Organização das Nações Unidas para a Alimentação e a Agricultura

Ministério da Agricultura e Ambiente

BUILDING ADAPTIVE CAPACITY AND RESILIENCE OF THE FORESTRY SECTOR IN CABO VERDE

GCP/CVI/046/EC - CABO VERDE

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SUMMARY

The REFLOR-CV project aims to increase resilience and enhance adaptive capacity to address the risks climate change poses to desertification and land degradation in Cabo Verde. This study as part of REFLOR-CV investigates how natural product (NP) and non-timber forest product (NTFP) value chains can contribute to build the adaptive capacity and resilience of the forestry sector and create livelihood improvement opportunities benefitting local people. Data was gathered from November 2020 to March 2021 to answer these questions through a survey, literature review, observations and interviews during a mission to Cape Verde, and feedback from reviewers in the CV-FAO team in April 2021.

To meet these aims, four main questions were answered. The first is a market assessment of the value chain, stakeholders and frameworks for managing and governing NP value chains. Mainly local markets exist for an estimated 84 commercialised natural products. Six major value chains were identified, based on their uses and characteristics: Medicinal plants and products; fruits; forage and fodder; knowledge products; artisanal products and ecosystem services. Some innovative examples exist with new products and value chains but most products are undifferentiated. Economic values were difficult to quantify due to the informal, dispersed economic markets, but high cultural and resilience value. The chains are mainly short, informal (unrecognised by policymakers and unregulated) in-island value chains with few segments based on traditional products, small numbers of stakeholders in upstream segments e.g. processing, retailing and generally small product volumes, although some with higher seasonal turnovers. Product unit values are low on average, ranging from 100-300$00. These chains provide irregular, seasonal employment and contribution to household incomes for women, youths, older people in rural areas. Natural products compete with imported products and often have an inferior image. The environmental values of NP value chains are high, given that around half are based on endemic plants, several of which are threatened and a significant proportion of which are sourced from protected areas. Governance frameworks operate mainly at farm, household and family level with few formal regulations and policies, no market-based arrangements and few customary regulations. In the past natural product value chains have been subject to boom and bust cycles.

Secondly, to integrate NPVCs in nurseries for reforestation and forest rehabilitation, the status of nurseries was assessed. Three types were identified: REFLOR-CV Project plant nurseries, municipal plant nurseries and private nurseries. Opportunities exist to diversify plants, seeds and processed product ranges, services and knowledge; to set up experimentation and demonstration plots for agroforestry; to engage nurseries to share experiences and support them to develop pre-competitive, collective action such as possibilities for tax breaks and carbon payments; to develop guidelines for propagation of key NPs and to support with entrepreneurial and marketing training.

Thirdly, the potential for adoption of fruit tree NP value chains to enhance sustainable forest management and livelihoods was investigated. A wide variety of fruit trees are grown on the three islands, however to facilitate further NP and fruit tree adoption, opportunities need to be grabbed. These include information campaigns about the traditional values of natural resources; pricing schemes and fiscal incentives incentivising tree planting and community actions; support for nurseries and service providers to develop planting and aftercare packages; promoting a value chain approach – offering plants plus planting, technical and

management advice and services to help producers and processors upgrade; encouraging experimentation and demonstration of agroforestry systems supported by extension officers and community associations; regular stakeholder exchanges on NP and agroforestry practices, and the project getting on board innovators, entrepreneurs and influencers as ambassadors. Skill building and technical information transfer to farmers and processors in manufacturing remains important, as do students in conducting and documenting experiments and knowledge on agroforestry models.

Fourthly to integrate natural product value chain development into resilient forest and land use management to benefit Cabo Verdeans, recommendations include that natural product value chains should be included in forest and protected area management plans. Harvest, processing and use guidelines can be created as part of climate smart agriculture and forest plans. Experiments, demonstrations and documentation of the efficacy of different agroforestry-crop systems is needed. Communication and marketing can increase the image and socio-economic, environmental and economic value of NPs. The project can play a key role in linking direct and indirect value chain stakeholders who support upgrading and equitable benefit sharing. Several threats to the sustainability of NP value chains and resilience of women´s and men's livelihoods need to be actively addressed. Potential new product chains include beekeeping products; fruits; multipurpose products; exploiting underused but valuable species such as moringa, baobá, babosa, jatropha and reviving historically used wild species such as sizal, riccinus, panos di terra and purgueira.

Recommendations for actions include 34 short term actions that focus on what the REFLOR-CV project could implement in the last year of the project focusing on specific value chains, addressing threats to natural plant resources and to sustainability of current NP value chains, and on resilience of the value chains and people dependent upon these products and chains. Actions are also advised that strengthen the regulatory, but also importantly given the informal, small scale and unregulated nature of many of these products and their trade, the customary and community level frameworks for managing and governing land, natural resources and the resulting products and value chains. The 23 medium and 13 long term actions are those that take longer time scale to implement and for outcomes of these actions to be visible. The larger scale and/or longer scope of these actions could implemented by the potential second term of the FAO REFLOR-CV project, the Cabo Verde government particularly the Ministry of Environment and Agriculture, community associations, individuals, private sector and other partners in the project in medium term (two to five years) and in the long term (five years and more).

AAPG	Agricultura e Ambiente Planos de Gestão Florestal resilientes às alterações climáticas	Agriculture and Environment Forest Management Plans resilient to climate change
AFOLU	Agricultura Florestas e Outros Usos do Solo	Agriculture Forests and Other Land Use
CDM		Clean Development Mechanimsm
CEABN	Centro de Ecologia Aplicada	Center for Applied Ecology
DGASP	Direção-Geral de Agricultura, Silvicultura e Pecuária	Directorate-General for Agriculture, Forestry and Livestock
DMAA	Delegações locais do Ministério da	Local delegations of the Ministry of
DNA	Direção Nacional do Ambiente	National Directorate for the Environment
DSSER	Direção de Serviços de Silvicultura e Engenharia Rural	Directorate of Forestry and Rural Engineering Services
FAO CV	Representação da FAO em Cabo Verde	FAO Representation in Cape Verde
HORECA	Hotel, Restaurant and Cafe sector	
INGT	Instituto Nacional de Gestão do Território	National Institute for Territorial Management
INIDA	Instituto Nacional de Investigação e Desenvolvimento Agrário	National Institute for Agricultural Research and Development
INMG	Instituto Nacional de Meteorologia e Geofísica	National Institute of Meteorology and Geophysics
MAA	Ministério da Agricultura e Ambiente	Ministry of Agriculture and Environment
MRV	Sistema de Monitorização e Verificação	Monitoring and Verification System
NTFPs	Recursos não lenhosos da floresta	Non-wood/forest products
ObC	Organizações de base comunitária	Community-based organizations
ONG	Organizações não governamentais	Non-governmental organizations
REDD+		Reducing Emissions from Deforestation and Degradation
SIA	Sistema de Informação Ambiental	Environmental Information System
SIG	Sistemas de Informação Geográficos	Geographic Information Systems
TdR	Termos de Referência	Terms of reference

INTRODUCTION AND CONTEXT

This section briefly introduces the REFLOR-CV project, the aims, context and scope of this study and report.

THE REFLOR-CV PROJECT

The '**Building Adaptive Capacity and Resilience of the Forestry Sector in Cabo Verde**' (Reforço da Capacidade de Adaptação e Resiliência no Sector Florestal em Cabo Verde) REFLOR-CV is a four year project started in 2017, funded by the European Union and implemented by the Food and Agriculture Organization of the United Nations (FAO). The main project objective is to increase resilience and enhance key adaptive capacity to address the additional risks climate change poses to desertification and land degradation in Cabo Verde at the national level. In particular, this project aims to encourage forest management for civil society organizations with the goal of mitigating climate change-induced desertification processes and strengthening the resilience of communities in the specific context of Santiago, Fogo and Boa vista Islands. Also, this project aims to contribute to the national climate change mitigation targets, as indicated in the Cabo Verde Intended Nationally Determined Contributions, by contributing to approximately 10% of the intended national reforestation target and CO2 removal. REFLOR-CV has three technical components:

1: Integrating climate change risks into forest policy frameworks, and institutional and individual capacities for more resilient forestry;

2: Reducing the effects of desertification and land degradation on targeted islands through reforestation and re-naturalization of forested areas for a participatory approach to forest resource management;

3: Knowledge and lessons learned are captured, analysed and disseminated.

The REFLOR-CV Project aims to increase resilience and improve the country's adaptation capacity to face the increased risks of climate change, with particular impacts on desertification and land degradation, in selected forest areas. The Project aims to promote participatory forest management, strengthening the personal and collective capacities of communities and institutions responsible and involved in forest management, to adapt to desertification in the context of climate change, and other effects, and to strengthen the resilience of various communities of the islands of Santiago, Fogo and Boa Vista. This implies engaging women, men, specific groups and communities in a participatory way in the identification, evaluation and implementation of the options that best suit their local contexts, which are diverse on each island contemplated by the Project, in terms of the challenges they face in and their socio-economic profile.

The islands covered by the Project are quite different in terms of agro-ecology, land use and land cover, relief and climate. It is therefore unsurprising that for some communities benefiting from the REFLOR-CV Project the term forest is positive, while for others it is not recognized: the wooded areas being known as tchada or pasture. In addition, the socio-economic characteristics, activity profile and income generation opportunities in different communities make their dependence upon forest and natural resources different.

AIMS OF THIS NATURAL PRODUCT VALUE CHAINS DEVELOPMENT REPORT

This report as part of the REFLOR-CV project supports the FAO project team by investigating how natural product and non-timber forest products (NTFPs[1]) value chains can contribute to build the adaptive capacity and resilience of the forestry sector in Cabo Verde and create livelihood improvement opportunities for the benefit of local people. The terms of reference (TdR) was to conduct the following:

- Undertake a brief market assessment to identify local, national and regional trends, market size, supply and demand gaps for NTFPs;
- Integrate natural product value chains development in the upgrading of existing government nurseries in the target Islands to serve as centres for plant production for reforestation and rehabilitation of degraded forestland areas, and as livelihoods improvement opportunities for the benefit of local people;
- Facilitate the adoption of fruit trees and relevant NTFP value chain development to enhance sustainable forest management for livelihood improvement;
- Integrate NTFP value chain development into the target Island's climate resilient forest management plans, adaptive planning techniques, sustainable land use and management and livelihood improvement opportunities for the benefit of local people.

SCOPE

This report addresses three islands: Santiago, Bao Vista and Fogo and the project sites on which the REFLOR-CV project focuses, shown in Figure 2.

THE ROLE OF NATURAL PRODUCTS IN BUILDING ADAPTIVE CAPACITY AND RESILIENCE

Livelihood characteristics, such as productive activities and assets, are important factors determining how vulnerable or resilient livelihoods are to climate change (IPCC 2014). For example, rain-fed subsistence farming (Gentle and Maraseni 2012), agro-livestock smallholding (Panthi et al. 2016), and pastoralism (Sallu et al. 2010) are considered sensitive to climate change. Adger (2000) established a link between natural resource-dependent societies and resilience, specifically within social systems that are dependent on a single ecosystem or natural resource. Opinions differ however on whether dependence on natural, forest products is associated with increased vulnerability (Pavageau et al. 2016). The use and sale of natural and non-timber forest products (NTFPs) can provide an important safety net for rural households, when access is not restricted (Paumgarten 2005). However, dependence on forest products can also be poverty trap, given the pressure on forest resources (Pavageau et al. 2016,(Ingram 2016)), suggesting compromised resilience.

Robust evidence indicates that climate variability worsens poverty and inequalities and triggers new vulnerabilities (IPCC 2018). Climate variability is also expected to slow economic growth and create or extend poverty traps. Adverse livelihood outcomes can accelerate food and livelihood insecurity due to the inability to rebuild affected assets (IPCC 2014). In contrast, financial capital provides a buffer capacity for households (Ifejika Speranza et al. 2014), allowing daily expenditures and responses to a disaster (IISD 2003). Sufficient buffer capacity

[1] After consultation with the REFLOR-CV project coordinator Zoéwindé Henri-Noël Bouda and adviser Patrice Savadogo, the ToR was changed with the focus on Non-Timber Forest Product (NTFPs) value chains enlarged to Natural Product value chains (NP VCs) see Box 1 for definitions.

can help mitigate and meet the costs of adapting to climate change (Ifejika Speranza et al. 2014). There is, however, little empirical evidence about the contribution of subsistence income to resilience or vulnerability, despite increasing literature on the relationship between the impact of climate change on poverty and poverty reduction (Adger 1999, Hansen et al. 2019). Subsistence income refers to the value of products produced or collected for household consumption or given away to family or friends (CIFOR 2007). Adaptive capacity refers to the skills of people and groups to access, mobilize and use goods and resources to facilitate adaptation to change, without degrading resources, to deal with change, adapt and learn from it, recognizing it and take advantage of the opportunities that come with change to transform livelihoods and community well-being and to promote women's empowerment. Adaptive capacity thus refers to the potential or capability to adjust to or cope with change and stresses. Vulnerability is a function of exposure, sensitivity, and adaptive capacity integrates both external and internal factors (IPCC 2001), with exposure being: “the nature and degree to which a system is exposed to significant climate variations” (IPCC 2001, p. 987). Sensitivity is “the degree to which a system is affected, either adversely or beneficially, by climate-related stimuli” (IPCC 2001, p. 993). Resilience derives from ecology and is defined as the capacity of a system to undergo disturbance and to absorb changes and persist (Holling 1973). A livelihood is a means of gaining a living: the capabilities, assets, and activities or stocks and flows of food and cash to meet basic needs (Chambers and Conway 1991). A resilient livelihood, therefore, can sustain its vital functions and absorb negative impacts that cause declines in production and well-being (Ifejika Speranza et al. 2014).

The way people are affected by the impacts of climate change varies depending, among others, on their social status, gender, poverty, education level, access and control over productive resources and services. This is manifested in differences in food security and poverty - two key indicators of resilience – in different geographic locations across the islands – shown in Figure 1. There are also several factors that contribute to differences in exposure and vulnerability to risks associated with climate change between women and men, among others:

1. Gender disparities in income and productivity.

2. Disparities in access to policy-making and decision-making processes.

3. Sociocultural norms that limit women's acquisition of information and skills to avoid the impacts of climate change, but also the lack of recognition or underestimation of women's traditional (beneficial) knowledge and practices about their surroundings and the way they deal with natural resources.

4. Absence of data disaggregated by sex and age in various sectors, which lead to underestimating the roles and contributions of women, and the risk that gender blind interventions contribute to aggravating gender inequalities and discrimination against women.

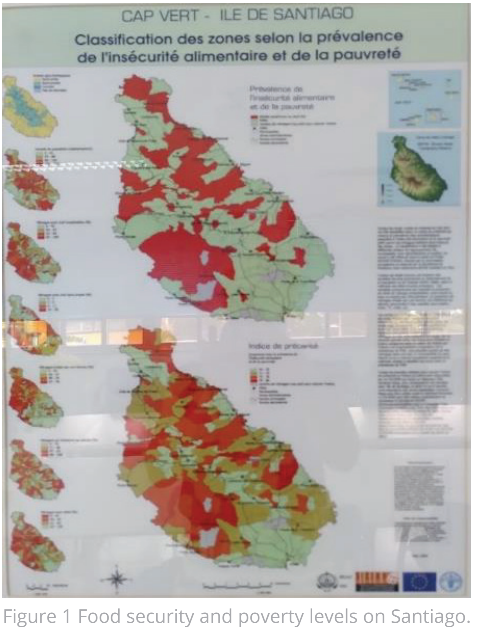


Figure 1 Food security and poverty levels on Santiago. Source FAO 2020

The REFLOR-CV Social and Gender Diagnosis (Anjos, 2020) describes the social dynamics present in the communities covered by the REFLOR-CV Project, and makes explicit how gender specificities that need to be taken into account in the project, and in programs and public policies in forestry and agriculture in general, to avoid the deepening of pre-existing inequalities, and to contribute to both women and men can benefit from public investments in this field and contribute to the sustainable development of the country.

Box 1 Clarifying forests, NTFPs, natural products, agroforestry. values and value chains

The terms forests and NTFPs can be confusing given different local and project perceptions of forests and plants in Cabo Verde from some definitions used by the FAO. The following definitions are used here:

• **Forests** are defined here according to the FAO (FAO 2015) as land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. The term forest does not include land predominantly under agricultural or urban land use. In Cabo Verde the FAO definition of forest is used, and there is no official definition for agroforests (FAO 2020), although the law is currently being revised. Forested project sites are shown in figure 2.

• **Non-timber forest** products (NTFPs) (also known as Non-wood forest products, NWFP) are goods derived from forests that are tangible and physical objects of biological origin other than wood (FAO 2015). These terms were not widely known or used outside of the FAO and academic community in Cabo Verde.

• **Natural products (NP)** include NTFPs and products from plants (such as fruits, sap, root, bark) growing naturally and wild outside of forests. Natural products include plants which may be introduced exotic and now naturalized for Cabo Verde, as well as endemic and indigenous plants. Products include tangible and physical products and goods and services – such as the knowledge about these natural resources which can be used commercially. Some plants are seen as natural or wild because they grow spontaneously around houses, farmland, fallows and former settlements (e.g. Alicrim - rosemary - Salvia rosmarinus). Natural products therefore can be seen to grow in a continuum of production systems from natural forests to resource-enriched natural forests, swiddens and fallows, exploitation from reconstructed (natural) forests, in mixed arboricultural and agricultural systems and in plantation systems (Wiersum, Ingram et al. 2014). In this study the following products were not included:

- Wood products such as fuelwood, charcoal and timber
- Cultivated, agricultural tree products (such as mango, papaya or coffee)

• **Value** includes both the most common form of economic or market value of a product or good, but also their social, cultural and environmental values. The term value also captures the notion of intrinsic value i.e. the value of something in and for itself, irrespective of its utility for someone else.

