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Master of Science in Geography

High Conservation Values Forest, the challenges of identifying human interests in the definition of new conservation areas, the case of São Tomé Island

Vasco Ferreira da Costa

Under the direction of Prof. Dr. Gretchen Walters
and Dr. Ricardo Faustino de Lima

Abstract

In conservation, it becomes difficult to recognize the interests of communities in future territorial redefinitions if these are not mapped. A situation that might leave communities unprotected, worsening their economic situation and further disturbing cultural identities that are often fragile. This thesis aims to explore how conservation tools and their application could simultaneously recognize environmental and human interests, using the identification of HCVs in São Tomé as a case study, where an initial assessment was mainly based on biodiversity values. The aim here is to integrate additional applications of the tool, focusing on socio-economic and cultural aspects, using alternative mapping methods and integrating them into the so-called “traditional” mapping methods. This works revealed that there are forest resources that are part of people's daily lives and are needed to meet their basic needs, and that certain locations are considered sacred and part of the identity of the community. The dependence on natural resources and the existence or not of sacred places changes according to cultural, historical, environmental but also accessibility and land tenure parameters. Finally, this thesis shows that it is indeed possible to include human interests in the definition of new conservation areas, under the condition that the local context is considered in the definition of areas and in the development of management tools, at the community level.

Keywords: Recognition, counter-mapping, conservation and people, High Conservation Value Areas, São Tomé

Résumé

En matière de conservation, si l'on ne cartographie pas les zones importantes pour les intérêts humains, il devient difficile de reconnaître les intérêts des communautés dans les futures redéfinitions territoriales, ce qui les laisse sans protection. Une situation qui pourrait aggraver leur situation économique et perturber davantage leurs identités culturelles déjà fragiles. Cette thèse vise à explorer comment les outils de conservation et leur application pourraient reconnaître simultanément les intérêts environnementaux et humains, en utilisant l'identification des HVC à São Tomé comme étude de cas où l'évaluation était principalement basée sur les aspects de la biodiversité. L'objectif ici est d'intégrer l'application supplémentaire de l'outil, qui se concentre sur les aspects socio-économiques et culturels respectivement en utilisant des méthodes de cartographie alternatives et en les intégrant aux méthodes de cartographie dites "traditionnelles". Les résultats ont révélé que certaines ressources forestières font partie de la vie quotidienne des gens et sont nécessaires pour répondre à leurs besoins de base et que certains lieux sont considérés comme sacrés et font partie de l'identité de la communauté. La dépendance aux ressources et l'existence ou non de lieux sacrés évoluent en fonction de paramètres culturels, historiques, d'isolement de la communauté mais aussi fonciers. Enfin, cette thèse a montré qu'il est possible d'inclure les intérêts humains dans la définition de nouvelles zones à conserver, à condition que le contexte local soit pris en compte dans la définition des zones et dans le développement des outils de gestion, au niveau de la communauté.

Mots clés : Reconnaissance, contre-cartographie, conservation et populations, Zones à Haute Valeur de Conservation, São Tomé

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1 Introduction

With climate change and the increasing pressure of human society on nature, the need to safeguard areas with a good level of biodiversity becomes central. The preservation of these areas is important for the proper functioning of the ecosystems in which we all live, but also because it plays a vital role in our health (West, 2006; Lorimer, 2015). One way to protect these places is called conservation. While conservation can be said to have begun in the Middle Ages with the creation of specific places to hunt or to protect sacred areas, today we consider examples of conservation to include natural parks which began in the mid-19th century in the USA, with a desire to preserve scenic "wilderness" areas from human-generated dangers, including deforestation, agriculture (Prendergast & Adams, 2003). This vision of nature was then exported to the Asian and African colonies where game reserves and parks were created (Siurua, 2006). For many years, this was done at the cost of banning traditional and local practices, which were seen as unhealthy and harmful to wildlife (Hutton and al., 2005) and conservation kept being mainly based on biological information (Margules & Pressey, 2000; Brockington & Igoe, 2006). When it comes to defining new areas for conservation, the question of land use planning maintains this separation. Since the first parks, it was a question of securing specific geographical areas that were considered important to conserve a good biodiversity level. To achieve those goals maps were generated to "*designate and spatialize practices that are considered appropriate or inappropriate for the maintenance of natural resources"* (Harris & Hazen, 2005) resulting in some cases to protected area laws that criminalized traditional practices that were the very basis for maintaining the conservation values of the areas they seek to protect (ICCA, 2021).

For instance, until recently organisations like International Union for Conservation of Nature (IUCN) kept on excluding humans from conservation objectives, with strict protected areas (IUCN category 1-4) and it is only in the 1990s that the paradigm started to change when the IUCN started to work with the local communities and with the addition of two more categories (protected landscape/seascape and protected area with sustainable use of natural resources) (Dudley, 2008). Practitioners learnt from unsuccessful projects that excluding people in conservation prevents achieving the

desired objectives since it does not allow the definition of measures appropriate to the local context (Adom, 2016). Indeed, some communities may be strongly connected and reliant on local natural resources, and not taking that into consideration might worsen their socio-economic situation, affect cultural identity, and create territorial conflicts, ultimately jeopardizing the conservation objectives (Brechin and al., 2002; Norton, 2003; Shoreman-Ouimet & Kopnina, 2015).

Therefore, it is now accepted that for conservation to be truly successful, biodiversity factors cannot be the only parameter to be considered when defining areas to be safeguarded (Peluso, 1995; Robinson, 2006; Martin and al., 2016; Bennett and al., 2017; Rasmussen & Lund, 2018). With the integration of human factors in conservation, it ultimately leads to a more inclusive conservation projects, through the recognition of traditional and alternative ways of knowledge and practices and considering local communities as part of the land (Matulis & Moyer, 2017; Murray, 2017).

Thanks to this new paradigm, the field of conservation saw the creation of a series of tools to define land use planning by identifying areas important for biodiversity but also for local populations. For instance, IUCN developed guidelines to define contextualized measures to achieve conservation goals while fully integrating local stakeholders on the designing and managements of projects (IUCN, 2021) while with the creation of the ICCA consortium, territories and areas conserved by indigenous peoples and local communities are being increasingly promoted (ICCA, 2021). Amongst those initiatives, the private sector, in this case forestry and agricultural industry, also proposed land use measures to increase preserved areas when creating concessions for raw material production (Dudley and al., 2018). One of those tools being the High Conservation Value (HCV), that was developed by the Forest Stewardship Council (FSC) as part of its certification standard (Principle 9) to ensure the preservation of important or critical social and environmental values in the context of forest certification. The tool allows an assessment of (1) Species diversity; – (2) Landscape-level ecosystems and mosaics; (3) Well-preserve or rare ecosystems that are important habitats for species of interest (endemic, threatened or relevant for ecosystem functioning); (4) Ecosystem services in critical situations; (5) Sites and resources fundamental for satisfying the basic necessities of local communities or Indigenous people; and (6) Sites, resources, habitats that have a strong cultural significance (Brown and al., 2013).

If in those tools, the social and cultural aspect in conservation is mentioned and considered as a full part of the assessment, the process of creating maps to define new areas to be conserved still today mainly focus on biodiversity setting aside human interests (Peluso, 1995; Bennett and al., 2017). The issue is that maps are a vector of power and can almost single-handedly define territories, at least in the eyes of decision-makers, especially in a conservation context where all protected areas are well-mapped spaces (Malavasi, 2020). According to the Theory of Recognition in conservation, not recognizing human interests could lead to lack of representativeness and the partiality of knowledge on the definition of those territories (Harley, 1989; Wood, 1993; Martin and al., 2016). To avoid that, if the social and cultural components are not initially considered, it is therefore necessary to recognize the local special features and *counter-map* to explore strategies that might address those concerns (Harris & Hazen, 2005). The concept of "Counter-mapping" allows to consider human factors using the alternative forms of mapping and highlight local communities needs to help promote a more inclusive conservation project and try to upset eco-social inequalities (Dalton & Stallmann, 2018).

To address this topic, the identification of High Conservation Value Areas in São Tomé (ST) island is used as a case study. To contextualize, starting in the 1990s, São Tomé and Príncipe (STP), supported by the European Union (EU) through the Ecosystèmes Forestiers d'Afrique Centrale programme (ECOFAC), launched a series of policies that aimed to protect its forests and biodiversity; (Busquet & Aran, 2009; Brito, 2016). Among others, this resulted in the creation of the São Tomé Obô Natural Park in 2006, which protects around one quarter of the island.

The 6th round of ECOFAC is currently in place, being led by Birdlife International in STP, in partnership with the government, local NGOs, and researchers. The will to conduct a HCV assessment is following a landscape approach to conservation, aiming to develop a conservation gradient in and around the park, to ensure the protection of the key biodiversity values it holds. Indeed, some areas outside the Obô Park are still well preserved and hold important biodiversity values but have little to no protection against anthropogenic pressures (Birdlife International, 2020). The HCV tool even if it is initially planned for the private sector, was used by Birdlife since it provides guidelines that allow them to identify but also to develop tools to manage and monitor areas outside the park that should be conserved while not categorizing them as "protected areas".

In São Tomé the assessment so far has focused mainly on the three first parameters, leading to 11 areas island-wide that have been preliminarily identified for classification as HCVs (Birdlife International, 2019). However, regulating and supporting ecosystem services (HCV 4) and the socioeconomical and cultural aspects (HCV 5 & 6), that are also part of the toolkit, were only mentioned and have not yet been evaluated, because the main objective was to protect biodiversity values, and these aspects were considered difficult to assess (Birdlife International, 2019). For Birdlife, HCV 4 its assessment was considered as a very difficult task and imply very different methods while for HCV 5 & 6, the reason come from the little data available as well as the lack of knowledge on conservation social science. The scarcity of social conservation data and focus on biodiversity data is not unique to São Tomé: in many projects around the world, the importance of ecosystems for the human populations is often poorly understood, and consequently not considered when defining protected areas and strategies to manage natural resources.

This thesis aims to explore how conservation tools and their application could simultaneously recognize environmental and social interests, using the identification of HCVs in São Tomé as a case study. This thesis considers the additional application of the tool, and specifically HCV 5 and HCV 6, which focus on socio-economic and cultural aspects respectively, since I made the choice to not assess HCV 4 as like Birdlife, it's a difficult process that requires skills I don't have. From this, the following main research question will guide this case study:

How can the interests of human populations in São Tomé be integrated in High Conservation Value areas initially identified solely based on biodiversity values?

To be able to explore the integration of human interests of a conservation project and its challenges in detail, the above main research question was further divided into three sub-questions:

1. *Which areas in São Tomé can be classified as HCV based on the stated interests of human populations?*
2. *Do these areas coincide with those identified on the basis of biodiversity values?*
3. *Can the identification of areas valuable to human populations influence the identification of High Conservation Value areas in São Tomé?*

Based on this work a map focusing on specific portions of the island based on latter parameters is proposed and contrasted with the original maps which only included HCV 1-3. To understand the effects of these different maps, counter-mapping and the Theory of Recognition are employed. This will enable an analysis of the harms, mechanisms, and responses to this lack of recognition of the human interests in conservation planning (Martin and al., 2016).

Since this thesis explores these issues through the application of the HCV conservation tool in STP, fieldwork was conducted in two communities that had already worked with Birdlife in mapping HCVs 1-3 (solely oriented around biodiversity). Questionnaires and mapping of HCVs 5-6 (socio-economic and cultural values) were conducted. Finally, semi-structured interviews with conservation practitioners in STP and in the world were led to find out their opinions on the subject and to discuss the issues.

We will start by characterizing the communities to contextualize the identification of HCVs in São Tomé. We will then map HCV 5 and 6 and compare these maps against those based on HCV 1-3, to discuss the role of social values on defining new conservation areas.

In the next sections, the theoretical framework will evolve around natural resource dependency, cultural tradition, mapping in conservation and the recognition theory. Then, the HCV tool will be explained in detail as well as the Santomean context. Overall, this will allow to develop the problematic and research question about the issues of HCV application in ST regarding the non-identification of HCV 5&6. From this, we will characterize the communities to contextualize the identification of HCVs in São Tomé. We will then map HCV 5 and 6 and compare these maps against those based on HCV 1-3, to discuss the role of social values on defining new conservation areas.

2 Theoretical framework

This second chapter reviews the literature which will be used to build the theoretical framework to answer the research questions. As the aim of this Master's thesis is to highlight the characteristics and needs of rural populations in the definition of areas to be conserved, the analysis of the results has been done through the prism of human geography in order to identify, map and explain local phenomena.

To better understand the complex forces that drive the maintenance or change of human practices in space, human geography attempts to answer three fundamental questions: Who? What? Where? The first question concerns the groups (in this case, the local populations) who occupy the space with their values, their modes of operation, and their characteristics. The second question concerns the economic, cultural and social productions of these groups, thanks to organisations, resources, technology and exchanges. The third deals with the problem of location, which is an expression of the choices made by societies (Bailly and al., 2016). In other words, human geography makes it possible to study a population, its spatial distribution, and its practices (housing, social and cultural relations, etc.) in a given space at a given time.

In the case of my work, the "Who" revolves around identifying people/communities who depend on natural resources. The "What" is about what makes them vulnerable, in this case what resources and places are important to meet their socio-economic and cultural needs. The "Where" is about mapping the forest places that are important to the communities identified.

In this section, as the aim of the work is to highlight the human interests related to nature through its socio-cultural links, the next part focuses on resource dependency and cultural links and knowledge. Secondly, as one of the study objectives is to provide a map that considers social and cultural factors in the definition of areas to be conserved, it will be essential to know the issues related to cartography and conservation. Finally, this approach ultimately aims to recognise the needs of local people in defining areas to be conserved but does not allow for a critical look at the issue. Recognition theory is used to highlight the power relations between those who have used the HCV toolkit based solely on biodiversity and the needs of local populations, and the impact on these local populations.

2.1 Resource dependency

Literature suggests that natural resource dependency can come from traditional ways of living when it comes to Indigenous peoples (Godoy and al., 2005) but could increase in cases of absentee land ownership; when there is a preponderance of low-skilled jobs; when a single sector is dominated by a single large company, especially if it is involved primarily in raw materials rather than secondary processing (Peluso, 1994) or even where there's poor state implementation through its institutions (Gylfason & Zoega, 2006).

In many countries, rural households are often strongly dependent on natural resources, through forest products (Mamo and al., 2007; Narain and al., 2008). They provide goods and services to the populations that use them to satisfy their needs for food, energy, housing, health, etc (Fonta & Ayuk, 2013) and the importance of the uses of forest products for the households determines the dependence of populations on forest resources.

Dependence on natural resources is a challenge when it comes to conservation, as forests are also strongholds of biodiversity (Garekae and al., 2016). Moreover, poor implementation of conservation policies has been linked to the exploitation of natural resources, such as hunting, logging, and other gathering activities inside protected areas (Ouédraogo and al., 2013). If it is a mistake to say that populations no longer have the right to access these lands at all to meet their needs, it is nevertheless necessary to examine this dependence to better identify why and which populations are most dependent in order to determine which conservation programs work and therefore improve conservation practice (Marshall and al., 2010).

Several indicators of dependence are found in the literature. There are income-based measures of dependence (e.g., forest income as a share of total household income) and time-based measures of dependence (e.g., time spent collecting forest products as a share of total household work time) (Narain and al., 2008). The share of forest products in the household diet can also be used as an indicator of people's dependence on forest resources. Mamo and al (2007) demonstrated economic dependence on forest resources in Dendi District, Ethiopia, using the share of forest income in total household income. Narain and al (2008) analyzed poverty and resource dependence in rural India, distinguishing between two types of household income: permanent and current income (Wollenberg, 2000; Narain and al., 2008; Mamo and al., 2007). It requires a valuation of

the forest products or services used. The estimation of the value of forest products is based on the theory of the economic valuation of a natural asset.

In São Tomé there are rural communities living in poverty and relative isolation, which are directly and strongly dependent on forest resources. Medicinal plants are often used to treat illnesses and pains such as stomach pains, diarrhea, cold sores and headaches (Madureira, 2012). Other studies also have identified some wild foods that seem to be part of people's diet (Almeida, 2012). One of the most traditional dishes, *calulu*[1], uses some herbs that are not cultivated, such as *Begonia baccata* (Sequeira, 1994), an endemic plant of the island[2]. The price and availability of fish, meat, and of other products not produced locally, can also lead to greater pressure on wild animals, such as the case of the introduced West African giant land snail in São Tomé, which is often collected in the forest and represent an important source of protein, especially for poorer and isolated households (Pereira, 2021).

In this thesis, understanding resource dependency is important to better understand the needs of local people. This will be crucial in the process of recognizing their needs when defining the map based on HCV 5 and analyzing the mechanisms and harms that can result from such mapping. This assessment will evolve around the will to not use practices that are Euro-centric, such as market-based forms of valuing ecosystems. Instead, alternative forms such as free-listing and qualitative information will be used to characterize people's resource dependency on forest products (Puri and al., 2010).

2.2 Cultural traditions and traditional beliefs

Rural populations very often maintain spiritual and cultural links with the forests that surround them. Given the great importance of the forest in the life of communities, it is not surprising that traditional identity and culture are often defined in relation to the forest and its fauna and flora (Sow, 2003). Some communities are so closely tied to the forest that it is likely that forests are central to their traditional cultural identity. These include peoples in voluntary isolation, Indigenous peoples, self-governing local communities, and cultural groups that depend on the forest for their livelihoods (Jennings and al., n.d.).

[1] *Calulu* is a fish or meat stew spiced with a combination of herbs.
[2] POWO (2019). "Plants of the World Online". http://www.plantsoftheworldonline.org/

The cultural link that people may have with natural resources can manifest itself in different ways. According to the work of Sow (2003), the forest can, for example, be sacred and be considered as a place where young men become adults, or it can be home to many medicinal plants that are used by village elders. These plants constitute an element of cultural identity through the specificity of their form of use since their uses are based on a body of knowledge. The location of these forests, in various regions, are often protected by customary chiefs who control socio-economic activities in order to preserve these places (Mubalama and al., 2021). However, there are threats to these traditions and practices. Indeed, colonization and the rise of imported religions such as Islam and Christianity, traditional culture has clearly weakened and beliefs have changed (Sow, 2003; Savadogo and al., 2011; Mubalama and al., 2021). In addition, there is also human pressure on resources due to the population explosion and the growing demand for arable land.

Nevertheless, by recognizing and valuing the rights of local populations in the management of their spaces and species, practices and rites have maintained their vigor and dynamism and some practices guaranteed sustainable use of resources (ICCA, 2021). Fair representation and enhancement of local knowledge in negotiation processes are major challenges for ensuring the link between the requirements of sustainable development and biodiversity conservation.

In Santomean communities, nature has a spiritual (associated with traditional beliefs, rituals, and medical practices) and utilitarian (nature, through farming, harvesting or hunting, meets the need for subsistence) character (Busquet & Aran, 2009). According to the authors, certain practices in the forest have a strong implicit magical component, such as certain beliefs linked to traditional medicine, or rituals of contract with the spirits living in the forest.

All this makes the forest an element with symbolic weight within the local culture (Madureira, 2012). Like in many places in the world, in São Tomé, while for some people some places are obviously sacred/magical, other people might not consider sacred even if they use them for some rituals. Some people do not value these beliefs, while others in the same community might take it very seriously. Moreover, many are secret, for instance places where people take purifying baths, or collect specific powerful plants.

2.3 Mapping and conservation

When it comes to developing conservation programs, the spatial factor is central, whether in the designation of land use zoning or the definition of areas to be protected. The process of creating maps involves designating geographical areas considered important for conservation and spatializing practices that are perceived as appropriate or inappropriate for natural resources (Harris & Hazen, 2005) jeopardizing the representativeness, the partiality of knowledge of some stakeholders (cf., Harley, 1989). Indeed, the author suggests that one should begin from the premise that maps are rooted in and essential to power/knowledge, and points to the tendency of mapmaking to "codify, to legitimate, and to promote the world views which are prevalent in different periods and places".

Much work has highlighted how mapping in conservation can be a process involving power relations. In some cases, decision-makers may draw inappropriate conclusions or overlook the attitudes of local people and their relationship to wildlife, and this may unintentionally lead to increased pressure on the species to be protected (Turner, 1999). On the other hand, Peluso (1993) demonstrates links between the establishment of conservation areas, policies towards local populations and the violence that can result from them. Nowadays, it has become accepted that it is necessary to consider the role of local people in planning conservation areas (Andrade & Rhodes, 2012) The integration of local people's needs and conservation planning interests must therefore go hand in hand to promote human well-being on the one hand, but also to ensure that biodiversity and conservation needs can be secured in the long term (Sinclair and al., 2000).

All too often, these conflicts arise from different forms of knowledge between western, highly scientific viewpoints and a local knowledge production (Berkes and al., 1998). In the literature around the issue of the power of maps, it is often proposed that alternative forms of demonstrating spatial use (such as or narratives, participatory mapping) should be addressed and valued so that they are recognized and integrated into Western techniques, even though these maps can often convey very complex spatial relationships (Sparke, 1995). One of the key concepts about this issue is the "counter-mapping", as Peluso (1995), describes as the efforts to contest or undermine power relations and asymmetries in relation to cartographic products or processes.

It is important to be able to counter existing maps [in conservation] as well as to explore how conservation mapping can be pursued in ways that counteract mapping in the most

common use of the term - using mapping to overcome prevailing power hierarchies, cross-species inequities and other power effects (Harris & Hazen, 2005).

The thesis objective being to map the needs of communities in relation to forests is fully in line with the concept of counter-mapping. Indeed, in São Tomé, the definition of HCV maps has only been based on parameters related to biodiversity, using western knowledge and tools. For that reason, it will be interesting to provide a counter-map considering human factors using the alternative forms of mapping proposed in the literature to highlight the local needs and promote a more inclusive conservation project and try to upset eco-social inequalities.

2.4 Recognition theory

To have a critical look at how to address the socio-cultural role of people in setting up conservations, it is first and foremost necessary to recognize them, to give them real importance (Dacks and al., 2019). Recognition theory emphasizes that there can be no social justice if individuals are not socially recognized and valued. Initially developed by philosopher Hegel, of the Frankfurt School, recognition, theory focuses on the struggle for recognition, addressed by Hegel works "System of Ethical Life" and the "Phenomenology of Spirit" (Honneth, 2004). Today, in an increasingly globalized society where economics and technology drive processes, minorities are increasingly seeking recognition or people living in the areas targeted for conservation projects are in a minority situation. To understand in more detail why recognition theory can be applied in a nature conservation context, it is necessary to know the context in which it emerged.

For Honneth (2004), the theory of recognition is built around human suffering. It is the product of the lack of recognition and the motor of social struggles. According to the author, recognition is only possible if three spheres are brought together: love, law, and solidarity. Love promotes care and attention and depends on the reference group of the subject. The strongest bonds come from the family, partner or friends; these bonds are the pillars of recognition. The law grants norms to guarantee the forms of recognition. The establishment of the norms are guaranteed by social struggles, these last ones will widen the margin of the rights and the duties of the individuals. Finally, solidarity, includes the qualities and skills of a person within a community are recognized.

The lack of recognition occurs when there are tensions within one of the spheres. For example, in the sphere of solidarity, if one does not feel part of the group, one's self-esteem is undermined. In the legal sphere, this can be expressed by a lack of recognition in the capacity of a subject to assume acts.

But then, what does this have to do with the implementation of conservation policies? As introduced earlier in the text, all too often, local populations are not recognized or considered in the development processes of conservation projects. These individuals are the ones most affected by these changes, they live on the land and they have developed knowledge related to its exploitation and management. Not taking them into account is to denigrate a culture and miss out on knowledge that could help improve the sustainability of conservation projects (Martin and al., 2016).

In the field of conservation, equity and therefore recognition fits into a perspective of improving biodiversity conditions. Terms like equity have been present in conservation discourse since at least the 1970s. This discourse has only changed through different ways of visualizing equity (Martin and al., 2016). However, these discourses are often produced by individuals assuming that conservation projects can be fair and equitable as long as it generates economic benefits. All too often, this vision of recognition and equity is limited to monetizing traditional cultures in order to attract tourists eager for exoticism (Suiseeya, 2014) and not considering their knowledge, practices, and lifestyles to create a sustainable use of biodiversity. Yet when compared to Honneth's literature, this is counterproductive to the proper functioning of the spheres. Indeed, these individuals are not recognized for their ecological knowledge but for the way they are dressed.

According to Martin and al. (2016), to better target approaches to consider when implementing conservation policies, he proposes to build on four components of recognition: subjects, harms, mechanisms, and responses. Subjects of justice refer to stakeholders or users who are entitled to moral consideration: those who hold rights and deserve recognition (Sikor and al., 2014). Harms are the types of injustices experienced by moral subjects and can vary by dimension of environmental justice. Mechanisms here refer to institutional and structural explanations for injustices. Finally, responses could be some individual efforts to self-development. Such as one’s connectedness to the rest of nature or a more political approach such as extending participatory democracy or giving voices to alternatives to capitalism such a degrowth.

In this work this theory will be applied around the concepts developed by Martin and al. (2016), as the subjects will help to define which population deserves to be recognized and what are the reasons for such a need, in this case the local communities living around the future HCV zones. The concept of harms will be explored using overlaps on the map or the lack of it, which might in one hand suggest conflicting biodiversity (HCV1-3) and community interests (HCV5&6) and in the other, lead to a potential lack of recognition by users of the map about what is important to protect versus what is not. The mechanisms will allow me, in the case of São Tomé, to highlight the repercussions of not mapping and recognizing the needs of the local population when implementing such a preservation project. Finally, the answers will allow me to analyze this issue and to propose, with the support of other case studies on the same problem, to provide an analysis on possible answers to allow the recognition of the needs of local populations in the definition of HCV in São Tomé.

3 Conservation tools and study area

This chapter contextualizes the framework in which this research work was conducted. First, I talk about the conservation program in which my thesis fits, then summarize the global importance of Santomean biodiversity, the history of São Tomé since its colonization, including the origins of the people living there and finally, how the HCV tool was applied in the island so far.

3.1 High Conservation Values

HCV areas aim to recognize the value of biodiversity and their importance for people rather than their economic value. This tool was created by FSC (Forest Steward Council) inused in forest management certification for companies and organisations that want to meet sustainability commitments and to ensure responsible investments specially in the forestry and agricultural domain. To obtain this label, it is necessary to identify and delimit important forests according to HCV parameters. The HCV assessment process allows the identification of values and the formulation of management and monitoring recommendations for a particular land-use plan (Brown and al, 2013). The first step is to determine whether any of the six values (Table 1) are present on a site before starting the clearing process in a land concession ruled by a company working in the domain mentioned above (Jennings, 2003). If HCVs are identified, the areas required to maintain these values are defined. To be considered an HCV area, there must be at least one value that is nationally, regionally, or globally significant, or of critical importance at the local level.

