b>                                |   |                                  |
| Female participation within POs                | Females in POs (%), of which in leadership positions  | POs survey                       |
| Frequency of POs meeting                       | Number of meetings per year   | POs survey                       |
| PO's ownership and empowerment                 | Index of PO's dependency in relation to the cooperative<br>POs level of cohesion  | POs survey, KII, FGD             |
| Access to market and infrastructure            | Distance to closest paved road<br>Distance to closest cooperative storage facility<br>Price received from buyers and applied to producers     | POs survey, KII, FGD             |
| Sustainability of partnership                  | Quality and sustainability of partnerships established with the private sector  | POs survey, KII, FGD             |

## Qualitative sample

In order to first inform the quantitative questionnaire and then triangulate the findings from the quantitative analysis providing additional learning opportunities, the qualitative analysis will consist of Focus Group Discussions (FDGs) and Key Informants Interviews (KIIs) with the producers' associations members and leaders disaggregated by gender and value chain crop, cooperatives' technical specialists, a number of producers that did not receive any support from the projects under evaluation and representatives from the private sector firms that entered in partnership with the cooperative. Specifically, the RIA team recommends 12 Focus Group Discussions and 12 Key Informants Interviews organized as follows:

| Instrument                      | Distribution  | Respondents  |
|---------------------------------|---|--|
| Focus Group Discussion (FGD)    | A total of 6 FDGs with <b>old</b> (PAPAFPA + PAPAC) producer's associations members – for a total of <b>30 people</b> | Divided as follows: <ul style="list-style-type: none"> <li>- 2 FDGs for the value chain of cacao; of which one composed by men and the other by women</li> <li>- 2 FDGs for the value chain of coffee; of which one composed by men and the other by women</li> <li>- 2 FDGs for the value chain of pepper; of which one composed by men and the other by women</li> </ul> |
|                                 | A total of 6 FDGs with <b>new</b> (only PAPAC) producer's associations members – for a total of <b>30 people</b>      | Divided as follows: <ul style="list-style-type: none"> <li>- 2 FDGs for the value chain of cacao; of which one composed by men and the other by women</li> <li>- 2 FDGs for the value chain of coffee; of which one composed by men and the other by women</li> <li>- 2 FDGs for the value chain of pepper; of which one composed by men and the other by women</li> </ul> |
| Key Informants Interviews (KII) | <b>6</b> KIIs with producer's associations leaders supported by the cooperatives                                      | Divided as follows: <ul style="list-style-type: none"> <li>- 2 for the value chain of cacao: of which one composed by men and the other by women</li> <li>- 2 for the value chain of coffee; of which one composed by men and the other by women</li> <li>- 2 for the value chain of pepper; of which one composed by men and the other by women</li> </ul>                |
|                                 | <b>3</b> KIIs with cooperative's <b>technical specialists</b>   | <ul style="list-style-type: none"> <li>- 1 for the cocoa value chain</li> <li>- 1 for the coffee value chains</li> <li>- 1 for the pepper value chain</li> </ul>   |

|  |   |  |
|--|---|--|
|  | 3 KII with producers that do <b>not</b> belong to any of the supported cooperatives | <ul style="list-style-type: none"> <li>- 1 for the cocoa value chain</li> <li>- 1 for the coffee value chains</li> <li>- 1 for the pepper value chain</li> </ul>   |
|  | 3 KII with private partners (Skype calls)   | <ul style="list-style-type: none"> <li>- 1 for the cocoa value chain (KAOKA)</li> <li>- 1 for the coffee value chains (Malongo)</li> <li>- 1 for the pepper value chain (Hom&amp;Ter/Agrisud)</li> </ul> |

Qualitative analysis is a fundamental part of the study because it enables one to gain additional information about project targeting, implementation, and projects contexts . Additionally, insights to the channels through which the project activities may be associated with the changes in the key outcomes indicators of interest will be investigated (Rao and Woolcock 2004, Ravallion 2003). FGDs and KII will be conducted prior to the quantitative data collection to inform the design of the survey questionnaires and to anticipate possible challenges that may be faced during the quantitative data collection.