• **Value chains** refer to the processes, inputs and outputs involved in creating a product (physical product or service) from the wild as a natural resource, through processing and production, to delivery to final consumers and ultimately disposal, and the activities conducted by various stakeholders both direct (harvesters, processors, traders, retailers) and indirect (service providers, banks, government agencies, support organizations). Value chains are thus a series of activities where which utility or value is added to goods and services to enhance their value to the customer and/or society. The term value chain is used here instead of supply chain (the network of all the individuals, organizations, resources, activities and technology involved in the creation and sale of a product, from the delivery of source materials from the supplier to the manufacturer, to the end user) as a supply chain primarily refers to the management and logistics of getting a product from A to B.

Figure 2 A generic natural product value chain

• **Agroforestry** is a hybrid land-use system and usually involves the addition of an agricultural system (agronomic or pastoral) into a forest landscape, or the incorporation of trees into an agricultural landscape. In either case, success hinges upon the ability of the new system to meet the end user's needs, e.g. increased economic returns, reduced labour, taking advantage of existing knowledge and capabilities, and positive environmental benefits in short and long term.

SUMMARY OF DATA COLLECTION AND ANALYSIS

The methods used to gather the data for this study are based on the FAO Market Assessment & Demand (MA&D) methodology and the M4P VCD methodology. To answer four main questions to address the aims of the consultancy:

1. Who are stakeholders and frameworks for managing and governing NP value chains?
2. What are the economic and social values for current and potential NP value chains?
3. What are the environmental values for current and potential NP value chains?
4. How sustainable are current and potential NP value chains?

Three methods (described in detail in Appendix 1) were used with the timescale shown in Table 2. First a literature review of FAO project documents, grey literature, databases, maps and academic literature to determine the stakeholders and frameworks for managing and governing NTFP value chains, their environmental, cultural and use values and sustainability issues. A survey (see Appendix 2) was conducted with nine Associations prior to the mission to establish stakeholders and frameworks for managing and governing NP value chains, economic and social values and thirdly a mission to 16 sites in Santiago, Fogo and Boa Vista islands was made with 33 interviews and meetings about current and potential NP value chains, the opportunities and barriers . Observations, photos and the interviews (see Appednix 3 for detials) were used to map where NPs are harvested and grown and potential areas for restoration. Current practices and potential for cultivation of NP was assessed by visiting nine nurseries. Eleven market and retail shop visits, observations and photos helped understand the values, where, how and when NPs are sold on Cabo Verde. Meetings with FAO staff and a wrap up meeting with FAO and selected stakeholders provided additional data to answer the questions and verified preliminary findings. These datasets were combined to identify stakeholders, opportunities and pathways for improvements in frameworks for managing and governing NP value chains, the main and potential NP VCs and values, and sustainability of past and current NP VCs and lessons learnt, and threats and opportunities for improvement and capacity building.

The data from all sources were combined and analysed together. Data on the natural products commercialized was combined into a table Appendix 5. Quantitative data on values was recorded, with ranges and averages for markets - but could not be extrapolate to provide an overall market size or valuation of markets for NPs from the three islands. Such an analysis would require more in-depth, long term data collection during different seasons.

The surveys, interviews and observations were made at the sites shown in the map in Figure4.

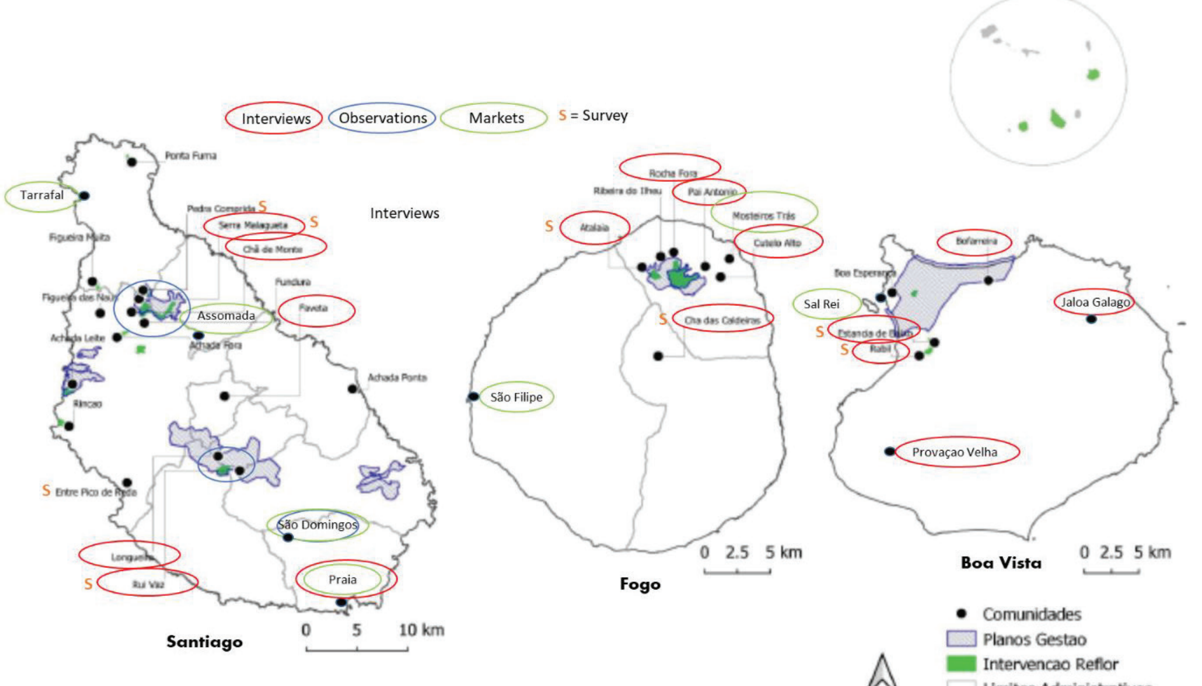


Figure 4 Map of surveys, interviews & observation locations, Cabo Verde

RESULTS

The results are presented for each of the four main aims: the market assessment to identify local, national and regional trends, market size, supply and demand gaps for NTFPs; how to integrate NP value chains development in the upgrading of existing government nurseries in the target Islands to serve as centres for plant production for reforestation and rehabilitation of degraded forestland areas, and as livelihoods improvement opportunities for the benefit of local people; how to facilitate the adoption of fruit trees and relevant NP value chain development to enhance sustainable forest management for livelihood improvement; and integrating NP value chain development into the target Island's climate resilient forest management plans, adaptive planning techniques, sustainable land use and management and livelihood improvement opportunities for the benefit of local people.

1. MARKET ASSESSMENT OF NATURAL PRODUCT VALUE CHAINS

A market assessment means understanding the current range of products used and commercialised in the three islands, their trends and markets, who are the stakeholders and if specific groups are excluded from participating in the value chains and why, current values, gaps in supply and demand, sustainability issues and future potential.

Local, national and regional trends and markets

Over 200 natural products were identified as currently used on the islands, 84 of which are commercialised and thus are seen as having value chains (see Box 1 for definition of value chains). Details of these products, their local and scientific names, uses, source locations and markets are provided in Appendix 5 (a list of NPs commercials on Cabo Verde). These products are grouped into six major value chains, which are described further below, based on their uses and characteristics, with examples given of the different species from which products are derived and a graphical description of the main segments in the value chains. In general the NP value chains from the three islands can be characterised as:

1. Informal and low economic market, but high cultural and resilience value

- Short, informal, traditional products (unrecognised by policymakers and unregulated) in-island chains with few segments
- Small numbers of stakeholders in upstream segments e.g. processing, retailing
- Small volumes of products, although some with higher seasonal turnovers
- Traditional image and cultural importance of many products e.g. honey for medical and food use
- Low product unit values ranging from 100-300$00
- Provide irregular, seasonal employment and contribution to household incomes for women, youths, elders in rural areas
- Product quantities, market volumes and profitability generally unknown and unrecorded

2. Examples of innovation in new products and value chains exist but are infrequent

A few examples were found of natural products being valorised in ways novel for Cabo Verde – but most do not consider the sustainability or ensure vertical integration of the value chain:

- Tambara using medicinal herbs used in soaps, Boa Vista
- New designs and uses of natural products in tourist products such as seen in Fogo
- Selling natural product knowledge e.g. specialized botanical guide for Serre Melegueta, Ravy Vaz
- Indigenous plants sold in commercial plant nurseries Flor de Lakakan, and Ecocentre, São Domingos, Santiago
- High quality, plant based oils and soaps with product and source information –eg Tambara, Boa Vista and Badia, Praia

3. NATURAL PRODUCTS COMPETE WITH IMPORTED PRODUCTS AND HAVE A POOR IMAGE

- Local natural products compete with imports e.g. baobab and tamarind from Senegal and West Africa, and honey imported from Europe – where the volumes supplied are higher, and prices often lower than locally products due to their low volumes, lack of bulking and sometimes variable quality
- Generally low added value with little to no bulking and transformation, many products sold fresh
- Little product differentiation and low levels of branding, advertising and marketing
- Consumer use information mainly limited to local knowledge
- Generally low and inconsistent product quality, with few formal standards- including for medicinal products
- Seasonal and insecure supply due to climate change and weather variabilities

4. REPEATED HISTORY OF UNSUSTAINABLE OVER-EXPLOITATION OF NATURAL PRODUCTS WITH FEW LESSONS LEARNT

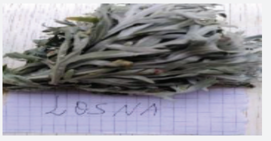
- Sustainability issues: scarcity, uncertain supply, susceptible to drought, endemism
- Boom and bust cycles for a number of natural products – described in Appendix 7. These cycles indicate the risks of unplanned and uncontrolled commercialisation, with issues of under and over-supply, poor product quality, negative publicity, and of some species becoming near extinct while others become invasive species.
- Infrequent and haphazard sharing of information and learning from past and current development and project experiences between different responsible government agencies and between islands, especially from projects that have been successes and “white elephants” - those that have failed – see Appendix 8 for more information.

Medicinal plants & products: > 28 species

Erve doce*, Erve cridera, Losna, Aruda, Elicrm, Lingua-da-Vaca, Funcho, Lantana, Riccinius, Purgueria, Euycalptus, Dragoeiro*, Marmulano*, Figueria, Aipo, Avalon, Babosa. Moringa, Pimenta Ros, Honey*

*Cultivated and found growing "wild" around old settlements

Characteristics	Medicinal & health product value chains
Value chain description	- Very short, largely within island value chains. Low volume trade exported to Santiago. Low volume, occasional trade/export to diaspora abroad. - Mainly wild harvested, some REFLOR-CV nurseries in Santiago, Fogo and Boa Vista have cultivated medicinal plants - Large range of species sold (63 medicinal species used of which 38 sold) in small volumes - estimated as tens of kilograms at retail level - Generally harvesters sell upon demand or occasionally on availability to a retailer or direct to customers from home (traditional medicine practitioners) - Limited processing for most species and products – most sold fresh or dried, distilling into oil (Eucalyptus, pourgeria, riccinou, babosa) - Generally no or low quality packaging and presentation of processed products

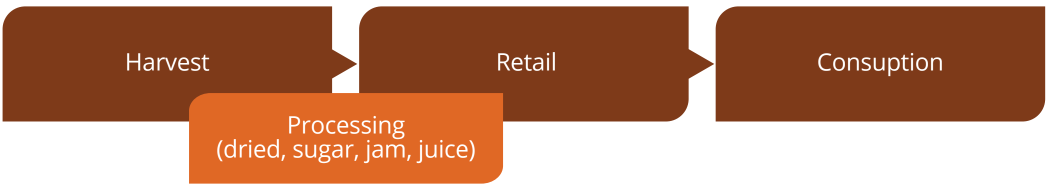
Characteristics	Medicinal & health product value chains
Products	**Fresh plant parts (leaves, seeds & barks)**  Losna **Aromatic oils**  (L-R) Pourgeria, Eucalyptus, Rosemary*, Babosa **Dried plant parts (leaves, seeds & barks)**  Cideria **Health & personal care products (shampoos, soaps oils, creams)**  Babosa
Geographic locations	- Fogo, Santiago, Boa Vista, Forested, fallow and farm land, National parks
Product uses	- Health teas (chá) - Traditional medicinal use (self-medication or advised by traditional medical practitioners) - Medicinal additive ingredient in alcoholic drinks - Medicinal/health active ingredient in personal health care products eg soaps, creams, oils
Main stakeholders	- Harvesters (mainly women, also men) and harvesters selling from home (mainly older women) - Market retailers (mainly older women) - Industrial processing companies (International Quimicas Cintila Lda, Sao Vicente- shampoo) - Artisanal cooperatives (Tambra, Boa Vista – soaps) - Small-scale manufacturing & retail shops (e.g Badia, Praia – soaps & oils)

Characteristics	Medicinal & health product value chains
Economic values	- Stable, seasonal, small scale trade - Low product values - on average prices for a bunch of fresh and dried plants 200$00 to 500$00 CVE, 5 ml oils 100$00 to 500$00
Social & cultural values	- Employment: estimated around 18 fulltime-regular market retailers (Santiago: 8 in Praia, 5 in Santa Catarina, Boa Vista: 1 in Rabil, 2 in Sal Rei, Fogo: 1 in São Filipe), 20 to 40 seasonal harvester/processers supplying retailers, unknown number traditional medicinal practitioners - Medical remedies and health uses based on a long traditional of folklore and traditional ecological and medicinal knowledge - Increasing body of scientific knowledge supports and explains traditional medicinal uses of plants and their efficacy - Use of local flora in folk/traditional medicine common and extensive, and important given limited medical facilities (Romeiras, Catarino et al. 2011) - Plant sales an important income sources in times of economic hardship - High cultural value indicated by plants being requested and sent to diaspora living abroad - Contributes to household health and income resilience - Understanding how medicinal plants respond to environmental perturbations and climate change could open new frontiers in plant production and in agriculture, where successive innovation is urgently needed due to the challenges in connection with global food security and climate change
Environmental values	- Around half of the plants traded for medicinal use are endemic species. Around half of the plants traded for medicinal use are exotic, naturalized species. At least 101 exotic plants (constituting 20% of exotic flora on Cabo Verde islands) are used in medicines (Romeiras, Catarino et al. 2011) - Medicinal and aromatic plants constitute an important part of the natural environment and agro-ecosystems

Characteristics	Medicinal & health product value chains
Environmental values	- Medicinal and aromatic plants contain many chemical compounds (secondary metabolites and including alkaloids, glycosides, essential oils and other miscellaneous active substances) which help plants cope with environmental and/or external stimuli in a rapid, reversible and ecologically meaningful manner. Environmental factors play a crucial role regulating metabolic yield of these biologically active molecules (Ghorbanpour and Varma 2017).
Frameworks managing & governing VCs	- No regulations governing harvest, processing or quality control or guiding use as medical products. Few controls on harvested or sold species - Agreements for local community harvest in protected areas - Recognition of endemic/endangered species used for medicines
Opportunities for improvement	- Valorising traditional knowledge - Product labelling and information (dosage, usage, known efficacy, health warnings) - Sustainable harvest guidelines - More effective and quality controlled Processing techniques - Dissemination of knowledge on propagation techniques for nurseries for some difficult to propagate species - Commonly found exotic-naturalised species little used and low levels of value adding e.g. neem, jatropha, riccinou, aloe vera - Large scale production for industrial use (example: Aloe vera)
Sustainability threats	- Over harvesting and boom & bust cycles of exploitation in past (e.g. Moringa, Dragoeiro) – see Appendix 7 for details. - Uncontrolled harvesting of endangered and endemic species + low awareness of threat of over harvest - No sustainable harvest guidelines, no customary practices controlling access, few controls on harvest

Characteristics	Medicinal & health product value chains
Sustainability threats	outside of National Park - Landuse change (to agriculture, around urban areas) - Climate change (aridness, droughts, heavy rains) - Loss of traditional knowledge of medicinal uses - Goat and livestock grazing (especially Boa Vista)
Lessons learnt	- Lessons from projects on different islands not well valorised – see Appendix 7 and 8
Potential product VCs	- Dried, well packaged medicinal plants for teas (local, tourist and export market) - Medicinal and flavoured herbs used in combinations with other local products (wines, grogo, Fogo cheese)

Fruits: 14 species: Cimbrão, Azdinhiea, Baoba*, Tamareria*, Tamarindus, Goioba*, Burnelo



Characteristics	Fruit value chains
Value chain description	- Short, largely within island value chains of fresh, conserved, dried and processed fruits - Harvesters sell upon availability/season to retailers or direct to consumers - Most food fruits are sold by small-scale vendors in season, in small volumes – estimated as tens of kilograms at retail level - Limited amount of processing for most species and products (dried or conserved in sugar)

Characteristics	Fruit value chains
Value chain description	- Industrial processing on Cabo Verde appears to be with imported fruits - Species found on the islands with mainly subsistence use and local, low volume, seasonal value chains also imported as processed products: Baobá, Tamareira, Tamarindos *
Products	**Fresh fruits**  Zimbro **Juices, jams, drinks, confecitonery**  Tambarina **Conserved fruits**  Azedinha **Dried fruits**  Tambarina
Geographic source locations	- Fogo, Santiago, Boa Vista - Forested, fallow and farm land - National parks
Product uses	- Food
Main stakeholders	- Harvesters (children, women) - Market retailers (mainly older women)

Characteristics	Fruit value chains
Main stakeholders	- Harvesters selling from home (mainly older women) - Industrial manufacturers (Technil Industria – Santiago – juices and Trinidade water, Maria Banetto) - Small scale artisanal manufacturers (Rosilda Pires – Fogo - jams, Monina Gostasa, Santiago – alcoholic & fruit drinks)
Economic values	- Stable, small scale trade, seasonal - Low product values - on average prices for a bag fresh or dried fruits 100$00 to 300$00 CVE - Employment: estimated around 10 to 50 occasional, seasonal roadside vendors and 20 to 40 seasonal harvester/processers
Social & cultural values	- Nutritional value - (Minor?) contribution to food and nutritional security
Environmental values	- Some native species have cultural values e.g. Baobá, Tamareira,
Frameworks for managing & governing VCs	- No regulations governing harvest - No regulations processing or quality control - No regulations gliding use as medical products - Few controls on harvested or sold species - Agreements for local community harvest in protected areas e.g. Serra Malagueta, Santo Antonio, Park Natural do Fogo
Opportunities for improvement	- Products currently imported from West Africa could be produced in larger quantities on the Cabo Verde (baobab, tamarind) - Product labelling and information (usage, benefits) - Sustainable harvest guidelines - Extend range of processing techniques - Propagation techniques by nurseries

Characteristics	Fruit value chains
Sustainability threats	- Uncontrolled harvesting + low awareness of threat of over harvest - No sustainable harvest guidelines - No customary practices controlling access - Few controls on harvest outside of National Park - Landuse change (to agriculture, around urban areas) - Climate change (aridness, droughts, heavy rains) - Loss of traditional knowledge of medicinal uses - Goat and livestock grazing (especially Boa Vista)
Lessons learnt	- Lessons from projects on different islands not well valorised eg
Potential product VCs	- Dried, well packaged fruits (local, tourist and export market) - Arsenal and industrial processing jams, juices (fresh, pasteurized & frozen), fruit ices, confectionery. - Combinations with other local agricultural products (eg pineapple, sugar cane, apples etc) in jams, juices, fruit ices etc.