Table 1: High Conservation Value parameters

HCV 1: Forests that contain a significant concentration of biodiversity on a global, regional, or national scale with the presence of threatened and/or endemic species or a situation close to a protected area.
HCV 2: Large intact forest areas of global, regional, or national importance with species present in a natural way and in natural abundance whose population is viable to maintain.
HCV 3: Forests that contain rare or threatened ecosystems, which require significant management measures as they are generally degraded ecosystems such as mangroves or wetlands.
HCV 4: Forests that provide certain environmental services. I. e., the Amazon, a distinction is made between forests that are important for watershed protection or erosion control.
HVC 5: Forests that are essential to meet the basic needs of local communities (native or Indigenous).
HVC 6: Forests critical to the traditional cultural and religious identity of local communities.

3.2 São Tomé and Principe

3.2.1 São Tomé geography and it's biodiversity

São Tomé is an island is in the middle part of the island group in the Gulf of Guinea, the other islands being Principe, also part of the country, Bioko and Annobon. They are part of a volcanic chain originating at Mount Cameroon and finishing with the island of Annobon. São Tomé lies 255 km, and Principe 220 km, off the coast of Gabon (Fig. 1) (Jones, 1994). The first is the larger having a total area of 857 km2. Neither island has ever been connected to the African mainland or to each other and as a result of this isolation both have developed a rich endemic flora and fauna (Serrano, 1995; Measey and al., 2007; Figueiredo and al., 2011). São Tomé is incorporated in the global biodiversity hotspot of the "Guinean forests of West Africa", and it has been targeted by several ecology and conservation studies (e.g. de Lima and al., 2016). The island is particularly known for its endemic bird richness. For instance, among the 45 bird resident terrestrial species, 17 are single-island endemics, three are endemic to the Gulf of Guinea oceanic

islands (Annobón, São Tomé and Príncipe) and eight are widespread species represented in the island by an endemic subspecies (Collar & Stuart, 1988; Buchanan *and al.*, 2011) and from the 930 plant species recorded in these islands, a bit more than 800 are native and a hundred are strict endemics to the archipelago (Dauby, s. d.).

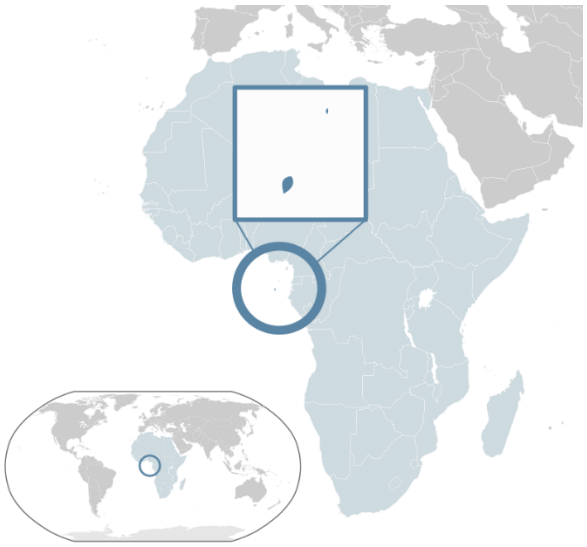

Figure 1:São Tomé e Principe in Africa and the World (Wikipedia, 2021)

The volcanic origin of the island determines its rugged topography, marked by deep valleys and high ridges, up to 2024 meters above sea level (Salgueiro & Carvalho, 2001). The high mountains in the centre and south of the island promote a variety of climates. The south-west is characterized by frequent rains and almost permanent cloud cover, while the north-east is fairly dry and sunny (Tenreiro, 1961). Since the human occupation, apart from some coastal areas, most of the island remained untouched until the 19th century and in 1999, 90% of the island was still covered by forested land uses, with primary forest, secondary forest and a shade plantation. However, there was a decrease of primary forests and shade plantation in the 10-year period between inventories, and an increase in the cover of secondary forests and non-forested land uses (Salgueiro & Carvalho, 2001). Nevertheless, today thanks to its difficult topography the island maintains unusually well-preserved insular forests that hold a remarkably high proportion of endemics and guarantee that these habitats have had little human influence (de Lima and al, 2016).

3.2.2 History

The island of São Tomé was uninhabited until 1470-1471, when they were discovered by the Portuguese navigators João de Santarém and Pedro Escobar. The island of São Tomé was discovered on December 21, 1470 and the island of Príncipe on January 17, 1471 (Eyzaguire, 1986). Colonization began soon after, still in the 15th century, and sugar cane started being cultivated (Bacelar, 2006). Agriculture was further promoted in the archipelago during the 19th century, when coffee and later on cocoa started being grown intensively in large rural properties, the "roças" (Kiesow, 2017). Early in the 20th century the small island of São Tomé even became the largest global producer of cocoa, making it a staple of the country's economy and history until today (Berthet, 2012).

Although slavery was abolished in 1876, throughout the 20th century the Portuguese colonial rule kept rural workers in degrading working conditions. The economy of São Tomé was based on a labor force brought mainly from different regions of the west coast of the African continent, namely from other Portuguese colonies: Angola, Mozambique and Cape Verde (Keese, 2011). In 1953, attempts by the Portuguese government to force Santomeans to work in precarious conditions in plantations and public works resulted in the Batepá massacre on February 3 in São Tomé, which left hundreds dead (Gallet, 2019). In 1960, an independence movement organized in exile by the Committee for the Liberation of São Tomé and Príncipe emerged in the country. In 1972, the name was changed to the Movement for the Liberation of São Tomé and Príncipe (MLSTP). On July 12, 1975, the country gained its independence from Portugal, but the MLSTP assumed the government as a single party. It was not until 1990 that a new constitution established a multiparty republican system, with direct elections for the president. In 1991, the first multiparty elections were held and since then the country has become one of the best examples of democratic rule in the African continent (Seibert, 2015).

3.2.3 Santomean Cultures

The actual colonization of São Tomé began in 1493, 23 years after its discovery. Initially, the island was populated by European white settlers and black African slaves, who were first brought from the neighboring kingdom of Benin, in the delta of the Niger River (now Nigeria), and since the beginning of the 16th century also from the kingdoms of Congo and Ndongo (now Angola) (Varela, 1997). Slaves from Benin spoke Edo, which belongs to the western languages of Benue-Congo, while those from Congo and Angola spoke

Bantu (the eastern language of Benue-Congo), Kikongo, and Kimbundu, respectively (Lorenzino, 1996; Seibert, 2015). This linguistic situation is reflected in the genesis of the island creoles. Amongst this, genetic miscegenation gave rise to mestiços (mixed race), and the slave trade led to the emergence of freed slaves, the "Forros" (Hagemeijer, 2009).

During the first phase of colonization, the inhabitants of São Tomé became involved in the slave trade and established the first plantation economy in the tropics, based on the monoculture of sugar cane and slave labor. The escape of slaves from the sugar farms was a recurrent phenomenon during the first colonization of São Tomé. The island's mountainous topography and dense rainforest in its interior facilitated the establishment of *quilombo* communities in the south of the island (Garfield, 1992; Vansina, 1996). The relative isolation of this group for more than two centuries, living primarily from fishing, resulted in a distinct cultural and linguistic minority, the Angolares (Almeida, 1962).

A second colonization of the archipelago made possible by the introduction of coffee and cocoa, began in the second half of the nineteenth century, when the plantation economy was re-established (Seibert, 2015). This recolonization was marked by a greater influx of white settlers, by a marginalization of Forros, who lived mostly around town, and, due to the abolition of slavery in 1875, by the introduction of a new category, *contratados* (indentured), who arrived mostly from Angola, Cape Verde, and Mozambique (Feio, 2018). From 1926 to 1961, the Portuguese colonial system classified Santomean Forros and Angolares, and *contratados* from Angola and Mozambique as indigenous, while *contratados* from Cape Verde benefited from the higher social status of *assimilados*, due to the perceived closer proximity to European culture, and were often trusted with more skilled jobs (Nascimento, 2013). Despite this, all *contratados* lived on the plantations, separated from the Santomeans, and their social life was under strict control (Eyzaguirre, 1986).

São Tomé and Príncipe was a plural society, where categories created by the colonial rule dictated how each group was allowed to live (Santos, 1996). At independence in 1975, the State granted full citizenship and equal rights to all inhabitants (Hagemeijer, 2009). Over the years, the different groups have successively grown closer together, but the old colonial barriers have not yet completely disappeared and are often maintained by the distinct cultural backgrounds. Although today the Forros have assumed most of the

political and commercial power, the children of former *contratados* and Angolares often become members of the government, deputies or company directors. As a result, the Forro elite today is much more permeable and heterogeneous than in colonial times (Seibert, 2015).

3.2.4 ECOFAC

ECOFAC is a program funded by the European Union and managed by the European Commission. It works in partnership with RAPAC (Réseau des aires protégées d'Afrique centrale) to preserve and enhance the natural resources of Central African forests. ECOFAC covers seven countries: Cameroon, Central African Republic, Congo-Brazzaville, Equatorial Guinea, Democratic Republic of Congo, Gabon and São Tomé and Príncipe. The program began in 1992 and is currently in its sixth phase, which will end in October 2023.

Currently, the program works directly with international NGOs. In the case of São Tomé, the responsibility of managing the project has been given to Birdlife. However, Birdlife's role is not to assume full responsibility but to collaborate with the STP government and with a consortium of NGOs, working towards development and conservation, and coordinating other projects that align with the goals of ECOFAC.

In STP, over the years, the program has allowed, among other things, the establishment of protected areas, raising the awareness of the population for the challenges of safeguarding biodiversity, and the creation of a botanical garden (ECOFAC, 2021).

3.2.5 Birdlife International

Birdlife International is a non-profit organization that aims to conserve wild birds, their habitats and global biodiversity, by working with people in their communities towards sustainability in the use of natural resources (Birdlife International, 2019). This NGO has been present in Santomean territory for 20 years because these islands present one of the largest hotspots of endemic biodiversity on the planet (Peet & Atkinson, 1994). While from the beginning they have focused mainly on collecting information about birds, they have also implemented small nature conservation awareness projects. In 2015, the EU offered Birdlife to manage the next phase of the ECOFAC project, then named ECOFAC 6.

3.2.6 HCV preliminary potential areas identification in São Tomé

In São Tomé, an evaluation mainly based on criteria related to biodiversity was conducted during May and June 2019 by Birdlife International to provide a first proposal to the STP government and ECOFAC, the areas most likely to be considered as HCV. Additionally, they collected information to validate a preliminary land use map for São Tomé, and occasional data on the distribution of threats and of values that might trigger HCV criteria in the buffer zone.

The identification of HCV zones 1 to 3 was based on literature research and expert knowledge (Birdlife International, 2019). In total, 21 preliminary potential HCV areas were identified (Fig. 2). As for the mapping of these areas, it was possible through GPS data collection, but also by using military maps, aerial photos. When it made sense, some areas were delimited by rivers and roads.As proposed by the team conducting this evaluation the current proposal, mostly based on an assessment of existing biodiversity values, would be the basis for the subsequent public discussion, informing and engaging relevant stakeholders, while weighting these values against socio-economic interests.

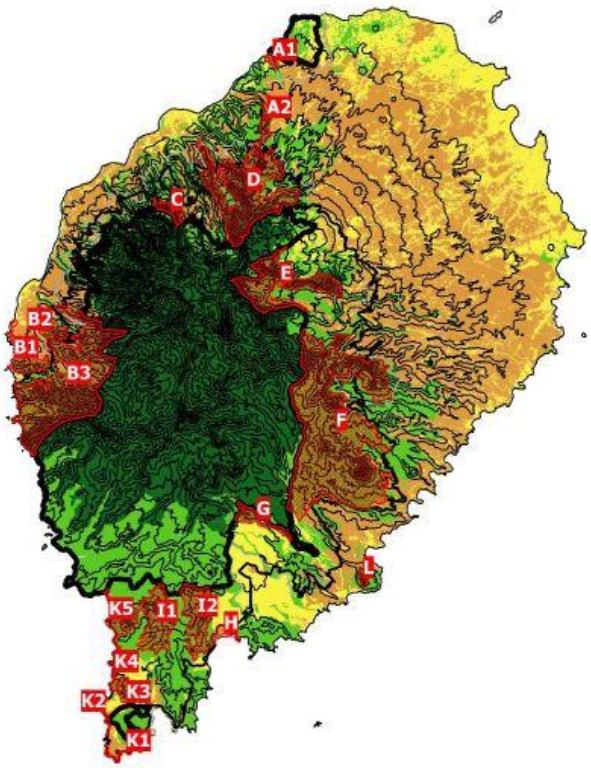

Figure 2: Location of pre-identified High Conservation Value areas in São Tomé, based on criteria 1-3 (Birdlife International, 2019)

In 2021, the STP Directorate for the Environment, with the help of its partners, organized meetings and direct contacts with the main interested parties in every district of the island with the objective of presenting to the society in general and to the local population in particular, the proposal for the creation of areas of HCV's, to promote the recognition of areas of terrestrial and coastal habitat of high conservation value on the island of São Tomé. This was made through a process of consultation with the communities that, in a first stage, culminates in the preparation of a preliminary report containing the point of view of the local population and relevant actors about the main concerns and aspirations concerning the definition of these areas.

The second stage of the process involved a more careful definition of the boundaries to be covered by the said areas and an updating of the cartography, through effective and participatory zoning of land use of the proposed areas with local stakeholders in order to avoid overlaps between forest users and conservation objectives. Finally, the third step consists of the elaboration of the management plans for each of the proposed HCVs and their validation by the stakeholders. The process culminates in the approval/validation of the proposed HCV by the authorities, with all the tools for implementation.

3.3 Problematic and research question

All too often many resources management and conservation projects are planned and implemented by natural scientists, so it is not surprising that socio-cultural factors are less present in the planning of interventions therefore also a lack of social scientific conservation integration (Ancrenaz and al., 2007). As discussed in the introduction, the case of São Tomé follows the same trend explained in the work of the author. Indeed, the HCV framework has mainly been used to define biologically important areas and even if now its recognized the need to include social science on conservation planning, far too often is not embedded in the design, implementation, monitoring, and assessment of conservation interventions (Sieva-nen and al. 2012). Intervention planning must consider the multidimensional dynamics of human relationships with nature (especially those that are culturally embedded or non-tangible) in order to identify locally appropriate social and cultural components that are important for resource conservation and/or management (Bennett, 2017). From that, indicators can be developed for these components and more appropriate approaches to measuring these indicators can be determined. This is best accomplished by using a wide range of knowledge sources, including conservation social

science (Orr and al., 2017). Indeed, the conservation social sciences might serve an instrumental role, for example, in determining what constitutes effective management, governance, or communications strategies for conservation. They can also serve a descriptive role, by providing a historical account or describing the diverse ways in which conservation occurs in different contexts (Bennett, 2019). It must therefore be increasingly integrated in conservation projects, and when I first got to know the topic, I was approached by Birdlife in STP to improves this lack on the HCV identification.

It is with these issues in mind, that I am developing this thesis using the HCV framework to identify zones based on social and cultural parameters in São Tomé to determine if it can be implemented while adding a critical eye on the mechanisms of recognition related to the addition of those parameters in an identification of areas that have so far only been identified on biodiversity values. From that I developed my research question:

How can the interests of human populations in São Tomé be integrated in High Conservation Value areas initially identified solely based on biodiversity values?

Specifically, this dissertation aims to understand:

Which areas in São Tomé can be classified as HCV based on the stated interests of human populations?

Recognizing human populations interests in the classification of HCV areas must necessarily involve identifying these areas, only then can they be compared with the work already done in São Tomé.

If these areas coincide with those identified based on biodiversity values?

The issue of overlap between the two types of maps is important to address because if human needs are not considered in the definition of conservation-only areas, there may be conflicts of use with conservation practitioners on the one hand and traditional land users on the other.

Can the identification of areas valuable to human populations influence the identification of High Conservation Value areas in São Tomé?

Looking at the opinions of people who have developed HCV identification in São Tomé will give us an opportunity to compare their views with what the literature says. This question will also allow us to look at the potential responses cited by recognition theory.

4 Methodology

My first specific research question aims to identify areas that can be considered important for the local population in terms of their basic needs and their cultural and spiritual identity. To answer this question, the methodology must be divided into two parts. Firstly, it was necessary to find out which forest resources can be used by people to satisfy basic needs. Regarding the cultural and spiritual aspects, data collection was done through semi-structured interviews with key stakeholders. The development of both these parts was based on the HCV framework (Brown and al., 2013), and on secondary data collected from the literature about the country and expert consultation, which then lead to the development of a contextualized questionnaire for forest users.

Secondly, once the information from the questionnaires was collected, it was necessary to map the areas where people collect forest resources. This identification was done through participatory mapping, ground truthing and observations. Next, I used GIS software to create a map based on these data and compare it with the map based on biodiversity values.

This approach answered both my first and second specific questions, as it permitted me to visualize the position of these areas and whether they are located in the same places as the proposed HCV 1-3 map.

To answer the third research question, I used semi-structured interviews with people who used the HCV tool in São Tomé and around the world to know their opinion about my results and the issues related to linking human interests with conservation planning, I then linked these opinions with the literature on the theoretical framework.

4.1 Secondary data collection

The secondary data collection relied on information collected from the literature and from expert consultation. Since the aim of the first specific question is to identify which areas can be considered as HCV 5/6, it is important to do a precise analysis of secondary data for identifying which resources and traditions to target during fieldwork.

To know the context in which I worked as well as possible, I conducted a literature review on the social, economic and cultural characteristics of the country, its past and present. I was interested in socio-economic reports of STP households (INESTP, 2012), scientific

articles explaining the culture and traditions (Valverde, 2000; Vasconcelos, 2003; Feio, 2008), works on the country's past and present (Eyzaguirre, 1989; Keese, 2011; Seibert, 2016; Semedo, 2021). This literature also helped me to better select the communities in which I worked.

Regarding forest resource use issues, I conducted my research around the key aspects proposed by the "Generic Guide to Identifying High Conservation Values" developed by Brown and al. (2013) with the understanding that HCV 5 seeks to identify areas that are of high importance to help meet basic needs. These include plant- and animal-based foods from the forest, water for washing and drinking, timber for construction, firewood, charcoal, and products for traditional medicine.

As seen in the literature, there are different approaches to define resource dependency, but it was not possible to apply them in such detail in my work due to lack of means and time. As an alternative, I conducted research on the place of these products in Santomean society, searched which ones are generally the most used and which people consider the most important. As for cultural aspects, the HCV generic guide proposes to focus on questions of spiritual, traditional connection that people have with the forest and, as for forest resources, I searched the literature and consulted experts to gain a better understanding of local practices and their meaning. This assessment allowed to adapt the questionnaires to the specificities of São Tomé, and to use them to improve the data analysis.

4.2 Selection of the study area

The choice of communities was based on Birdlife's desire to learn more about the socioeconomical and cultural ties to the forest by the 11 communities with which they work (Generosa, Plancas I, Praia das Conchas, Saudade, São Carlos, Santa Genny, Porto Alegre, Vila Malanza, Claudino Faro, Mulundo, Abade) under the EU-funded ECOFAC6 project. To identify communities that would have HCV 5 and/or HCV 6 zones, I relied on documents containing socio-economic and cultural data for the country.

The socio-economic data was based mostly on a study developed by Oikos (2019), a NGO that is also part of ECOFAC6. This study focused on the 11 ECOFAC6 communities, allowing me to make a first assessment on the relationship between the community and forest resources. It gave information on the (1) main resources existing in the forest, (2) main activities related to forest resources and (3) main resources harvested in the forest. For each of these three parameters, I extracted the elements the NGO collected about the community uses and practices related to forest resources and noted whether they valued these parameters, as *1=valued, 0=not valued* (Annex 1). For each of the parameters, I created a scale to assess the level of linkage between the community and the forest resources. The closer the balance is to 0, the greater the linkage. Finally, I linked the scales of the three parameters and made an average. The closer the average is to zero, the stronger the link between the community and the forest resources (Fig.3).

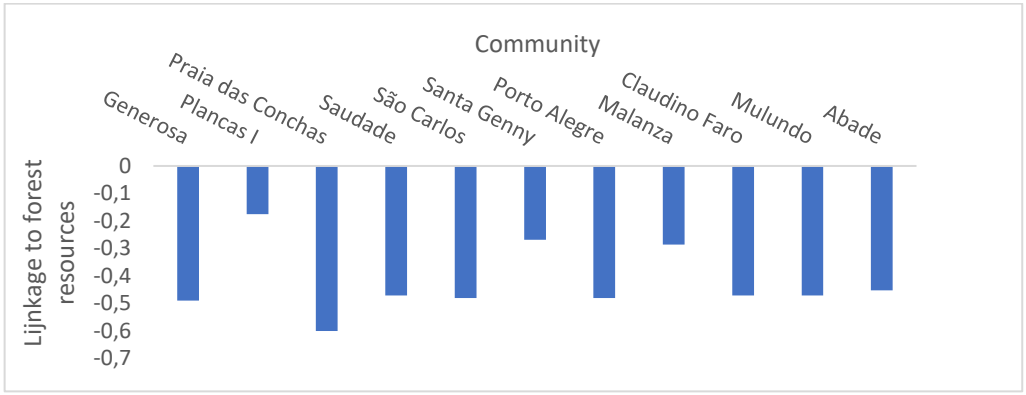

Figure 3: Level of linkage between ECOFAC6 communities and forest resources. The closer the score is to 0, the higher the link to forest resources.

The selection was also made using the population reports developed by Instituto Nacional de Estatística de STP (INE, 2012). The parameters taken from these reports considered forest resources for daily life, the ethnicities represented in the community and their cultural link to nature. These included the % of households with access to water through rivers and/or private sources, % of households using timber products for cooking, % of houses built of wood, % of households with access to electricity. For the cultural links to the forest, the choice was based on the ethnicities of people living in these communities, as this can relate to distinct cultural background and to how people connect with nature (Annex 2).

Finally, the last parameter was the distance to the proposed HCVs. Indeed, one of my specific research questions is whether there is complementarity between HCV zones 5 and/or 6 with the pre-identified HCV zones 1-3. Hence, it is necessary that the area studied is relatively close to the latter.

The two communities chosen were Plancas I and Vila Malanza. Regarding Plancas I, from a social point of view, in 2012 it had 182 inhabitants, 99% of which drunk and washed using water either from the river or from private sources, and 99% used firewood or charcoal for cooking, although these high proportions were common to all communities were ECOFAC6 was working. About 42% of the houses were wooden. Concerning linkage to forest resources, Plancas I had an average score of -0.17, showing the strongest link to forest resources. Regarding cultural aspects, 22 people spoke fluent cape-verdian, 3 forro and the rest speaks only Portuguese.

As for Vila Malanza, it had 532 inhabitants in 2012, 18% of whom drunk or bathe from rivers and/or public fountains, 96% of whom cooked with timber, 96% of whom had wooden houses and 75% of whom had access to electricity. Vila Malanza had a score of -0.28, third place just after Plancas I and Santa Genny. However, this community was preferred over Santa Genny because it is mainly composed by people belonging to the Angolar ethnic group. In fact, according to the INE report, 479 of the residents spoke Angolar. In addition, the Angolar community has a special link with nature (Valverde, 2000). Finally, these two communities are interesting in terms of their location and the characteristics of their environment. Both are close to PNOST exclaves: Plancas I is close to the northern savannah and Vila Malanza is close to southern mangrove (Fig. 4). Plancas

I is a community at 300 meters of altitude, located in a colonial farm that had a strong focus on cacao production. It is in the north of the island and its climate is semi-arid.

Vila Malanza is a coastal fishing village that emerged by mid-20th century and did not have a colonial genesis. It is in the south of the island and its climate is humid. Moreover, the community is known to be close to a well-known spiritual place in STP, Budo Bachana. This makes the presence of a potential HCV 6 zone very likely. In addition, Vila Malanza is adjacent to Agripalma, a palm oil producing company that has a 5,000-hectare concession from the government since 2013, part of which was bought from Vila Malanza's residents.

The different characteristics of these two communities made it possible to emphasize the diversity of situations that can be found throughout the country and the need to give importance to each local context if one wants to have a realistic vision of the uses of the territory by the populations. For this reason, although this thesis is not intended to be a comparative study, in my results section I will provide information from both communities side by side to highlight the differences between them.

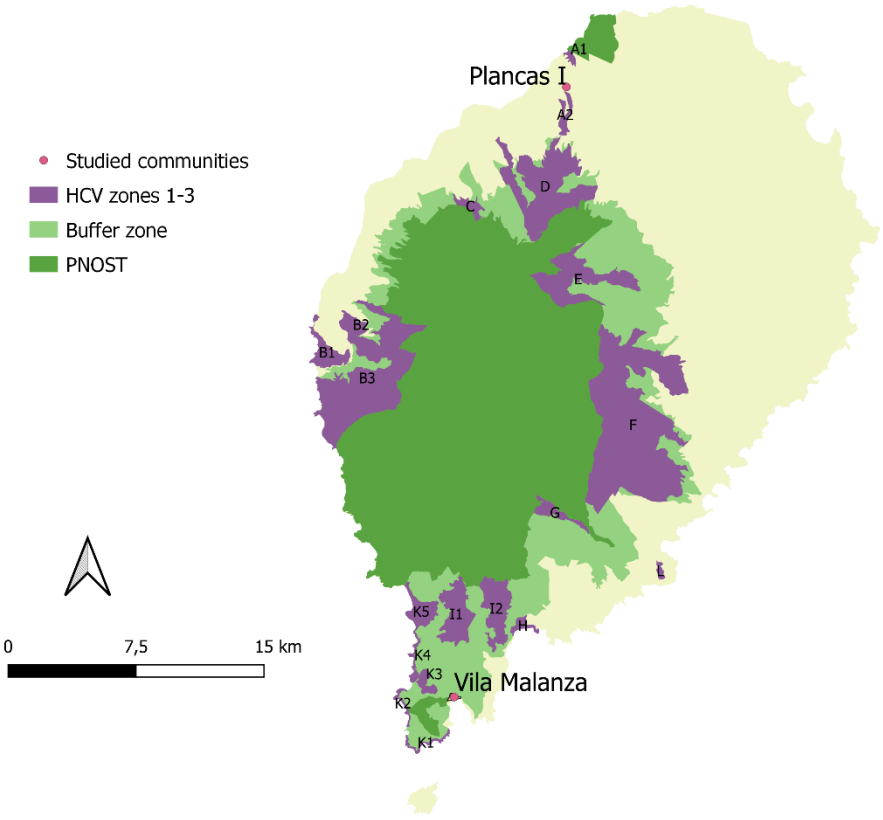

Figure 4: Location of communities targeted by the current study (Birdlife International, 201)

4.2.1 Link between selected communities and pre-identified HCV 1-3 areas

The community of Plancas I is located near the pre-identified HCV zones A1 and A2. The A1 zone is in the north of the community and borders with the western portion of the northern PNOST exclave (Fig. 5). Some of the species that can be found there include the bat *Eidolon helvum* (roost) and various bird species (e.g., https://ebird.org/checklist/S56871592). The ecosystem is mostly composed of shade plantation, secondary forest, anthropogenic savanna, stream, and scarp. The A2 area is located near the community of Águas Sampaio and Plancas I. Some of the species that can be found there, as for the A1 zone, are the bat *Eidolon helvum* (roost) and different species of birds (e.g., https://ebird.org/checklist/S57706151). The ecosystem of this zone is composed of native forest and dry forest plains, stream and scarp and is one of the most important strongholds for the highly threatened flora of the north of the island (Dauby, s.d.).