In this impact assessment, the qualitative surveys will follow a semi-structured format and will focus on the following topics:

- Description of projects implementation (selection of beneficiaries, level of participation, activities administered)
- Knowledge and adoption of improved and organic practices
- Barriers to participation in both projects
- Barriers to success (land ownership and youth empowerment, factors that hindered increases in productivity, income generation)
- Gender empowerment and constraints
- Environmental sustainability
- Benefits of certifications and membership to cooperative
- Income opportunities
- Market access
- Quality and sustainability of the partnerships with private sector buyers
- Possible spillovers
- Sustainability of programme activities
- Potential improvements

## Quantitative sample

The quantitative data collection will consist of two stages: the household and the producers' organization surveys. The producers' organization survey will have as unit of analysis producers organizations leaders. This may pose some challenges if, in control communities, we won't find a comparable PO structure either of formal and/or informal nature (e.g. groups). This will effectively be determined after the listing/enumeration of producer households. The household level data collection envisages the collection of information from cooperatives' producers/members and their households in treatment communities and producers with similar characteristics in control communities.

Specifically, data will be collected across 1500 households, across a number of producers organizations and in a number of communities that will be exactly determined upon the successful completion of the households listing in project and non-project communities (a total of 144 communities) including both treatment and control locations. The producers organizations survey will include a number of POs that will also be exactly determined upon completion of the listing/enumeration of producers households and the determination of the PO structure in counterfactual communities. Detailed geographic location information, captured using GPS equipment, of the households and villages will have to be gathered.

To ensure that there exists sufficient statistical power given the budgeted sample size, preliminary power calculations have been performed, leading to a rough sample size of 1500 households . The following formula is employed to calculate the desirable sample size:

$$N = \frac{4 \sigma^2 (Z_\alpha + Z_\beta)^2}{D^2} [1 + \rho(m - 1)]$$

where  $\sigma$  is the standard deviation of the baseline outcome variable,  $Z_\alpha$  is the critical value of the confidence interval,  $Z_\beta$  is the critical value of the statistical power,  $D$  is the minimum expected change in the baseline average of outcome variable,  $\rho$  is the intra-cluster correlation (ICC) of the unit of analysis, and  $m$  is the number of units to be sampled within each cluster. Among other parameters, we assumed the analysis will have 80% statistical power and 95% confidence level so  $Z_\alpha = 1.96$ , and  $Z_\beta = 1.28$ . Following the standard practice, we plan to sample at least 12 sampling units (households in this case) per cluster ( $m$ ), e.g. producers organizations, and the ICC is assumed to be 0.05.

The 1500 households will have to be distributed across three groups 1) PAPAFA/PAPAC 2) PAPAC only and 3) and a comparison group outside project communities. Assuming equal sizes and based on the overall distribution, this leads to a sample of about 42 producers organizations per group. However given that the effects on the recipients of PAPAFA and PAPAC are larger than the ones that can be observed on the recipients of PAPAC only, we anticipate the need to have a larger sample size for the latter. Considerations will have to be given after the enumeration to precisely assess the “time into the cooperative” variable which will be essential to understand the extent to which new PAPAC beneficiaries constitute an actual treatment as opposed to a control group.

The household level questionnaire will collect the following data domains: demographic and socio-economic characteristics, agricultural production and sales, knowledge of improved and organic practices, diffusion and adoption of improved practices, household income and assets, resilience, market access, gender empowerment and sustainability. The questionnaires will be administered in the local language, Portuguese. Therefore, the household and the PO questionnaires will contain the following modules:

| Quantitative questionnaires modules   |
|---|
| Household survey  |
| Household roster (including demographics, education, religion, health/disability) |
| Agricultural, tree/perennial, home gardening production                           |
| Organic techniques and plot rehabilitation  |
| Adoption of technologies  |

Livestock (poultry, goats, pigs)  
Housing characteristics  
Assets  
Food consumption and security  
Employment  
Other income  
Social capital  
Gender empowerment  
Credit  
Savings  
Shocks & resilience  
Market access

#### PO survey

Market access and infrastructure  
Women empowerment at PO level  
POs empowerment (governance)  
Sustainability of PPP partnership  
Prices

## Supplementary data

The PAPAC program staff provided data such as beneficiaries at community level, agro-ecological zones, and targeting information. The National Office of Statistics provided data and reports of the National Census conducted in 2012. These data were employed to support the identification strategy for this impact assessment. Finally, the government committed to provide a list on the types of crop grown in the country, fertilizers and pesticides sold that will help to inform the questionnaire and tentatively price data that will be used for the analysis.