Forage/fodder: 30 species: Leucaena, Faidherbia albida, Acácia, Algaroba, Jinglano, Creolina, Marmona

Harvest
Seeds
Processing (dryng)
Retail
Consuption

Characteristics	Fodder value chains
Value chain description	- Fodder and fodder seed chains very short, largely within island value chains - Limited value adding – sold fresh or dried - Most fodder is not sold but self-collected- mainly sold to generate cash income during times extreme stress/need e.g. droughts, covid pandemic, financial crisis

<table>
<tr><th>Characteristics</th><th>Fodder value chains</th></tr>
<tr><td>Products</td><td>Fresh folder

Dried fodder

Seeds for fodder pasture
</td></tr>
<tr><td>Geographic sources</td><td>- Fogo, Santiago
- Fallow and farm land</td></tr>
<tr><td>Product uses</td><td>- Forage crops and fodder crops serve the same purpose, but thrive in different environments and require different levels of care. For those with larger growing areas, forage crops can work, for those with smaller farms and who want to closely monitor food intake, fodder crops work better.
- Fodder for livestock (cows, pigs, goats) include crops intended specifically to serve as livestock feed and enable the livestock owner to regulate the animals' food intake. These include some grasses, but mostly cereal crops like maize. Generally, fodder crops work best as livestock feed for smaller animals like goats, pigs and poultry. Advantages of fodder crops is their</td></tr>
</table>

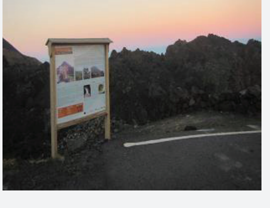
Characteristics	Fodder value chains
Product uses	ability to survive with less water, making them work well for drought conditions or relatively arid environments. However, cereal crops are prone to develop mould if not properly maintained. Prior to planting, the seeds, wash and rinse them thoroughly with cold water to remove spores. Give the plants plenty of room to grow by using growing trays or other containers. Smaller farms without a lot of open space could grow fodder crops where possible. Larger farms can grow forage crops. - Forage crops are crops on which animals graze independently, or crops that have purposes other than animal feed. Grasses and legumes make up the two broad sources of forage livestock feed. Grazing livestock like cows and horses do well with forage crops. Forge crops also can aid in land conservation, reduce weed population, and prevent soil erosion among other benefits. Common forage crops include planted grasses which can require more maintenance at start-up before the plant stand becomes established. Regular application of nitrogen and manure can ensure that grasses get the nutrients needed to grow and if soil pH goes below 6.5, applying lime can lower its acidity, thus testing soil's pH levels regularly is necessary.
Main stakeholders	- Harvesters (young boys, young men, women) selling from home (mainly older men and women)
Economic values	- Occasional, small scale trade, seasonal - Low product values - Employment: unknown number of seasonal harvester-vendors
Social & cultural values	- Mix of species used for fodder contributes to resilience and traditional diversified livelihoods in keeping livestock – including reducing need for imported feedstock (associated with periods of drought) or the need to feed livestock maize (also for human consumption)

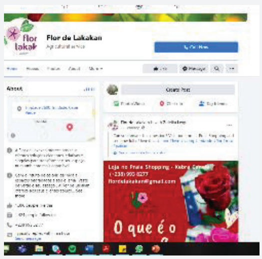
Characteristics	Fodder value chains
Social & cultural values	- Mix of species used for fodder contributes to increased farming system resilience to pests (compared to monocrop maze or imported feed)
Environmental values	- Mix of native, endemic and naturalized exotic species
Frameworks managing & governing VCs	- No regulations governing harvest - Few controls on harvested or sold species
Opportunities for improvement	- Sustainable harvest guidelines - Propagation techniques by nurseries - provision /sale of seed for pasture
Sustainability threats	- Uncontrolled harvesting - No sustainable harvest guidelines - No customary practices controlling access - Few controls on harvest outside of National Park - Landuse change (to agriculture, around urban areas) reduce amount of pasture and forage - Climate change (aridness, droughts, heavy rains) reduce amount of pasture and forage
Lessons learnt	- Dogs have reduced number of goats on Boa Vista which has increased availability of forage - Pasture improvement is practiced in some areas and islands and has been introduced by projects e.g. Fogo - Free grazing and harvesting for fodder/pasture contributes to biodiversity loss, pasture production in lowland areas, which have the largest goat populations, have aggravatingly regressed due to low rainfall and the amount of pasture remains very much below the needs (Medina, Gomes et al. 2015). - “Improving breeds, feed production and processing of food products" project supported pasture production to improve cattle feed, construction and improvement of livestock infrastructure, diversification and improvement of livestock breeds through artificial insemination for cattle and goats. In pasture production, activities included the collection

Characteristics	Fodder value chains
Social & cultural values	and conservation of pasture and fixing forage plants in 2012, with forage production of grasses and legumes in the areas of open forest and shrub formations estimated nationally at around 122 353 t of dry matter (DGADR, 2013). These activities and other private sector initiatives, particularly the "Ilha Verde /Green Island" project for maize production (15 000 t in 2013) abroad to manufacture of feed, helped address extensive grazing and over-grazing (Medina, Gomes et al. 2015).
Potential product VCs	- Nutritional, climate smart mixes of seeds (native and existing exotics) for pasture

Knowledge products: Ecotourism, Conservation (endemics), Cultural (uses, knowledge)

Knowledge generation → Transformation (guides, signs) → Retail (Tourism guides, botanic garden, nursery) → Consumption

Characteristics	Knowledge product value chains
Value chain description	- Value chains of tangible and non-tangible products based on scientific and local, traditional ecological/historical-cultural/medicinal knowledge
Products	**Tourist information**  **Public information (in-situ & published)** 

Characteristics	Knowledge product value chains
Products	**Botanic guides**  **(Public) Botanic gardens**  **Botanic guides** 
Geographic sources	- Fogo, Santiago, Boa Vista - Protected areas e.g. Parque Natural do Serra Malagueta, Parque Natural do Santo Antonio, Parque Natural do Fogo, - Communities adjacent to national parks
Product uses	- Products sold (e.g. booklets) to tourists and in support of tourism (e.g. websites, knowledge used by tourism guides, by Community forest associations) - Products supporting conservation and management of protected areas (eg information signs, booklets, websites) - Plants sold by nurseries for ornamental and food use, and for landscaping tourist resorts e.g. Dragoerio (Dracaena draco) and Tamareira (Phoenix atlantica A.Chev., Arecaceae, Phoenix atlantidis P. dactylifera L.)

Characteristics	Knowledge product value chains
Main stakeholders	- Academic & scientific community (Universities, INIDA, Botanic Garden) - Projects e.g. UNDP, GEF, FAO - Ministry of Environment, Agriculture & Fishery - National park and other protected area authorities - Project staff eg UNDP-GEF, GTZ, NGOs - Commercial, municipal and REFLOR-CV project plant nurseries e.g. Ecocentre, Sao Domingos
Economic values	- Unknown direct economic value and unknown indirect value contributing to tourism sector
Social & cultural values	- Valorization and maintenance of traditional knowledge about plants and their cultural, medicinal and economic significance - Public information on natural heritage and environment
Environmental values	- Valorization about endemic and endangered plants
Frameworks for managing and governing value chains	- Tourism guides trained by University Tarrafal & Santa Catarina Licence & Gestion de Hotelarai and Toursim and Technicha du Tourism Rural Mr Marcelina Fotard, Mr Jose Luis Mascharena - Association of tourism guides, Praia (not active – contact via Mr Ravy Vaz)
Opportunities for improvement	- Recognised, specialised training and certificates for botanic guides - Marketing specialised botanic guides (eg online websites and tourist guides e.g. Get your Guide, Lonely Planet, Brady Guides, in resorts, advertisements in taxis etc) - Increased prevalence of native plant gardens with informative signage (e.g. in front of councils, in town centres, in tourist areas eg Cidade Velha - Publishing and disseminating scientific botanical and ethno-botanic knowledge e.g. technical briefs on plant

Characteristics	Knowledge product value chains
Opportunities for improvement	status, traditional and industrial uses; harvesting guidelines; chemical, medicinal and nutritional properties, processing, labelling , - Souvenir-heritage plants sold at nurseries, tourist shops, markets, Cidade Velha, airport & resorts - Increased public information/signage concerning endemic plants used in landscaping tourism and public spaces
Sustainability threats	- Souvenir-heritage plants need to be accompanied by permitting and cultivation program
Lessons learnt	- Experiences with commercialising souvenir plants from Senegal (eg www.BabaobAfrica.com) and Suriname (eg Stichting Tresor https://stichtingtresor.org) - Associations of tourism guides have not worked well to date – few incentives to group or work collectively, most attached or known by different resorts or tour operators
Potential product VCs	- Souvenir-heritage plants - Botanic tourist guide qualification - Revision, reprint and online version of the Endemic Plants and Indigenous Trees of the Cape Verde Islands booklet (GTZ/UNEP 2003)

Artisanal products: Baskets, tourist crafts, paints, tools
> 5 species Cariz, Sizal, Acacia, Esprinta

Harvest > Processing (drying, transformation) > Retail > Consumption

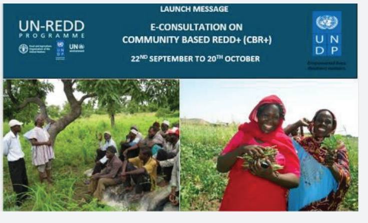
Characteristics	Artisanal product value chains
Value chain description	- Very short, largely within island value chains - Processing techniques based on traditional species, knowledge and designs - Harvesters sell upon availability to retailers or direct to consumers - Traditionally used species (e.g. Sisal) now little used - Imported products (eg table mats, lampshades, baskets, hats) compete with locally produced value chains also imported as processed products: Baobá, Tamareira, Tamarindos * - Some examples of designer/artistic designs, trade (eg Cape Verde Design on Sao Vicente and web shop) and use of traditional products in tourist resorts, bars and cafes – usually made upon demand
Products	**Baskets, hats and woven products**  **Tourist souvenirs**  **Utensils**  

Characteristics	Artisanal product value chains
Geographic sources	- Fogo, Santiago, Boa Vista - Forested, fallow and farm land
Product uses	- Functional household and small-scale industrial uses - Tourist souvenirs - Art/craft objects
Main stakeholders	- Craftsperson's and weavers (older men & women) working from home or small businesses - Community processing association (Tambra, Boa Vista)
Economic values	- Part time work for some processers, full time for some producers and retailers - Products compete with similar imported products - Employment: unknown number of seasonal harvest-er-vendors - Employment: estimated around 18 part-time/regular processors (Santiago: 10 to 15, Boa Vista: 1 in Rabil, 1 in Sal Rei, Fogo: 1) and 5 market retailers and small shops (Santiago: 2 in Praia, Boa Vista: 1 in Rabil, 1 in Sal Rei, Fogo: 2 in Sao Filipe)
Social & cultural values	- Traditional products, designs and materials
Environmental values	- Exotic naturalised species used (eg sizal) and native (cariz, esprinta)
Frameworks for managing and governing value chains	- No regulations governing harvest - No quality standards
Opportunities for improvement	- Sustainable harvest guidelines - Propagation techniques by nurseries - Updating and reskilling for use of now little used

Characteristics	Artisanal product value chains
Opportunities for improvement	materials with abundant resource availability eg Sizal - agricultural cultivation and production of resources
Sustainability threats	- Uncontrolled harvesting - No sustainable harvest guidelines - No customary practices controlling access
Lessons learnt	- Adoption and uptake rates of craft production after training projects in Boa Vista & Fogo has been low
Potential product VCs	- Updating designs, skill and marketing training for craftsperson's –examples of use of traditional techniques and products in tourist resorts, and HORECA sector

Ecosystem services: Soil erosion, boundary markers, biodiversity, pollination, restoration, carbon payments

Characteristics	Ecosystem services value chains
Opportunities for improvement	- Economic value of forests and natural areas their products and services is monetarised and supports forest protection and forest and people's livelihood resilience

Characteristics	Ecosystem services value chains
Products	**Reforestation projects**  **PES initiatives REDD+/ carbon credits/ CDM / Forest Carbon Partnership Facility/Green Climate Funds** 
Geographic sources	- Forest restoration and reforestation project locations eg FAO REFLOR-CV in Santiago, Boa Vista, Fogo, - UNDP project - Sao Vicente
Product uses	- Income source for government ministries concerned with forest, environmental protection and climate change
Main stakeholders	- Government Ministry of Environmental, Housing and Land Planning and Ministry of Foreign Affairs - Donors and aid agencies e.g. USAID, FAO, UNCC, European Commission - Private sector

Characteristics	Ecosystem services value chains
Economic values	- Forest revenue streams not yet established for REDD+ (Reducing Emissions from Deforestation and Forest Degradation) to provide economic incentives to avoid deforestation and forest degradation. The objective is to mitigate climate change by reducing net GHG emissions through enhanced forest management. - Insect based pollination services not yet calculated - 365 $ million committed 2010-2015 for climate change related ecosystem services on Cabo Verde based on water supply and sanitation and renewable energy, but not for forest restoration (Canales, Atteridge et al. 2015)
Social & cultural values	- Ecosystem services value chains support adaptation to and mitigation of climate change
Environmental values	- Adaptation to and mitigation of climate change - INDC 2015 Cabo Verde's long-term commitment to engage in new afforestation/reforestation ("A/R") around 20,000 hectares until 2030.
Frameworks managing & governing VCs	- UN Framework Convention on Climate Change (UNFCCC) Intended Nationally Determined Contribution" (INDC) - Clean development mechanism (CDM) under the Kyoto protocol - Reducing Emissions from Deforestation and Forest Degradation (REDD+) initiative under the United Framework Convention for Climate Change - Nationally Appropriate Mitigation Actions (NAMA) and INDC 2015: long-term commitment to new afforestation/reforestation ("A/R") of 20,000 hectares (about 400 trees/hectare) by 2030 with international support. If 20,000 hectares are successfully planted, this will generate a long-term sequestration gain of 360 tCO2eq per hectare after 30 years, corresponding to 7.2 mtCO2eq. Cabo Verde aims at eliminating three stone cooking stove (35% of households still use three-stone stove) through improved low-emissions

Characteristics	Ecosystem services value chains
Frameworks managing & governing VCs	cookstoves by 2025, and thereby removing demand for firewood. Regarding governance and institutional infrastructure, Cabo Verde seeks to improve forestry governance by investing in inventory and land registry systems, designating priority afforestation/reforestation, and preparing long-term sustainable land management plans with performance-based subsidies (Republic of Cabo Verde and UNFCCC 2015).
Opportunities for improvement	- Investigate eligibility of reforestation projects for CDM and carbon credits
Sustainability threats	- Rate of reforestation hampered by droughts and species used - Reforestation initiatives do not include climate resilient species with characterisations such as drought and salt tolerance - (Agro)forestry and farming systems are not climate smart eg irrigation leading to salination - Reforestation i and restoration is fragmented- resulting in isolated patches of forest
Lessons learnt	- Lessons from previous projects not well valorised between different ministries and islands or over time with some lessons and projects being lost e.g. between MMA, FAO and UNDP GEF projects - CDM projects can take a long time to get off the ground "On average, it took CDM activities in Africa nearly two years to reach registration, and a further three years to have carbon credits issued. As such, if the Fund is to support the CDM, project developers expressed that ongoing efforts to simplify and streamline CDM rules should further intensify to reduce associated transaction costs and speed up the CDM project development cycle. "If one CDM project can already achieve so much, imagine what the country could achieve with international support from the GCF" Ana Monteiro, Head of Environment, Social and Administrative Department of Cabeolica S.A. (Cabo Verde)

Characteristics	Ecosystem services value chains
Potential product VCs	- REDD+, carbon credit, CDM projects - Private sector and private person restoration and reforestation projects. Current political guidelines advise that many activities that currently fall within the competence of the public sector, should be gradually transferred to the private sector and MAA believes that in this next legislature, this process will be accelerated further. Unlike in the agricultural and livestock sectors, in the forestry sector this will probably only be feasible if there are subsidies from the state. - Camara municipal level restoration and reforestation, and climate smart botanic gardens and demonstration projects

STAKEHOLDERS IN NP VALUE CHAINS

• Who are the current stakeholders?