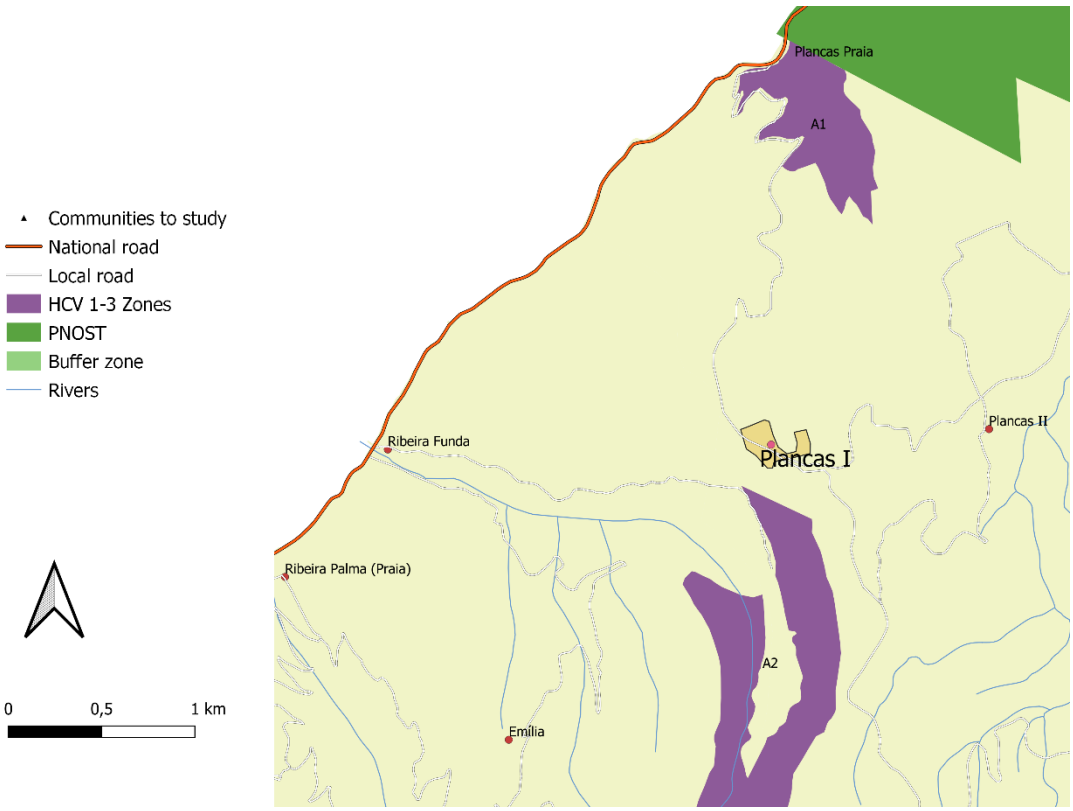

Figure 5: Map of HCV 1-3 zones and the surroundings of Plancas I (Birdlife International, 2019)

The community of Vila Malanza is located near the zones K1, K2, K3, K4 (Fig. 6). Except for K3, which is slightly inland, the other zones are coastal, and are thus not effectively considered, because in this work I have not addressed coastal resources. K3 is north of Vila Malanza, and some of the species that can be found there are birds, such as *Hydrobates* cf. *castro*, the endemic snake *Philothamnus thomensis*, and the endemic and threatened tree *Pandanus thomensis*. In terms of ecosystems, we can find secondary forest, stream, scarp, coastal forest, and coastal plantations.

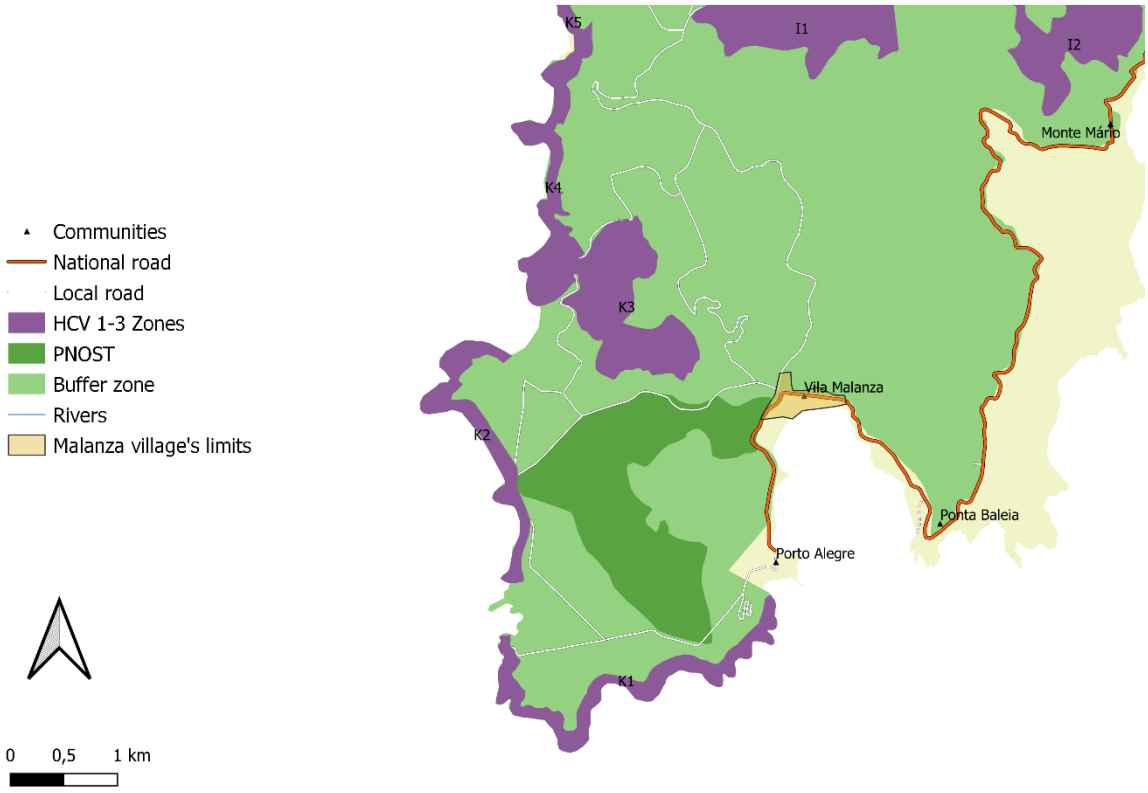

Figure 6: Map of HCV 1-3 zones and the surroundings of Vila Malanza. (Birdlife International, 2019)

4.3 Data collection method

Access to local communities was through local promoters. These local promoters have been identified as the representative of the communities, working as awareness-raising agents under the ECOFAC6 banner, and were elected by the communities after submitting a CV demonstrating their interest in development and conservation issues *(personal communication*). Contacting them facilitated contact with the community. These representatives, by their status, were often more informed about forest resource issues because they are in contact with NGOs working in this field. They were also key to explain my research to the inhabitants. In both communities, they were not the community leaders, so I conducted a separate interview with the promoter and the leader. I presented them the objective of the project, the methodology and the related logistic needs, such as a place to sleep, eat, wash. Finally, I went to the community by public transport, to avoid being associated to any NGO, as it would have happened if I arrived there in their vehicles. This also allowed me to experience their challenges in accessing more densely populated areas of the island.

4.3.1 Characterizing the community

To obtain their informed and voluntary consent to conduct my research in the community, the objectives of my work were first presented to the leader and to the promoter of each community. This allowed for them to put me in contact with the people to be interviewed. In addition, local representatives provided me with information related to their communities through a specific questionnaire, which included general questions related to the accessibility of the community, health care and access to water. This allowed me to validate and complete the information already collected through the secondary data, and to have a better profile of the whole community. All interviewees were made aware of the objectives of the study and their voluntary consent were obtained prior to conduct the interviews.

4.3.2 Understanding resource use by the community

Information was collected through questionnaires with the head of each household, aiming to interview 30 households in each community. Working with the whole community at once may prevent some households from expressing themselves freely, especially if they are marginalized. To make participants feel more comfortable and facilitate data collection, interviews took place in people's homes after their working day,

so as not to interfere with their activities. The choice of interviewees was made through random selection, to avoid a bias related to the choices of the people helping me in each community, which could influence the results. The selection was made by counting the total number of houses in each community and then selecting them randomly until 30 interviews were obtained, taking care to cover all inhabited areas in each community. For those who have agreed to be interviewed, it was explained to them that their participation is voluntary, that it could be skipped or stopped at any time and that when the results are published their voice will be anonymous if they want it to.

During the interview, questions about the structure of the household and its social characteristics were asked. *Freelisting* methods (Newing, 2010) were used to ask questions to determine which forest resources they use in their households and which ones are most used/consumed. To be sure we talked about resources they use from the forest, it was told that it is resources that are not cultivated/breed and that are not from agricultural plots. As explained earlier, the categories considered were medicinal plants, wood used for construction, wood used for cooking, and food from the forest, which includes animals and plants.

To determine the degree of economic dependence on natural resources, participants were asked to indicate the level of consumption in the household, for each of the 5 most consumed products. They were further asked how they acquired the resource (bought/traded or gathered) (Annex 4).

The effort required to reach a community from the more populated areas of the island varies greatly with distance, road conditions and type of transport. According to Hymas (2015), this has an influence on the availability of alternatives to other products that are consumed in the community and increases the use of wild products. To answer that, I estimated the time needed to access the field from the nearest market, assessed the road condition, and asked to the local representative how often the HIACE comes to the community[3] (Annex 3). The less often a HIACE comes to a community, the more dependent it will be on surrounding resources, especially if the community has no electricity to refrigerate food.

[3] HIACE is a form of public transport that can hold up to 9 people and can also take a good amount of resources from a market to a community and back, unlike motorbikes that are the most frequent alternative but have a very limited carrying capacity.

Finally, to identify their perception of the sustainability of harvesting wild products, it was asked if participants noted a difference in the availability of resources and to identify the cause.

4.3.3 Understanding the community's spiritual/cultural link with the forest

In the questionnaire for each household, it was asked whether there are people in the household who used sacred sites in the forest, whether these sites are still used and how often, and whether everyone can access them. General questions addressed to local representatives were related to the presence or not of celebrations, rituals in the community, the place of the forest in medical treatments, the existence of traditional medicine specialists in the community and the way these specialists use sacred areas. These questions were also addressed to the specialists who were identified through the interviews with the abovementioned questionnaires. The interviews with the specialists varied greatly depending on the local context, but they revolved around the existence of spiritual/cultural places, the best way to respect these places, if there were ceremonies, what they were about, and, if there were sacred areas, what purpose do they serve (Annex 4).

However, care was taken to mention the reasons why I was conducting this work and that I was not seeking access to these areas, but just to know about their existence. Access to these areas was only possible with their consent, and information was only collected from these people through participant observation, if they volunteered to teach me more.

4.3.4 Participant observation

At the time of data collection, there was also some participant observations, which made it possible to feel the dynamics of the community. Direct participant observation is essential to the proper conduct of the research, with this technique the researcher is outside the scene, observing and interacting (Fortin, 2010). It is useful in cases where there is a need to study the modalities of certain interactions and individual behaviors in the face of very specific situations. Also, sometimes interviewees forget to include certain points that might be important to the research (Puri, 2010). I had the opportunity to conduct various observations during my stay in the two communities where I was invited by practitioners to follow them in their activities. While doing so, I managed to have informal discussions, where additional information was gathered, that was often forgotten

or omitted during the semi-structured interviews, when practitioners were not yet comfortable to share it. This method allowed me a better understanding of certain actions.

To facilitate participant observation and data collection for the semi-structured interviews, I slept in the community while those activities were taking place.

4.4 Primary data analysis and HCV identification

Naming the most important resources through *freelisting*, allowed identifying the most important resources for each person. However, the information was biased by the effect of seasonality, as the fieldwork was conducted in March and April 2021, which is during the rainy season. Indeed, for some products, if it was not harvest season, the interviewees may not take it into account when they could be at another time of the year. This bias is one of the limitations of my research as I did not have the time or the resources to carry out research over the whole year.

The frequency of consumption of a product indicated the place it occupies in a household. The more the product is used, the greater the dependence. For my research, for edible products I defined that up to a weekly consumption the product is necessary to meet the basic needs of a household. For medicinal plants, this definition doesn't apply since they might be fundamental even if they're not used on a regular basis.

If those wild products came mostly from within the community, it may indicate a dependence on resources and a lack of alternatives for the family that extract the resource. This information was supported by the results of the accessibility survey carried out with local representatives. The frequency with which a HIACE comes to the community completed these data.

About the identification of HCV 6 areas, the analysis is qualitative. The results depended on the answers given by the interviewers on the presence or not of cultural/spiritual places.

To have strong and reliable conclusions, it was necessary to use the triangulation method. Among the interviews, it was necessary to use other data sources and the information collected from participatory observations.

4.5 Mapping

After identifying the forest resources needed to meet people's basic needs and spiritual/cultural places, mapping was conducted. The first step was to develop a map in a participatory way and to go to the field to ground truth that information, and finally compile this information on a geographic information software (GIS) to develop the final maps.

4.5.1 Participatory Mapping

Participatory mapping is an umbrella term used to define a set of approaches and techniques that combine the tools of modern cartography with participatory methods to record and represent the spatial knowledge of local communities (Emmel, 2008). According to Brown & Raymond, (2014) it is a powerful tool that allows remote and marginalized communities to represent themselves spatially, bringing their local knowledge and perspectives to the attention of government authorities and policy makers.

After identifying the resources that could be considered important for inclusion in HCV 5 and the cultural and spiritual places that could be important for HCV 6, key community members were brought together to identify important locations to obtain each of the key forest resources. Thanks to questionnaires results, interviews and observations, the choice of community members was based on their knowledge of the area, either because they have a profession related to the collection of forest resources, or because of a spiritual link.

I proposed to the participants to draw the roads, ruins, mountains, rivers, to delimit the area where we were working. After main points of interest where defined, we drew the harvesting locations in relation to the defined points of reference. During the identification process, for each area, participants were asked to indicate what type of resource is found there. They were also asked to indicate the most important resources in each zone, although their opinion is subjective and further study of the area is needed, it does highlight some trends. The process used to create participatory maps provided a result that represents the knowledge of the community. The location was approximate but facilitated ground truthing.

4.5.2 Ground truthing

After identifying the main areas of use, ground truthing was carried out using a GPS. Each group of areas was walked along paths that are known to the communities. Ground truthing consisted on going to the field with the map developed by participatory mapping and checking that the information matches up with the information given by the stakeholders. This technique increases the accuracy of the information and recognizes the value of local knowledge of forest resources. This step was conducted with key informants from the community who were familiar with the area that were identified thanks to questionnaires, interviews and advises from the local community. The data for each of the places with resources important for basic needs and spiritual/cultural places were compiled using GPS, and then mapped using QGIS 3.16.

Given the time needed to carry out the ground truthing, I gave a financial contribution corresponding to the work time to the person who accompanied me.

4.5.3 Map creation with GIS

Thanks to the information collected during the participatory mapping and ground truthing, it was possible to identify accurately the different locations where forest resources were harvested. However, some limitations were identified in the creation of the polygons. Indeed, if the ground truthing allows the identification of precise points on a map, it does not allow the creation of polygons. Harvest areas can be complicated to determine because the harvest point of a resource can vary from individual to individual and from year to year. To fill this variable, it was necessary to define zone limits. The outer limits of the areas used were defined according to parameters related to the distance to be covered from a path, the altitude, the existence of a river or other impassable obstacle, historical maps, satellite images or the existence of private land such as small plot or agricultural plots from big companies.

4.6 Interviews with conservation professionals working with the HCV tool

To understand how taking into consideration the value for human populations can influence the identification of HCV areas in São Tomé, I approached those involved in doing the preliminary identification of these areas in the island. To get a more global view, I also sought the opinion of a representative of the HCV secretariat. For São Tomé, interviewees were identified following a snow-ball approach, starting from those

mentioned in project reports (Birdlife International, 2019; DGASTP, 2020). For the HCV secretariat, I contacted the main author of the HCV guidelines (Brown and al., 2013).

For each interview (Annex 3), the questions focused on the profile of the interviewees, their role in the identification of HCV in São Tomé, issues and challenges related to their implementation, and perception of the effects of taking human values into account while identifying HCV areas. The questions for the representative of the HCV secretariat were adapted to tackle the global use of HCV rather than focusing on specific problems in São Tomé, taking into account human values in the definition of HCV areas (Annex 5).

5 Results

5.1 Plancas I

In Plancas I, there are approximately 300 people living in the village, according to the community leader, despite the latest census, from 2012, mentioning a population of 183 (INE, 2012).

In Plancas I, among those interviewed, 55% of the population considered themselves Cape Verdean, 32% Santomean, 7% Tonga[4], 3% Angolar and 3% Forro (Fig. 7). The information collected coincides with that of the census; in fact, if we look at the most represented language beyond Portuguese, in Plancas I 22% of the population speaks Cape Verdean (INE, 2012). It is important to note, however, that in the census the question was to identify the language spoken while in my research it was to identify the ethnic group, which may explain the differences in results. In Plancas I households are composed in average of 4.8 persons. Among the interviewees, 10 people were between 20 and 34 years old, 13 people were between 35 and 49 years old, 8 were between 50-64 years old and none was more than 65 years old.

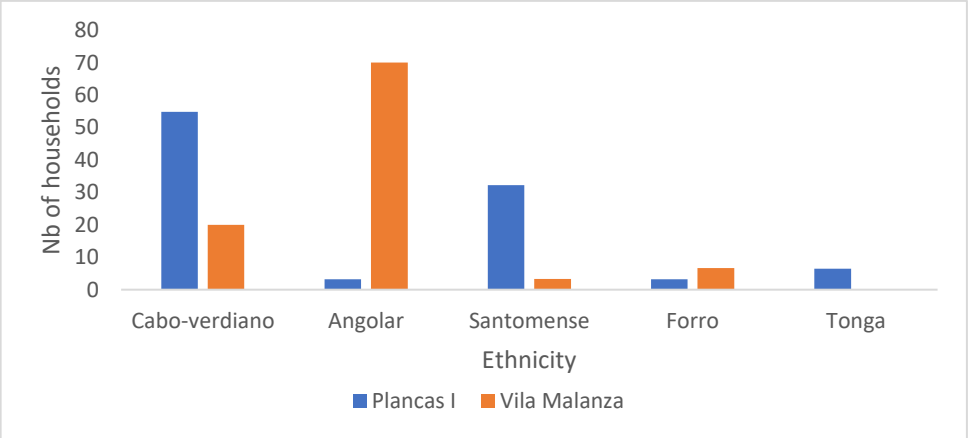

Figure 7: Distribution of households according to the self-identified ethnic group in both targeted communities: Plancas 1 and Vila Malanza

Related to professional occupation, in Plancas I, among the 30 interviewees, 21 considered farming their main activity (15 men and 6 women) and 6 people considered it as their secondary activity (5 men and 1 woman), most of them owning cocoa plantations,

[4] Tonga refers to the descendants of immigrant agricultural labour, former servants or or hired labourers, already born in São Tomé and Príncipe. Lately, most of them had Angolan or Mozambican ancestors (Baxter, 2002).

which are sold to CECAB[5]. The second main occupation in Plancas I is *Vinhanteiro* (palm wine collector) with 4 people, and also 4 people considering it as secondary. The next most important occupation in Plancas I is charcoal production, with 2 people considering it as their main occupation (1 man and 1 woman), and 7 men considered it as a secondary occupation. There were 2 women who answered that they worked in the school canteen. Other occupations are respectively practised either primarily or secondarily by a single person (Fig. 8). Among the 30 interviewees, 8 people said that they did not have a secondary occupation.

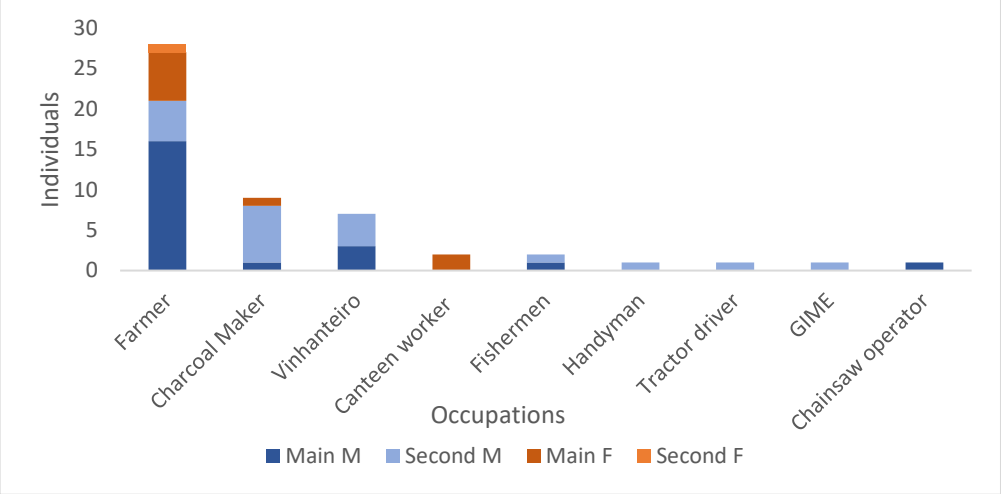

Figure 8: Distribution of individuals according to their main or secondary occupations by gender M: male; F: female, in Plancas I.

5.1.1 Accessibility to the community

Access to Plancas I is possible by motorbike taxi from Guadalupe, 7 km from the village, which is the largest town and capital of Lobata District, with a market and a health center. In normal weather conditions, the trip takes about 20 minutes on a road that is well kept but mostly dirt, and only paved in the final stretch. However, there is no HIACE that goes up to the village, forcing the population to bring most goods by motorbike taxi.

[5] Cooperativa de Exportação de Cacau Biológico, a cooperative that brings together nearly 37 associations of small cocoa producers, i.e. more than 2400 families in São Tomé (Jeune Afrique, 2016)

5.1.1.1 Accessibility to markets and fresh edibles

In Plancas I there are 6 shops. During my stay I noted that 4 were selling fruit and vegetables, while the other 2 only sold drinks (alcoholic and non-alcoholic), snacks, and dried carbohydrates foods (rice, past). Fresh products, such as meat, fish or fruit and vegetables, are mainly sold directly by the producers.

5.1.1.2 Accessibility to health center

In Plancas I there is no health center, and nobody has training in this field; hence the inhabitants have to go to the health center in Guadalupe.

5.1.1.3 Accessibility to water

In Plancas I, the water used for washing, clothes and drinking comes from a spring above the community of Águas Sampaio, which is then channelled to Plancas I. This work is recent and was made possible thanks to the collaboration between the population and CECAB, which buys the organic cocoa from the community's farmers. However, the water supply is not continuous.

5.2 Vila Malanza

In Vila Malanza, there are 1020 inhabitants according to the community leader, and there were 532 in 2012 based on the latest population census (INE, 2012).

Among the 30 households interviewed, 70% of the people considered themselves as Angolares, 20% as Cape Verdeans, 7% as Forro and 3% as Santomeans. Like in Plancas I, the households interviewed had on average 4.6 people. Among the interviewees, 11 people are between 20 and 34 years old, and 10 are between 35 and 49, 8 are between 50 and 64, and 4 were over 65.

As far as professional occupations are concerned, we can see that the profile of Vila Malanza is distinct from that of Plancas I: there is a greater variety of occupations, and most do not work in agriculture. Five people, including 2 women, consider agriculture as their main occupation and 8 people consider it as a secondary occupation. Then the occupations of fisherman, *vinhanteiro* and employee at Agripalma[6] each have 5 persons

[6] A concession of just under 5,000 hectares in the south of the island for industrial oil palm plantations (SOCFIN, 2018)

as main occupation. This is followed by occupations with fewer practitioners, such as carpenters and GIME[7] employees, each with 2 people practising as their main occupation (Fig. 9). Other occupations are respectively practised either primarily or secondarily by a single person[8]. Of the 30 people interviewed, 9 said that they did not have a second occupation.

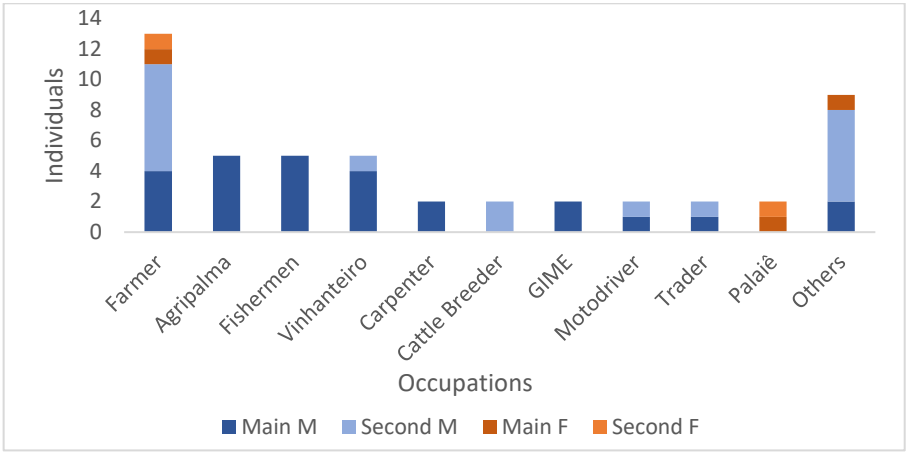

Figure 9: Distribution of individuals according to their main or secondary occupations by gender M: male; F: female, in Vila Malanza

5.2.1 Accessibility to the community

Vila Malanza is accessible by HIACE from the nearest large town and capital of Caué Distrcit, S. João dos Angolares, which is 28 km away, and has a market and a health center, via a paved road in poor condition. In normal conditions, the journey from there takes about an hour and half and three hours from the capital, São Tomé. In Vila Malanza, most days there are 3 HIACE that come from S. João dos Angolares. Every time those HIACE transport people and goods.