As part of the enumeration, household and producers organizations surveys – geo-referenced data will be collected, specifically the geo-location of the household and PO. This will be paramount to geo-localizing such entities and triangulating our data with climatic data from other external sources.

## Budget, deliverables and workplan

### Planned Budget

The data collection activities will be carried out by Plan Evaluation selected after a competitive tender process. Plan Evaluation has proposed the following budget for the data collection activities (Table 8).

**Table 8: Tentative itemized budget**

| Item                                   | Cost (US\$)   |
|--|---------------|
| Survey strategy                        | 3347          |
| Data quality system                    | 1526          |
| Qualitative tools and data collection  | 7903          |
| Household listing                      | 8659          |
| Tools for quantitative data collection | 10451         |
| Enumerators Training and pilot         | 5799          |
| Quantitative surveys                   | 52874         |
| Data cleaning                          | 1667          |
| Report                                 | 6693          |
| <b>Total</b>                           | <b>98920</b>  |
| <b>Overhead (9%)</b>                   | <b>8903</b>   |
| <b>Total Costs</b>                     | <b>107823</b> |

### List of deliverables and workplan

As part of these impact assessment activities, the associated deliverables, along with their tentative timeline, are shown in Table 10. At the completion of the impact assessment activities, we will produce three sets of main deliverables.

1. A set of presentations on the impact assessment methodologies, which introduces the concepts, requirements, and implementation plan, along with some key considerations about how to incorporate impact assessment into project design and implementation
2. Finalized household and POs surveys and their cleaned datasets, along with an enumerator guideline explaining how to conduct field interviews using the software
3. An impact assessment report, which summarizes empirical findings from the analyses of household-level and PO-level data and highlights key learning messages for future project design and implementation plan

**Table 9: List of deliverables and their timeline**

| Item | Completion date |
|------|-----------------|
|------|-----------------|

|  |              |
|--|--------------|
| Review of project documents and IA preparation                         | February     |
| IA methodology training  | 31 March     |
| Procurement Process Finalized  | 2 June       |
| Finalization of producers' listing and qualitative surveys instruments | 31 June      |
| Qualitative data collection  | 27 July      |
| Listing exercise   | 30 July      |
| Enumerator training and pilot testing                                  | 28 August    |
| Data collection  | 11 September |
| Data cleaning  | 5 October    |
| Preliminary IA analysis  | October      |
| Final IA report  | November     |

## Impact Assessment team and main counterparts

Table indicates the team members involved in this impact assessment and the main counterparts in the PMU

**Table 10: Research team and main counterparts**

| Name               | Role                           | Affiliation  |
|--------------------|--------------------------------|--|
| Alessandra Garbero | Principal Investigator         | RIA, IFAD  |
| Martina Improta    | Research Analyst               |  |
| Vincenzo Galastro  | Country Programme Manager      | WCA, IFAD  |
| Carminda Viegas    | Project Director               | PAPAC, Ministry of Agricultural Development of STP |
| António Sousa      | Monitoring & Evaluation Expert |  |
| Fabrizio Rigout    | Programme Manager              | Plan Evaluation                                    |

## Validation of results and dissemination plan

Upon finishing the final impact assessment report, RIA will share the report with the PMU staff members and other key stakeholders to validate the results presented in the report. RIA will also work with other IFAD and PMU staff members to plan the dissemination of the findings through various seminars, conferences, and workshops.