Current stakeholders in NP value chains are indicated in the preceding sections. Stakeholders who are not yet - but could/should be engaged in the REFLOR project and value chains include:

o Commercial nurseries
o Cabo Verde financial institutions e.g. impact investors, providing credit and advice to entrepreneurs and associations, diaspora
o Tourism agents and resorts
o Tourism trainers
o Tourist guide associations
o Ministry of Tourism
o GEF project coordinators
o Carbon credit certifiers
o Marketers, designers and artists: marketing. product (re)design and packaging

Specific groups or types of people who appear excluded from access to resources or markets:

o Older, rural traditional medicine harvesters/ producers difficult to access modern healthcare, diaspora or health products markets

FRAMEWORKS FOR MANAGING AND GOVERNING NP VALUE CHAINS

• What are the barriers in current frameworks?

Trade in NP and their value chains are generally considered too small scale and unimportant to be formally regulated except from protected areas, where agreements have been made with local communities. However some harvesting was acknowledged to occur outside of these agreements.
Customary regulations to manage natural products on a daily basis and govern access to resources but also access to their markets in the longer term at community level do not seem to exist. Most governance and management appears to exist at private, household and farm scale.
No examples of market based governance or management were found. such as voluntary sustainability certification or standards such as Geographic Indication, organic, FairWild or Forest Stewardship Council (FSC).

• What are the opportunities in current frameworks and changes needed?

Export of heritage plants would need phytosanitary guidelines and control to ensure these are cultivated – not wild sourced seeds and products – these guidelines appear to exist but would need bringing together to enable exports and tourists to take plants off the archipelago Checks and control of trade in threatened IUCN and Cabo Verde Red-listed species (Romeiras, Catarino et al. 2016).

• What are current (sustainable) land use and VC management plans on Cabo Verde?

Sustainable land use management plans were reported by MMA and the adjacent community Associations only for the natural parks on Santiago and Fogo. Details were not obtained.

• What adaptive planning techniques are used?

Except the initial steps in cultivating and propagating some endemic and naturalised plants in some of the REFLOR-CV nurseries (notably some medicinal – but also some fruit trees such as baobab has successfully propagated by Associação Longuera) – few adaptive planning techniques appear to be practiced.
INIDA and the Botanic Garden, the REFLOR-CV project staff and several of the Associations possess knowledge on cultivation and propagation of specific NPs which if shared can aid planning and increase a more secure and larger supply of natural products which does not threaten wild populations and also allow for testing for resilience to climate change (which varieties do better under which conditions?).

ECONOMIC AND SOCIAL VALUES OF CURRENT AND POTENTIAL NP VALUE CHAINS

• Which products are NPs and are used, by who, why or for what uses, how is value is added in processing?

Over 200 natural products were identified as currently used on the islands, 84 of which are commercialised with value chains. Details of these products, their local and scientific names, uses, source locations and markets are provided in Appendix 5 List of NPs commercialized in Cabo Verde. These products are grouped into six major value chains, based on their uses and characteristics:

1. **Medicinal plants and products** – for human and animal use - fresh and processed (dried, and oils) sourced from forests, protected areas, field and fallows.
2. **Fruits** – for human consumption- fresh and processed (jams, juices, drinks)
3. **Forage and fodder** – for livestock - fresh and processed (dried)
4. **Knowledge products** – including information for tourists, for consumers, for the general public on ecosystems and species, and plant sales
5. **Artisanal products** – processed products such as baskets, crafts for the tourist market, paints and household utensils
6. **Ecosystem services** provided by natural products alone and in their habitats and ecosystems, which include countering soil erosion, acting as boundary markets, enhancing biodiversity richness, supporting pollination of crops and indigenous plants, contributing to land restoration and to a positive carbon balance.

• What are the economic and social threats (including resilience to climate change) to NP value chains?

o Changing cultural tastes such as higher status of “Western” products than traditional products e.g. locally made baskets and hats, and medicines - leading to loss of local knowledge of medical and artisanal products
o Covid pandemic continues to cause major economic and social repercussions for island economics eg low to no tourism sector, restricting inter-island and international travel
o Expected different reliance on NP VCs by rural households with different typologies – as identified by the REFLOR Social and Gender diagnostic report (Anjos, 2020), where the differences in incomes, access to control and benefits families with a female representative in Cape Verde (around 64%), in rural areas in the country (around 70%) are shown, especially in Santiago and Fogo, and less in Boa Vista.
o difficult access to credit and loans to implement farming and agroforestry (Johnson and Delgado 2003)
o Implications of access to and benefit sharing of profits ensuing from commercialised natural resources products based upon traditional knowledge, under the rules of the Convention on Biological Diversity – see Box 5.

• What opportunities are there to enhance social and economic resilience of NP value chains?

o High costs of imported goods mean that locally produced products can be economically attractive for local and tours market
o High levels of mobility (due to (re)migration for work and education (Anjos, 2020)and exposure to other cultures and products via tourism mean that many Cabo Verdeans are open to new products and services
o Learn more from other previous and current projects in Cabo Verde, and other natural product value chains initiatives in similar agro-ecological and island settings

• Which are potential NP chains in near future and why?

Potential chains for the near future (i.e. the next and last year of the REFLOR-CV project that it can support) project have been prioritized based on the criteria shown in Table 1.

TABLE 1 CRITERIA AND ASSESSMENT OF POTENTIAL NP VC OPPORTUNITIES

	Products contribute to people's & forests resilience?	Timescale to implement actions & generate income?	Potential to upgrade existing chains?	Inputs & knowledge exist in CV to upgrade?	Current markets &/or imports	Gendered benefits
High	Yes - Forest & People	Short term <1 year	Yes	Yes	Yes	Benefits mainly women & youths
Potential product chains	Medicinal plant processing, fruit processing, native plant nursery sales, heritage souvenir plants, knowledge products (public information, technical information sheets), fodder crop seeds, tourist information					
Medium	Forests or people – not both	Medium term > 3 years (post project, REFLOR 2, new projects& partners)	Partial	Partly	Yes (other countries, similar products or species	Benefits men & women equally
Potential product chains	Revamped & resigned artisanal products, beekeeping and hive products value chains, botanic guide training,					
Low	No	Long term > 5 years	No	No	No	Benefits men and existing businesses
Potential product chains	REDD+, carbon payments & PES projects, cultivation & domestication medicinal plants, native fruits and artisanal product resources					

Box 5 ABS under the Convention on Biological Diversity

Cabo Verde ratified the Convention on Biological Diversity (CBD) on in 1995 and the Nagoya Protocol in 2011. The CBD refers to “Access to genetic resources and the fair and equitable sharing of benefits” (ABS). The concept of ABS emerged from the Convention on Biological Diversity (CBD) process in 1992, and was further elaborated in the 2014 Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilisation. The objectives of the CBD framed ABS as “…the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding.” The Objectives (Article 1) and Use of Terms (Article 2) make clear, the original focus of ABS was on biotechnology and biodiscovery in high tech sectors like the pharmaceutical industry. At this time, some industry R&D programs collected samples of plants, insects, microorganisms, marine organisms, and other natural products, and screened these in a laboratory, usually far from the site of collection. Collections were mainly undertaken by research institutions like botanic gardens and universities, and companies.

Article 2. Convention on Biological Diversity, Terms

• “Biological resources” includes genetic resources, organisms or parts thereof, populations, or any other biotic component of ecosystems with actual or potential use or value for humanity.
“Biotechnology” means any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use.
• “Genetic material” means any material of plant, animal, microbial or other origin containing functional units of heredity.
• “Genetic resources” means genetic material of actual or potential value.
• “Technology” includes biotechnology
Article 2. Nagoya Protocol, Terms (building on those of the CBD)
• “Utilisation of genetic resources” means to conduct research and development on the genetic and/or biochemical composition of genetic resources, including through the application of biotechnology as defined in
• “Derivative” means a naturally occurring biochemical compound resulting from the genetic expression or metabolism of biological or genetic resources, even if it does not contain functional units of heredity.

Environmental values of current and potential NP value chains

5. WHERE DO NPS GROW AND THE SOURCED FROM AND WHAT QUANTITIES ARE AVAILABLE NOW AND IN PROJECTED FUTURE?

Natural products are found growing wild in Fogo and Santiago and to a more limited extent on Boa Vista. They are also managed on farms and fallows (see Box 1 for explanation and definition) and found and managed in forested and protected areas, which correspond with the Important Plant Areas identified by INIDA and IUCN on Cabo Verde, shown in Figure 5.

Figure 5 Map of Important Plant Areas of Cabo Verde
Source: (IUCN and INIDA 2017) https://www.protectedplanet.net/country/CPV

6. WHAT ARE THREATS TO NP RESOURCES?

Appropriate options for how and where to protect threatened species: At the moment just a small area (2.9%) of the Cabo Verde landmass (120 km2 of the 4,149 km2) is under protected area management. Thus many plants that are threatened may not be covered, although the map in Figure 5 shows that there is a high level of coincidence. The relationship between in-situ and ex-situ conservation of species has implications for local communities, public and private land owners and managers, the entire value chain and, of course, wild species. Identifying the conservation benefits and costs of the different production systems for especially medicinal plants should help guide policies as to whether species conservation should take place in nature or the nursery, or both.

- Uncontrolled harvesting + low awareness of threats of over harvest
- No sustainable harvest guidelines
- No customary practices controlling access

- Few controls on harvest outside of National Park
- Landuse change (to agriculture, around urban areas)
- Climate change (aridness, droughts, heavy rains)
- Loss of traditional knowledge of medicinal uses
- Goat and livestock grazing (especially Boa Vista)

7. WHAT ARE OPPORTUNITIES ARE THERE TO ENHANCE ECOLOGICAL RESILIENCE OF NP RESOURCES?

Natural products are found growing wild in Fogo and Santiago and to a more limited extent on Boa Vista. They are also managed on farms and fallows (see Box 1 for explanation and definition) and found and managed in forested and protected areas, which correspond with the Important Plant Areas identified by INIDA and IUCN on Cabo Verde, shown in Figure 5.

- Introduce threatened and endangered species into agricultural and/or agroforestry systems
- Develop seed banks for threatened and endangered species
- Restoration of threatened and endangered species and habitats
- Develop climate smart cultivars
- Remove threats eg competing invasive species and exotic pests and diseas

SUPPLY AND DEMAND GAPS FOR NP VALUE CHAINS

8. WHAT IS ESTIMATED CURRENT AND FUTURE DEMAND AND SUPPLY?

Given that most stakeholders in the six types of chains do not have written records of the volumes and values of their trade, it is not possible to estimate current supply. current supply is also a function of the supply and production of natural resources. Report on the current state of the forest and carbon stocks is being completed by REFLOR project, which means supply cannot yet be estimated. The current covid situation also means estimating demand is very difficult, especially for the tourist sector. An estimate of current and future demand and supply could not be made.

HOW SUSTAINABLE ARE CURRENT AND POTENTIAL NP VALUE CHAINS?

9. WHAT ARE THE THREATS TO THE SUSTAINABILITY OF EXISTING AND POTENTIAL VALUE CHAINS?

Uncontrolled harvesting due to indiscriminate cutting of shrubs for domestic consumption (firewood) and uncontrolled picking of plants (fodder, medicinal, food and cultural purposes) including endemic ones, have contributed to the sharp decline of native plant populations, aggravated by water erosion in steeply sloping areas, degradation and soil degradation (Medina, Gomes et al. 2015) and drought caused by climate change and irrigation. Whilst cutting firewood in national forests (430 t legally and 10 t illegally), which was noted from 2003 to 2015 appears to have halted (FAO 2020), outside protected areas in the islands it still occurs. In 2012, about 26% of the population used firewood / coal as the main energy source for cooking (Censo 2010). With the creation and implementation of the natural parks of Serra Malagueta and Chã das Caldeiras, logging and harvesting of plant species, especially endemic ones, have been banned within the limits of parks. Large areas of the parks have been restocked with endemic species like Tortolho (Euphorbia tuckeyana), Lorna (Artemisia gorgonum) and Lantisco (Periploca laevigata) and others, and recovery of some native vegetation is ongoing and visible, observed during the mission and interviews, and reported by scientists (Medina, Gomes et al. 2015).

Climate change has already been identified as a threat by the REFLOR-CV project partners to forest resilience in general and is equally a threat to natural product value chains.

Anthropogenic factors such as the proliferation and introduction of invasive species of animals and plants, landuse change from natural areas, habitat fragmentation and destruction, and development of uncontrolled economic activities (free grazing and pasture harvesting), poor organizational and legislative management, poor environmental knowledge and awareness, and climate change, continue to represent the main anthropogenic factors of pressure on biodiversity in Cabo Verde, both observed during the mission and interviews, and reported by scientists (Medina, Gomes et al. 2015).

Most of the **products and value chains are unregulated**, neither by formal laws and policies, customary traditions and practices, or by market-based governance arrangements such as collective action (i.e. associations and cooperatives) or voluntary sustainability standards. The exceptions are where community Associations are managing forested and natural areas. This means that most of the management and governance of the habitats and landscapes the natural products originate from is at a plot, farm or family area owned scale, and so ecosystems may not be integrally governed integrally. On the other side of the value chain, the markets where these products end up being retailed are also rather informal, with few rules apparently governing the products, such as quality, phytosanitary or hygiene standards.

OPPORTUNITIES FOR VALUE CHAIN DEVELOPMENT

10. HOW CAN FURTHER VALUE BE ADDED TO CURRENT AND POTENTIAL CHAINS?

Upgrading refers to the process of increasing economic competitiveness of enterprises, individuals and associations. It means that the dynamics and impacts of trade need to be understood before interventions are made. Upgrading options can be both horizontal and vertical - shown in Figure 6. This value chain analysis is not an end, but its results feed into decisions of private and public promoters of chain development. Private enterprises use results of value chain analysis to set out a vision and upgrading strategy for themselves and the value at large. Public agencies and development projects need results for implementing chain promotion projects and planning supportive actions. Chain analyses can also be used to formulate impact indicators and for monitoring value chain promotion projects. Value chain analysis is closely connected to the process of chain upgrading and value chain promotion. As this study should be useful to make progress towards the overall project aims, how these results are utilized, is no less important than the methodological aspects of chain analysis as such. Generating information and using it must be treated as iterative steps. Often, the need for in-depth analyses only arises as ideas for market development and upgrading emerge in the process. This initial survey is unlikely to contain the information relevant for decisions at stake by different stakeholders. In any case, value chain analysis is part of the larger process of value chain upgrading, which can take place in six main ways:

1. Horizontal coordination: between the same actors – e.g. harvester groups, trader cooperatives, mixed gender groups, etc.

2. Vertical coordination: between actors in different chain positions, e.g. between individual women or a women's group with their buyers or service providers

3. Product upgrading: to more sophisticated products with increased unit value (e.g. products complying with buyer requirements for higher quality, certification, food safety standards, traceability, packaging, etc.)

4. Process upgrading: more efficient transformation of inputs into outputs by reorganizing productive activities (e.g. applying new processing technologies, delivering on schedule, reducing waste, etc.)

5. Functional upgrading: acquiring new functions (or abandoning old ones) that increase the skill content of activities (e.g. grading, primary processing, bulking and storage, transporting; provision of services, inputs or finance)

6. New business actors: creating new products and chains from a timber or forest species previously collected for subsistence use.