Figure 10: HIACE selling vegetables in Malanza

[7] "Grupo de Intervenção e Manutenção de Estradas": association that collaborate with the Government of São Tomé and Príncipe to maintain the national road network
[8] Artesan, Hunter, Chainsaw Operator, Coco-collector, Seamstress, Housewife, Gardener, Mason, Retired, Security Guard

5.2.1.1 Accessibility to markets and fresh foods

Vila Malanza is located 28 km from the market in S. João dos Angolares and there are 17 shops for 532 people. Only 2 stores sell fruits and vegetables. In the community, there is no real vegetable production, as agricultural production is mainly concentrated around cassava. In the community, even vegetable gardening is not possible because the soil is not suitable (sandy soil) coupled with the presence of pigs that eat the crops. To make up for the lack of vegetables produced in the community, a HIACE from the Monte Café region comes once a week to sell vegetables (Fig. 10). However, vendors and customers agree that the price is higher than average and that the availability is lower, namely because this HIACE sells in two other communities before arriving at Vila Malanza.

Figure 11: Fields of cassava in the front and banana in the back in Vainha, a place close to Vila Malanza

5.2.1.2 Accessibility to health center

In Vila Malanza, there is no health center although, there is a person who has received basic first aid training and who also gives first aid medicines (such as paracetamol). In addition, there is a small center in Porto Alegre, 3 km from the community where it is possible to treat wounds, take more medication and where a doctor comes to give regular consultations. For more serious injuries, it is possible to go to S. João dos Angolares, 1 hour and 30 minutes away, or to the capital. There is an ambulance in Porto Alegre in case of emergencies.

5.2.1.3 *Accessibility to water*

In Vila Malanza, water for drinking comes from fountains installed in different parts of the community. The water for these fountains comes from the area around Santa Josefina and the structure has been restored from colonial times. Bathing and washing of clothes and dishes is mostly done in the Gumbela river, which runs through the community.

5.3 Forest resource uses

The identification of the use of forest resources in the two communities revealed that they differ greatly from one another. The knowledge and use of medicinal plants, food collected from the forest or wood cut for building houses is greater in Vila Malanza. Firewood is more important in Vila Malanza, while charcoal is more important in Plancas I.

5.3.1 Medicinal plants

Like in the other parts on the country, in Plancas I and Vila Malanza the use of medicinal plants is a common alternative to chemical-based medicine. Indeed, of the 30 households in each community, in Plancas I 21 considered that they used medicinal plants while in Vila Malanza, 25 claim using them. There are however clear differences in the relationship that communities have with medicinal plants. For instance, the total number of plants used in Vila Malanza (N= 35) is much higher than in Plancas I (N=22). In addition, in Plancas I, they are more cultivated (19% only cultivated and 38% mainly cultivated and secondarily collected, 29% only collected in the forest), while in Vila Malanza where they are mainly collected in the forest (64% only collected) (Fig. 12).

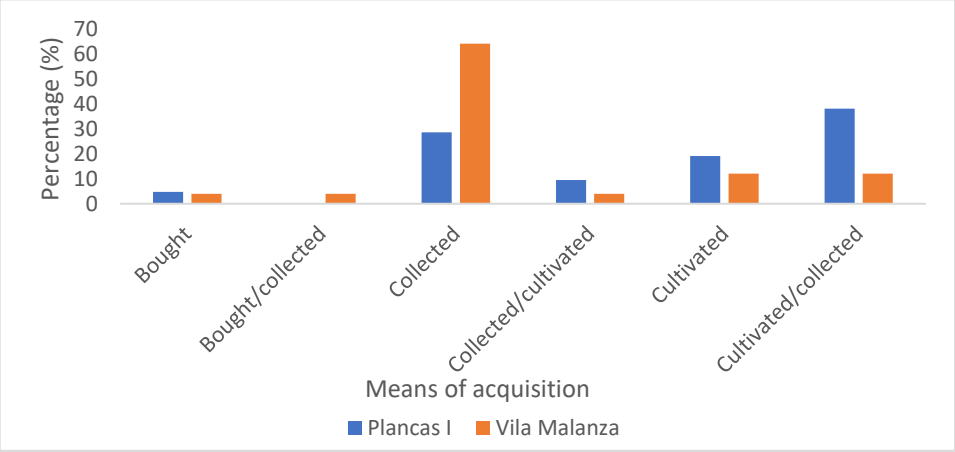

Figure 12: Means of acquiring medicinal plants in both targeted communities, Plancas I and Vila Malanza

With regard to the top 5 medicinal plants harvested in the forest by each household, no plants species was highly mentioned in both communities.

The main ones in Vila Malanza are Coentro (Coriander, *Eryngium foetidum*), Mucumbli (*Lannea welwitschia*), Matruço (*Chenopodium ambrosoides*), Grigô (*Morinda lucida*), Libô-d'água (*Struchium sparganophora*) and in Plancas I, the main ones are Pau-preto Maguá (*unidentified species*), Codoquê (*Paullinia pinnata*), Pau-três (*Allophylus africanus*), Bengue (*Alchornea cordifolia*) and Mucumbli. However, there are plants that are present in both communities, such as Guava (*Psidium guajava*), Mucumbli or Matruço (Fig. 13).

It is also interesting to note that among all the plants collected for medicinal purposes, only one[9] has been identified as endemic (Annex 6), half are introduced and the other half putatively native to the island (Figueiredo and al, 2011).

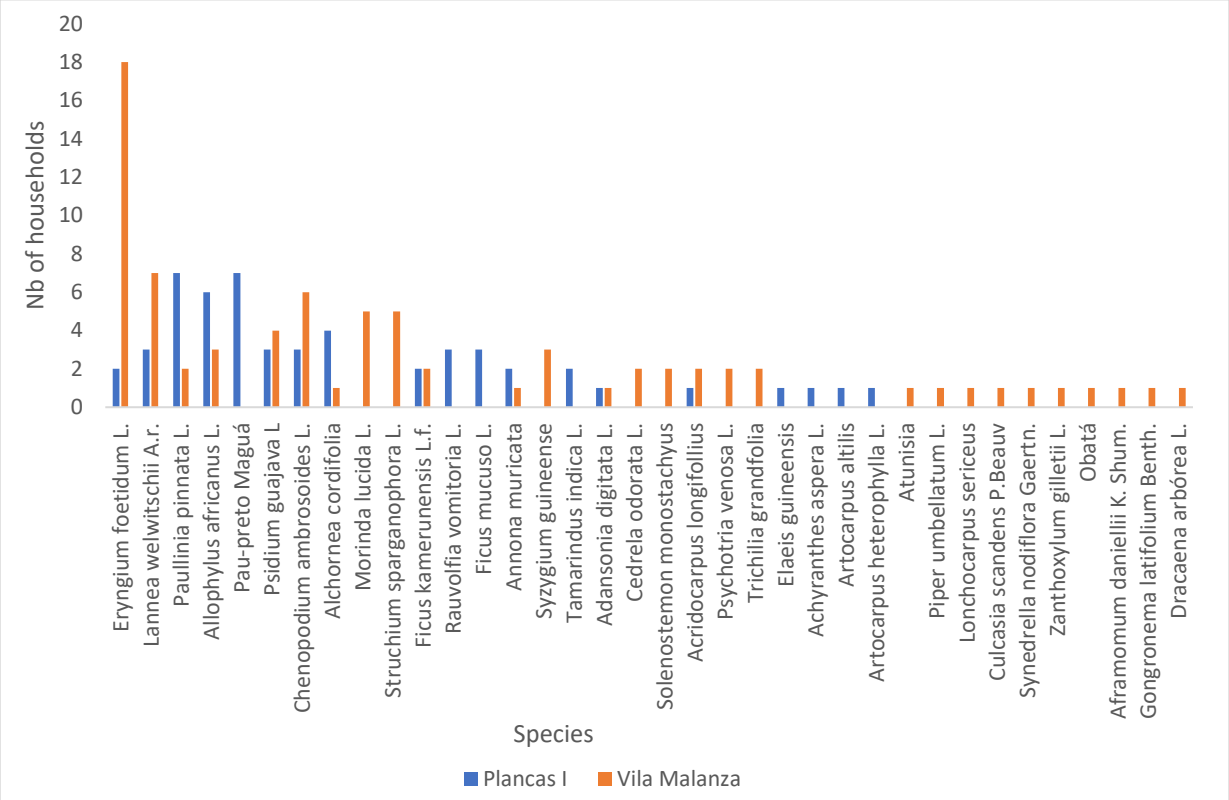

Figure 13: Main medicinal plants used in households for Plancas I and Vila Malanza

[9] *Trichilia grandfolia,* local name: Veludo

5.3.2 Housing

The composition of the interviewee's houses also differs between Plancas I and Vila Malanza. Plancas I, a former cacao plantation from colonial times, has 48% brick houses and 52% wooden houses, although it is important to note that 19% of the wooden houses are from colonial times, and the wood has remained the same since the house was built, mostly Azeitona (*Manilkara obovata*). In Vila Malanza, a fishing community that was built independently from colonial structures[10], 97% of the houses are made of timber and 3% of brick. The way in which the wood is obtained to build the houses also differs, while in Plancas I the wood comes mainly from plots and to a lesser extent from the forest, in Vila Malanza it comes from the forest as well as from the plots, where the amount of wood that is bought is also not negligible (Fig. 14 & 15).

Among the timber used to build houses in Plancas I, Cedrela (*Cedrela odorata*) was the most mentioned (N=8), followed by wood from Amoreira (*Chlorophora excelsa*) (N=7), both coming mainly from the plots of the interviewees or from the plots of their families. Then, Pau-fede (*Cestrum laevigatum)* is also very used (N=6), coming mainly from the forest but also from the plots, this is followed by Figo-plôcô (*Ficus mucuso*) (N=3).

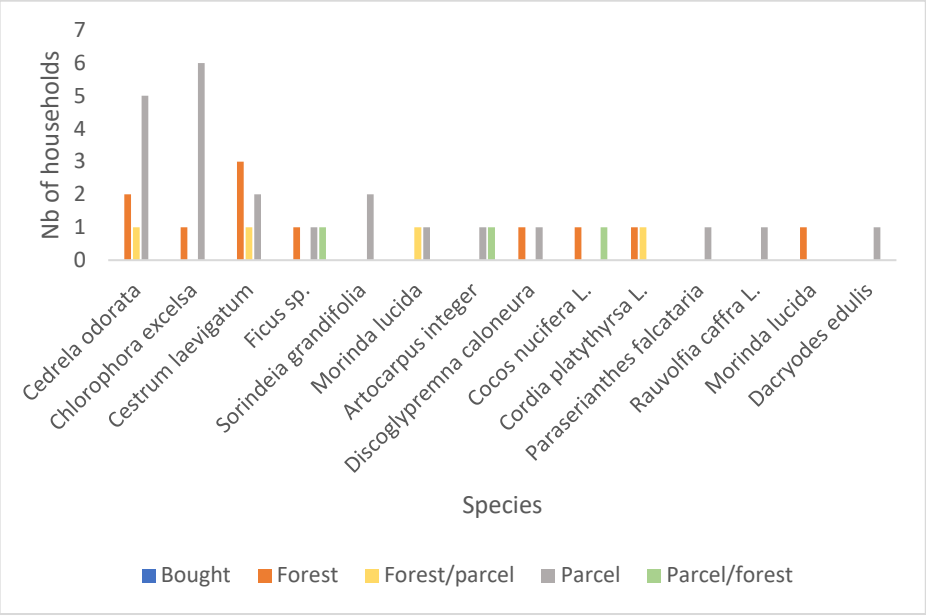

Figure 14: Main trees used for construction and how they are obtained in the community of Plancas I

[10] There was no plantation structure within the community.

In Vila Malanza, timber from Amoreira is the most used for construction (N=17 households), mainly from the forest (N=7), from plots (N=6) or bought (N=4). Wood from Pau-branco (*Tetrorchidium didymostenon*) is present in 14 households, like wood from Amoreira, and comes mainly from the forest, but was also bought or recovered from a plot. Next comes wood from Figo-plôcô, present in 8 households, it is bought as much as taken from the forest (N=3&3), a little less recovered from a plot (N=2). Fruteira (*Artocarpus altilis)*, Acácia (*Acacia nilótica)* and Jaqueira (*Artocarpus heterophylla)* come mainly from plots, while Gogô (*Sorindeia grandifolia)* comes mainly from the forest. On the contrary, Viro (*Scytopetalum klaineanum)* is mainly bought. Of those who indicated that they bought their wood for construction, 2 bought it in Vila Malanza and 6 bought it outside the village.

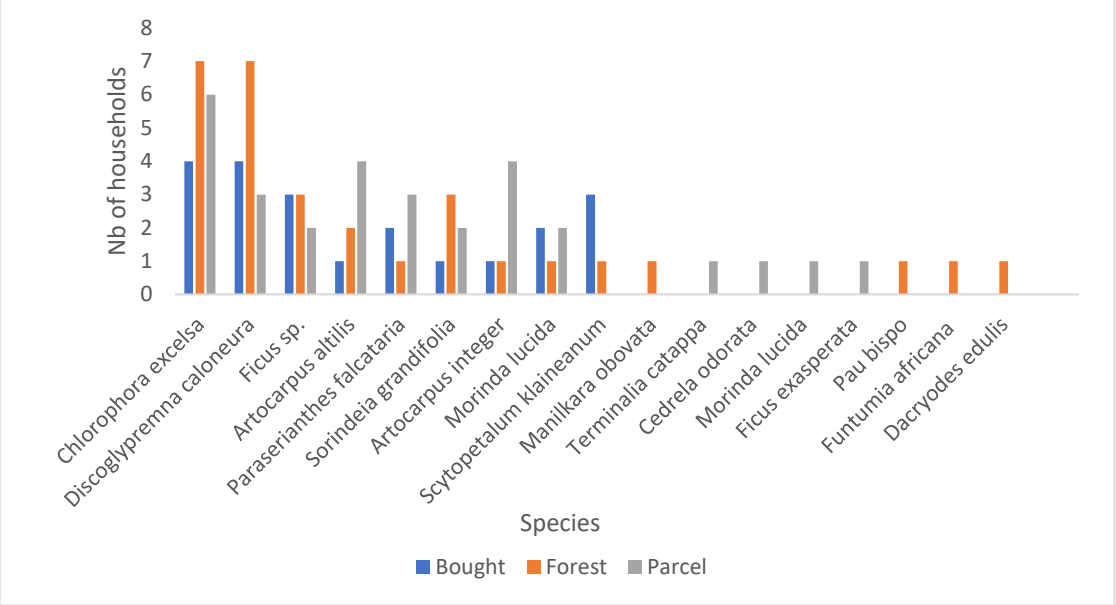

Figure 15: Main trees used for construction and how they are obtained in the community of Vila Malanza

5.3.3 Cooking

In Plancas I and Vila Malanza, the materials used by the interviewees for cooking are firewood, charcoal, petrol, and biogas. However, firewood is used more in Vila Malanza while charcoal is used more in Plancas I (Fig. 16) and while firewood comes mainly from the forest in Vila Malanza, it comes more from the plots in Plancas I (Fig. 17).

It is also important to note that some households use several materials. Five people in Plancas I and four people in Vila Malanza use mainly charcoal but also firewood. According to those interviewees, firewood would be used mainly to start the fire, while charcoal would be used afterwards. Other people use mainly firewood and secondarily charcoal, the main reasons being the lack of charcoal but also the lack of financial means to buy it.

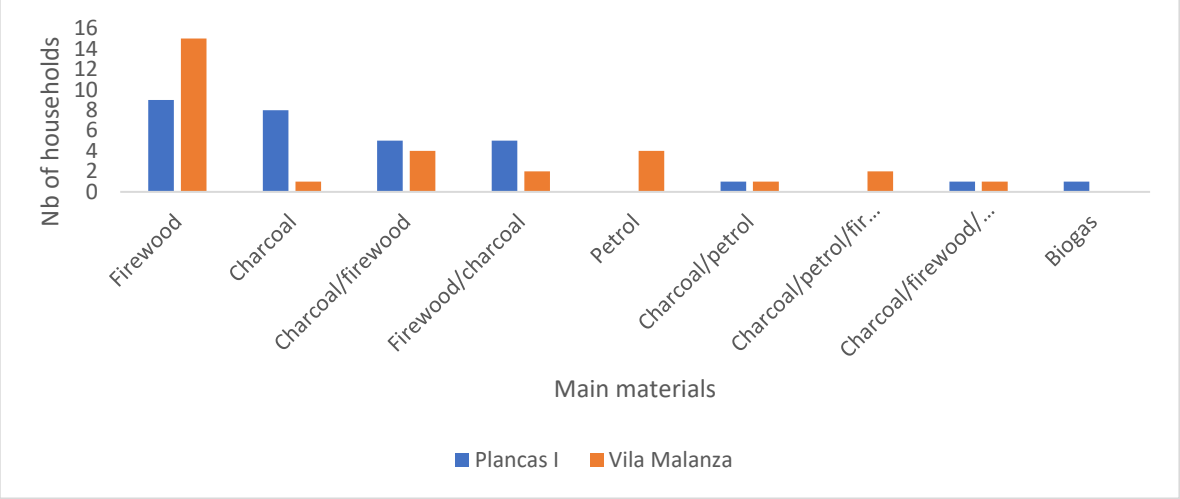

Figure 16: Main materials used for cooking according to households in Plancas I and Vila Malanza. For the categories with more than one material, the main used is the first in the reading order

The charcoal in Vila Malanza, when purchased, comes from Emolve, a community located in the core of the Agripalma concession. Of those who buy charcoal in Plancas I, it comes from Plancas I itself. This is because this community is a coal producer. Among the jobs related to the exploitation of forest resources, charcoal production is clearly dominant as the main occupation in Plancas I, being second only to farming (Fig. 8). Charcoal is produced mainly in the plots but also in the surrounding forests. The charcoal is mainly sold in the capital, but also in Plancas Praia and in the community of Plancas I (Annex 9).

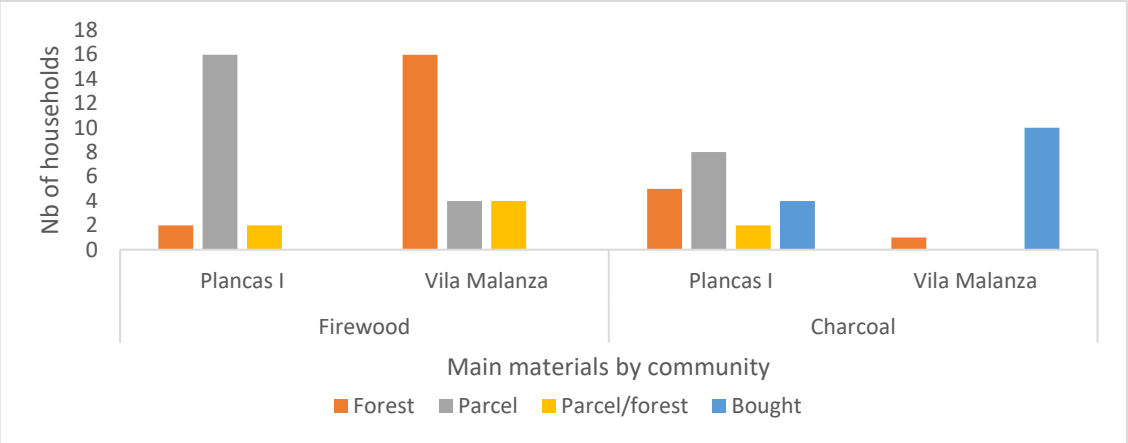

Figure 17: Origin of timber for firewood and charcoal according to the households in Plancas I and Vila Malanza

The species most harvested for firewood in Vila Malanza are Coqueiro (*Cocos nucifera*) (N=14), Acácia (N=10), Pau-ferro (*Margaritaria discoidea*) (N=8), Caroceiro *(Terminalia catappa*) (N=7), Figo-plôcô (N=7) and Cocoa (*Theobroma cacao*) (N=5). In Plancas I, key species to make charcoal are Cólima (*Lonchocarpus sericeus*) (N=14) and Pau-flor (*Albizia lebbeck*) (N=13).

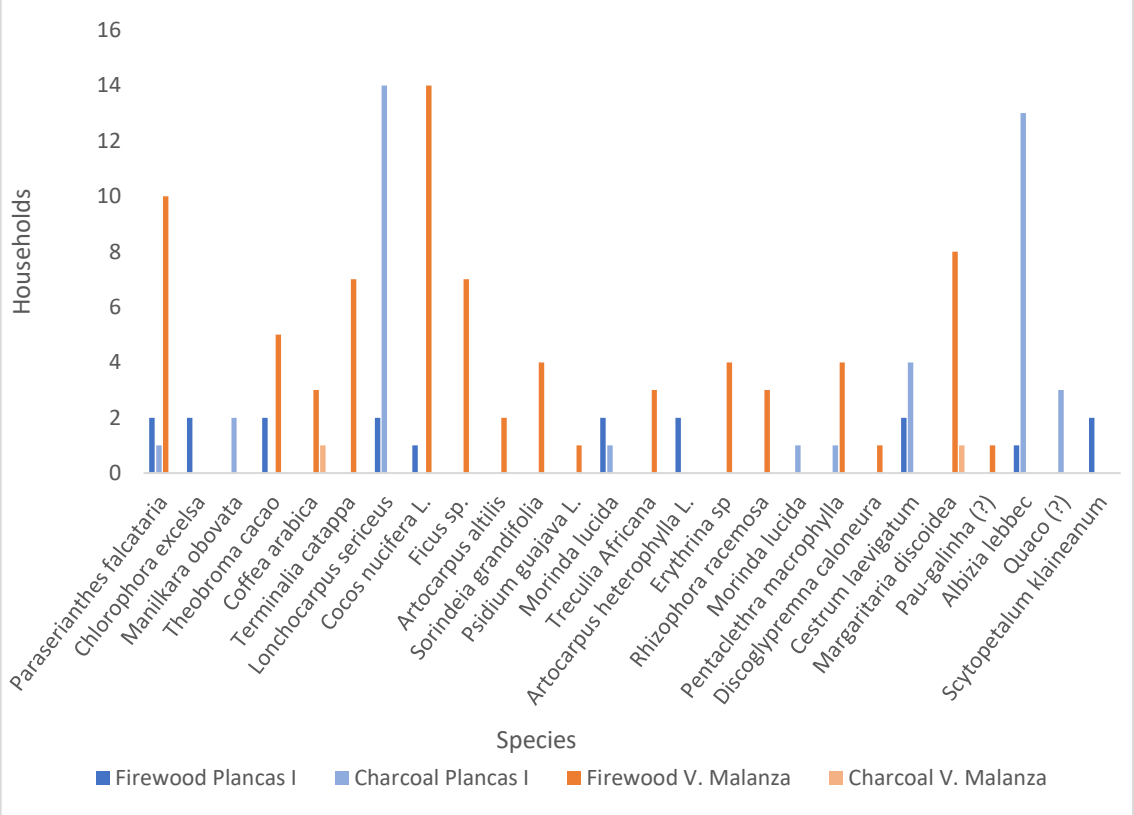

Figure 18: Type of wood used for firewood and charcoal production according to households in Plancas I and Vila Malanza

5.3.4 Edible plants

Regarding the communities I studied, in Vila Malanza 26 households said they go to the forest to gather edible plants, while in Plancas I the number of households using edible wild plants is only 6. In addition, in Plancas I, according to household responses, they only identified 5 products from the forest (Fig. 19), all of them being introduced plants and fruits trees (Figueiredo and al., 2011). Of these, Fruta-Pão (Breadfruit, *Artocarpus altilis*) (N=4) and Jaca (Jackfruit, *Artocarpus heterophylla*) (N=3) followed by Andim (Palm oil fruit, *Elaeis guineensis*), Abacate (Avocato, *Persea americana*) and Côco (Coconut, *Cocos nucifera*), each with one household each. Nevertheless, Fruta-pão, Jaca and Abacate are eaten weekly or daily, showing that they're still important to meet the basic needs of the consumers.

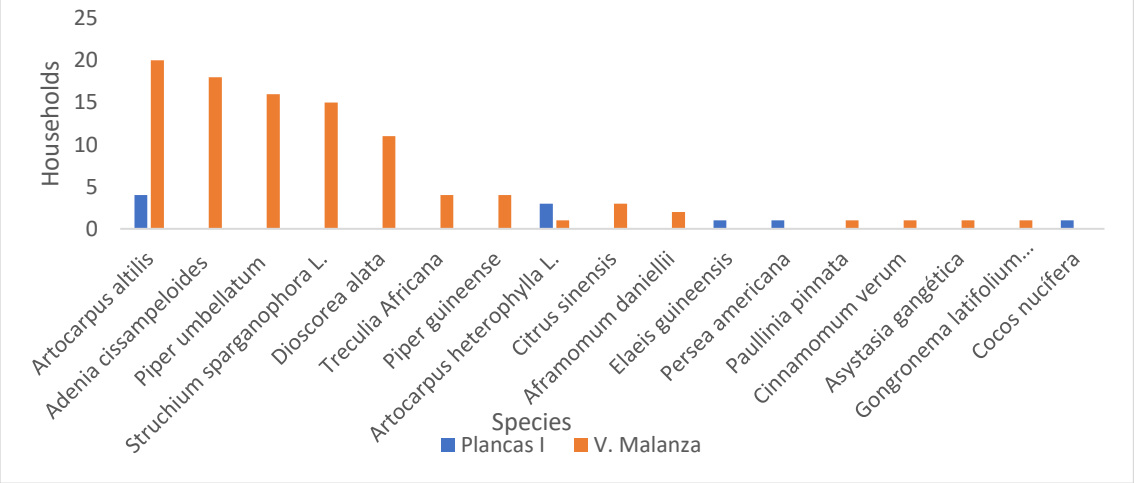

Figure 19: Species of edible flora collected in the forest according to households in Plancas I and Vila Malanza

In Vila Malanza, the diversity is much greater. Among the most sought-after products, Fruta-Pão with 20 people, Fissandjá (*Adenia cissampeloides*) (N=18), Folha-Bôba (*Piper umbellatum*) (N=16), Libô-d'água (*Struchium sparganophora)* (N=15), Inhame (*Dioscorea* sp.) (N=11), followed to a lesser extent by Izaquente, Pau-pimenta, Laranjeira, Ossame. Fissandjá, Folha-bôba, Libô-d'água and Ossame are spices that people put in the traditional *Calulu* dish, which is also seen as a medicine. According to the qualitative sources collected, it is a dish often eaten in Vila Malanza and in some families, every week. This information corresponds to the information collected on the frequency of use of the products. Indeed, in most cases in the households interviewed, these four plants are picked at least once a week (Fig. 20). Like in Plancas I, Fruta-Pão is also consumed by most of its consumers, at least weekly (Fig. 21).