## Appendix

### Appendix I – Producers Associations breakdown by gender

#### CECAB

| Associação         | F  | M  | Total | % F |
|--------------------|----|----|-------|-----|
| Água Sampaio       | 14 | 36 | 50    | 28% |
| Água Telha         | 29 | 45 | 74    | 39% |
| Benfica            | 37 | 92 | 129   | 29% |
| Cadão              | 6  | 10 | 16    | 38% |
| Caldeira           | 31 | 51 | 82    | 38% |
| Costa Santos       | 28 | 35 | 63    | 44% |
| Filipinas          | 12 | 11 | 23    | 52% |
| Generosa           | 40 | 55 | 95    | 42% |
| José Luis          | 5  | 13 | 18    | 28% |
| Laranjeira         | 25 | 32 | 57    | 44% |
| Lembá/Ponta Furada | 28 | 57 | 85    | 33% |
| Maianço            | 32 | 41 | 73    | 44% |
| Maria Luisa        | 13 | 16 | 29    | 45% |
| Monte Forte        | 0  | 1  | 1     | 0%  |
| Monte Macaco       | 37 | 66 | 103   | 36% |
| Mulundo            | 22 | 70 | 92    | 24% |
| Paga Fogo          | 2  | 27 | 29    | 7%  |
| Pedra Maria        | 6  | 37 | 43    | 14% |
| Plancas I          | 18 | 28 | 46    | 39% |
| Plancas II         | 21 | 47 | 68    | 31% |
| Ponta Figo         | 8  | 21 | 29    | 28% |
| Prado              | 15 | 16 | 31    | 48% |
| Praia das Conchas  | 26 | 28 | 54    | 48% |
| Queluz             | 27 | 72 | 99    | 27% |
| R. P. Sede         | 6  | 16 | 22    | 27% |
| Rib. Funda         | 13 | 36 | 49    | 27% |

|                     |            |             |             |            |
|---------------------|------------|-------------|-------------|------------|
| Ribeira Palma Praia | 5          | 10          | 15          | 33%        |
| Rio Ouro Pequeno    | 29         | 61          | 90          | 32%        |
| Rosema              | 9          | 15          | 24          | 38%        |
| Saltado             | 12         | 35          | 47          | 26%        |
| Santa Jeny          | 10         | 22          | 32          | 31%        |
| Santa Luzia         | 46         | 73          | 119         | 39%        |
| Santa Teresa        | 9          | 26          | 35          | 26%        |
| Sede S. Cat.        | 19         | 68          | 87          | 22%        |
| Sta Clotilde        | 25         | 70          | 95          | 26%        |
| São José            | 6          | 30          | 36          | 17%        |
| Vila Braga          | 7          | 8           | 15          | 47%        |
| Vista - Alegre      | 37         | 47          | 84          | 44%        |
| <b>Total</b>        | <b>715</b> | <b>1424</b> | <b>2139</b> | <b>33%</b> |

### CECAQ11

| Associação          | F  | M  | Total | %F  |
|---------------------|----|----|-------|-----|
| Abade               | 11 | 26 | 37    | 30% |
| Alto Douro          | 11 | 17 | 28    | 39% |
| Anselmo Andrade     | 21 | 37 | 58    | 36% |
| Bernado Faro        | 29 | 55 | 84    | 35% |
| Castelo             | 13 | 23 | 36    | 36% |
| Clara Dias          | 18 | 13 | 31    | 58% |
| Claudino Faro       | 38 | 69 | 107   | 36% |
| Guegue              | 12 | 30 | 42    | 29% |
| Mato Cana           | 21 | 50 | 71    | 30% |
| Mendes da Silva     | 11 | 27 | 38    | 29% |
| Mestre António      | 11 | 18 | 29    | 38% |
| Monte Belo          | 22 | 45 | 67    | 33% |
| Pedroma             | 10 | 28 | 38    | 26% |
| Ponta das Palmeiras | 15 | 20 | 35    | 43% |
| Quimpo              | 31 | 62 | 93    | 33% |
| Santa Clotilde      | 24 | 41 | 65    | 37% |

|               |            |            |             |            |
|---------------|------------|------------|-------------|------------|
| Santo António | 15         | 28         | 43          | 35%        |
| São Januário  | 8          | 33         | 41          | 20%        |
| Uba Budo Sede | 18         | 41         | 59          | 31%        |
| Vila Celeste  | 13         | 30         | 43          | 30%        |
| Água Izé      | 41         | 49         | 90          | 46%        |
| <b>Total</b>  | <b>393</b> | <b>742</b> | <b>1135</b> | <b>35%</b> |

### CECAFEB

| Associação            | F          | M          | Total      | %F         |
|-----------------------|------------|------------|------------|------------|
| Bem Posta             | 36         | 57         | 93         | 39%        |
| Colonia Açoriana      | 29         | 82         | 111        | 26%        |
| Mongo                 | 10         | 10         | 20         | 50%        |
| Novo Destino          | 30         | 32         | 62         | 48%        |
| Poiso Alto            | 5          | 6          | 11         | 45%        |
| Santa Catarina        | 29         | 52         | 81         | 36%        |
| São José e São Carlos | 19         | 18         | 37         | 51%        |
| São Nicolau           | 2          | 2          | 4          | 50%        |
| <b>Total</b>          | <b>160</b> | <b>259</b> | <b>419</b> | <b>38%</b> |