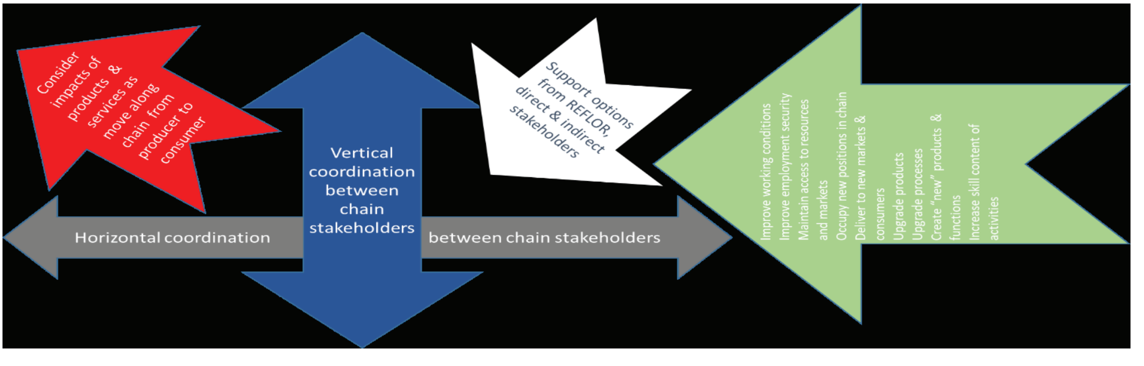


Figure 6 Value chain upgrading options

The upgrading opportunities identified on the three islands include:

- Adding value by transformation (jams, juices, jellies, wine, pills, creams, cosmetics...)
- Collective action for cultivation and bulking to enable more efficient value chains and upscaling of volumes
- Introduction of robust but administratively light weight quality control checks, information and standards by the sector- with input from specialists eg phytosanitary and medical experts
- Support for existing value chains in marketing, branding
- New product combinations – shown in Figure 7 and novel mixes of agricultural and natural products : Fogo cheese + herbs, Wine + herbs, Grogo + herbs, herbal cosmetics + clay (Boa Vista) inshofre (Fogo), fuel/charcoal/pellets
- Promoting value chains of products with multipurpose uses (e.g. Baobab: food (leaves, pulp), artisanal, beekeeping, medicinal uses, Tamarind; for juices, jams, medicinal use, Neem and Aloe Vera health and medicinal products)
- Re-use and revamp traditional knowledge to rebuild former value chains of wild, natural products that are abundant and not threatened (see Appendix 7) such as Moringa, Sisal and Prosopis
- Target "Warm markets": Diaspora, tourism, local markets, weekend CV recreational market
- Provide additional training, register and brand "Botanic Ecoguides"
- Carbon credits
- Link direct and indirect actors in chain
- Capacity building training after a comprehensive assessment of feasibility and willingness to engage for selected associations and entrepreneurs: Entrepreneurial skills, marketing and processing

New products inspired by natural products sold other markets

Combinations of local agricultural and natural products

Marketing based on br anding heritage and local pride

High quality transformat ion and processing

11. WHAT CAPACITY AND SUPPORT ARE AVAILABLE AND NEEDED TO MAKE NPS AND THEIR CHAINS SUSTAINABLE?

A wealth of opportunities appear to exist to build existing capacities to make NPs and their chains sustainable on the three islands. The main reason that they are not being implemented appears to be creating connections and linking individual people, businesses and organizations:

a. Technical information sheets (using scientific eg INIDA, Botanic Garden, Uni-CV, Uni Lisabon, Uni Wageningen, project experts + local ecological & ethnobotanical knowledge) – for harvesters, processors, nurseries and consumers
b. Information on multipurpose uses of natural products eg website, factsheets
c. Updated "Endemic & useful flora guide" (Gomes, Gomes et al. 2003) aimed at tourism, tourist guides and general public
d. Training local "traditional plant-based pharmacies"
e. Upgrading: Cultivation & domestication
f. Cultivation and selection and breeding of improved varieties of selected species with more desirable characteristics eg more flesh on Cimbron fruits, drought resilient etc.
g. Sale of endemic ornamental plants
h. Beekeeping (vs honey hunting) for multiple high value products & services
i. Forage seed sales
j. Souvenir plants
k. Enhance agroforestry, soil conservation and improvement techniques

2. HOW TO INTEGRATE NPVCS IN NURSERIES FOR REFORESTATION AND FOREST REHABILITATION

Integrating NP value chains into the upgrading of existing government nurseries in the REFLOR-CV target Islands can help the nurseries to serve as centres for plant production for reforestation and rehabilitation of degraded forestland areas, and contribute to livelihood improvements that benefit local people. As a precursor for NPs to be integrated into nurseries, an assessment of the current status is provided in Box 5.

Box 6 Current status of natural products in nurseries

Three main types of nurseries were identified during the study:

REFLOR-CV Project plant nurseries: financed and set up technically and with skills training with substantial ongoing assistance on state owned (central state or municipality) or privately owned (person(s) or entities) land. Employ people from the community. The long term exit strategy and financing post-project was not clear for all nurseries. Most have good success rates (germination and seedling survival) and grow seedlings for reforestation activities by the project, with some for sale and use by the community associations. Supply a limited range of endemic and naturalised, multipurpose agroforestry and forest trees, some endemic and useful plants. Seeds sourced locally in the wild by the community and multiplied via vegetative propagation. Major buyers are the REFLOR project and other donor funded projects. Nursery mangers, workers and community access information and knowledge on plants and markets mainly via project experts and partners. Land tenure of the land used for nurseries and the arrangements made about what will happen after the end of the Project need to be clarified as it has implications for the project exit strategy, and in general for the future business model(s) that need to be prepared for "after REFLOR".

Municipal plant nurseries: financed and set up technically and in terms of skills training by local municipality on municipal land and employ local people. Most have reasonable success rates (germination and seedling survival) and grow seedlings for reforestation activities by the council. Supply a limited range of exotic, naturalised and multipurpose exotic agroforestry and fruit trees and food crop plants. Main buyers are the municipality, some donor funded projects, with some sales to public (usually on demand). Materials purchased as seed and through vegetative propagation. Nursery mangers and workers access information and knowledge on plants and markets mainly via government.

Private plant nurseries: financed and set up technically and in terms of skills training by local entrepreneurs- usually plant lovers with family history in agriculture and/or with agricultural training and interest (eg coffee). Most on privately owned land and employ local people. Infrastructure e.g. irrigation and boreholes and scale differ and are major factors affecting profitability and scale. Some provide additional services such as suppling plants and landscaping to project developers and resorts. Most have reasonable success rates (germination and seedling survival) and offer a wide range of ornamental and some food plants, but few endemics. Main buyers are public individuals, businesses, some donor funded projects (usually on demand). Materials purchased as seed and through vegetative propagation. Nursery manger and workers' information and knowledge on plants and markets gained in diverse ways, including experimentation. Notable differences in the aims, products and management styles include:

• Perceptions of (agro)forestry differ widely per island and capacities
• Little competition between private, REFLOR & government nurseries – separate customers
• Some nurseries have propagation experience of endemics e.g. Mosterias
• None provide clients with written information on planting out and after care (e.g. nutrition, soils, water), supplied inputs or information relating to the value chain (e.g. scientific name, product information, characterises and use) - although some of this information was given verbally.

Environmental values of current and potential NP value chains

OPPORTUNITIES

- Diversify: As well as plants sell seeds and processed products
- Diversify plant product range: include more multipurpose trees, endemics and fuelwood
- Diversify services and sell knowledge e.g. agroforestry, composting, erosion control, terracing, water harvesting, climate smart agriculture practices etc.
- Act as experimentation and demonstration plots for agroforestry
- Engage all types of nurseries to share experiences and support them to develop pre-competitive, collective action e.g. media campaigns promoting endemic, medicinal, cultural values of plants and supporting of reforestation and degrades land rehabilitation
- Investigate possibilities for tax breaks and carbon payments
- Develop and disseminate guidelines for propagation of key NPs (medicinal herbs, baobab...)
- Provide (scientific and local knowledge based) technical plant information sheets for nurseries
- Entrepreneurial and marketing training

Note that many of these opportunities are linked to government funding, when available. Several tasks conducted by public institutions (MAA/Delegations, INIDA) could be argued to be mandates of these institutions.

3. POTENTIAL FOR ADOPTION OF FRUIT TREE NP VALUE CHAINS TO ENHANCE SFM & LIVELIHOODS

A wide variety of fruit trees are already grown on the three islands with plants and a range of seeds available. To facilitate the adoption of fruit trees and NP value chains development to enhance SFM for livelihoods improvement, opportunities

OPPORTUNITIES

- Change hearts and minds of consumers with information and communication about the traditional values of trees and natural resources
- Work out pricing schemes that provide an attractive incentive to plant trees – possibility with fiscal incentives and community actions supporting and encouraging tree planting
- Support nurseries and service providers to develop planting and aftercare packages and aftercare eg Tree Clinics – to ensure follow up
- Promote a value chain approach – offering not just plants but also planting, technical and management advice and services to help producers/processors upgrade along the value chain
- encourage experimentation and demonstration projects for agroforestry systems supported by extension officers and community led officers (as a paid business model) and medical clinics
- Set up regular exchanges between stakeholders on current agroforestry practices: Fogo coffee systems, Canaries/ Portugal/Senegal AF systems

• Get innovators, entrepreneurs & influencers on board as ambassadors
• Skill building and technical information transfer to farmers and processors with fruit and manufacturing sectors (juices, jams, soaps)
• Student MSc thesis and internships to conduct and document experiments on fruit and natural product agroforestry models and set-up demonstration plots (Uni-CV, University of Lisbon, Wageningen University)

POTENTIAL PRODUCTS AND SPECIES

• Beekeeping products: honey, wax, propolis and pollination services
• Fruits: Propagation and training on multipurpose species such as baobab and tamarind
• Underused species: Moringa, Baobá, Babosa and Jatropha,.....
• Historically used species: Sizal, Urzela, Oricella, Panos di terra, Riccinus, Purgueira etc.

4. INTEGRATING NATURAL PRODUCT VALUE CHAIN DEVELOPMENT INTO RESILIENT FOREST AND LAND USE MANAGEMENT TO BENEFIT CABO VERDEANS

To integrate and develop natural product value chains into the three Island's climate resilient forest management plans, adaptive planning techniques, sustainable land use and management and livelihood improvement opportunities for the benefit of local people, and considering both women and men the following are recommended:

INCLUDE NATURAL PRODUCT VALUE CHAINS IN FOREST AND PROTECTED AREA MANAGEMENT PLANS

• Zoning and planning production of fodder, forge, medicinal plants, fruits and resources for artisanal products with clear definitions of species
• Harvesting guidelines including seasons and prohibited /protected species
• Agreements for common on access to resources and benefit sharing
• Agreements on monitoring and enforcement responsibilities and penalties

DEVELOP HARVEST, PROCESSING & USE GUIDELINES AS PART OF CLIMATE SMART AGRICULTURE AND FOREST PLANS

• Technical information and standards to guide producer/processors and provide consumers with information (e.g. labelling)
• Media information packs on the values of natural products and importance of their trade for specific people and communities

EXPERIMENT, DEMONSTRATE AND DOCUMENT DIFFERENT AGROFORESTRY-CROP SYSTEMS

• Sustainable land management means experimenting not just with the socio-economic

system but also what works in each ecological and land use system.
• Give assignments and have competitions for university students to develop new agroforestry-crop systems designs including costs-benefits and profit analysis and timescale of product and cash flows
• Promote the setup of demonstration farms next to nurseries
• Promote Municipality endemic and medicinal gardens as sources of public information to show the value of natural product value chains

INCREASE THE IMAGE AND SOCIO-ECONOMIC, ENVIRONMENTAL AND ECONOMIC VALUE OF NPS

• Communication and marketing can be used for "Hip" rebranding of traditional knowledge
• Engage with top chefs, musicians, resorts, influences, artists, designers, Exhibitions and Fairs
• Organic and natural values
• Cultural value (Saudade)

LINK UP DIRECT AND INDIRECT VALUE CHAIN ACTORS WITH EACH OTHER

The project can play an key role in linking up indirect actors:

o Media
o Microfinance
o INIDA, Botanic garden, Universities CV

• Direct actors:

o Horizontal linking especially harvesters, processors and Botanic tourism guides
o harvesters with nurseries

ACTIVELY ADDRESS THREATS TO SUSTAINABILITY OF NP VALUE CHAINS

• Assess which pragmatic regulations and control are needed and how to ensure sustainable harvest, use and trade via formal and informal
• Develop community levels solutions for households with difficult access, uncertain tenure and land parcellation and ensure the procedures applied take into account gender biases in tenure and rights registration (ex. co-titling when applicable)
• Market coordination to avoid the history of overexploitation repeating itself –see Appendix 7– before specific products become established
• Develop harvesting and processing guidelines with stakeholders in the value chains
• Work to ensure a balance of women's power and voice in Associations
• Soil salination and rain water harvesting in Boa Vista via smart agricultural techniques

5. RECOMMENDATIONS FOR ACTION

Based on the findings presented in this report, the following actions are recommended for the short term, medium term and long term regarding specific natural product value chains and concerted actions to address threats to resilience and sustainability of the value chains in Cabo Verde are recommended for the REFLOR-CV project. Short term actions focus on what the REFLOR-CV project could do in the last year of the project, whereas medium and long term actions are those are those that take longer time scale to implement and see outcomes of, that the FAO, the Cabo Verde government particularly the Ministry of Environment and agriculture as the main project partner, community associations and other partners in the project can continue in medium term (two to five years) and long term (five years and more).

Addressing threats to resilience means actions that address and link social and ecological systems. Social systems include the rules governing the value chains and their daily management, and the stakeholders - both individuals and organisations involved in the chains. Ecological systems refer to the natural ecological and agricultural systems where these products currently originate from and in future could be produced.

Product value chains	Actions	Main stakeholders
Knowledge products	13. Develop technical information sheets for common medicinal and fruit products including uses, nutritional, health and chemical properties, processing techniques, propagation and climate change resilience tips for cultivation	REFLOR-CV project staff, MAA, INIDA, Uni-CV, Botanic Garden, private, municipality and REFLOR, nurseries
	14. Develop and put in place public information/signage at strategic project locations concerning endemic plants	REFLOR-CV project staff, community associations, Municipalities, botanic Gardens, municipalities in project, government & private plant nurseries, landscape architects and project developers
	15. Provide information on endemic plants (propagation, use and cultural & environmental values) for use in landscaping tourism and public spaces	
	16. Organize exchange visit/meetings with other suppliers of souvenir-heritage plants Experiences with commercialising souvenir plants from Senegal (eg www.BabaobAfrica.com) and Suriname (eg Stichting Tresor https://stichtingtresor.org)	REFLOR-CV project staff, private and project nurseries, community associations
	17. Revision, reprint and online version of the Endemic Plants and Indigenous Trees of the Cape Verde Islands booklet (GTZ/UNEP 2003)	REFLOR-CV project staff, INIDA, Uni-CV, traditional medicinal plant healers, Community associations

Knowledge products	18. Organize exchange visit/meetings between private, public and REFLOR nurseries, encourage and support building an network to share information on endemic and endangered plants and their propagation	REFLOR-CV project staff, government/umnicplaity , private and project nurseries, community associations

Justification for concerted action	Actions	Main stakeholders
Revise frameworks for managing and governing value chains	19. Inventory which endemic and endangered species used for medicines and how they are addressed in regulations (and customary governance) to ensure that frameworks for managing are adequate to meet immediate threats	MAA, Uni-CV, INIDA, other universities working on the area e.g. Lisbon), FAO project, community associations
	20. Organise a one-off meeting (online and in person if possible) to exchange (again!) lessons from previous projects	MAA, FAO, UNDP GEF, WHO, MinS, MTT, NGO partners of previous projects,
	21. Set up regular cross-sectoral, intra-island and cross-ministerial coordination meetings	
	22. Check if and how natural product value chains are addressed and included in the sustainable land use management plans for natural parks on Santiago and Fogo, and by community associations	REFLOR-CV project, MAA, Community associations
	23. National Parks engage and discuss with communities and harvesters from outside communities, how to best control and monitor harvests inside and outside of park	MMA, National park staff, communities, community associations
Address threats to natural plant resources and VC resilience	24. Encourage Community Associations to develop harvesting plans, sustainable harvest guidelines, rules and systems to monitor and control access and goat and livestock grazing (especially Boa Vista)	Community associations, MAA, FAO project

Address threats to natural plant resources and VC resilience	25. Develop and distribute Media information packs on the values of natural products and importance of their trade for specific people and communities in REFLOR project Communication and marketing can also be used to support “hip” rebranding of traditional knowledge.	FAO project staff, MAA, media
	26. Engage with top chefs, musicians, resorts, influences, artists, designers, via exhibitions and fairs to promote NP and how they can be sustainability developed, publicizing the organic nature and natural values of natural products and cultural values	FAO project staff, MAA, media & value chain stakeholders
	27. Online or physical meeting to exchange and learn lessons between community associations and key interested producers, harvesters and retailers interested to develop natural product value chains further, to avoid boom and bust cycles and ensure differentiation and specializations – collaboration rather than competition.	Community associations, MAA, FAO project, stakeholders
	28. Give assignments and have competitions for school and university students to develop new agroforestry-crop systems designs including costs-benefits and profit analysis and timescale of product and cash flows	Community associations, FAO project, Universities (CV and international eg Wageningen and Lisbon), Schools
	29. Setup demonstration farms next to nurseries	Community associations, FAO project, government/municipal and project nurseries, Schools
	30. Municipality endemic and medicinal gardens as sources of public information to show the value of natural product value chains	Community associations, FAO project, Botanic Garden, government/municipal and project nurseries, Schools

Address threats to sustainability of current NP value chains	31. Assess which pragmatic regulations, monitoring and controls are needed and how to ensure sustainable harvest, use and trade of medicinal plants and fodder via formal (regulations) and informal (community level) rules	MAA, FAO project
	32. Develop community level solutions for households with difficult access to natural resources- especially medicinal plants, fuelwood and fodder with uncertain tenure and land parcellation	
	33. Work to ensure a balance of women's power and voice in Community Associations	
	34. include soil salination and rain water harvesting in training on smart agricultural techniques in nurseries and demonstration plots in Boa Vista	

LINK UP DIRECT AND INDIRECT VALUE CHAIN ACTORS WITH EACH OTHER

Product value hain	Actions	Main stakeholders
Artisanal products	1. Training artisans and craftspersons on sustainable resource collection and cultivation 2. Training potential artisans (building on previous projects) on traditional techniques and processes and on revamped and resigned products for new markets 3. Connect value chain actors: traditional craftspersons with artists, marketers (eg internet based), HORECA to develop new products, quality standards and harvest	Artisans, Community associations, MTT, TVET, Câmara Municipal São Filipe
Beekeeping and hive products	4. Training potential beekeepers on sustainable beekeeping and hove product processing 5. Connect value chain actors to develop honey and hive products and sustainable beekeeping: traditional honey hunters, market retailers, beekeepers, universities	Honey hunters, MAA, retailers, beekeepers, African and international beekeeping associations, Universities (eg Wageningen)