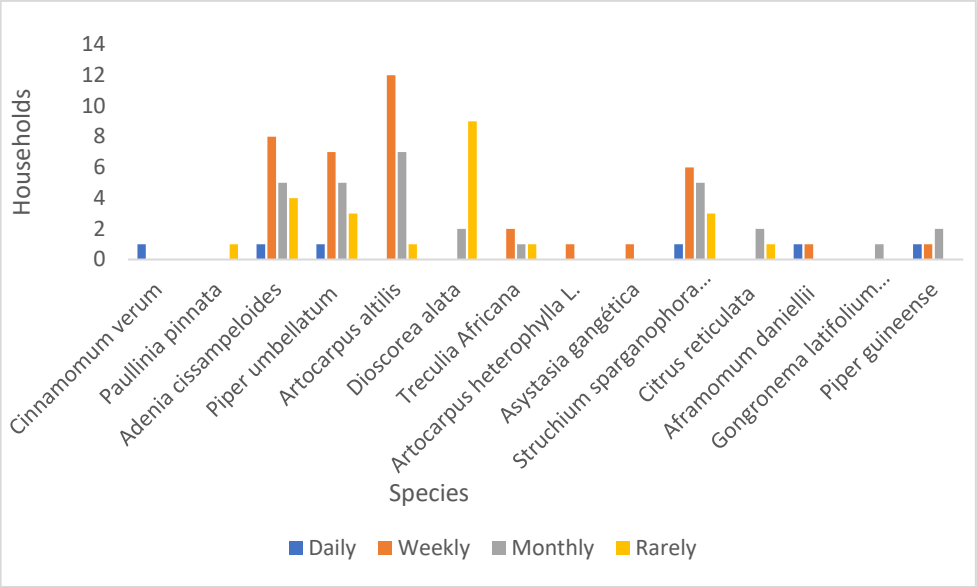

Figure 20: Frequency of edible flora consumption in Vila Malanza according to the households

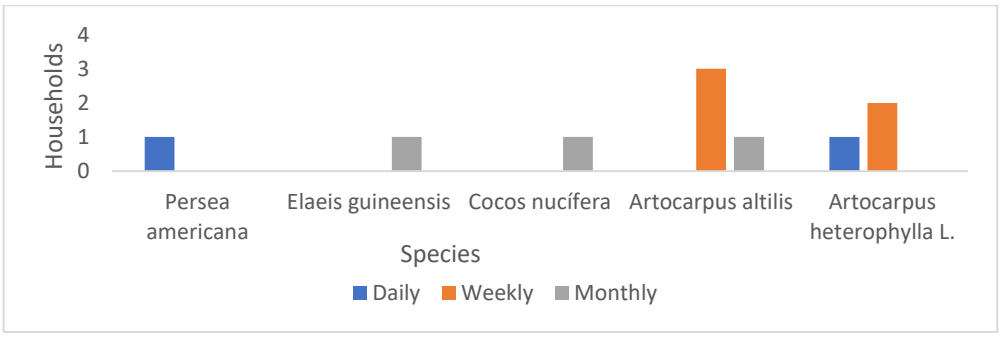

Figure 21: Frequency of edible flora consumption in Plancas I according to the households

5.3.5 Wildmeat

As far as Vila Malanza and Plancas I are concerned, among all the interviewees, everyone consumes wild meat. The type of meat consumption is also relatively similar between the two communities. Like in Carvalho (2015), the most consumed wildmeat is Búzio-vermelho (Giant snail; *Archachatina marginata*). In fact, 30 households in Plancas I and 29 in Vila Malanza say they consume it. Moreover, the búzio is the only meat that is consumed on a regular basis (at least weekly). In Vila Malanza, most of the households that consume it do so weekly (N=15), while in 8 households it is consumed monthly. In Plancas I, most households consume it monthly (N=15), 7 weekly.

About Lagaia (African Civet, *Civetictis civetta*) and Macaco (Mona Monkey, *Cercopithecus mona*), the two most eaten meats after Búzio, although they are consumed by half of the interviewees in each community, they are eaten only very rarely, mostly on a monthly or annual basis (Fig. 22 & 23). Most of the time, according to the interviewees,

when there are feasts or when a hunter brings them back. The same trend is visible with the bat and the wild pig, even if these are less consumed.

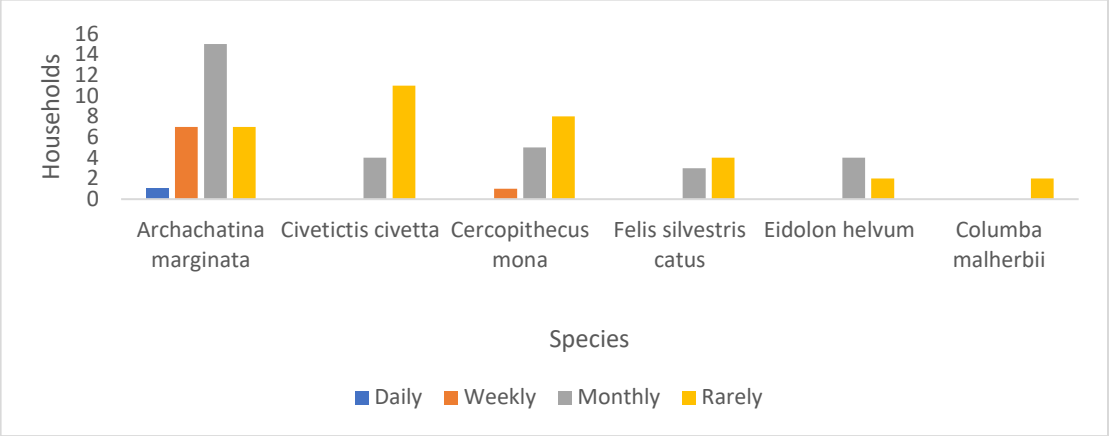

Figure 22: Frequency of eating wild animals in Plancas I according to households, by species

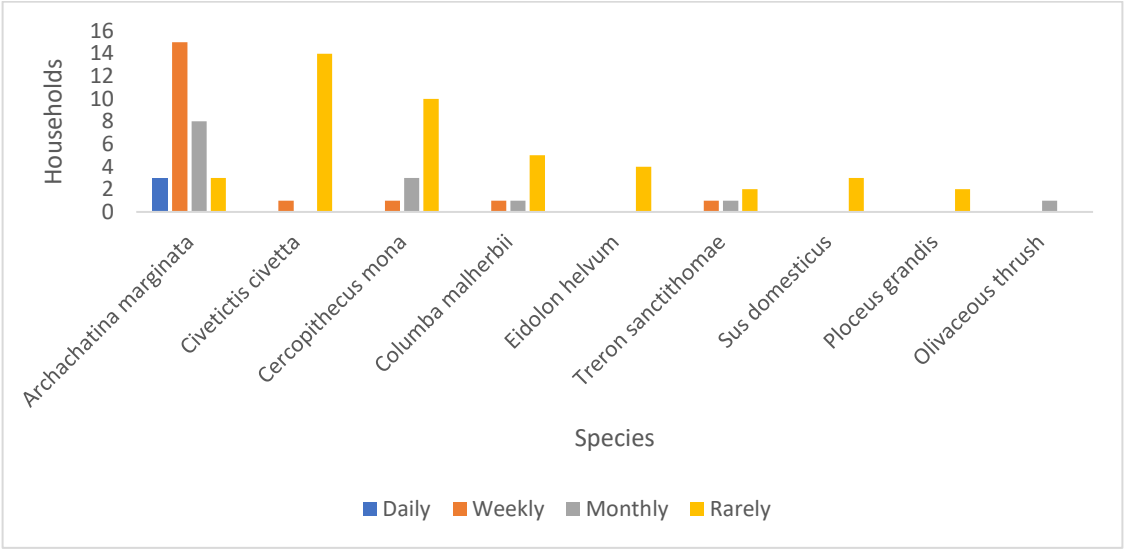

Figure 23: Frequency of eating wild animals in Vila Malanza according to households, by species

In terms of how the households obtain these animals, it is possible to see a clear trend to buy them. Of those who indicated that they eat wild animals, the majority buy them, especially mammals such as Lagaia and Macaco, both in Plancas I (N=9 & N=9) and Vila Malanza (N=6 & N=10) all of them from within the communities, where there are recreational hunters.

In relation to the Búzio, it is mainly purchased in Vila Malanza (N=22), mostly come from nearby the village, while it is mainly collected in Plancas I (N=14), although it is also purchased to some extent (N=12) and mostly from within the village. In Plancas I, there are also 2 households indicating that it is collected in the plot.

The Morcego (Fruit bat, *Eidolon helvum*), when consumed, is mainly bought in both Plancas I (N=4) and Vila Malanza (N=3). Javali (Wild pigs, *Sus domesticus*) are only hunted in Vila Malanza (N=3) and Gato (Cat, *Felis silvestris catus*) are only eaten in Plancas I, mostly hunted (N=4) but also bought (N=3).

Rolas are mainly hunted in households that eat them. The same trend is observed with other birds such as the Curucucu and Mucanha. According to the interviewees, while most of the animals are often hunted by armed adult hunters with dogs, the birds, are mainly hunted by children who catch them with traps, slingshots or rocks.

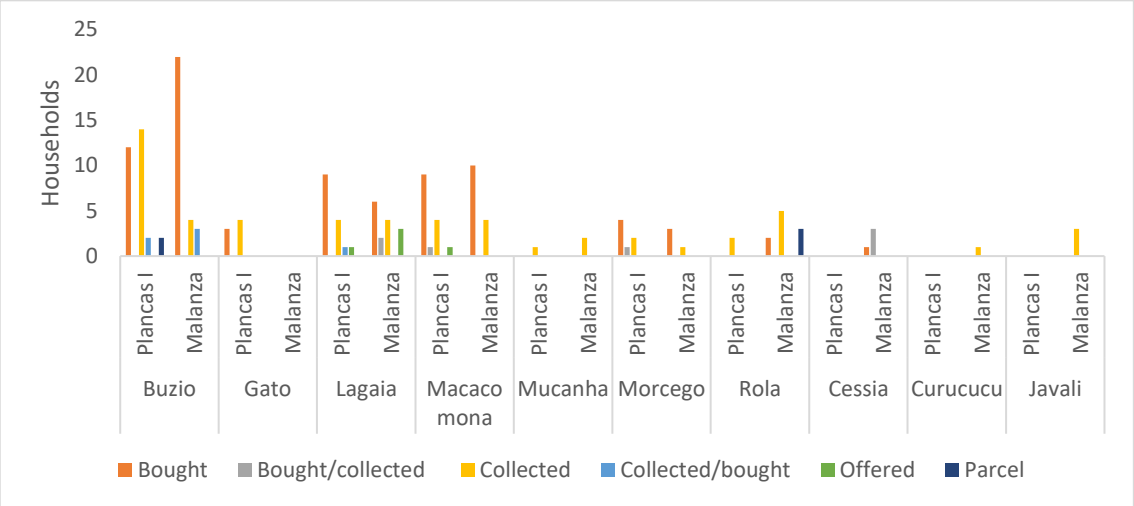

Figure 24: Origin of wildmeat, by species, eaten in Plancas I and Vila Malanza according to the households

5.4 Cultural and spiritual link

When I asked if anyone in the household had a special or cultural connection with the forest in the communities I stayed, the responses were mostly negative. In Plancas I, all households (N=30) indicated that they had no particular spiritual connection with the forest. In Vila Malanza, 28 households indicated the same as in Plancas I except for 2 people. In both cases, they are *massagistas*[11] and often go to the forest for medicinal plants.During the interviews with community representatives and leaders, the identification of celebrations or rituals taking place in the forest was discussed. In Plancas I, according to the two interviewees, there have never any rituals or celebrations occurring in the forest and *curandeiros*[12] or other magicians doing this. In Vila Malanza, they indicated that in the past there were people who performed rituals but that they had died, and that the knowledge had not been transmitted. They did however mention the presence of Budo Bachana, which they consider to be a magical place, that is a rock and according to oral tradition, has malevolent powers against the enemies of the Angolares, whenever they invoke it (Valverde, 2000). Nevertheless, in informal conversations with the inhabitants of Vila Malanza, the magical status of the place is not shared by everyone, especially among the younger people who no longer believe in it.

Regarding the issue of traditional medical treatments taking place in the wild, again in Plancas I, there is no place for this according to the representative and the leader. In Vila Malanza, it was reported that there are still people who use places in the forest to treat people. They were unable to tell me how this was done, but pointed to people who knew more, including two *massagistas*.

5.4.1 Interviews with the *massagistas*

I had the opportunity to interview two massage therapists in the community of Vila Malanza, Mr. Plácido and Mr. Angelino, both of whom are over 60 years old. I use their first names because they granted me permission. At first, I thought they were the only ones, but it turns out there are more, the rest being the family of Mr. Plácido.

[11] Use treatments that are mainly of an external nature by applying a concoction or decoction of plant material on the relevant part of the body. The *massagistas* practise their therapy at a community level and often do not demand payment. Many collect their own plant material from nearby forests, with which they are very familiar (Sequeira, 1994).
[12] *Curandeiros* use witchcraft and mysticism combined with plant therapy, and always demand remuneration for their services, andare typically concentrated in urban areas (Vasconcelos, 2003).

5.4.1.1 Treatments and cures

Healers work with leaves and bark and make medicines from them. They are the go-to people to deal with ailments. These ailments can be related to body pains, injuries or problems related to sexuality but not related to relationships or money. When people come to them, they talk to the patient to find out the reason for the problem, but sometimes people do not have a physical problem, they also come to talk, according to Plácido. According to the massage therapists I interviewed, it seems that people are not directly treated. Indeed, according to Mr Angelino *"...people come to me when they have a problem. Then we talk, she [the patient] tells, then I tell them to come such and such a day, I go and get [the plants and/or barks] and then we treat*". According to Angelino, there are special places to collect these ingredients and they cannot just be taken "*When we go to collect it, we ask for it, sometimes we take two coins and put them near the plant and then we get it [the plant]*". According to Plácido, depending on the treatment, the plants and barks are either mixed with red wine or boiled in salt water. Once the mixture is complete, patients return to the *massagistas*, get a massage in the area that hurts or eat a mixture if it is to be applied orally. Treatments can last between two and three days and the mixtures are applied twice a day.

When I asked if there were any other practices they did besides massages or medicines Mr Angelino said no, but Mr Plácido practised "*pagar o santo*", a practice also observed by Valverde (2000) which, according to the author, consists of an eye infection treatment and is carried out in rivers or in the sea. According to Mr Plácido, this is a practice that takes place in the Gumbela River. It happens when a person has an "*itchy body and the face fills up*" and that went already to a hospital, but nothing happened. The person comes to see Mr. Plácido, he goes to the forest to pick leaves, brings an egg and together they go into the river and while the person dips his whole body into the river, the *massagista* massages him with the mixture of egg and plants while praying. The ritual takes place for two consecutive days at the end of the day, around 5pm and it only works if the river is free of people bathing or doing other household chores. To make it as discreet as possible, the place chosen by Mr. Plácido is upstream from the river towards the first bridge over the Malanza River.

5.4.1.2 Magical & spiritual places

When I asked about the different magical places in the area, only Budo Bachana was mentioned. According to Mr. Plácido, at that time when people had problems, they went to see a person called Toni Água, a tall and thin man who lived near the rock, who to treat people's problems would go to the foot of the Budo Bachana, alone, for several days and "*stay there talking to the rock*". However, it is 30 years since he passed away and according to Mr Plácido, the magic of the rock disappeared with Toni Água because he did not transmit this knowledge to others. According to the two *massagistas*, the place remains a very important cultural place in the community and in the country in general. It turns out that Mr. Plácido is going to collect some plants in this area, especially for some less common treatments, but he did not want to give me more information. For him, the Budo Bachana is the only magical place in the area, it seems that there is a *sumidouro* on the Rolas islet, another in Neves and Yo Grande, which according to Valverde (2000), is a portal that connects one place to the other.

As far as Mr. Angelino is concerned, we did not address the question of where the areas where he collects his plants are located, but he participated in the mapping exercise and indicated the different places where his plants are located as well as the most known places to collect medicinal plants.

5.5 Mapping

The maps were developed around resources which, according to the data collection, appeared to be those important for meeting basic needs or those of strong cultural and spiritual importance. The results of the cartography have shown that there are different places used by people to collect resources. The observations showed that these places are articulated along footpaths or motorised paths close to the community and easy to access. Some of these areas are in contact with areas pre-identified as HCV 1-3, but most are in separate locations. Finally, not all areas are used for the same resources.

5.5.1 Plancas I

The map of Plancas I first shows the extent of the cacao plantation areas. Indeed, the community was a *roça* in colonial times and after independence continued to produce cacao, nowadays the farmers are organised around the organic cacao cooperative CECAB. Beyond the observations I was able to make during my fieldwork, I was able to identify agricultural areas to produce vegetables and other annual plants through satellite images. These areas are in the north of the community. Its boundaries are defined by the topography and the presence of land used for cocoa production. It seems that some of these areas are owned by the farmers of the community, however I could not get more information on this, the last land register is from 2014 and it may have changed since. A more extensive study could be carried out to have a better knowledge on the subject. In relation to the forest area used by the population of Plancas I, four forest resources zones (FR) were identified according to the most important resources (Tab. 1 & Fig. 25).

Table 1: Potential HCV 5 & 6 areas for Plancas I

Code	Name	Area (ha)	Forest resources
FR1	Morro Vermelho	17.3	Charcoal
FR2	Leste de Plancas Praia	23.6	Charcoal
FR3	Oquê Posson	21.9	Timber for construction Palm wine Medicinal plants Coconut
FR4	Maria	20.3	Búzio Charcoal

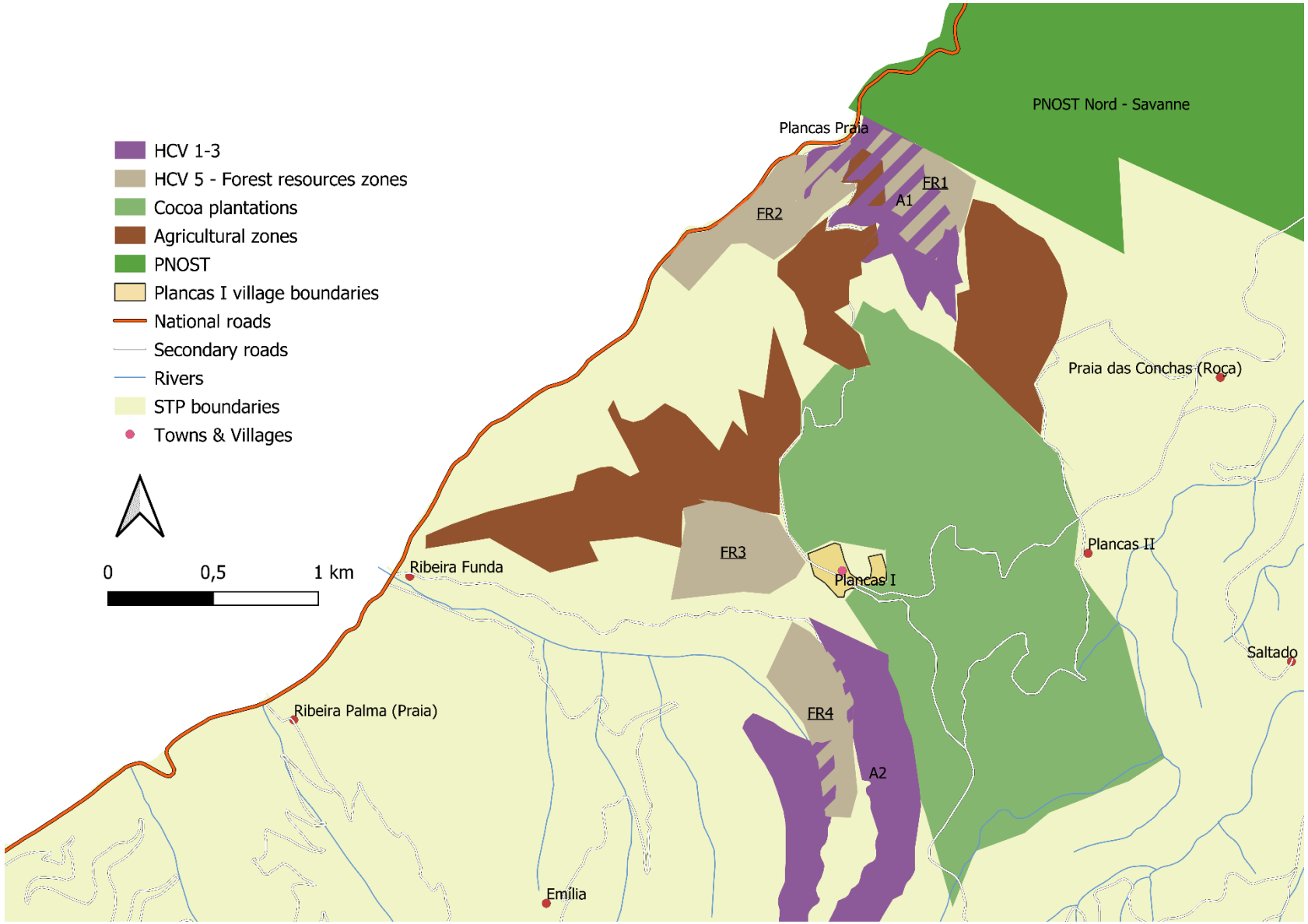

Figure 25: Identified HCV 5 & 6 areas used by Plancas's population. (Birdlife International , 2019; Vasco Costa, 2021)

The FR 1 area is located between Plancas Praia in the north and Morro Vermelho, a hill in the south, where agricultural fields can also be found. At its centre in the hollow formed by the river, it has been claimed that Lagaias and bats can be hunted. The rest of the area is mainly used for charcoal production.

The FR2 area, mainly for charcoal production, starts in Plancas Praia to the north and runs along the coast to an abandoned community called Pedra Comprida. It stops there because after the river near this community, the terrain becomes too steep. Its coastal location is due to the steepness of the slope when entering the land, making it difficult to harvest timber for charcoal.

Figure 26: Charcoal production in Plancas I

The variety of products is highest in the FR3 area, which is used for collecting palm wine, coconuts, but also medicinal plants. It is bounded on the north by agricultural fields, on the east by the road and the beginning of the cocoa plantation and on the south and west by steep slopes.

Zone FR 4, is located at the bottom of the cliff below the community of Plancas I. It is mainly used for collecting Buzio, being a very wet area due to the presence of the river. It is also known for coal making. It is bounded by the steepness of the slope as it is in a valley wedged between two cliffs.

Overlap with HCV 1-3 preidentified zones

Of the areas identified, only FR 3 does not coincide with pre-identified HCV 1-3 areas. Indeed, FR1 & FR2 as well as some agricultural areas are in the same territory as zone A1. It is also possible to see that zone FR 4 touches on zone A2, especially in the southern zone on the river edge (Fig. 25). It is important to note, however, that not all of these areas are dedicated to the collection of the same resources, as while the northern and western areas have a large share of charcoal production and hunting, the southern area is mainly dedicated to logging and to the collection of buzios (Table 1).

5.5.2 Vila Malanza

On the map of Vila Malanza, it is possible to see the extent of Agripalma's agricultural concession, I had to delimit the areas used by this company thanks to CNES/Airbus satellite images dated 21/10/2019. At the same time, I was able to delimit the agricultural areas used by the populations, especially in the area north of Vainha[13], as well as the airport area, which since 2006 no longer receives aircraft. Since then, this land has been occupied by farmers from Vila Malanza and Porto Alegre, but they do not own it, which remains the property of the state[14]. During the participatory mapping, it was pointed out that although the land in Agripalma is mainly occupied by palm trees, there are some plants used for Calulu, such as Folha-Bôba, and Libô d'água.

About the forest territory used by the Vila Malanza populations, it was possible to identify 7 major use forest resource zones (FR) (Tab. 2 & Fig. 26). They are articulated around 3 main axes that coincide with existing paths, whether exclusively pedestrian or motorised. The first axis is on the road from Vila Malanza to Vainha (FR5 & FR6), the second is on the road to S. Josefina from the west (FR7 & FR11) and from the east (FR10), and the third axis is towards Monte Henrique and Budo Bachana on the road to Ponta Baleia (FR8 & FR9).