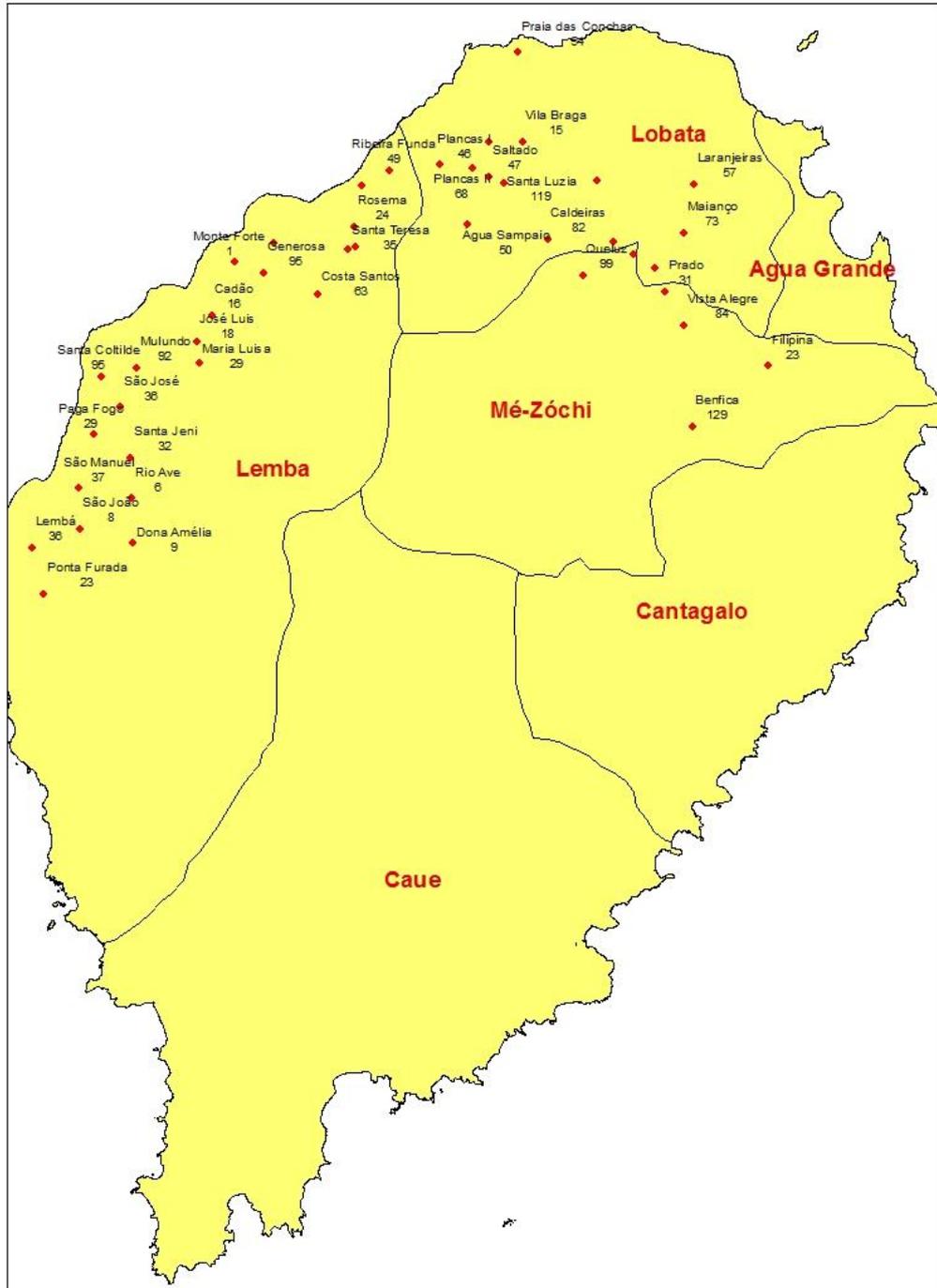
### CEPIBA

| Associação              | F  | M  | Total | %F  |
|-------------------------|----|----|-------|-----|
| Água Francisca/Plat..   | 2  | 13 | 15    | 13% |
| Água Sampaio            | 27 | 30 | 57    | 47% |
| Bela Vista/Porto Real   | 4  | 8  | 12    | 33% |
| Benfica                 | 1  | 7  | 8     | 13% |
| Monte Belo              | 5  | 2  | 7     | 71% |
| Monte Belo / Mendes..   | 1  | 4  | 5     | 20% |
| Nova Estrela/Abade      | 20 | 31 | 51    | 39% |
| Ponta das Palmeiras..   | 8  | 8  | 16    | 50% |
| Praia Nazaré            | 4  | 4  | 8     | 50% |
| Rio Lima/Q. Palmeiras   | 12 | 17 | 29    | 41% |
| S. José/V. Alegre/Otó.. | 4  | 1  | 5     | 80% |

|                       |            |            |            |            |
|-----------------------|------------|------------|------------|------------|
| Santa Catarina        | 2          | 7          | 9          | 22%        |
| Santa Clara           | 9          | 9          | 18         | 50%        |
| Santa Luzia           | 10         | 10         | 20         | 50%        |
| Santa Rita/Azeitona.. | 1          | 7          | 8          | 13%        |
| Santo Antonio/Quimpo2 | 1          | 1          | 2          | 50%        |
| Sao Joaquim/P/M       | 0          | 1          | 1          | 0%         |
| Sao José/Vista Alegre | 3          | 12         | 15         | 20%        |
| Sto.António/Quimpo II | 1          | 7          | 8          | 13%        |
| Terreiro Velho        | 5          | 13         | 18         | 28%        |
| Uba Budo/Pedroma/Pi.. | 6          | 17         | 23         | 26%        |
| Vanguarda/Rodia       | 3          | 10         | 13         | 23%        |
| Vila Fernanda         | 1          | 9          | 10         | 10%        |
| <b>Total</b>          | <b>130</b> | <b>228</b> | <b>358</b> | <b>36%</b> |

Appendix II – Beneficiaries number per community and cooperative

Número de Beneficiários por Comunidade "CECAB"