Souvenir - heritage plants	6. Develop souvenir-heritage plant value chains grown and sold via nurseries, tourist shops, markets, Cidade Velha, airport & resorts and authorised via MAA to clarify permitting and phytosanitary guidelines and controls that distinguish cultivated plants from wild collected plants.	REFLOR-CV project staff, project nurseries, MAA, MTT
Woodfuel	7. investigate potential and feasibility of developing value chains of invasive and exotic species for woodfuel eg briquettes and small scale biogas eg Prosopis, jatropha- making explicit the different attitudes towards these species	REFLOR-CV project staff, project nurseries, MAA, Ministro Da Indústria, Comércio E Energia
Information: botanic guide training	8. Develop a recognised, specialised training and certificates for botanic guides and marketing actions to create awareness of specialised botanic guides eg websites, via tourist guide associations (existing and revitalised), with Municipalities and tour operators	INIDA, University Tarrafal & Santa Catarina, traditional medicinal healers, MinS, tourism guide association
New product value chains	9. Investigate feasibility and develop new product value chains for multipurpose products based on underused but valuable species such as neem, moringa, baobá, babosa, jatropha, riccinou, aloe vera and reviving historically used species such as sizal, riccinus and purgueira 10. Investigate feasibility and develop new product value chains for commonly found exotic-naturalised species are little used and have low levels of value adding e.g. neem, jatropha, riccinou, aloe vera 11. Investigate feasibility and develop new product value chains for large scale production of underused for industrial use (example: Aloe vera) 12. Investigate feasibility and develop new products based on medicinal and flavoured herbs used in combinations with other local products (such as wines, grogo, Fogo cheese)	2nd REFLOR-CV project & private sector partners (eg harvesters, , nurseries, processors, retailers, manufacturers) support NGOs, community associations, financial & credit organizations,

Information	13. Valorising traditional medicinal plant knowledge eg through community medicinal health centres	2nd REFLOR-CV project, MAA, community associations, traditional medicinal healers, MinS, municipalities, Universities, INIDA
	14. Research on fodder nutritional values for animals, contribution to incomes and nutritional and food security, climate change threats	REFLOR-CV project, INIDA, Uni-CV, other universities (eg Wageningen, Lisbon) MAA, fodder harvesters, community associations, livestock owners

Justification for concerted action	Actions	Main stakeholders
Resilience enhancing opportunities	15. Introduce threatened and endangered species into agricultural and/or agroforestry systems 16. Develop seed banks for threatened and endangered species 17. Restoration of most threatened and endangered species and habitats outside of National Parks (based on identification of Important Plant Areas – see) 18. Develop climate smart cultivars 19. Remove threats e.g. competing invasive species and exotic pests and diseases	MAA, INIDA, Universities NGOs, Community associations
Address threats to natural plant resources and VC resilience	20. Sustainable land management experiments in each island on different ecological (and altitude) zones and land use systems 21. Setup demonstration farms next to nurseries 22. Municipality endemic and medicinal gardens as sources of public information to show the value of natural product value chains	
Address current VC sustainability threats	23. Market coordination to avoid the history of overexploitation repeating itself – see Appendix 7- before specific products become established	MAA, FAO project, VC stakeholders

LONGER TERM ACTIONS

Product value hain	Actions	Main stakeholders
REDD+, carbon payments & PES projects	1. Development of REDD+ projects and carbon credit projects	MAA, Ministro Da Indústria, Comércio E Energia
Cultivation & domestication medicinal plants	2. Develop “Community pharmacies” based on local ecological and medicinal knowledge of plants, recognize traditional medicinal plant healers, document their knowledge (being aware of ABS ad completion aspects) and their practices and products 3. Encourage and support increased cultivation of natural and wild medicinal plants providing raw materials for health products 4. Governmental financial and fiscal incentives for local production of wild, natural plants for medical use	MAA, MinS
Native fruits	5. Encourage and support increased cultivation of plants providing raw materials for artisanal products 6. financial and fiscal incentives for local production of artisanal products (in contrast to imported products	MAA, MinS
Artisanal raw materials	7. Encourage and support increased cultivation of plants providing raw materials for artisanal products 8. financial and fiscal incentives for local production of artisanal products (in contrast to imported products)	MAA, Ministro Da Indústria, Comércio E Energia
Woodfuel	9. Encourage and support increased cultivation of plants providing raw materials for biomass energy 10. financial and fiscal incentives for local production of wood and biomass energy (in contrast to imported products)	MAA, Ministro Da Indústria, Comércio E Energia

Justification for concerted action	Actions	Main stakeholders
Resilience enhancing opportunities	11. Restoration of threatened and endangered species and habitats	MMA, Community associations, NGOs, `private landowners
	12. Develop climate smart cultivars of wild natural plants and ensure gene and seed-banks exist of endemic and endangered species	MMA, Uni-CV, other universities and research organizations, INIDA
	13. Inventory the main invasive species competing with threatened and endangered plants, priorities and systematicities their removal, accompanied by public information campaign	MMA, Uni-CV, INIDA, Community associations, NGOs, private landowners

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APPENDIX 1 APPROACH TO DATA COLLECTION AND ANALYSIS

The methods used to gather the data for this study are based on the **FAO Market Assessment & Demand (MA&D) methodology** and the **M4P VCD methodology**.

Three methods were used to collect data to answer four main questions to address the aims of the consultancy:

1. Who are stakeholders and frameworks for managing and governing NP value chains?
2. What are the economic and social values for current and potential NP value chains?
3. What are the environmental values for current and potential NP value chains?
4. How sustainable are current and potential NP value chains?

Literature review

A review was conducted of FAO project documents, grey literature, databases and maps (e.g. FAO stat, government data) and academic literature (see the References section of this report) to determine:

- Main stakeholders and frameworks for managing and governing NTFP value chains known
- Some of the main NP value chains and their environmental, cultural and use values
- Sustainability issues of current NP value chains

Survey

A survey (see Appendix 2 Survey) was conducted by the REFLOR-CV project team with nine Associations (Associaçãos) prior to the mission to establish:

- Main stakeholders and frameworks for managing and governing NP value chains known
- Estimated economic and social values for some current NP value chains
- Some potential NP VCs

Mission – interviews, observations and meetings

Thirty three interviews were held with key informants[4] and stakeholders[5] of current and potential NP value chains, the opportunities and barriers during field visits in the field in 16 sites in Santiago, Fogo and Boa Vista islands. Observations, photos and the interviews were used to map where NPs are harvested and grown and potential areas for restoration. Current practices and potential for cultivation of NP was assessed by visiting nine nurseries. Eleven market and retail shop visits, observations and photos helped understand the values, where,

[4] Key informants can include people involved in NTFP value chains with broad knowledge of the chains and context in Cabo Verde, such as FAO project focal points, association leaders, business owners and managers, community leaders and representatives, CSOs, NGOs, government officials, consultants and academics.

[5] Stakeholders are those directly involved along the value chain - from land owners, farmers, harvesters, to individuals, enterprises and community associations involved in processes in the chain such as e.g. seed production, NTFP harvest, processing and transformation, marketing, retailing, warehousing, transport, export, and indirect stakeholders such as financial and credit organisations, input suppliers, government agencies, NGOs, knowledge and research organisations, media etc.

how and when NPs are sold on Cabo Verde. Meetings with FAO staff and a wrap up meeting with FAO and selected stakeholders provided additional data to answer the questions and verified preliminary findings. These datasets were combined to identify:

• Current and potential stakeholders (including marginalised or excluded)
• Opportunities and pathways for improvements in frameworks for managing and governing NP value chains
• Main and potential NP VCs with indications of economic, social and environmental values for current NP value chains
• Sustainability of past and current NP VCs and lessons learnt/issues for potential NP VCs
• Threats and opportunities for improvement and capacity building of NP VCs

Please see Appendix 4 for the data collection observation locations, survey and interview respondents. In Appendix 5 is the mission schedule with details of how, where and from whom the data was collected. The qualitative data from all sources were combined and analysed together. Data on the natural products commercialized was combined into a table in Appendix 6, which was verified with FAO project team members for correct local and scientific names. Quantitative data on values were recorded, with ranges and averages provided on the different markets - but could not be extrapolate to provide an overall market size or valuation of markets for NPs from the three islands. Such an analysis would require more in-depth, long term data collection during different seasons.

The surveys, interviews and observations were made at the sites shown in the map in Figure 4.

The islands covered by the REFLOR-CV Project are quite different. The Cape Verde archipelago, of volcanic origin, can be divided from the physiographic point of view into (i) islands with steep and rugged mountains up to 2,800m (Brava, Fogo, Santo Antão, Santiago, São Nicolau, São Vicente), and (ii) islands with a more or less flat terrain not exceeding 450m, including sand dunes in coastal areas (Boa Vista, Maio, Sal). Santiago and Fogo, as islands of the first group, have ecological and climatic zones differentiated according to the level of altitude. Forest characteristics (including trees, shrubs and herbaceous formations) vary in terms of the type of trees, their density, degree of cover, state of vegetative vigour, size of plants, etc. Boa Vista, as an island of the second group, is generally flat and sandy, and tree groves characteristics are different, with some areas covered by Prosopis juliflora and with date palms). The classification used here is shown in Table 2.

Forest classification	Arid coastal zone consisting of herbaceous steppe, with shrubs or small trees occasionally with forestry type forestry	Semi-arid zone with marginal agriculture and the same logic of afforestation as the arid coastal zone	Sub-humid areas with better rainfed agricultural areas, endemic plant species, woody shrub and tree species, with low density	Humid areas with tall grasses and numerous endemic species, with forest stands of diversified species
Altitude (meters)	0-200	200-400	400-700	Over 700
Rainfall	Low ◄		►	Higher

The 1994 National Forest Action Plan (PAFN) summarizes Cape Verde's five land use systems:

i) Arid lowlands destined for extensive goat breeding. Boa Vista, almost entirely, corresponds to this.
ii) Semi-arid lands with extensive livestock farming of goats and maize and bean crops, with little or no profitable production.
iii) Sub-humid and humid lands where congo beans, roots, tubers and corn are grown, including Santiago and Fogo, with many variants (eg goats and cattle in permanent housing or tied to a paddock, presence of fruit trees, fruit growing)
iv) Humid lands, at altitude, where precipitation affect crops and forest species, with three main 3 variants: forestry; coffee, fruit and congo beans; and two crop seasons.
v) Irrigated crops with intensive agricultural activities (e.g. sugar cane, banana, horticulture, etc.).

The REFLOR-CV Project diagnostic highlights the importance of the forest for Cape Verde: in general, the soils in the country are shallow and have a high content of sand and stones, being poor in organic material and often unsuitable for agricultural use. There are frequent and strong winds from the Northwest, which, in the absence of vegetation cover, contribute to soil degradation; the generally adverse environmental conditions of the islands have a negative impact on the density and growth of the planted trees, with an impact on the productivity and quality of the forest; climate change affects the archipelago, among others through the risks of more frequent extreme events, such as storms, floods and droughts, as well as shorter rainy seasons, which further aggravate the desertification process; the impacts are immediate, on means of subsistence, infrastructure, sanitary conditions, recharge of reservoirs and agricultural productivity; and for Boa Vista, desertification is manifested by the loss of vegetation cover and by the change of coastal sand dunes, under the combined influence of all climatic factors, particularly strong winds from the Northwest and over grazing with goats, cows and donkeys, becoming a serious threat to urban areas. The environmental functions of forests are thus fundamental for Cabo Verde, namely for the protection of soil and water, for the maintenance of the islands' tourist value and for local economies (through products such as firewood, pasture, etc.).

Activity	Methods	Time planning				
		November 2020	December 2020	January 2021	February 2021	March 2021
Literature review	• Literature review					
Survey	• Online and in-person					
Mission	• Interviews with stakeholders • Market visits • Field visits • Stakeholder meetings on MA&D • Wrap up meeting FAO					
Reporting						

Table 3 Study timescale

APPENDIX 2 SURVEY

Aim: The aim of this survey is to provide preliminary information to answer the four main questions on the stakeholders, environmental, social and economic aspects of NTFPs (Non-Timber Forest Products) Value Chains Development as part of the FAO Building Adaptive Capacity and Resilience of the Forestry Sector project in Cabo Verde.

Name of person completing the survey ______________________________

Title/Position/role ______________________________

Organisation ______________________________

Date ______________________________

Consent to be interviewed and name/organisations to be referred to the project report:

☐ Yes ☐ No

Request for anonymity ☐ Yes ☐ No

1. What is the definition of NTFP used on Cabo Verde

In the law:

By the FAO project, communities and businesses, what does the term "NTFP" mean to you:

Does the term NTFP include:

Exotic species (i.e. not native to Cabo Verde, introduced species) ☐ Yes ☐ No

Native/indigenous, forest species ☐ Yes ☐ No

Native/indigenous, natural products (i.e. not farmed, collected in the wild, from nature)

☐ Yes ☐ No

Tree products ☐ Yes ☐ No

Agricultural products ☐ Yes ☐ No

2. Which NTFPs are regulated or protected by law, and by which laws (including management plans and land use plans)?

NTFP local name	NTFP scientific name	Law

(e.g., Artemisia gorgonum, Campylanthus glaber, Sarcostemma daltonii, Satureja forbesii), woody fuel

3. Do the laws work well? are they applied? if not, why not
4. Are there also customs which "regulate" which NTFPS are used, by who and how they are used? If yes, explain
5. Do you know of any inventories of NTFPs for Cabo Verde?

NTFP local name	Santiago		Fogo		Boa Vista	
6. Which are the FIVE most used NATIVE NTFPs for household (domestic) consumption & what are they used for?	NTFP name 1. 2. 3. 4. 5.	Uses	NTFP name 1. 2. 3. 4. 5.	Uses	NTFP name 1. 2. 3. 4. 5.	Uses
7. Which are the FIVE most used EXOTIC NTFPs for household (domestic) consumption & what are they used for and where are they sold?	NTFP name 1. 2. 3. 4. 5.	Uses	NTFP name 1. 2. 3. 4. 5.	Uses	NTFP name 1. 2. 3. 4. 5.	Uses
8. Which are the FIVE most used NATIVE NTFPs sold/commercialised, what are they used for and where are they sold?	NTFP name 1. 2. 3. 4. 5.	Uses & where sold	NTFP name 1. 2. 3. 4. 5.	Uses & where sold	NTFP name 1. 2. 3. 4. 5.	Uses & where sold
9. Which are the FIVE most used EXOTIC NTFPs sold/commercialised, what are they used for and where are they sold?	NTFP name 1. 2. 3. 4. 5.	Uses & where sold	NTFP name 1. 2. 3. 4. 5.	Uses & where sold	NTFP name 1. 2. 3. 4. 5.	Uses & where sold

NTFP local name	Santiago		Fogo		Boa Vista	
10. For commercialised NTFPs, where are they sold? E.g. location and name of markets, shops, traders, ports etc.	NTFP name	Location	NTFP name	Location	NTFP name	Location
11. Which NTFPs are currently grown in nurseries, what are they used for and where are the nurseries?	NTFP name & use	Nursery name & location	NTFP name & use	Nursery name & location	NTFP name & use	Nursery name & location
12. Which NTFPs have been promoted by projects/government, NGOs etc, why and where?	NTFP name	Why & where	NTFP name	Why & where	NTFP name	Why & where
14. On what kind of land are the most harvested NTFPs found (egg in forests, farms, etc)? And who manages this land and the NTFPs on it?	NTFP name	Landuse type & management	NTFP name	Landuse type & management	NTFP name	Landuse type & management

NTFP local name	Santiago		Fogo		Boa Vista	
15.Which NTFPs do you think have most potential to be part of restoration, reforestation or agricultural schemes? And where/ which communities? and why?	NTFP name	Village Why?	NTFP name	Village Why?	NTFP name	Village Why?
16. Which NTFPs do you think have most potential in cultivation/agriculture? And where/which communities?	NTFP name & use	Village	NTFP name & use	Village	NTFP name & use	Village
17.Where (identify on a map if possible) and when have NTFPs been planted as part of agricultural, reforestation and restoration schemes? When? And have these projects been successful?	NTFP name	Where, when, success?	NTFP name	Where, when, success?	NTFP name	Where, when, success?
18. Who are the contact persons in the communities regarding NTFPs on each island? Tree nurseries | Harvesters Farmers | Processing and transformation | Trading/retailing enterprises | Exporters						

NTFP local name	Santiago		Fogo		Boa Vista	
Regulations/government officials (forest, agriculture, trade, customs, phytosanitary, etc.) NGOs/CSOs Others e.g. experts, researchers						
19. For which NTFPs do you see most opportunities, where (show on map if possible) and why? (i.e. growing potential, resistant to fire, resistant to drought, opportunities for commercialisation, high demand, other reasons)	NTFP	Reason	NTFP	Reason	NTFP	Reason
20.Which NTFPs are threatened or endangered and why? (e.g. over harvested, fire, climate change, insufficient rain, land use change theft, etc)	NTFP name	Where, when, success?	NTFP name	Where, when, success?	NTFP name	Where, when, success?

20. How do people obtain and share information about NTFPs (harvesting, cultivation techniques, processing techniques, selling prices etc)?
21. Are there NTFPs that used to be important (used or traded) that are no longer used or no longer sold? Which and why?
22. Which/who are good examples of people/organisations/businesses that have sustainably exploited NTFPs?
23. Can you provide copy of maps about land use planning, fire threats and actual and predicted climate change on the islands?
24. Do you think there is other information which is important for me to know about NTFP value chain development?
25. Do you have questions for me?