[13] Territory around FR6
[14] Ministério das Infra-Estruturas, Recursos Naturais e Ambiente, Plano Nacional de Ordenamento do Territorio, 2014

Table 2: Potential HCV 5 & 6 areas in Vila Malanza

Code	Name	Area (ha)	Forest ressources
FR5	Aeroporto	6.1	Palm wine Coco
FR6	Vainha	6.1	Palm wine Medicinal plants
FR7	Alto Douro	29.7	Timber for construction Firewood
FR8	Monte Henrique	18.6	Medicinal plants Timber for construction Calulu leaves Ossame
FR9	Budo Bachana	5.9	Medicinal plants Calulu leaves Inhame
FR10	Gumbela	47.81	Medicinal plants Timber for construction Palm wine
FR11	Santa Josefina	13	Timber for construction Palm wine Ossame

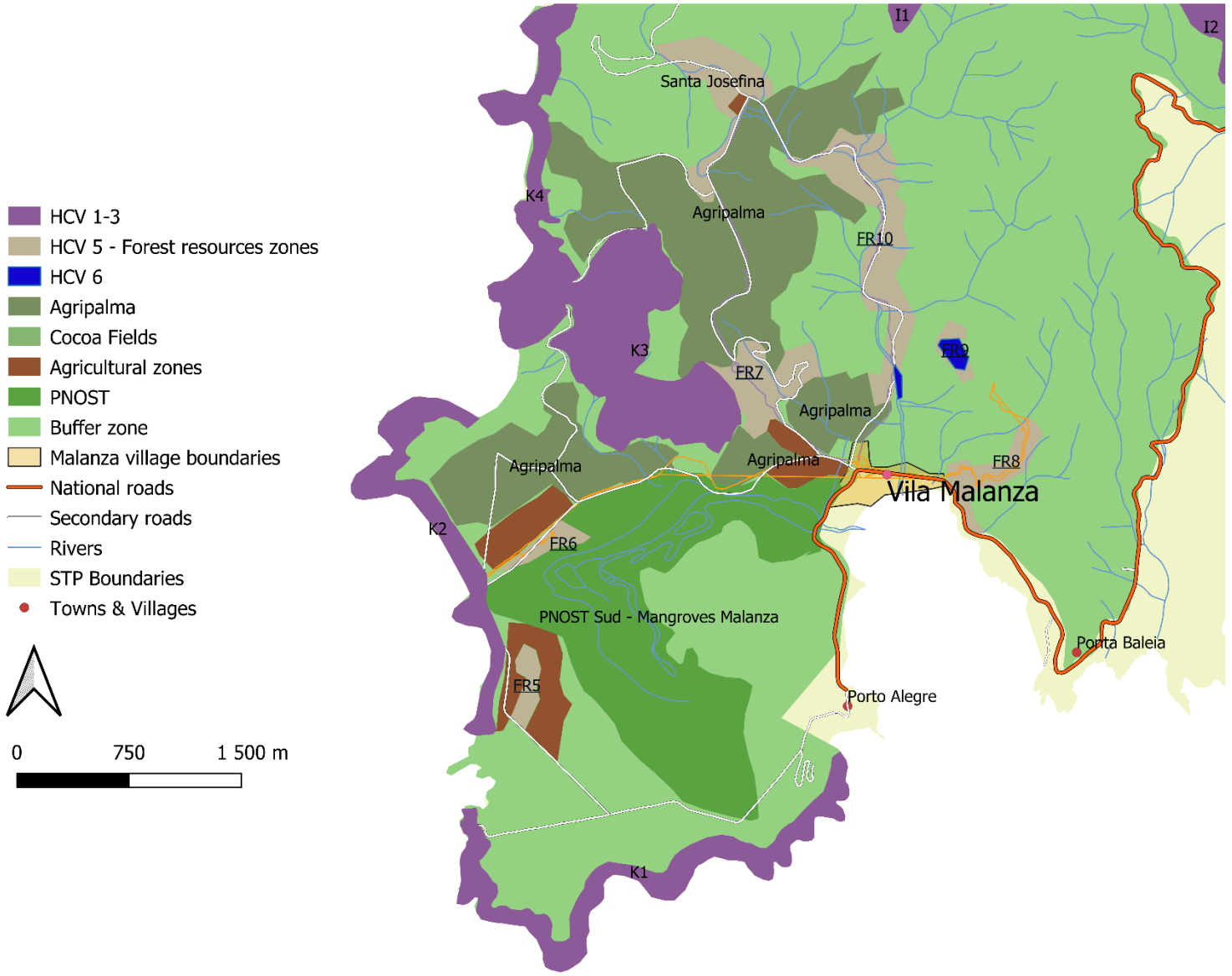

Figure 27: Identified HCV 5 & 6 areas used by Vila Malanza's population. (Birdlife International , 2019; Vasco Costa, 2021)

FR5 and FR6 are located to the west of Vila Malanza, the forest areas are mainly used for palm wine extraction (Fig. 27 & 28), coconuts harvesting, some medicinal plants and hunting. Of all the forest areas, FR5 and FR6 are the main ones for palm wine extraction, a popular drink in the village.

Figure 28: Palm wine found in FR5

Figure 29: Palm wine collector in FR6

Zone FR7 is in the former Alto Douro dependency of the *roça* de Porto Alegre to the north of Vila Malanza. This area is relatively steep and is mainly used for cutting wood for construction and for harvesting firewood. It is located on the road to Santa Josefina and is bounded on the north and south sides by the Agripalma concession (Fig. 30). On the southern side of the zone, between the two Agripalma zones, it is bounded by private land. FR7 is adjacent to the K3 area to the west, HCV area 1-3, and its outer boundary is 150m from the footpath. This distance was defined by the steepness of the slope and the difficulty of bringing large resources to processing points.

Figure 30: Timber for cooking near Alto Douro.

Figure 31: Agripalma's employee pruning the oil palm tree on the way to Santa Josefina.

Then there is the area in Monte Henrique, the FR8. It is a privileged place for medicinal plants and *calulu* leaves because it is relatively close and easy to access from the community. Like FR7, it is relatively steep and can only be reached by a small footpath. Despite this, traces of logging have been found in the area (Fig. 31). According to the information gathered, there is also hunting as well as *ossame* harvesting. The outer limits of this area were defined in relation to the distance to the footpath and the slope of the topography. The northern boundary is defined by the river because after that there was no more footpath and the guide told me that people did not go further because they did not know the way. This does not exclude that a minority of people go anyway. The southern part is bounded by the road and the coast.

Figure 32: Fagara macrophylla*, a medicinal bark found. in the very beginning of FR8*

Figure 33: Old evidence of logging in FR8

The FR9 zone is the smallest of all. It is located around Budo Bachana, and follows the topographical limits of the sacred place, i.e. the cliff. This zone classifies as based on criteria HCV 5 for the presence of medicinal plants used by the *massagistas* of the community, and based on criteria HCV 6 for the presence of Budo Bachana. There is no photographic evidence because I was not allowed to access it.

Zone FR10 runs along the road from Vila Malanza to Santa Josefina from the east. It also runs along the Gumbela River which defines its boundary at various points. To the north, this area is bounded by the presence of Agripalma. To the south of this zone, one can find a HCV 6 zone, which is a place where people go to "*pagar o santo*". As with the other zones, its outer limits are defined by the topography and the presence of rivers or other natural obstacles.

Here you can find different medicinal plants and just like in FR7, it is a very accessible area and therefore popular for its medicinal plant resources (Fig. 32). I could also find recent tree logging proving that the area is still used for this activity (Fig. 33).

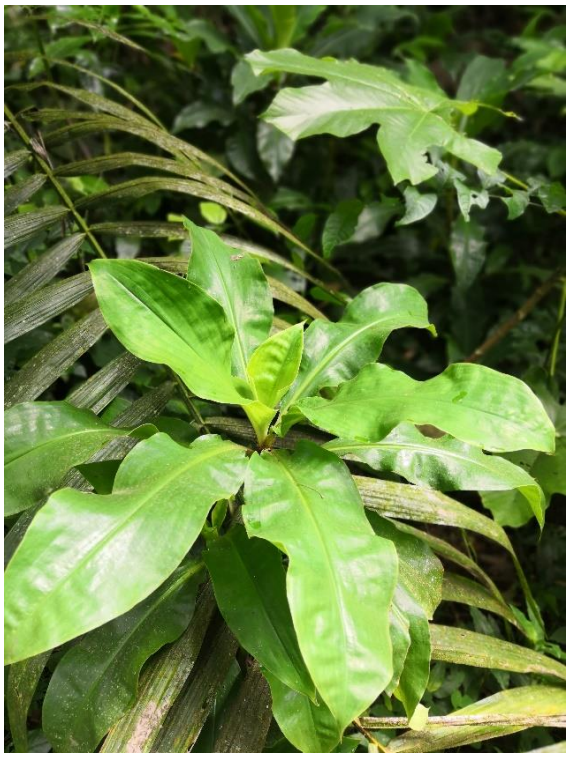

Figure 34: Medicinal plants found on the road in FR 10

Figure 35: Recently cut tree in the FR10 area.

The last zone, FR 11, is located around the uninhabited *roça* of Santa Josefina. It runs along the road to Willy and to the south it is bounded by Agripalma. The other boundaries have been defined according to natural obstacles such as rivers and topographical changes. The southern part of this area is home to a reforestation project. However, there is no information on whether it is still in operation. In this area, it was mainly reported that timber, palm wine and hunting could be found.

About the possibility of an overlap between the pre-identified HCV zones 1-3 and/or PNOST and HCV zones 5&6, one may note FR6 and PNOST to the west as well as FR7 and K3.

5.6 Interviews with conservation practitioners

Identification of biodiversity-based HCVs

During my interviews with conservation practitioners in São Tomé, I was reminded that the project was carried out to set up conservation areas outside the park to create a conservation gradient between inside and outside the PNOST, therefore Birdlife and its partners focused mainly on biodiversity aspects according to Birdlife's programme manager at STP. From a more global point of view, the HCV Network employee notes that social and cultural aspects are less considered when identifying HCV areas. According to her,

> "*One of the reasons why HCV 5 & 6 are less taken into account is that in some cases it is easier to 'count' trees than to assess social and cultural phenomena. It is easier to do so remotely for biodiversity, thanks to satellite images, existing data, etc and the evaluation of socially and economically important areas requires a constant presence in the field and is therefore more costly in terms of time and money for practitioners.*"

HCVs in São Tomé and its future implementation

According to conservation practitioners in São Tomé, the implementation of these zones will require legal decrees that can define management models for each of the zones. However, their opinion on how it is going to be implemented is mixed. In fact, everything depends on the politics and according to Birdlife's Head Office "*HCVs is a tool that in the best of cases, is appropriated by the government with a law decree and in the worst of cases an informal tool for the better management of natural resources and the valorisation of certain territories*".

As for the management of the areas identified so far, they would require a close collaboration with the population, and according to Birdlife it will be done "*through awareness-raising projects but also the support of some entrepreneurial projects in line with the NGO's vision*". This desire to raise awareness is also visible in Programa Tatô, which adds "*the idea is not to prohibit the use of beaches by the population, but there will have to be rules to guarantee the sustainability of turtle egg-laying. These rules can be related to not throwing waste on the beach or not disturbing the nests*", referring to the coastal areas they helped to identify.

Opinions on the importance of the identification of human interests in for the HCV assessment

The main advantage recognised is a better awareness of the population regarding their use of common areas and thus ensure ownership of these places. However, its implementation should be gradual, as one Birdlife collaborator said "*first make a pilot, apply it, see how it works, learn and replicate*" to ensure adaptation to local contexts.

On the other hand, such assessments are sometimes difficult to implement because they are difficult to quantify and would therefore have little value in advocacy. For this reason, some practitioners find it unnecessary to include them in HCV identification.

At HCV Network, they also recognises that it can sometimes be difficult to assess the boundaries of these areas as they change over time according to various factors that are difficult to predict, such as economic development or population growth. To overcome these challenges, she says, "*it is important to look to the future, even if it means planning for more land in order to stay within the limits in the event of an increase in resource use*".

Integration of HCV 5 & 6 in the biodiversity-based identification in São Tomé

As far as Birdlife and Programa Tatô are concerned, this type of identification provides added value, enabling them to identify contextualised management tools more accurately and thus avoid conflicts as much as possible. According to a Birdlife employee, the NGO with its strong scientific component, welcomes with open arms "*any scientific work that would allow them to learn as many tools as possible in order to be better prepared to achieve their objectives*". It would also allow them to identify and map places that are important for Santomean culture.

> "*Birdlife's intention now is to enhance the different cultural aspects of São Tomé. If our [Birdlife's] intention is to promote tourism or local gastronomy, we also want to identify places that can be established and transformed into places of interest to help develop a more present cultural identity in São Tomé because they contribute to improving the quality of life of the people living near these areas."*

When I asked what the identification of HCV based on human interests could mean for the government, the views were similar to those of the NGOs. According to the STP General-Director for the Environment, the government has something to gain from such initiatives as they would improve the management of HCV areas, empowering local people to manage them and reducing the workload for the government. However, this appropriation is questioned by some practitioners. According to some, the problem is that the key people [in government] are not necessarily always involved in what is being done. Of course, there are people from the government who work in the project, but they don't decide. This can be an obstacle to decision-making. Furthermore, there is a feeling of fatigue on the part of the government regarding development projects, which is due to the large number of projects with external funding that have little government engagement and no follow-up when the funding stops.

According to the interviewees, the local populations are the main partners in this identification. Indeed, it has made it possible to develop tools that can more easily integrate the communities into the definition of the management of the areas. According to a Programa Tatô staff member, "*if we make them realise what they use and give them some responsibility for these areas, they will have a better idea of how to manage the resources. This is an island, resources are limited*", a view shared by Birdlife and the government, which see this as an opportunity to make them actors in resource management.

6 Discussion

The first section will aim to answer the question of which areas are important for human interests, indeed there are areas containing forest resources that are part of people's daily lives and are needed to meet their basic needs as well as places important for spiritual identity of the communities. This spiritual relationship with nature varies from place to place, like resource dependency. This is mainly accentuated by historical, cultural, or land tenure factors. Then, about the overlapping issue, the discussion will evolve around the fact that even though in some cases the areas identified were also important for biodiversity, their distribution is mostly mismatched. This led to the last question, that evolves around the issues of the influence of this thesis result on the HCV identification in São Tomé. As it shows that, social and cultural assessments are primordial to guarantee the success of conservation through its ability to understand the local context.

6.1 Which areas in São Tomé can be classified based on the stated interests of human populations?

In São Tomé there are natural areas that provide vital resources for to satisfy the basic needs of human populations. However, the type of resource and level of dependency can vary greatly between the communities. In Plancas I, the cultural and spiritual links to nature are very limited when compared to Vila Malanza. Many resources are obtained in the vicinity of communities, and especially near existing trails or roads, where access is easier. However, this is not necessarily the case for all resources, namely to culturally important places.

6.1.1 Profile of dependence on forest resources to satisfy basic needs

In this section we will discuss the different types of resources that are considered important to people’s interests (HCV 5). Firstly, each community will be described according to its own needs, with the aim of highlighting their differences. As results showed, Plancas I is less dependent than Vila Malanza and not for the same resources. Finally, the question of land tenure will be used to describe why the outcome is different.

6.1.1.1 Plancas I

In Plancas I, most of the interviewees collect only a few resources and use mainly what comes from their plot. These resources include some medicinal plants, timber, palm wine and coconuts. The only exception is wood for charcoal production, which comes from the forest and plays a central role in the income of some households in Plancas I, as evidenced by the work of Nuno (2021), which states that Plancas I is one of the communities with the highest charcoal production in the country. Indeed, the lack of access to more efficient fuels, forces people to cook using firewood or charcoal, which in turn creates demand and job opportunities around these timber forest products (Biran and al., 2004; Schlag & Zuzarte, 2008).

Although research has shown that the practice of charcoal production is harmful to the fauna and flora of STP (Mandinga, 2010), it is important to consider that these populations might depend on this resource. Nuno (2021) proposes to produce charcoal from coconuts, to reduce environmental impacts. However, this analysis was done at the country level, and adequate site-specific contextualisation would need to be evaluated. Indeed, the distribution of coconut trees is very limited[15] and might not be a viable alternative for charcoal producers in some regions. A stronger involvement of local populations in the elaboration of new alternatives is advised.

Regarding wild meat, the resource consumed by everyone (Fig. 22&23), but only *Búzio* is considered important for the vital needs. This matches the findings of Carvalho and al. (2015), according to whom, this is the only wild meat that is not obtained mostly for recreational purposes and eaten on special occasions. However, in Plancas I, *Búzio* is not harvested in the forest but mainly purchased (Fig. 24) thus excluding it in setting up of the map.

[15] Observation by the autor

6.1.1.2 Vila Malanza

In Vila Malanza, dependence on forest resources is higher than in Plancas I, namely regarding the use of edible forest plant species, timber products as well as medicinal plants.

During the fieldwork, of the 30 households interviewed, 26 said that they obtained food from the forest. Among them, ingredients for *Calulu* are collected often on a weekly basis, such as *Fissandjá*, *Fia-bôba* or *Libô-d'áua*. Breadfruit, a common staple food in São Tomé (Santo & Carvalho, 2012), is also collected weekly. A similar trend is seen amongst timber products as most timber used to build houses comes from the forest, as is the firewood used for cooking (Fig. 17).

Regarding medicinal, more than 60% of the interviewees in Vila Malanza declare to look for medicinal plants exclusively in the forest. According to the Madureira (2012), in São Tomé, traditional care comes mostly from the secondary forest, as the abandonment of cocoa plantations left some room for some medicinal plants to grow. These "disturbance pharmacopoeias" have been studied in many places across the globe (Leal Alencar and al., 2010), showing that both final users and healers often use plants from secondary forests (Chazdon & Coe, 1999). This can be for a variety of reasons from historical to the phytochemistry of these plants (Gavin, 2009), and might help explain why at least half of the plants I listed were introduced, and only one was endemic. Further work should try to confirm the type of ecosystem where introduced and native species are being collected in São Tomé.

In Vila Malanza, wild meat is also consumed by everyone (Fig. 23) but like in Plancas I only *Búzio* is considered important for the vital needs. However, in this community *Búzio* is also mainly purchased (Fig. 24) and therefore excluded from the mapping process.

6.1.1.3 Land tenure and resource dependency

Land tenure seems to influence the distinct resource dependency between the two communities. The difference in the use of timber for house construction is particularly telling: In Plancas I most people obtain it from the plots, while in Vila Malanza more people buy it (Fig. 14 & 15). A similar trend could be seen from medicinal plants or edible flora. In Plancas I edible flora comes mainly from the plot while in Vila Malanza it comes mainly from the forest. It is, nevertheless, interesting to note the role of introduced

species in the diet. Introduced fruit trees (jackfruit, mango, breadfruit, etc.) and other useful plants have long been brought to the island (Ferrão, 1994), namely to feed workers in the *roça* during colonial times (Semedo, 2021), and have since become part of everyday life, and notably of traditional cuisine (e.g., Gonçalves, 2016). Even though most of these species were initially planted in agricultural areas, that today became plots, many can now be found in the forest, either due to agricultural abandonment (Madaleno, 2020; Almeida, 2012), or through natural spread (Lima and al., 2014) explaining thereby the differences in collection sites between the two communities.

These differences between the two communities could be explained by a higher rate of land tenure in Plancas I than in Vila Malanza (MOPIRNA, 2014). Indeed, the former is in a cocoa production area, where farmers have agricultural land concessions, who then sell their cocoa to the CECAB cooperative, which has no rights over the producers' plots. In Vila Malanza, fewer people have agricultural concessions. The main reason being that Agripalma bought concessions from Vila Malanza residents to implement an oil palm monoculture (Barreto, 2021). Similar phenomena have been reported in countries such as Ghana and Peru (Cuba and al., 2014), where several families have sold their land to concessions, and while some benefit from the arrival of these companies, namely by working for them, many have found themselves in a disadvantageous situation, having to find alternatives in common land.

6.1.2 Cultural link with nature

For cultural values (HCV 6), while in Plancas I there were no places considered important for the cultural or spiritual identity of the community, in Vila Malanza there were two *Massagistas* who identified at least two places: *Budo Bachana*, a cliff with magical powers, and the place of "pagar o santo", known for its healing capacities. Moreover, people in this community also shown an overall better knowledge of useful plants. In Vila Malanza, the variety of plants being collected is much higher, twice as many as in Plancas I. This community is mostly composed by Angolares, who have occupied the south of the island for at least 300 years (Almeida, 1962), and their relative independence from the colonial power and overall isolation has allowed them to develop a special bond with nature (Feio, 2008). Like Vila Malanza, *quilombo* communities in Brazil seem to have developed a special connection with nature due to the continuation of their African

background and their little influence from occidental culture and colonial structure (Yazbek and al., 2019). In some cases, it even led to new forms of religion, mixing African and Occidental belief within animistic practices (Lambais, 2020). About the particularly well developed knowledge of medicinal plants, other cases of Marroon[16] communities in Jamaica also showed that traditional botanical medicine maintained aspects of West African Akan culture, such as plant species selection and their traditional use of this flora, including medicine preparation practices and rites (Ragosta, 2011). This could help explain why many *curandeiros* in São Tomé are mostly *Angolares* (Valverde, 2000).

The contrast with Plancas I is particularly interesting, since this community is mainly composed by Cape Verdeans hired as rural workers by the Portuguese in the 20th century and their descendants. Their knowledge of the forest is noticeably more limited, and they remain heavily reliant on the same agricultural activities that their ancestors had during colonial times, i.e. cocoa cultivation, since the willingness of cape Verdeans to work in agriculture was one of the reasons why they were brought to the island, where *forros* and *angolares* refused to do this type of work (Semedo, 2021). Cape Verdeans might be less linked to forest resources due to their creole culture being more strongly influenced by European culture than that of *Angolares*. According to Seibert (2014), "*the islands of Cape Verde, within their extreme poverty, a non-stop miscegenation, leading to the formation of a community with fundamentally Portuguese customs, habits, behaviour and language*".

In this statement one can find parallels to other cases of 'recruitment' of people from other colonies to make up for the lack of labour after the abolition of slavery, for example on the island of Reunion (Andoche and al, 2009) or Mauritius (Pourchez & Hidair, 2013). On these cases, the knowledge of and feeling of belonging to this 'new' territory was also little developed and, as for some Cape Verdeans living in São Tomé, the nostalgia for the native land is still an important part of their culture (Semedo, 2021).

[16] English word for Quilombo as quilombo and angolares in ST are examples of maroon groups

6.2 Do these areas coincide with those valuable for biodiversity conservation?

Areas important for stated human interests sometimes coincided with those important for biodiversity conservation. Indeed, in the northern part of Plancas I, there is an area considered beneficial for the population that overlaps with an area already identified for biodiversity conservation. This area was considered important for the presence of a bat (*Eidolon helvum*) roost as well as for the presence of several bird species, while for the human population it is important for charcoal production. Another possible overlap is in Vila Malanza, notably with the mangrove part of PNOST. However, unlike in Plancas I where charcoal production is presumed to be harmful to biodiversity, in Vila Malanza in this area (FR6) is mainly used for palm wine harvesting and medicinal plant collection, which are perceived as being less harmful. However, further efforts should be made to assess the impact of these practices on biodiversity. Nevertheless, most of the areas identified as important for stated human interests do not coincide with those already identified for they biodiversity values (Birdlife International, 2021). Beyond being a simple assessment based on biodiversity values, HCV envisages integrating human needs, and a public consultation with representatives of the communities living in the vicinities of proposed HCV areas was already carried out, namely to inform, promote engagement and identify potential areas of conflict. This follows the increasingly recognized role of local people in planning areas for conservation (ICCA, 2021). The mismatch between immediate human interests and natural areas important for human populations was foreseen by conservation practitioners in São Tomé, further highlighting the urgent need to find means to maps both types of values and integrate them in the delineation of HCV areas. This concern is shared by Birdlife's head office in São Tomé and by the HCV Network at an international level. Mapping in conservation is a representation of what people think of nature and can be biased because they are defined by knowledge, skills, financial means, and time factors (Harris, 2005). Regarding HCVs in São Tomé, to the exact definition of areas was challenging, even though natural and artificial boundaries were often useful, namely rivers, paths, steep areas. Seasonal changes in harvesting locations depending on the availability of the resource provide an additional challenge that was not yet addressed, as recognized by Birdlife practitioners. For overlapping interests no longer being seen as "threats" to biodiversity, important forest resources and their integration in the definition of HCV and other biodiversity-oriented areas requires further recognition.

6.3 Can the identification of areas valuable to human populations influence the identification of High Conservation Value areas in São Tomé?

As in many cases, there is no clear cut answer to this question. The identification of areas valuable to human populations might influence the identification of HCV areas in São Tomé, but only to a certain point. To get a clearer picture, the theory of recognition will be engaged by following its concepts of subjects, harms, mechanisms and responses (Martin and al. 2016).

In this study, stakeholders or users are the subjects, who are entitled to moral consideration: those who hold rights and deserve to be recognised (Sikor and al., 2014). In São Tomé, the subjects are represented by the local communities that live in the vicinity of pre-identified HCV areas, they are the first ones affected by this type of project and the ones that will have to live with it on a daily basis.

The harms are the types of injustices suffered by the local communities in São Tomé and can vary according to the dimension of environmental justice (Martin and al., 2016). While in the previous specific question it was noted that Birdlife and partner institutions have made efforts to avoid overlapping HCVs and important areas to human interests, some harms remain. Although people have been consulted to limit overlap, there has been no real identification of the places they use and the areas were primarily defined based on their importance for biodiversity. Yet, as Harley (1989) states, maps have the power to codify, legitimise and promote worldviews that prevail at different times and in different places. The production of maps based solely on biodiversity can produce mechanisms that, according to Fraser (1997), shape status differences and can undermine the opportunities of certain social groups, thereby culturally subordinating them and denying equity in social interaction. For instance, politicians or STP governments, when they see the results of the maps and enact laws, will potentially only consider the areas identified by Birdlife and its partners, keeping the values and areas that are beneficial to human populations in a legal void. As a result, they are likely to suffer future territorial reshuffling (Peluso, 1993), as seen in the case of Vila Malanza and Agripalma, and lose access to some areas and resources. Countering existing maps with the maps developed in this work can be a way of overcoming dominant power hierarchies, inequalities, and other power effects (Harris & Hazen, 2005), as it has already been done in other parts of

the world, like Belize and in Nicaragua where human rights lawsuits have been woven together with participatory mapping (Wainwright & Bryan, 2009).

The inventory and zoning of natural resources and cultural sites used by people carried out in Plancas I and Vila Malanza can be a first step towards a legal recognition of these lands, to include them in the pre-identified HCVs and to allow them to develop management tools to encourage people to manage the resources sustainably. This has already been done in other places, such as the Okapi Wildlife Reserve in the DRC (Brown, 2009) or the Jawa Tengah province in Indonesia where the company Perum Perhuntani, a public entity responsible for forest management, conducted an HCV assessment that also mapped socio-economic and cultural aspects and integrated local people into the management, showing that the rate of fauna and flora diversity has increased since the project was set up (Sulistyowati & Hadi, 2018).

One possible way to overcome these challenges would be to promote Other Effective area-based Conservation Measures (OECMs). These are geographically defined areas, other than protected areas, which are governed and managed to achieve positive and sustainable long-term outcomes for in situ biodiversity conservation, with associated ecosystem functions and services and, where appropriate, locally relevant cultural, spiritual, socio-economic and other values (Convention on Biological Diversity, 2018). They would allow people to be managers of these areas rather than beneficiaries, but also recognise local power, thereby ensuring benefit-sharing mechanisms and decision-making processes that are appropriate to the local context and perceived locally as equitable (IUCN, 2019). This tool could be used in addition to the identification of HCVs, for all matters related to land management that support by social safeguards, the communities, governmental institutions and conservation experts could work together develop more inclusive and effective conservation (Dudley and al., 2018).