### Número de Beneficiários por Comunidade "CECAQ11"



### Número de Beneficiários por Comunidade "CECAFEB"



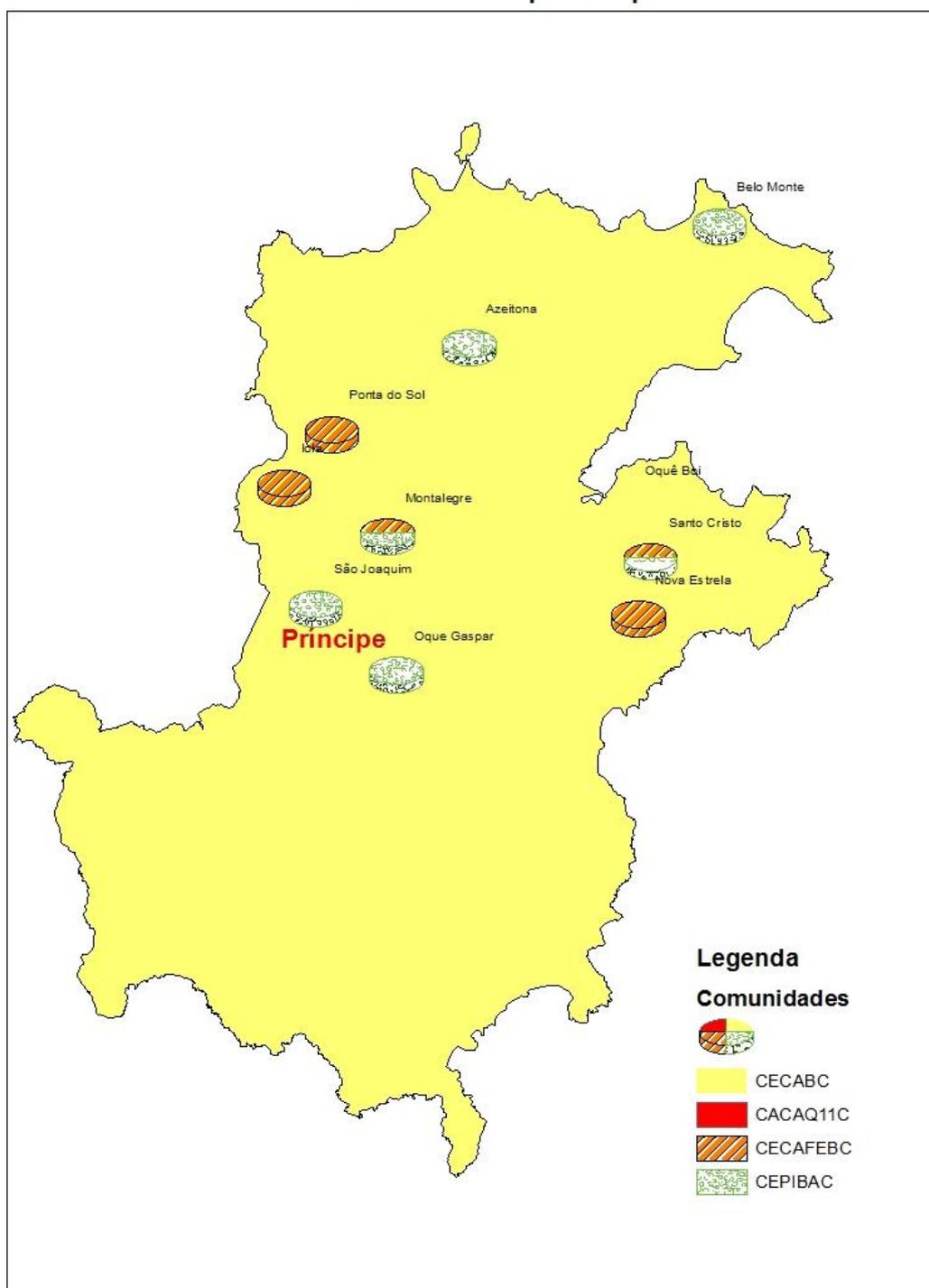
### Número de Beneficiários por Comunidade "CEPIBA"



### Número de Beneficiários por Comunidade "CEPIBA"



## Comunidades de Controle por Cooperativa



### Appendix III – List of possible control communities

| Type of community   | Community   | Total |
|---|---|-------|
| Comunidades "Puras"   | Milagrosa (x3), Agua João, Alto Voga, Amparo II, Azeitona, Beira, Belo Monte (Príncipe), Boa Entrada (x3, Príncipe), Boa Esperança, Bombain, Caridade, Colonia, Diogo Vaz Sede, Dona Augusta (x2), Favorita, Ferreira Governo, Fraternidade, Gratidão, Iola (Príncipe), Laura, Linda Vista, Mateus Sampaio, Micandor, Nova Olinda (x2), Potó, Praia Pesquiera, Ribeira Peixe, Roça São João, Santarém, Santo Cristo (x2), São João Angolares, Soledade, Uba Budo Praia, Uba Budo Velha, Uba Cabra, Vila Irene | 36    |
| Comunidades Novas de CEPIBA e com menos de 20 beneficiarios | Santa Clara (18), Santa Luzia (20), Bela Vista (14), Canavial (1), Mesquita (1), Monta Alegre (1, x2, Príncipe), Pinheira, Santa Margarida (2), São Joaquim (1)   | 9     |
| Comunidades menos de 20 beneficiarios                       | Ponta do Sol (5), Margão(5), Ouque Gaspar (1), Plateau (2, x2), Rodia (1), Santa Adelaide (5), Vanguardia (7), S. Paulo (11), Amparo (14), Santa Cecilia (10), S. Lourenço (11), Brigoma (18), Cadão (16), São João (8)   | 14    |

| Type of community     | Community   | Total |
|-----------------------|---|-------|
| Comunidades Excluidas | São José (56), Nova Estrela (Príncipe, 42), Mendes da Silva (40), Uba Budo (65), Guegue (90), Agua Ize (90), Castelo (36), Mestre Antonio (29), Pedroma (70), Queluz (100), monte Macaco (104), Mulundo (92), Agua Telha (74), Generosa (95), Pedra Maria (43), Ponta Figo (29), S. Manuel (37) | 17    |

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