Thank you! Next steps: meetings in November, preliminary and final report in December and January

APPENDIX 3 DATA COLLECTION OBSERVATION LOCATIONS, SURVEY AND INTERVIEW RESPONDENTS

Date	Respondents	Organisation	Contact	Location	Methods
19 December 2020 19 January 2021	Maria Afonso S.Tavanes Maria Jezus	Associação Amigos de C. Serra Malagueta Nursery		Santiago	Survey Interview Observation
18 December 2020 26 January 2021	Socorro Andrade Montrond	Associação Chã das Caldeiras Monthino Nursery		Fogo	Survey
14 January 2021 26 January 2021	Jose da Luz	Associação Planalto Nursery		Ruiz Vas, Santiago	Survey Interview Observation
17 December 2020	Marcelino Furtado	Associação Pedra Comprida		Santiago	Survey
17 December 2020 23 January 2021	Carlos Morais	Associação Onze Estrelas Clube de Bofareira		Boa Vista	Survey Interview Observation
18 December 2020	Luciano de Silva	Associação Atalaia		Fogo	Survey

Date	Respondents	Organisation	Contact	Location	Methods
27 November 2021	Vítor Cabral Goncalves Wilson Cleidir da Veiga Lopes	Associação Entre Picos de Reda		Santiago	Survey
17 December 2020 23 January 2021	Pancrecio	Associação Arbera Rabil		Boa Vista	Survey
4 December 2020	Maria de Jezus Vanela	Associação Pé de Montes		Santiago	Survey
19 January 2021	Herbert Elba	Serra Malagueta Park natural		Santiago	Interview
18 January 2021	Zuleika Levy	Flor de Lakakan	flordelakakan@gmail.com 9912335	Santiago	Interview
16 January 2021	12 retailers	Mercado municipal Sucuperia mercado		Praia, Santiago	Observation Interviews
	Amelia Mindez Valeria	Traditional plant healer		Buen Trado	Interviews
16 January 2021	2 retailers	Mercado municipal Sucuperia mercado		Assomada/ Santa Catharina, Santiago	Observation Interviews

Date	Respondents	Organisation	Contact	Location	Methods
19 January 2021	Delegate	MMA		Assomada, Santiago	Interview
21 January 2021	Samuel Gomes Isildo Gomes	INIDA	Gomessamuel60@gmail.com +238 9911203 isildogomes@hotmail.com +238 9959924	Sao Jorge, Santiago	Interview
21 January 2021	Rosa Rocha	Uni-CV	rosalopesrocha@gmail.com +238 9729411	Praia, Santiago	Interview
28 January 2021		Associação Longuera		Sao Jorge, Santiago	Observation Interview
21 January 2021	Paula Dias Monterio	DNA, BioTur		Praia, Santiago	Interview
22 January 2021		MMA		Sal Rei, Boa Vista	Interview
22 January 2021	Joao Mosso Mendes Claudio Mendonca	Câmara Municipal		Sal Rei, Boa Vista	Interview
22 January 2021		Associação Varandinha		Sal Rei, Boa Vista	Interview
22 January 2021	Sandro Gomes			Sal Rei, Boa Vista	Interview

Date	Respondents	Organisation	Contact	Location	Methods
27 November 2021	Vítor Cabral Goncalves Wilson Cleidir da Veiga Lopes	Associação Entre Picos de Reda		Santiago	Survey
17 December 2020 23 January 2021	Pancrecio	Associação Arbera Rabil		Boa Vista	Survey
4 December 2020	Maria de Jezus Vanela	Associação Pé de Montes		Santiago	Survey
19 January 2021	Herbert Elba	Serra Malagueta Park natural		Santiago	Interview
18 January 2021	Zuleika Levy	Flor de Lakakan	flordelakakan@gmail.com 9912335	Santiago	Interview
16 January 2021	12 retailers	Mercado municipal Sucuperia mercado		Praia, Santiago	Observation Interviews
	Amelia Mindez Valeria	Traditional plant healer		Buen Trado	Interviews
16 January 2021	2 retailers	Mercado municipal Sucuperia mercado		Assomada/ Santa Catharina, Santiago	Observation Interviews

Date	Respondents	Organisation	Contact	Location	Methods
22 January 2021		Associação Jao Galago Jambra		Boa Vista	Interview
23 January 2021		Associação das Mulhereres do Norte do Boa Vista		Boa Vista	Interview
23 January 2021		Associação Para o desenvolvimento da Agricultura e da Pecunaria na Zona Norte do Boa Vista		Boa Vista	Interview
23 January 2021		Pottery		Boa Vista	Interview
25 January 2021		Câmara Municipal		São Filipe, Fogo	Interview
25 January 2021		MMA		São Filipe, Fogo	Interview
26 January 2021		Mercado municipal		Mosterias, Fogo	Observation
27 January 2021		Câmara Municipal Câmara Municipal Nursery		Santa Catarina, Fogo	Interview Observation
26 January 2021	Loudindo Mendes Carla Correa	Associação Cutelo Alto		Cothelo, Fogo	Interview Observation

Date	Respondents	Organisation	Contact	Location	Methods
26 January 2021	Marilena, Ekvity, Lenine	REFLOR		Mosterias, Fogo	Interview
27 January 2021		Câmara Municipal		Mosterias, Fogo	Observation
27 January 2021		REFLOR nursery Associação Mosterias-Tras Associação Pai Antonio Associação Cutelo Alto		Mosterias, Fogo	Interview Observation
27 January 2021	Orlandhino & Timas	Orlandhino nursery		Mosterias, Fogo	Interview Observation
27 January 2021	John John & Pauolo Renate	Plant nursery Fogo Coffee Spirit		Mosterias, Fogo	Interview Observation
28 January 2021	Maria & 6 members	Associação Longuera Nursery		Longuera, Santiago	Interview Observation
28 January 2021	Zeca	Ecocentra (nursery)		São Domingos, Santiago	Interview Observation
29 January 2021	Luisa, Maria, Edmoind Marta Nadia, Solange, Carla	DGASP		Praia, Santiago	Interview

Date	Respondents	Organisation	Contact	Location	Methods
29 January 2021	Marodinho “Papa des plantes”	Botanic Garden		Sao Domingos Santiago	Interview Observation
29 January 2021		Sucuperia mercado		Praia, Santiago	Interview Observation
31 January 2021	Ravy Vaz Juan	Private tourism guide Serra Malagueta	9124874 vazravy@gmail.com Facebook RavyVaz	Serra Malagueta Santiago	Interview Observation
1 February 2021		4 supermercados in Praia Badia Praia Shopping		Praia, Santiago	Observation

APPENDIX 4 MISSION SCHEDULE

Day & Date		Subjects & activities	Location
1	13/01/2021	Flight Yaoundé - Abidjan Flight Abidjan- Dakar	- Verina Ingram
2	14/01/2021	Day in Dakar Analysis of surveys	- Verina Ingram
3	15/01/2021	Introduction Meetings	- Verina Ingram - Henri Bouda - Claudia
4	16/01/2021 (Saturday)	Visit and observations Mercado municipal & Sucuperia mercado Visit Assomada, Santiago & Gato de Agua, Serra Malagueta	- Verina Ingram
5	17/01/2021 (Sunday)	Analyzing NTFP surveys	- Verina Ingram
6	18/01/2021 (Monday)	Meeting Flor de Lakan Meeting DGASP	- Verina Ingram - Luísa Morais
7	19/01/2021 (Tuesday)	Meeting MMA Assomada, Santiago Meeting Association Serra Malagueta & nursery	- Verina Ingram - Henri Bouda - Luísa Morais - José Lopes - Francisca Baessa - Leinine Tavares - Ekvity Santos

Day & Date		Subjects & activities	Location
8	20/01/2021 (Wednesday)	Visit Rui Vaz Association Visit to nursery Visit Park	-Verina Ingram - Henri Bouda - Luísa Morais - José Lopes - Francisca Baessa - Leinine Tavares - Ekvity Santos
9	21/01/2021 (Thursday)	Meeting INIDA Sao Jorge, Santiago Meeting Uni-CV Praia, Santiago Meeting DNA- Praia	- Verina Ingram - Luísa Morais - Henri Bouda
10	22/01/2021 (Friday)	Arrival at Boa Vista and installation • Working meeting with the REFLOR-CV Project Focal Point and the MAA Delegate; • Work meeting with the leaders of the Boa Vista City Council; • Visit to the farm of Mr. Sandro Gomes.	- Henri Bouda - Luísa Morais - Verina Ingram - José Lopes - Francisca Baessa - Leinine Tavares - Ekvity Santos
11	23/01/2021 (Saturday)	• Working meetings with Varandinha associations; Northern Women's Association of Boa Vista; Association Eleven Stars of Bofareira; Association for the Development of Agriculture and Livestock in the North Zone of Boa Vista; and Arbera de Rabil Association; • Visit to the farm of Mr. Sandro Gomes; • Monitoring of the activity "Management of Associations and Community Mobilization" together with the association Arbera de Rabil (or Sunday morning).	- Henri Bouda - Luísa Morais - Verina Ingram - José Lopes - Francisca Baessa - Leinine Tavares - Ekvity Santos

Day & Date		Subjects & activities	Location
12	24/01/2021 (Sunday)	• Community Mobilization ”together with the association Arbera de Rabil). • visit shops and market in Boa Vista	- Verina Ingram - José Lopes - Francisca Baessa - Ekvity Santos
		• Travel back to Praia (afternoon).	- Henri Bouda - Luísa Morais - Verina Ingram - José Lopes - Francisca Baessa - Leinine Tavares - Ekvity Santos
13	25/01/2021 (Monday)	• Arrival in Fogo and installation; • Meeting with the leaders of the City Council and the MAA delegation of São Filipe	- Henri Bouda - Luísa Morais - Verina Ingram - José Lopes - Francisca Baessa - Leinine Tavares - Ekvity Santos
14	26/01/2021 (Tuesday)	• Visit to the nursery of Monte-Velha; • Working meetings with the Community Development Association Chã das Caldeiras Montinho; • visit nursery • Visit of local market in Sao Filipe	- Henri Bouda - Luísa Morais - Verina Ingram - José Lopes - Francisca Baessa - Leinine Tavares - Ekvity Santos

14	26/01/2021 (Tuesday)	• Conducting the Pedagogical Forest activity at the Cova Figueira School (Santa Catarina/Fogo) • visit associations and farms Santa Catarina/Fogo • visit Chã das Caldeiras Montinho forest	- Henri Bouda - Verina Ingram - José Lopes - Francisca Baessa - Leinine Tavares - Ekvity Santos
15	27/01/2021 (Wednesday)	• Meeting with the leaders of the Municipality of Santa Catarina; • Meeting with MAA focal point in Mosteiros; • Meeting with Association of Mosteiros-Trás; • Visit to the nursery of Mr. Orlandinho; • Visit to the nursery of REFLOR-CV.	- Henri Bouda - Luísa Morais - Verina Ingram - José Lopes - Francisca Baessa - Leinine Tavares - Ekvity Santos
16	28/01/2020 (Thursday)	• Travel back to Praia (morning) • Visit Ecocentra (nursery)	- Henri Bouda - Luísa Morais - Verina Ingram - José Lopes - Francisca Baessa - Leinine Tavares - Ekvity Santos
		• Visit Associação Longuera members & Nursery	- Verina Ingram - Ekvity Santos
17	29/01/2020 (Friday)	• meeting DGASP MMA & REFLOR • visit Marodinho "Papa des plantes", Botanic Garden • visit Sucuperia mercado • Reporting in office	MMA (Luisa, Maria, Edmoind, Marta, Nadia, Solange, Carla) - Verina Ingram - Ekvity Santos

Day & Date		Subjects & activities	Location
18	30/01/2020 (Saturday)	• tour with Ravy Vaz - Tourism guide • interview with Juan, MMA, Serra Malagueta • visit Serra Malagueta	- Verina Ingram
19	31/01/2020 (Sunday)	• working on report	- Verina Ingram
20	01/02/2021 (Monday)	• Meeting FAO representative • Meeting FAO Gender rep • Meeting Maria	- Verina Ingram - Ana Laura Touza - Eunice - Henri Bouda - Maria
		• Visit 4 supermercados, Praia Shopping, Badia, NaturVida & Tambake Mercearia oficina & biologica	- Verina Ingram
21	02/02/2021 (Tuesday)	• Reporting • Wrap up & restitution meeting in DGAP office (online)	- Henri Bouda - Luísa Morais - Verina Ingram - Francisca Baessa - Leinine Tavares - Ekvity Santos - Patrice - Owaldo
22	03/02/2021 (wednesday)	Flight to Dakar	Verina Ingram

Day & Date		Subjects & activities	Location
23	04/02/2021 (Thursday)	Meetings in Dakar with CIFOR representative Markus Ihalinen (gender) and Ousseynou Ndoye (former FAO NTFP projects in Central & West Africa, currently coordinator West & central Africa coordinator, for Africa Forest Landscape Restoration Initiative (AFR100) Flight Dakar- Abidjan	- Verina Ingram
24	05/02/2021 (Friday)	Flight Abidjan - Yaoundé	Verina Ingram

APPENDIX 5 DISTRIBUTION LIST FOR FINAL REPORT

ORGANISATION

Associação Amigos de C. Serra Malagueta
Associação Chã das Caldeiras Monthino
Associação Planalto
Associação Pedra Comprida
Associação Onze Estrelas Clube de Bofareira
Associação Atalaia
Associação Entre Picos de Reda
Associação Arbera Rabil
Associação Pé de Montes
Associação Longuera
Associação Varandinha
Associação Jao Galago Jambra
Associação das Mulhereres do Norte do Boa Vista
Associação Para o desenvolvimento da Agricultura e da Pecunaria na Zona Norte do Boa Vista
Associação Cutelo Alto
Associação Mosterias-Tras
Associação Pai Antonio
Associação Cutelo Alto
Park natural Santo Antonio
Park natural Serra Malagueta
Park natural do Fogo
Flor de Lakakan
MMA Fogo, Boa Vista, Santiago
INIDA
Uni-CV
DNA, BioTur
DGASP
Câmara Municipal Santa Catarina, Fogo
Câmara Municipal Mosterias, Fogo
Câmara Municipal São Filipe, Fogo
Câmara Municipal Sal Rei, Boa Vista
Orlandhino nursery
Fogo Coffee Spirit
Ecocentra (nursery)
Botanic Garden
Ravy Vaz Private tourism guide
Badia Praia Shopping
NaturVida & Tambake Mercearia oficina & biologica

Name species (CV Creole	Name English /French	Name Scientific	Plant type & Parts used	Status Native Exotic Endemic E-N Exotic naturalized	Uses	Value adding	Users Domestic Industrial Artisanal	Value chain Local International ?=unknown	Habitat/ Locations	Data sources MS=market survey I=Informant S=Survey O=Observation In=Interview	Notes
Alfarrobeira		Ceratonia silipua		E-N	Soil stabilization		D		Cha, Fogo	In O	
	Acacia	Acaia sirissa									
Tendente/nim		Azdraca indicus			Medicinal		D		Serre Melegueta Santiago	In	
	Beefwood	Casuarina equisetifolia	Tree	E	Shade tree				Santiago	Johnson 2005	
Espinho preto	Egyptian thorn	Acacia nilotica	Tree	N	Shade tree				Santiago	Johnson 2005	
Cactus	Fig	Opantia ficus-indica	Fruits	E-N	Food		D		Santiago	In	
	Sweet wormwood	Artemisia annua	Leaves	E-N	Medicinal (anti malaria, use in soaps)	Drying, processing	D		Santiago (Melegueta Santiago), Boa Vista (Tambara)	S In	
	White thorn	Faidherbia albida	Flowers, Leaves	N	Fodder		D		Santiago	Lindskog 1996	
Abacate		Persea americana	Leaves	N	Medicinal		D	L	Mercado municipal, Santiago 50 Santiago Santa Catarina 150 E	MS	
Abencte				N	Food		D		Santiago	S (Montes)	
Acacia		Acacia spp. Acacia bironosia			Forage		D		Rabil Boa Vista	In	
Acácia	Acaia	Acacia capeverdiane	Leaves branches	E	Casa de animais Fuelwood charcoal Fodder, carvão		D	I	Santiago	In	

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Acácia	Acaia	Acacia spp. Acacia bironosia	Leaves branches raizes	N E-N	Casa de animais Fuelwood charcoal Fodder carvão		D	I	Santiago, Boa Vista	Stats Biodiv report 2015 S In	6% agorofrestry species n CV
Afarokeira		Coratonia ciligua	Leaves		Medicinal		D		Fogo	In	
Agriathus					Medicinal		D	A	Rabil Boa Vista	In	
Aipo		Lavandula rotundifolio Benth. (Lamiaceae)	Leaves flowers	N En	Medicinal (traditional, cough)		D	I	Fogo	web MS	
Aipo de Rotcha / rocha	celery		Cascas	N	Medicinal (traditional, womens problems sarampo" e contra a febre. Estimula menstrução).		D	I	Mercado municipal, Santiago 50 to 100 E bunch	S MS Gomes 2008	'Wild' and cultivated
Aipo roxa	Purple celery	Lavandula rotundifolia	Leaves	N			D	L	Santiago	S	
Alecrim-brabo brabo de folha gorda		Campylanthus glaber subsp glaber spathulatus	Leaves	E	Medicinal (traditional)dores de cabeça e perturbações menstruais.		D	L	Santo Antão, S. Vicente, S. Nicolau, Santiago, Fogo e Brava	Gomes 2998 RCV	
Alexandre					Medicinal		D	A	Rabil Boa Vista	In	
Alfu Bocu			Leaves	N	Medicinal (hemeraohids)		D	L	Mercado municipals, Santiago	MS	