However, attention must be paid to the Santomean context. Indeed, it is peculiar compared to other areas of the world in that the population is not indigenous and that access to most land has only became effective over the last 30 years, while it was previously owned and managed by state companies. Nowadays, with the distribution of land carried out through reforms from 1991 onwards (Temudo, 2008), people are focusing on exploring their plot of land, rather than on obtaining resources from the territory as a whole. In the communities of Plancas I and Vila Malanza there is no evidence of rules of

access or governance to the common areas hold by the state that are used by the community inhabitants. If that is the case, it might be important to bear in mind the tragedy of the commons (Hardin, 1968), which states that individuals who have access to a resource act in their own interest and in doing so end up depleting the resource. With the population growth that São Tomé is experiencing, the search for resources is expected to continue increasing, jeopardising not only resources useful to the population but also biodiversity. This seems to be the case already for timber for construction and for wildmeat (Annex 10), which are perceived to be decreasing.

In conclusion, it is indeed possible to include human interests in the definition of new areas to be conserved, under the condition that the local context is considered in the definition of areas and in the development of management tools, at the community level.

7 Conclusion

Although the identification of HCVs allows for an assessment of areas of importance for biodiversity, it also allows the identification of those important for local communities. In São Tomé, however, the identification so far was based solely on biodiversity values, as the objective was to create a conservation gradient between the interior and exterior of the park. By looking at the identification of human interests in the definition of HCV areas, this work has demonstrated that it was possible to identify natural areas that are important to human population. It has also identified options to and shown the benefits of integrating these areas into those initially identified based solely on biodiversity values, despite the challenges.

The resources and characteristics of the areas that are important to human interests differ between communities, according to land tenure, level of dependence on resources and cultural connection to nature, demonstrating the importance of looking at the local context when trying to redefine territorial uses.

Even without mapping areas important to human interests, consultation of local populations is already a first step towards integrating resource management, even if just trying to avoid overlaps and thus potential future conflicts. Nevertheless, not all overlaps can be avoided, and certain zones are already in potential conflict with biodiversity values, namely regarding palm wine and medicinal plants in Vila Malanza, and charcoal production in Plancas I. This reinforces the need for continuous monitoring of activities, and to further assess how the users of areas that have been identified as potential HCVs in the island are going to be engaged to avoid future conflicts.

Not mapping the areas important for human interests it becomes difficult to recognize the interests of communities in future territorial redefinitions, leaving them unprotected. A situation that might worsen their economic situation and further disturb their already fragile cultural identities. This work shows that it is possible to have these needs recognised, using alternative mapping methods and integrating them into the so-called “traditional” mapping methods. This could be a first step towards new forms of governance that allow for a better inclusion of communities in the sustainable management of their resources, and to help accomplishing the conservation goals. However, there is still a long road for this to happen. Even if some HCV users agree and

understand why this study was conducted, one can also see that social sciences and alternative forms of knowledge still have some way to go before they are fully recognised when defining new conserved areas. The question remains; if nowadays there is no doubt that social science must be part of conservation planning, are conservation organizations already able to integrate insights from this form of knowledge? Bennett (2019), says that today social science still may be watered down and that their potential insights are often ignored, resulting in policy evaporation, meaning little implementation on the ground.

Social sciences should not be just an add-on to interdisciplinary conservation research projects after the project has already been conceived, it must be part of it since the beginning (Viseu 2015:291). According to Bennett (2019), the failure of conservation social science to be mainstreamed, stems in part from a lack of clearly articulated objectives and values associated with the social sciences and it is not only the fault of conservation practitioners. Social scientists may need to get better at working in teams, at integrating ideas with other disciplines and practitioner knowledge, and at communicating research and ideas to diverse audiences of practitioners and policy-makers.

Yet, the case of São Tome shows that paradigm shifts in recognition are taking place, as evident by this thesis being part of the ongoing HCV assessment. For example, in Principe Island, the HCV assessment was conducted integrating HCV 5 from the beginning (D'Avis, 2021). Another example is the work conducted by Madureira (2012) concerning medicinal plants, where she was interested in the different practitioners, their methods but also the plants used for their treatment to make an inventory and to recognise their practices. Recently, Birdlife in São Tomé has concluded a contract to make an inventory of all the cultural sites in STP (Birdlife International, personal communication, 27 July 2021), and although the main intention is to promote tourism, it nevertheless allows the whole of the Santomean population to recognise the existence of these sites which have often been forgotten or hidden. This work could contribute to the recognition of the country's heritage and help to develop, preserve and promote Santomean identity.

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9 Annex

9.1.1 Annex 1 : Practices related to forest resources in communities working with ECOFAC programme (Oikos, 2019)

	Main resources given by forests and rivers							Main professional activities related to forest ressources					Main resources taken from the forest									
Name	Water to drink	Water to wash	Medicine	Wood	Charcoal	Hunting	Balance	Charcoal	Palm wine	Buzio	Logger	Balance	Palm wine	Charcoal	Firewood	Fruits	Buzio	Wood for	Hunting	Medicine	Ossame	Balance	Balance means
Generosa	1	1	1	0	0	0	-0,5	0	0	1	0	-0,75	0	0	1	1	1	1	1	1	1	-0,22	-0,49
Plancas I	1	1	1	1	1	0	-0,16	1	1	1	0	-0,25	1	1	1	1	1	1	1	1	0	-0,11	-0,17
Praia das Conchas	1	1	1	0	0	0	-0,5	1	0	0	0	-0,75	0	1	0	1	0	1	0	1	0	-0,55	-0,60
Saudade	1	1	1	1	0	0	-0,33	0	0	1	0	-0,75	0	1	1	0	1	1	1	1	0	-0,33	-0,47
São Carlos	1	1	1	0	0	0	-0,5	1	0	1	0	-0,5	0	1	1	0	1	1	0	1	0	-0,44	-0,48
Santa Genny	1	1	0	1	0	1	-0,33	0	1	1	1	-0,25	1	1	1	0	1	1	1	1	0	-0,22	-0,26
Porto Alegre	1	1	1	0	0	1	-0,33	0	0	0	0	-1	1	0	1	1	1	1	1	1	1	-0,11	-0,48
Vila Malanza	1	1	1	1	1	1	0	0	1	0	0	-0,75	1	0	1	1	1	1	1	1	1	-0,11	-0,28
Claudino Faro	0	0	0	0	0	1	-0,83	0	1	1	1	-0,25	1	0	0	0	1	1	1	1	1	-0,33	-0,47
Mulundo	1	1	1	1	0	0	-0,33	0	0	1	0	-0,75	1	0	1	1	1	1	1	0	0	-0,33	-0,47
Abade	1	1	0	0	0	0	-0,66	0	1	1	1	-0,25	1	0	0	1	1	0	0	1	1	-0,44	-0,45

9.1.2 Annex 2: Characteristics and language spoken with communities working with ECOFAC programme

	CHARACTERISTICS		LANGAGE SPOKEN			
NAME	**Population in 2012**	**Number of households**	**Portuguese**	**Forro**	**Angolar**	**Cabo verdiano**
GENEROSA	448	110	439	29	8	125
PLANCAS I	182	52	173	3	4	22
PRAIA DAS CONCHAS	174	54	162	4	0	10
SAUDADE	94	23	89	9	0	19
SÃO CARLOS	39	12	38	4	0	1
SANTA GENNY	61	20	59	7	5	10
PORTO ALEGRE	795	195	770	141	118	54
VILA MALANZA	550	125	532	31	479	14
CLAUDINO FARO	337	91	318	88	28	139
MULUNDO	50	n.a	n.a.	n.a.	n.a.	n.a.
ABADE	126	35	121	9	1	4

9.1.3 Annex 3: Questionnaire template for promoters and community leaders

DEPENDÊNCIA DOS RECURSOS NATURAIS E LIGAÇÃO ESPIRITUAL/CULTURAL COM A FLORESTA					
- O meu nome é Vasco Ferreira e sou aluno de mestrado na Universidade de Lausanne - Estou a visitar a comunidade para perceber como usam os produtos que vêm da floresta - Gostava de saber se a comunidade pode colaborar comigo, respondendo a entrevistas - As entrevistas são anónimas - Só participa quem quiser e podem ser interrompidas a qualquer momento					
ENTREVISTA PARA PROMOTOR E LÍDER DA COMUNIDADE					
Nome da comunidade:	**Quantas pessoas vivem na comunidade, incluindo crianças?**				
Nome do representante/promotor local:	**Há quanto tempo vive na comunidade?**				
Sexo:	**Há quanto tempo é representante/promotor?**				
Idade:	**Identifica-se como?**				
	Angolar	Forro	Cabo-verdiano	Tonga	Outro, qual?

Acesso			
Qual o estado da estrada para chegar à comunidade? E em que estado ela está?			
Asfalto	Calçada	Terra	
Péssima	Má	Normal	Boa
Quantas vezes a HIACE vem à comunidade?			
Todos os dias	2-3 vezes por semana	Uma vez por semana	2-3 vezes por mês
Onde é o mercado mais próximo? Quantas lojas tem a comunidade? Se não tem, onde fica a mais próxima? A comunidade tem escola? Se sim, até que ano? Se não, onde fica a escola mais próxima?			
Saúde			
Existe centro de saúde comunitário? Onde fica o centro de saúde mais próximo, sem ser o comunitário? Quanto tempo demora a chegar lá?			

Água			
De onde vem a água que a comunidade bebe?			
Rio	Nascente	Chafariz/em casa	Outros, qual?
De onde vem a água que a comunidade usa para lavar, cozinhar, etc.?			
Rio	Nascente	Chafariz/em casa	Outros, qual?
Ligação espiritual, religiosa fora da comunidade			
Há celebrações ou rituais da comunidade que acontecem fora da comunidade?			
Onde?			
Quando alguém está doente, pode receber tratamento tradicional fora da comunidade, onde?			
Como é que essa pessoa é tratada?			
Existem lugares no mato que são considerados sagrados ou mágicos?			
Se sim, quem pode falar mais sobre eles?			
Há alguém na comunidade que seja especialista em plantas medicinais?			

9.1.4 Annex 4: Questionnaire template for promoters and community leaders

DEPENDÊNCIA DOS RECURSOS NATURAIS E LIGAÇÃO ESPIRITUAL/CULTURAL COM A FLORESTA

Resumo: Falar sobre características familiares, atividades de trabalho, consumo de alimentos selvagens, o lugar da tratamento tradicional em casa, materiais utilizados para construir a casa, e para fazer comida, e a relação espiritual/religiosa com a floresta fora da comunidade.
Os produtos só são selvagens quando não são plantados e não vêm do lote.

ENTREVISTA PARA AGREGADO FAMILIAR

Comunidade:					**Data :**
Tamanho da família:					**Nomes** (Voluntário) **:**
Sexo:					**Sexo:**
Há quanto tempo vive na comunidade?					**Nasceu onde? Sexo:**
Identifica-se como?					**Cresceu onde?**
Angolar	**Forro**	**Cabo-verdiano**	**Tonga**	**Outro, qual?**	

Perfil

Qual é a sua atividade principal?
Tem alguma outra atividade? Qual?
Para as pessoas que trabalham com recursos florestais: O que é que você apanha no mato? Por exemplo buzio, plantas, etc.

1.	2.	3.
4.	5.	

E esses produtos são sobretudo para?

Venda		Troca, oferta		Consumo próprio	

Quando troca ou vende, faz isso na comunidade ou fora? Se fora, onde o vende/troca?
Para quem apanha produtos no mato; Há mais ou menos do que antigamente? Responda para cada um com + ou -.

1.	2.
3.	4.
5.	

Se menos, porquê?

1.
2.
3.
4.
5.

Saúde

Você usa plantas medicinais? Se não, salte para a próxima secção.					
Se sim, como é que os obtém? Escolha as respostas mais adequadas:					
Comprada/ trocada/oferta		Cultivado		Colhida no mato	
Na comunidade quem sabe mais sobre plantas medicinais? Quando compra/troca plantas medicinais faz na comunidade ou fora? Se fora, onde? Que plantas medicinais mais se apanham no mato?					
1.		2.		3.	
4.		5.			
Nos últimos 5 anos, há mais, menos ou a mesma quantidade de plantas medicinais?					
1.		2.		3.	
4.		5.			
Se menos, porquê? 1. 2. 3. 4. 5.					

Madeira							
Construção							
A sua casa é de madeira? Se não, diga de que é feita e salte para próxima seção. De onde veio a madeira para construir a casa? Escolha as respostas mais adequadas:							
Cortada		Trocada, oferta		Comprado			
Lote		Mato		Cidade		Outra	
A sua casa é de que tipo de madeira? Se não sabe, passa para a próxima secção.							

Combustíveis					
Usa carvão ou lenha para cozinhar? **Se não, pule esta seção**. De onde vem o carvão ou lenha? Escolha as respostas mais adequadas: (se vários, 1=mais importantes; 3=menos importante)					
Produzido fora do lote		Comprados/ trocados		Produzido dentro do lote	
Se comprou, foi na comunidade ou fora? Se dentro, porquê? Se lá fora, de onde veio o produto? Para o carvão que produz no mato fora do lote, usa carvão de que madeira?					
1.		2.		3.	

4.	5.

Para a madeira apanhada fora do lote, usa lenha de que madeira?

1.	2.	3.
4.	5.	

O carvão e a lenha que apanha no mato, há mais, menos, igual do que antigamente?
Responda com +, - ou =.

1.	2.
3.	4.
5.	

Se menos, porquê?

1.
2.
3.
4.
5.

Alimentos			
Frutas, legumes e cogumelos silvestres			
Em casa come plantas que vêm do mato? Recursos comestíveis que venha do mato, mas que não seja plantado ou criado. Responda por sim ou não. **Se não, pule esta seção**.			
Liste os diferentes tipos de plantas do mato			
1.	2.	3.	
4.	5.		
Com que frequência come essas plantas?			
Diário		Semanalmente	
Mensal		Raramente	
No último mês, onde obteve plantas do mato? Escolha as respostas mais adequadas:			
Comprados/ trocados		Colhida no mato	
Quando você trocou ou comprou, você fez isso na comunidade ou fora dela? Se dentro, porquê? Se fora, onde??			

Nas plantas que apanha no mato, há mais, menos, igual do que antigamente? Responda com +, - ou =.

1.	2.	3.
4.	5.	

Se diminuir, qual seria a causa?

1.
2.
3.
4.
5.

Carne Selvagem			
Comem carne do mato em sua casa, incluído as crianças? Responda por sim ou não. Se não, pule esta seção.			
Diga o nome das carnes selvagens que come na sua casa:			
1.		2.	
3.		4.	
5.			
Com que frequência você come carne selvagem?			
Diário		Semanalmente	
Mensal		Raramente	
Onde os arranjou no último mês? Escolha as respostas mais adequadas:			
Comprado/ trocado		Colhida/caçado na floresta	

Quando você trocou ou comprou, você fez isso na comunidade ou fora dela?
Se dentro, porquê?
Se fora, onde?
Para maioria carne colhida/caçada no mato, há mais, menos, igual do que antigamente?
Responda com +, - ou =.

1.	2.	3.
4.	5.	

Se diminuir, qual seria a causa?

1.
2.
3.
4.
5.
Ligação espiritual, religiosa com o mato
Alguém lá de casa usa lugares sagrados ou mágicos que ficam no mato? Ou conhecem algum local com poderes especiais ? Com que frequência você ou a sua família usam ou visitam essas áreas? Qualquer pessoa pode ir lá? Se não, quem pode?

9.1.5 Annex 5: Questionnaire template for spiritual and cultural specialists

DEPENDÊNCIA DOS RECURSOS NATURAIS E LIGAÇÃO ESPIRITUAL/CULTURAL COM A FLORESTA					
- O meu nome é Vasco Ferreira e sou estudante de mestrado na Universidade de Lausanne. - Estou a fazer um estudo para saber como você usa os produtos florestais e a ligação e você têm com a natureza. - Não estou aqui para lhe pedir que me conte os seus segredos, mas apenas para saber o que faz e onde o faz. O objetivo é reconhecer a importância desses lugares para si e para a comunidade. - Eu gostaria de saber se pode colaborar comigo respondendo a entrevistas - As entrevistas são anónimas - Só participa se quiser e pode interromper a qualquer momento.					
ENTREVISTA PARA ESPECIALISTA CULTURAL/ESPIRITUAL					
Comunidade:					**Data :**
Tamanho da família:					**Nome** (Voluntário) **:**
Sexo:					**Idade:**
Por quanto tempo você está vivendo na comunidade					**Onde nasceu?**
Como se identifica?					**Onde cresceu?**
Angolar	Forro	Cabo-verdiano	Tonga	Outro, qual?	**Nome da sua atividade principal?**
As suas práticas					
Que tipo de atividades realiza fora da comunidade?					
As pessoas costumam vir ter consigo por causa da sua ligação com as atividades que realiza na floresta?					
Pode explicar-me brevemente como é que se passa?					
Para o seu trabalho, precisa de usar ou visitar lugares específicos no mato? Se sim, pode dizer-me mais sobre isto? Que tipo de lugares são estes? Sumidouros, rios, cruzamentos, arvores, outros? Pode-me dizer onde é que eles ficam?					

Todos podem ir a esses lugares? Se não, quem pode ir a esses lugares?

Uso de plantas medicinais

Você usa plantas? Pode dizer-me quais são as mais importantes??

1.	2.	3.
4.	5.	

Acha que agora há mais, menos ou as mesmas plantas na área de colheita do que antigamente?

1.	2.
3.	4.
5.	

Se diminuiu, qual a causa?

1.
2.
3.
4.

Há algo de mágico/espiritual nos sítios onde apanha as plantas? Se sim, pode dizer-me mais?

5.

Lugares tradicionais comuns na comunidade

Existem lugares que são importantes ou mágicos para toda a comunidade? Com magia e/ou espíritos?

Existem festas ou rituais nesses lugares? Quais são?

Frequência

Pode explicar-me quando é que essas festas ou rituais ocorrem ao longo do ano?

Identificação de lugares espirituais/tradicionais

Pode mostrar-me esses lugares? Se sim, preciso de saber alguma coisa de especial para respeitar o lugar?

Se não, pode dizer onde ficam ou mostrar-me à distância? Se não der, não tem problema.

9.1.6 Annex 6: Botanical names for medicinal plants used in Plancas I and Vila Malanza

Botanical name[17]	**English name**	**Local name**[18]	**Origin**[19]	**Users in Plancas I**	**Users in Malanza**
Psidium guajava L	Guava	Goiaba	Introduced	3	4
Ficus kamerunensis L.f.		Mussandá	Native	2	2
Annona muricata L	Cherimoya	Sape-sape	Introduced	2	1
Ocimum gratissimum L.		Micocó	Native	1	1
Eryngium foetidum L.	Coriander	Coentro	Introduced	2	18
Lannea welwitschii A.r.		Mucumbli	Native	3	7
Chenopodium ambrosoides L.		Matruço	Introduced	2	5
?		Pau-preto Maguá	?	7	
Paullinia pinnata L.		Codoquê	Introduced	7	
Allophylus africanus L.		Pau-Três	Native	6	
Alchornea cordifolia		Bengue	?	4	
Rauvolfia vomitoria L.		Cata pequena	?	3	
Ficus mucuso L.		Figo-floco	?	3	
Tamarindus indica L.		Tambarindo	Introduced	2	2

[17] Figueiredo, E., Paiva, J., Stevart, T., Oliveira, F., & Smith, G. F. (2011). Annotated catalogue of the flowering plants of São Tomé and Príncipe. *Bothalia*, *41*(1), 41-82.
[18] Own production
[19] Figueiredo, E., Paiva, J., Stevart, T., Oliveira, F., & Smith, G. F. (2011). Annotated catalogue of the flowering plants of São Tomé and Príncipe. *Bothalia*, *41*(1), 41-82.
POWO (2019). "Plants of the World Online". http://www.plantsoftheworldonline.org/

Elaeis guineensis	Palm oil fruit	Andim	?	1	
Achyranthes aspera L.		Folha Ponto	?	1	
Artocarpus altilis	Breadfruit	Fruteira	Introduced	1	1
Artocarpus heterophylla L.	Jackfruit	Jaqueira	Introduced	1	1
Adansonia digitata L.		Micondó	?	1	1
Morinda lucida L.	Brimstone tree	Grigó	?		5
Struchium sparganophora L.		Libô d'água	?		5
Syzygium guineense		Matianzoche	?		3
Cedrela odorata L.		Cidrela	Introduced		2
Solenostemon monostachyus		Manjoló	?		2
Acridocarpus longifollius		Micondó	?		2
		Não me toca			2
Psychotria venosa L.		Pó- água	?		2
		Tubujo			2
Trichilia grandfolia		Veludo	Endemic		2
?		Atunisia			1
Piper umbellatum L.		Bôba	?		1
Lonchocarpus sericeus		Colma	?		1
		Fiquitouro			1
Achyranthes aspera L.		Folha Ponto	Introduced		1
Culcasia scandens P.Beauv		Homem de um osso só	?		1

Synedrella nodiflora Gaertn.	Fiá-malé-muála	Introduced	1
Zanthoxylum gilletii L.	Marapião	?	1
?	Matrucha		1
?	Mbatá		1
Aframomum daniellii K. Shum.	Ossame	?	1
Gongronema latifolium Benth.	Otage	?	1
Dracaena arbórea L.	Pau Sabão		1

9.1.7 Annex 7: Botanical names for wood consumed in Plancas I and Vila Malanza

Botanical name [20]	**English name**	**Local name**	**Origin[21]**	**Users in Plancas I**	**Users in V. Malanza**
Chlorophora excelsa	Iroko	Amoreira	?	7	17
Discoglypremna caloneura		Pau Branco	Native	2	14
Ficus sp.		Figo-plôcô	Introduced	3	8
Artocarpus altilis	Breadfruit	Fruteira	Introduced		7
Sorindeia grandifolia		Gogó	Native	2	6
Artocarpus integer	Jackfruit	Jaqueira	Introduced	2	6
Morinda lucida	Brimstone tree	Moindo	Native	3	7
Paraserianthes falcataria	Acacia	Acácia	Introduced		6

[20] Figueiredo, E., Paiva, J., Stevart, T., Oliveira, F., & Smith, G. F. (2011). Annotated catalogue of the flowering plants of São Tomé and Príncipe. *Bothalia*, *41*(1), 41-82.

[21] Figueiredo, E., Paiva, J., Stevart, T., Oliveira, F., & Smith, G. F. (2011). Annotated catalogue of the flowering plants of São Tomé and Príncipe. *Bothalia*, *41*(1), 41-82. POWO (2019). "Plants of the World Online". http://www.plantsoftheworldonline.org/

Scytopetalum klaineanum		Viro branco	Native		4
Cedrela odorata		Cedrela	Introduced	8	1
Manilkara obovata		Azeitona	Native	3	1
Dacryodes edulis	African plum	Safuzeiro	Native	1	1
Funtumia africana	False rubber tree	Pó-leite	Native		1
Terminalia catappa		Caroceiro	Introduced		1
Ficus exasperata	Sandpaper fig	Pó-lixa			1
?		Pau-bispo			1
Cestrum laevigatum		Pau-fede	Introduced	6	
Cocos nucifera L.	Coconut tree	Coqueiro	Introduced	2	
Cordia platythyrsa L.		Tabaque	Native	2	
Rauvolfia caffra L.		Cata grande	Native	1	

9.1.8 Annex 8: Botanical names for edible flora consumed in Plancas I and Vila Malanza

Botanical name[22]	**English name**	**Local name**[23]	**Origin**[24]	**Users in Plancas I**	**Users in Malanza**
Artocarpus altilis	Breadfruit tree	Fruteira	Introduced	4	20
Adenia cissampeloides		Fissandjá	Native		18
Piper umbellatum		Folha-bôba	Introduced		16
Struchium sparganophora L.		Libô d'água	Introduced		15
Dioscorea alata	Yam	Inhame	Introduced		11
Treculia Africana	African boxwood	Izaquente	Native		4
Piper guineense	Pepper	Pau-pimenta	Native		4
Artocarpus heterophylla L.	Jackfruit	Jaqueira	Introduced	3	1
Citrus reticulata *Citrus sinensis*	Orange	Laranja	Introduced		3
Aframomum daniellii		Ossame	Native		2
Elaeis guineensis	Palm oil tree	Andim	?	1	
Persea americana	Avocado	Abacate	Introduced	1	
Paullinia pinnata		Códó-qué	Introduced		1

[22] Figueiredo, E., Paiva, J., Stevart, T., Oliveira, F., & Smith, G. F. (2011). Annotated catalogue of the flowering plants of São Tomé and Príncipe. *Bothalia*, *41*(1), 41-82.
[23] Own production
[24] Figueiredo, E., Paiva, J., Stevart, T., Oliveira, F., & Smith, G. F. (2011). Annotated catalogue of the flowering plants of São Tomé and Príncipe. *Bothalia*, *41*(1), 41-82.
POWO (2019). "Plants of the World Online". http://www.plantsoftheworldonline.org/

Cinnamomum verum	Cinamon	Canela	Introduced		1
Asystasia gangética		Fiá-qui-sobô	Introduced		1
Gongronema latifolium Benth.		Otage	?		1
Cocos nucífera	Coconut	Côco	Introduced	1	

9.1.9 Annex 9: Places of sale of charcoal produced in Plancas I

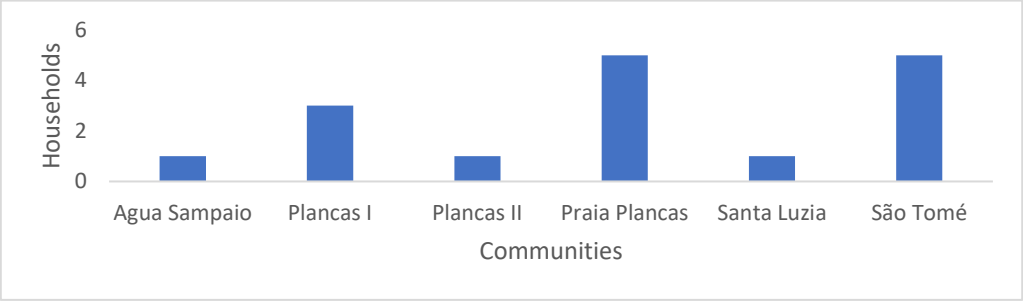

Figure 36: Places of sale of charcoal produced in Plancas I

9.1.10 Annex 10: Resource availability change perception over last 5 years, for edible flora, in Plancas I and Vila Malanza

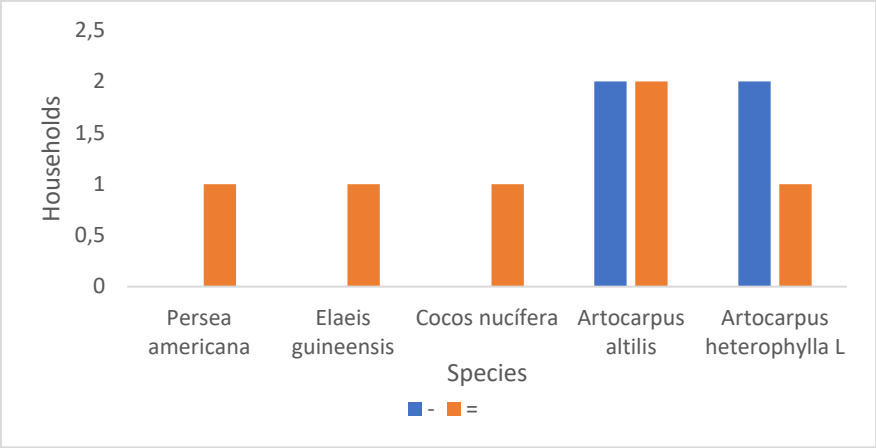

Figure 37: Resource availability change perception over last 5 years, for edible flora, in Plancas I

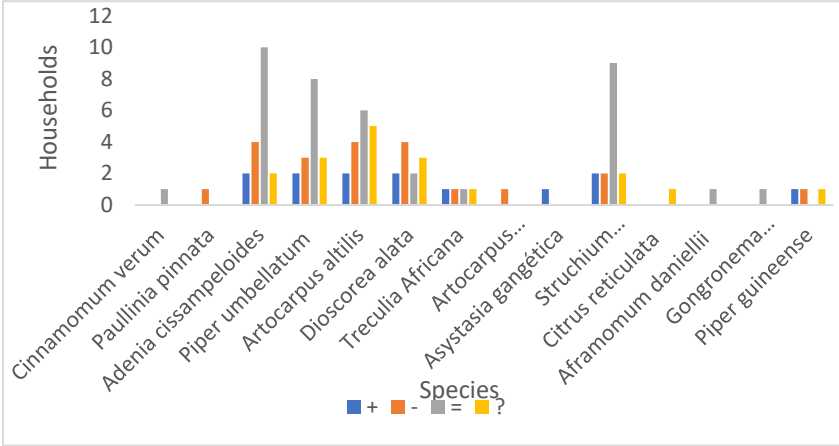

Figure 38: Resource availability change perception over last 5 years, for edible flora, in Vila Malanza

9.1.11 Annex 11: Resource availability change perception over last 5 years, for wildmeat, in Plancas I and Vila Malanza

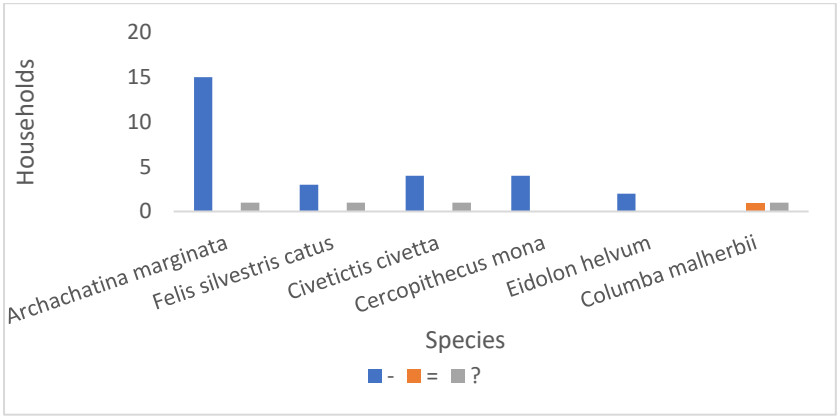

Figure 39: Resource availability change perception over last 5 years, for wildmeat, in Plancas I

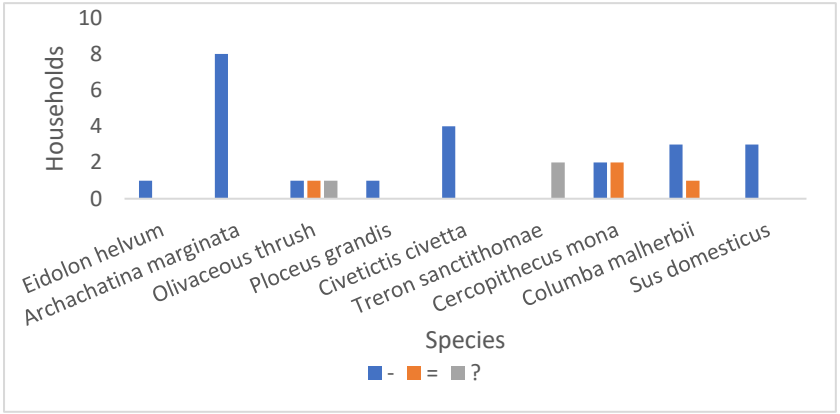

Figure 40: Resource availability change perception over last 5 years, for wildmeat, in Plancas I

9.1.12 Annex 12: Grid interview for HCV users in São Tomé

Chamo-me Vasco Costa e sou estudante de mestrado na Universidade de Lausanne, na Suiça. Estou a estudar o desenvolvimento de áreas de alto valor de conservação (HCV) em São Tomé e gostaria de lhe fazer algumas perguntas. Estaria disposto a ajudar? A participação é voluntária, pode ser anónima e interrompida a qualquer momento. Importa-se eu gravo a nossa conversa? Só a utilizarei para uso pessoal na redacção da minha tese.

Nome:	Idade:	Profissão:

- Pode falar-me da sua formação académica e profissional antes de trabalhar neste projeto?

- Há quanto tempo trabalha no ramo da conservação, incluindo trabalho pago e voluntário? E há quanto tempo em STP?

- Pode me falar um pouco sobre as suas atividades profissionais atuais?

- Qual tem sido o seu papel na definição dos HCV em ST?
- Porque foi decidido definir os HCV utilizando apenas os critérios exclusivamente baseados na conservação da biodiversidade?
- Como se pretende que os HCV sejam utilizados? Por quem?

O que significa para a Birdlife de São Tomé identificar HCVs exclusivamente baseados na conservação da biodiversidade?

Para o governo?

Para o sector privado?

Para as comunidades?

- Tanto quanto é do seu conhecimento, existem potenciais utilizadores e utilizações não intencionais da identificação dos HCVs?

Considera que os critérios de identificação de HCV relativos aos valores culturais e socioeconómicos devem ser utilizados para definir zonas de HCV? Porquê?

(Mostrar o meu mapa do HCV com base nos critérios 5-6, os mapas foram realizados a partir de cartografia participativa com as comunidades, verificação do terreno com gps e fotos)

- Em Plancas I, as áreas do Norte são principalmente utilizadas para a produção de carvão vegetal, as áreas centrais para a recolha de plantas medicinais e madeira para construção, e a área mais a sul para a recolha de búzios.
- Em Vila Malanza, as áreas são frequentemente utilizadas para madeira, vinho de palma, plantas medicinais, folhas para calulu

O meu estudo em Plancas I e Vila Malanza mostra que os critérios baseados na conservação da biodiversidade e os critérios baseados nos aspetos culturais e socioeconómicos identificam na maioria das vezes como áreas HCV distintas. Acha que pode ser este o caso para grande parte de São Tomé, ou o que identificámos nestas comunidades foi uma excepção?

Tem algum comentário a fazer sobre o mapa?

Acha que seria útil fazer esta comparação para todo São Tomé?

O que significaria essa identificação para o governo? Para a Birdlife? Para o sector privado? Para as comunidades?

No caso de Plancas I, certas áreas coincidem com as áreas pré identificadas. Na sua opinião, quais são as consequências potenciais de fazer um planeamento da conservação sem ter em consideração os interesses declarados das comunidades? Há mais alguma coisa que gostaria de partilhar comigo?

9.1.13 Annex 13: Grid interview for HCV secretariat

Thank you very much for accepting answer my questions. My name is Vasco Costa and I am a master student at the University of Lausanne, Switzerland. I am studying the development of High Conservation Value (HCV) areas in São Tomé, I am particularly interested in socio-economic and cultural aspects. First of all I would like to say that it has been an honour to work with this tool, which you and your team have developed. I find it very complete and relevant. As said in the email, I would like to ask you some questions about HCV. Participation is voluntary, can be anonymous if you want and it can be stopped at any time. I would like to ask you if I could record our discussion? This will be used for private purposes in the development of my dissertation.
First of all I would like to ask you some questions about yourself - Can you tell me about your academic and professional background before working on HCV Network? - How long have you been working in the field of conservation, including paid and voluntary work? - Can you tell me a bit about your current professional activities?
I would now like to tell you about my work. In São Tomé, it was decided that only HCV zones 1-3 would be identified. After reading about the issues related to the lack of recognition of the basic needs of local people in the designation of conservation areas, I set out to look at the missing part of the HCV assessment, i.e. HCV 5-6. I didn't consider HCV 4 since I don't have enough knowledge on the topic. I conducted my study in two communities, one at the northern end of the island and one at its southern end.
The study involved secondary data collection, questionnaires, semi-structured interviews, participatory mapping, ground truthing and GIS mapping.

Here are the results: My study in Plancas I and Vila Malanza shows that criteria based on biodiversity conservation and criteria based on cultural and socio-economic aspects mostly identify distinct HCV areas. However, the risks are there: In Vila Malanza, for example, Agripalma (a palm oil company) has already bought several plots of land from farmers who were left landless and forced to work for the company. In the case of Plancas I, some areas coincide with the pre-identified areas. In your opinion, what are the potential consequences of conservation planning without considering the stated interests of communities?
I have had the opportunity to read other case studies of HCVs in other countries, and I have found that HCV 5&6 are often considered secondary or not considered. In your opinion, why do you think this is the case?
I had a dilemma in relation to HCV 5, because I was able to identify areas that are considered fundamental to meet the basic needs of the people, especially for the cutting of wood for house building. This cutting is not sustainable but there are no viable alternatives, some of these woods are considered important for biodiversity. The population of the villages is growing every year. What would you have decided in this scenario?
One last question about literature, would you be willing to share with me reports of monitoring HCV implementation in other parts of the world?
Do you have any questions for me? About my work?
Thank you again for agreeing to answer my questions. It was an honour to finally talk to the person who developed the tool I am working on.

9.1.14 Annex 14: Participatory mapping and ground truthing reports in Plancas I

FEEDBACK FOCUS GROUP PLANCAS I AND GROUND TRUTHING

Introduction

The following meeting was held at the community promoter house on Monday 19 April 2021. The meeting started at 3pm in the afternoon. It lasted for about an hour and a half.

Figure 41: Focus group members defining the map

The following persons participated in the meeting:

These people were chosen because they have a job directly related to the extraction of natural resources, use these resources in their homes or are very familiar with the community's surroundings.

Alé – Chainsaw operator	**Arlezio – Vinhanteiro**
Camacho – Farmer/Coalcutter	**Soba – Farmer/Coalcutter**
Julinho – Vinhateiro	

The following participants did not attend to the meeting:

Yayá - Hunter	**Elisio – Farmer**
Safú – Farmer	

Process of the meeting

Objective

Getting to know the places where we go to get forest products through a map that we will create together

Focus group content

1. Explain the objective of the work and procedure of the meeting

On this exercise we will first made a map with the main known points of the area.

The following parameters were defined after the results for the whole week interviewing people in the community.

2. Set the known points of the area:

Rivers	Bluff
Roads	Beaches
Communities still inhabited	Abandoned communities
Hills	"Campo"
"Roças"	

- Map limit

Agua Sampaio	Praia Plancas

3. Ask for each of the occupations represented at the meeting, where they seek the resources. Ask where other people who have the same occupation get these resources:

Wood for construction	Wood for timber
Palm wine	Monkey
Coal	Birds
Buzio	Coconut
Lagaia	Medicinal plants

4. Ask where the community seek the following resources, participants must identify the different harvest areas of these resources on a community level, not focus on where they look or their household.

Firewood	Coal
Breadfruit	Medicinal plants

Results

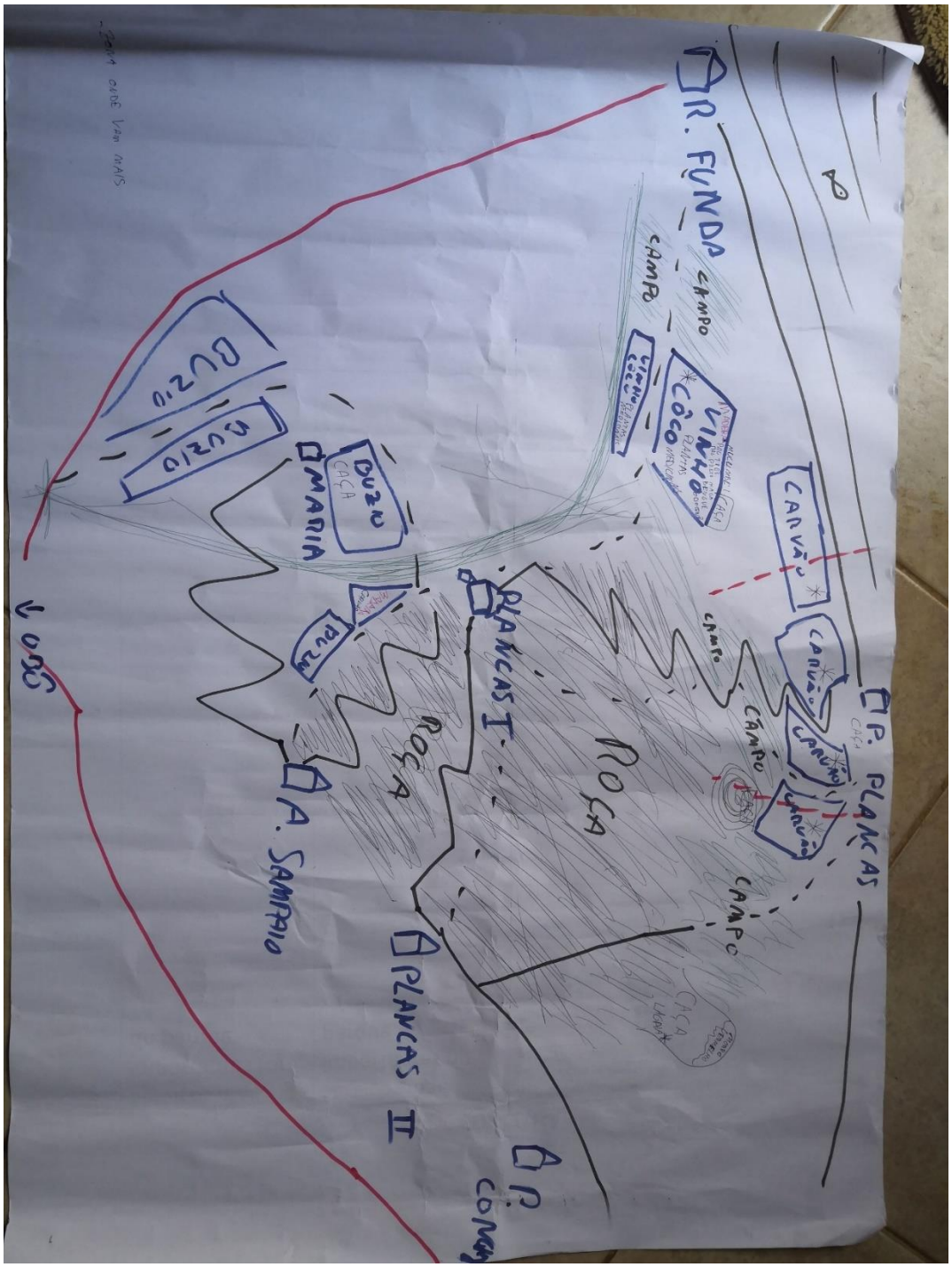

Figure 42: Red - rivers; Black – main roads; Dotted black – pedestrian roads; Green – Campo; Blue – Extraction zones

Ground Truthing

Introduction

After the focus group, I defined three zones where resources are harvested. The first is the northeast zone, which is next to the Praia Plancas abandoned community; the second, north, in the pedestrian path to R. Funda and the third, south, between the rivers in the direction of Obô.

On the 20th and 21th of April 2021 the fieldwork was carried out. I was accompanied by the farmer/coal cutter, Camacho, who showed me the different locations. The GPS data has not yet been processed, however, and will be provided in a later document.

Observations

It seems that the northern zone used for forest resources it's savannah, the southern part is "capoeira" and secondary forest. This could be validated by the existence of old cacao trees, but this must be confirmed using the GPS data collected and compare it with old maps from the colonial era.

What they call *campo* is very different from *roça*. While the *roça* is a plot of land belonging to them that mainly produces cocoa and bananas (fig. 3), the *campo* is mostly land that is squatted for horticulture with a preference for the production of corn, tomatoes or even manioc, at least this rainy period (fig. 4).

This area is very popular among farmers because the soil is of better quality than that of the *roças*, which seems to be rockier, and it would be interesting to prove this with geomorphological studies if they exist.

In the *campo* area, charcoal production is also present, especially around the tree called Pau-flor (fig. 5 & 6). It is very present in this area and according to the charcoal makers it has the advantage of growing very quickly. However, they say its quality is not as high as some trees such for example Viru, Quaquo or Colma.

Regarding the collection of buzio, according to the participants it is possible to find them in the roças, however during the ground truthing I focused only on the forest areas. Located in the southern area, which is also popular for cutting wood for houses (fig. 8) and medicinal plants, it will be relatively easy to map as it is in a steep area and therefore becomes inaccessible quite quickly. A comparison with satellite images and map layers defining the altitude will be able to define this area with a relatively high accuracy.

Figure 43: After collection, the cocoa is removed from its shell and the beans are separated

Figure 44:The campo, land where various vegetables are grown, here corn

Figure 45: Abandoned wood for constructing

Figure 46: Buzio shell

Figure 47 : Timber for cooking

Annex

Participatory mapping - Focus group	
Community	**Date**
Number of participants	**Hour**
Invitation of people working with forest resources	
Invitation of people who harvest wood	
Invitation of people who harvest eatables in the forest	
Explain the objective of the work and procedure of the meeting On this exercise we will first made a map with the main known points of the area. Set the following points: - Rivers - Beaches - Roads - Bridges - Communities still inhabited - Abandoned communities - Hills - *Campo* - *Roça*	
Map limit - Praia Plancas - Agua Sampaio	

Ask for each of the professions represented at the meeting, where they seek the resources. Ask where other people who have the same profession get these resources:
- Wood for construction
- Palm wine
- Coconut
- Coal
- Busheat
  o Buzio
  o Monkey
  o Lagaia
  o Birds
- Medicinal plants

Asking where the community will seek the following resources, participants have to think whenever possible to identify the different harvest areas of these resources, neo focus on where they will look. - Firewood - Coal - Leaves for calulu - Medicinal plants - Breadfruit

9.1.15 Annex 15: Participatory mapping and ground truthing reports in Vila Malanza

FEEDBACK FOCUS GROUP MALANZA AND GROUND TRUTHING

Introduction

The following meeting was held at the Malanza community centre on Monday 5 April 2021. The meeting started at 1pm in the afternoon. It lasted for about an hour and a half.

Figure 48: Focus group members in Vila Malanza

The following persons participated in the meeting:

These people were chosen because they have a job directly related to the extraction of natural resources, use these resources in their homes or are very familiar with the community's surroundings.

Pungé – Chainsaw operator	**Alcides – Vinhateiro**
Angelino - Masseur/Artisan	**Fanho - Community promoter**
Neiro – Vinhateiro	**Justiano - Head of Beach**

The following participants did not come to the meeting:

Placido – Massagista/Agricultor	**Tótó – Vinhateiro/Caçador**
Bi – Agripalma/Caçador	**Trajano – Responsável de saúde**
Neiro – Vinhateiro	

Process of the meeting

Objective

Getting to know the places where we go to get forest products through a map that we will create together

Focus group content

5. Explain the objective of the work and procedure of the meeting

On this exercise we will first made a map with the main known points of the area.

The following parameters were defined after the results for the whole week interviewing people in the community.

6. Set the known points of the area:

Rivers	Beaches
Roads	Bridges
Communities still inhabited	Abandoned communities
Hills	Airport
Agripalma	

- Map limit

Saint Anthony of Massacavu

7. Ask for each of the occupations represented at the meeting, where they seek the resources. Ask where other people who have the same occupation get these resources:

Wood for construction	Wood for timber
Palm wine	Monkey
Izaquente	Birds
Buzio	Coconut
Lagaia	Medicinal plants

8. Ask where the community seek the following resources, participants must identify the different harvest areas of these resources on a community level, not focus on where they look or their household.

Firewood	Coal
Leaves for calulu	Medicinal plants
Breadfruit	Oranges
Ossame	Cinnamon

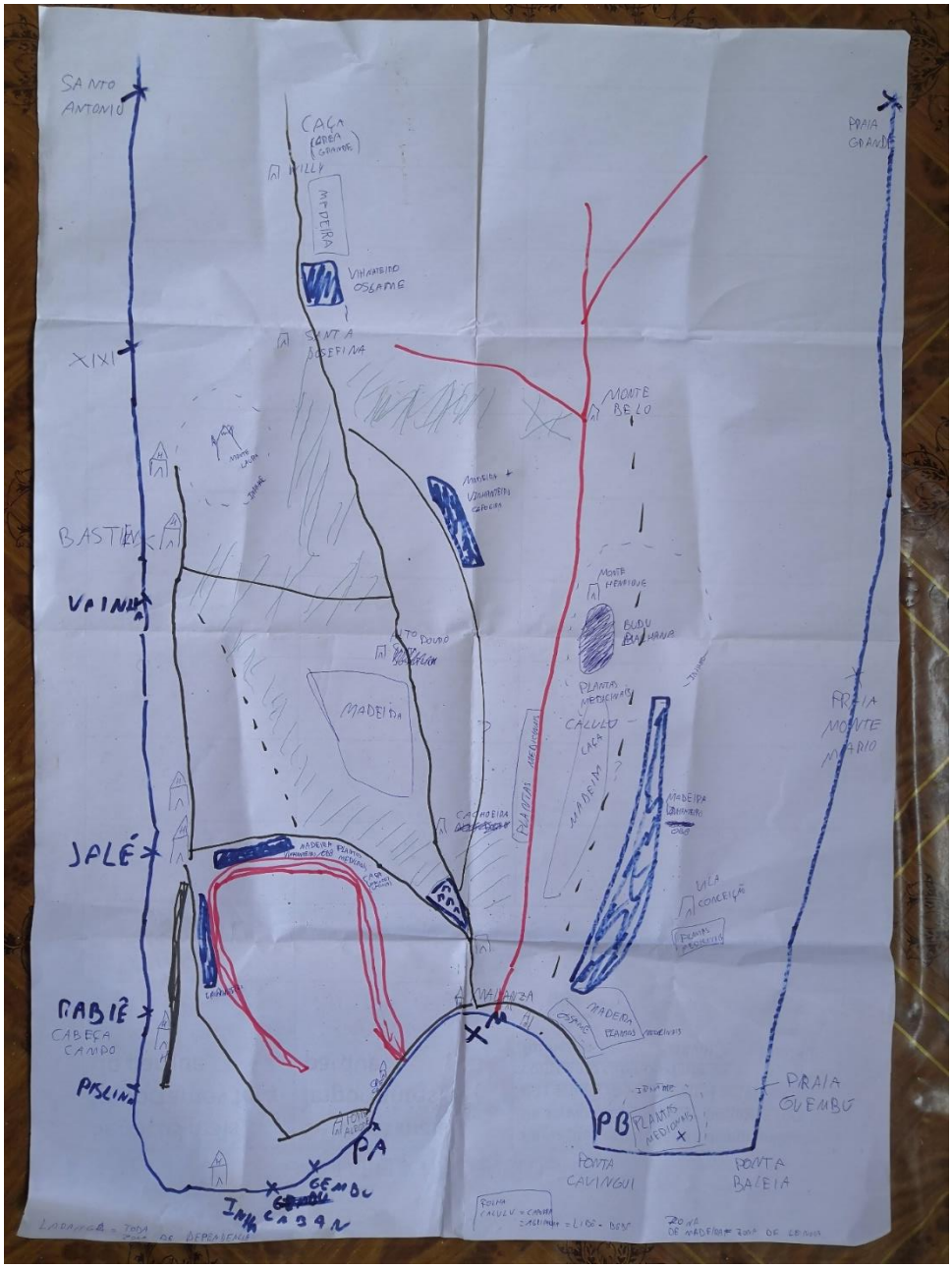

Figure 49: Red - rivers; Black – main roads; Dotted black – pedestrian roads; Green – Agripalma; Blue – Extraction zones

Ground Truthing

Introduction

After the focus group, I defined three zones where resources are harvested. The first is the eastern zone, which goes from Vila Malanza to Monte Belo; the second, central, from Vila Malanza to Santa Josefina/Willy and the third, western, from Malanza to the airport.

On the 6th and 7th of April 2021 the fieldwork was carried out. I was accompanied by a guide, Fanho's brother Nicho, who showed me the different locations. The GPS data has not yet been processed, however, and will be provided in a later document.

Observations

It seems that the entire zone used for forest resources it's capoeira, except for hunting. This could be validated by the existence of old rail roads on the ground, but this must be confirmed using the GPS data collected and compare it with old maps from the colonial era.

As Budo Bachana is concerned I could go to the top of it. I took a GPS position, nevertheless I didn't look for medicinal plants in the surroundings because Placido and his brother Casimiro, both *massagista*, consider those places as secret and didn't want me to get there.

Medicinal plants were too spread to really define precise areas where find one specie or another, to do it so, it needs another type of ground truthing only on medicinal plants.

Results

Figure 51: Limits between mato (left) and Agripalma concession (right)

Participatory mapping - Focus group	
Community	**Date**
Number of participants	**Hour**
Invitation of people working with forest resources	
Invitation of people who harvest wood	
Invitation of people who harvest eatables in the forest	
Invitation of *massagistas*	
Explain the objective of the work and procedure of the meeting On this exercise we will first made a map with the main known points of the area. Set the following points: - Rivers - Beaches - Roads - Bridges - Communities still inhabited - Abandoned communities - Hills - Airport - Agripalma	
Map limit - Saint Anthony of Massacavu	
Ask for each of the professions represented at the meeting, where they seek the resources. Ask where other people who have the same profession get these resources: - Wood for construction - Palm wine - Coconut - Izaquente - Busheat o Buzio o Monkey o Lagaia o Birds - Medicinal plants	
Asking where the community will seek the following resources, participants have to think whenever possible to identify the different harvest areas of these resources, neo focus on where they will look. - Firewood - Coal - Leaves for calulu - yam - Breadfruit - Oranges - Ossame - Cinnamon	