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Algaroba	mesquite	Prosopsis juliflora	Wood	E-N	Fuelwood, fodder		D	L	Água de Gato Watershed, southern Santiago	Johnson et al 2005	
Alicrim / Chali / Alecrim		Campylanthus glaber subsp glaber		N en	Medicinal (traditional)		D	L	Mercado municipals, Santiago 50 E bunch Santiago Mercado Santa Cathrina 250 E bunch Sold in the Market in the urban centers of Santiago (Praia, Assomada, Pedra Badejo)	S, MS I AP RCV	'Wild' version
Alicrim branco				En	Medicinal		D		Cha, Fogo	In O	
Andrew	Fennel				Medicinal		D		Fogo	I	
Aruda / Arruda		Ruta chalepensis L.	Shrub Leaves	E-N	Medicinal (traditional pain, mosquitos)		D	L	Mercado municipal, Santiago 50E bunch Santiago Amelia Mindez Valeria, Buentrado, Santiago Mercado Santa Catharina 50 bunch fresh Fogo	MS S I+O I AP	

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Avelon			leaves	N	Medicinal (traditional)(skin, soap, against envy)		D	L	Marche municipal, santiago 75 C small bag	MS	
Azeolinha / Azedinha		Phyllanthus acidus Phulantos acidus	Fruits	E	Food	Processed	D A	L	Mercado municipals, Santiago 100 E small tub E bunch, Fogo	I In O S MS Web, In	
Babosa / Abe Vela	Aloe Vera	Aloe Vera	Leite viande	E-N	Medicinal (headaches, skin, soap)	Processing	D	L	Santiago Fogo Santa Cathraina 300 E oil Boa Vista (Assoc. Tamara)	In S Rabil I AP MS	
Bachinuta	Wild bean			N	Food		D		Mercado & Cafe Nana, Orgãos, Santiago	O	
Baobá	Baobab	Adansonia spp	Fruit flesh Husks	N	Shade Cultural Food (drink) Artisanal (shells as tourist objects)		D I A	L	Mercado municipal Santiago 100 E bag (mainly sold in markets is Senegal) Boa Vista (tourism/hotel outlets) Nursery Flor de Lakan	O I In	sell in markets as a blocks & drink- raw material imported from Senengal
Beringelu / Beringela			Yellow fruit	N	Medicinal (heamerodis)		D	L	Mercado municipal Santiago 100 E 1 fruit	MS	

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Birbidjaka		Datura metel L. Datura stramonium L.	Shrub Spiky fruits	N	Intoxicant (bitter skins used by old men)		D		Santiago	O Romieras et al 2011	
Bissap	Hibiscus	Hibiscus		E	Drink		D A	L	Marche Municipal Santiago 100 E small bag	MS	
Bofareira		Nicotina glauca	Seeds	N	Medicinal (postpartum treatment women)		D		Boa Vista	In	
Bolo molon margôs				N	Medicinal (skin problems)			L	Marche Municipal Santiago 50 E small bag	MS	
Brabho / Cravo-Brabo		Erysimum caboverdeanum (Chev.)	Leaves	N En	Medicinal (traditional)		D		Santiago	I AP web	
Burnelo			Fruits	E					Santiago	In	
Camoc			Flower						Santiago Rua Vas	I	
Cariz /Carizza	Grass		Stalks	N	Handicrafts –baskets + banana leaves basket 20cm diameter - each type woven by a different sellers Construction (Roofs, matting/screens)	Drying	A	L	Mercado Sucupira, 200 to 400 E basket, Santiago Fogo Origin: Pe de Coriz, Picks,	MS O In	

Carqueja de Santiago		Limonium lobinii	Leaves	N	White Paint	Drying	D		Santiago Boa Vista	S I (Boa Vista)	
Carrea di likigran				En	Medicinal		D		Cha, Fogo	In O	
Cente		Centio conte			Medicinal		D		Rabil Boa Vista	In	
Centro			Leaves	N					Santiago BV	S Rabil	
Chá de Abacute			Leaves	N	Medicinal (traditional, kidney)		D	L	Marche municipal, santiago 50 C small bag	MS O	
Chá de Licinim /Liknus	Licinim Tea		Leaves	N	Medicinal (traditional tea)	Drying	D		BV	S Rabil	
Chá de Ribeiro / Ribeira / Rebeira		Chenopodium ambrosoides L.	Leaves	N	Medicinal (traditional tea, childless women)	Drying	D	L	Boa Vista, Fogo Amelia Mindez Valeria, Buentrado, Santiago	S Rabil I O I AP	
Cidernia			Leaves								
Cidneria vilgote			Leaves		Medicinal		D	L	BV	S Rabil	
Cimbrão / Zimbro	Juniper	Ziziphus mauritiana	Fruits	N	Food Medicinal (traditional tea)	Drying	D	L	BVMarche municipal, Santiago 75 C small bag Mercado & Cafe Nana, Orgãos, Santiago Mercado Santa Cathrina 200 & 400 E bagss	MS O I In	

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Colarau	Achiote	Bixa orellana	Seeds	N-E	Food condiment		D	L	Ecocentro, Sao domingues	O	
Congo	Wild bean			N	Food		D		Mercado & Cafe Nana, Orgãos, Santiago	O	
Conífera	Conifer			E	Timber		D			Stats Biodiv report 2015	
Cravo breu			Flowers	N	Medicinal		D		Amelia Mindez Valeria, Buentrado, Santiago	Stats Biodiv report 2015	
Creolina			Leaves		Fodder		D		Fogo	In	
Crianca					Medicinal		D	A	Rabil Boa Vista	In	
Curcaison					Medicinal		D	A	Rabil Boa Vista	In	
Dorela			Leaves	E	Medicinal (traditional)		D	L	Santiago Santa Catarina 100 E bag	MS	
Draco/ Sang de draco	Dragon Tree	Dracaena cabo verdiana	Cascas Sap	N En	Medicinal (traditional in grogo) Sap (historical trade)		D	L	Santiago	I AP nursery	
Dragoeiro	Dragon Tree	Dracaena draco	Cascas	N En	Medicinal (traditional)		D		Santiago São Nicolau Santo Antão	Romeiras et al 2014 I AP nursery	

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Erva cidreira / Erva cideira		Satureja forbesii	Leaves	E	Medicinal (traditional infusão, dores de estômago e gases)		D		Santiago (Varandhina)	S I MS	
Erva doce Funcho		Anethum graveolen Foeniculum vulgar	Leaves	N	Medicinal (traditional)		D	L	Mercado municipal 100 E bag/bunch Santiago Santa Catarina 150 E	MS I AP	
Erve citerio			Leaves	N	Medicinal		D	L		I AP	
Esprinta		Diarist cineria	Stems		Artisanal handicrafts (Weaving, baskets)	Drying Weaving	D A	L	Santiago	I O	
Eucaliptos	Eucalyptus	Eucalyptus Eucalyptus camaldulensis Citadora	Tronco Leaves raizes,	E	Casa de animais, combustivel p/animais, carvão ? Shade Food Medicinal (Oil, soaps)	Processing	D	L	Fogo Santiago Água de Gato Watershed, southern Santiago Mercado municipal, santiago E 150 small oil	Johnson et al 2005 Stats Biodiv report 2015 Johnson 2005, S MS I P SM	6% of AF species in CV
Fedegosa					Medicinal		D		Rabil Boa Vista	In	
Fig lemba		Ficus microcarpa	Tree, fruit		Shade, fodder		D		Santiago (Association languera)	In	
Fig O sicômoro	Fig	Ficus Ficus sycomorus		N	Fuel firewood		D		Boa Vista	Neto et al 2020 Web	

Name species (CV Creole	Name English /French	Name Scientific	Plant type & Parts used	Status Native Exotic Endemic E-N Exotic naturalized	Uses	Value adding	Users Domestic Industrial Artisanal	Value chain Local International ?=unknown	Habitat/ Locations	Data sources MS=market survey I=Informant S=Survey O=Observation In=Interview	Notes
Figueria-brabo	Wild fig	Ficus gnaphalocarpa	Wood	N	Boat building (historical)	Processing	D		São Nicolau	Romeiras et al 2014 RCV	
Flor de Carquesa					Medicinal		D		Rabil Boa Vista	In	
Funcho		Tornabenea bischoffii (J. A. Schmidt) (Apiaceae) Funcho; Tornabenea depressa K. Schmidt & Lobin (Apiaceae)	Leaves	N	Medicinal (traditional, skin problems)		D	L	Fogo	web RCV In	
Furemea		Fultiola agame			Medicinal		D		Serre Melegueta Santiago	In	
Gdreira			Leaves	N	Medicinal		D	L	Santiago Santa Catarina 150 E	Ms	
Gestibe		Sancostema daltoni		E-N			D		Fogo	In	
Goioba	Guava	Psidium guajava	Fruit	E-N	Food		D	L	Santiago	S	
Grevillia	Grevillia	Grevillea robusta Grevillea spp.	Grevillia robusta D Cha, Fogo In O	E-N	Timber Soil stabilization		D			Stats Biodiv report 2015	1% agorofrestry psecies in CV
Herne tao					Medicinal		D	D	Fogo Rabil Boa Vista	In	

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Inshofre				En	Medicinal (skin problems)		D	L	Cha, Fogo	In O	
Jacoba			Leaves		Fodder		D		Fogo	In	
Jatrofa Porgeria / Purgueria	Jatropha	Jatropha curcas	Wood Fruits	E	Fuelwood (biomass), Medicinal (traditional, oils, soaps)	Oil	D	L	Northen Santiago, Fogo	O I Rivas-Martín ez 2017	
Jinglano			Leaves		Fodder		D		Fogo	In	
Lantana freira/ kambara		Lantana camara	Woody parts Fruits	E-N	Artisinal Fuelwood Casa de animais, Alimentos p/animais carvão		D		Santiago Fogo	Johnson et al 2005 Romerias et al 2011 O In	
Lantisco		Periploca laevigata	Latex Leaves	E En	Tanning leather (traditional) Medicinal (traditional)(gripe com tosse e diabetes (parte utilizada raiz, caulee folha: xarope fervido com água e açúcar – tomar 2 x ao dia antes das refeições). fodder		I		Santiago Fogo	Gomes 2008 In	
Laranja	Orange	Citrus sinensis		E	Food		D		Água de Gato Watershed, southern Santiago consists	Johnson et al 2005	

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Larenye				E	Food		D		Santiago	S Montes	
Lignnash		Leucaena leucocephala	Leaves		Medicinal (dengue fever)		D		Santiago (Achada falcão)	O In	
Limão	Lemon	Citrus limonia	Tree	E	Food		D		Água de Gato Watershed, southern Santiago consists	Johnson et al 2005	
Língua de vaca	Cow tongue	Echium hypertropicum Echium vulcanorum Echium stenosiphon Webb ssp.	Shrub Leaves	N	Medicinal (traditional)		D	L	Santiago Fogo	O I AP I SM Gomes et al 2008	
Língua de vaca	Cow tongue	Echium hypertropicum Echium vulcanorum Echium stenosiphon Webb ssp.	Shrub Leaves	N	Medicinal (traditional)		D	L	Santiago Fogo	O I AP I SM Gomes et al 2008	
Linhachu / Linhacho	Wild bean	Leucaena leucocephala	Shrub/small tree Leaves, ramos	E-N	Food, fodder		D	L	Santiago, Mercado & Cafe Nana, Orgãos, Santiago	O Romerias et al 2011	
Losna / Lasna / Lorna	Wormwood	Artemisia gorgonium	Fruits Leaves	N En	Medicinal (traditional, anti malaria, fevers).		D	L	Fogo, Monte Velha, Boa Vista Santiago, BV 100 E bunch Santiago Santa Catarina 100 E	Silva et al 2011 Romeiras et al 2014 Gomes 2008 RCV MS I AP SM (Fogo, Boa Vista)	

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Losna-brabo		Conyza feae	Leaves	N	Medicinal (traditional)		D			Gomes 2008	
Madroni			Leaves	N	Medicinal (traditional)		D		Santiago	I AP	
Maguey	Maguey	Furcraea Foetida		E	Fuelwood		D	L	Água de Gato Watershed, southern Santiago	Johnson et al 2005	
Malagueta-de -galinha margueto-di-galinha podoreira pontadeira		Withania chevalieri	Shrub- leabes	N En	Medicinal (anti malaria)		D		Santiago Fogo	S Romeria et al 2016 Gomes et al 2008 web	
Malve / Malva lolo-branco		Lavatera cretica Abutilon pannosum (G.Forst.) Schltdl.	Annual herb leaves	N	Medicinal (tea)		D	L	Santiago Boa Vista	Romeiras et al 2011 I AP	
Manguire		Mango		E	Food		D		Santiago		
Manipu			Leaves	N	Medicinal (colds)		D	L	Santiago Santa Catarina 150 E	MS	
Marmelo	Quince						D	L	Mercado municipals, Santiago	MS, I (Rus Vas)	

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Marmolano / Marmulano		Sideroxylon marginata	Leaves - leaves nderstory tree	N En	Fuel firewood Medicinal (traditional, treatment fractures ósseas e dores no corpo (cataplasma e chá – ênfase às Leaves)		D	L	Santiago Fogo	S I AP O RCV Biodiv report 2015 Web	nursery production of over three hundred tree-size trres, the only dicotiledonea endemic to Cabo Verde that, until then, had not been propagate in situ or ex situ (nurseries or laboratory)
Marmona			Leaves		Fodder		D		Fogo	In	
Marve		Maspoco			Medicinal		D		Fogo	In	
Mas Tordo				N	Food		D		Boa Vista	S Rabil	
Massciligna				En	Medicinal		D		Cha, Fogo	In O	
Material / Mageriauo			Leaves		Medicinal (tea)		D	L	Boa Vista (Assoc Tamabra)	I	
Mato boton / Mato botão		Globularia amygdalifolia	Leaves Frutas Cimentes	N EN (Endangered IUCN)	Medicinal (traditional)		D		Santiago (Rua Vas, Serre Melegueta)	I AP S	

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Mato branco				N-EN	Medicinal		D		Fogo	In	
Mato sanfo anteo				N	Medicinal		D			MS	
Mel / Bekieria / Mel de abelha	Honey (bees = abelha)		Honey	N	Medicinal (traditional)(from bees living in rocks/ground in rocky areas, hard to find local honey now)		A	L	Fogo, Amelia Mindez Valeria, Buentrado, Santiago Santiago Santa Catarina 150 E	I, O, Int MS	
Menher de Gristo			Tree	N	Ornamental tree					Montes	
Mergueta de ligna					Medicinal		D		Fogo	In	
Mogno Africano	African mahogany	Khaya senegalensis	Tree	E	Shade Tree		D		Rus Vas, Água de Gato Watershed, southern Santiago	Johnson et al 2005 S O	
Molon bolo		Globularia amygdalifolia Cucumis mel	Fruit	N	Medicinal (traditional, skin, blood purifier)		D	L	Mercado municipal, Santiago Fogo	MS	
Molon margos			Fruit	N	Medicinal (traditional)			L	Mercado Municpal, Santiago 50 E small bag	MS	
Monti					Medicinal		D		Rabil Boa Vista	In	

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Moringa	Moringa	Moringa oleifera Lam		E-N	Medicinal		D I	L	Santiago	I SM AP Romerias et al 2011	Wild Around 2015 hype, over-exploitation, became rare in wild until negative press on side effects,. Now little exploted and found/used around house/farm
Mostarda / Mostardo		Diplotaxis antoniensis		N En	Medicinal Food		D		Santiago Top de Coroa	S Rabil I AP	
Mostarda preta				E-N	Medicinal		D			Romerias et al 2011	
Mostarda-brabo		Diplotaxis glauca Diplotaxis gracilis		N En	Medicinal						
Mulher de Cristoe	Cristoe woman		Plant	N	Ornamentao		D		Santiago	S Montes	
Neem	Neem	Azadirachta indica		E	Fuelwood, medicinal (anti-mosquito)	Drying Soaps	D		Água de Gato Watershed, southern Santiago, Mercado & Cafe Nana, Orgãos, Santiago	Johnson et al 2005 O	
Noui			Leaves	N	Medicinal (traditional skin problems)		D		Mercado & Cafe Nana, Orgãos, Santiago	O	

Name species (CV Creole	Name English /French	Name Scientific	Plant type & Parts used	Status Native Exotic Endemic E-N Exotic naturalized	Uses	Value adding	Users Domestic Industrial Artisanal	Value chain Local International ?=unknown	Habitat/ Locations	Data sources MS=market survey I=Informant S=Survey O=Observation In=Interview	Notes
olivera			Leaves	N	Medicinal (traditional oil, tea)		D		Santiago	I AP	Tree Species
Oricella	Lichen	Roccella tinctoria	Lichen	N	tanning		A				
Padje blanca			Leaves		Fodder		D		Fogo	In	
Padje corde			Leaves		Fodder		D		Fogo	In	
Paia santa					Medicinal (traditional)		D		Santiago (Serre Melegueta)	In	
Paper					Medicinal		D		Rabil Boa Vista	In	
Pimenta rosa		Cillias moles	Seeds	E	Food (condiment)	Drying	D	L	Cha, Fogo	In O	
Pinha		Annona squamosa	Fruit	E	Food		D				
Pinho	Pine	Pinus spp.	wood	E	Fuelwood		D		Mercado municipals, Santiago	Stats Biodiv report 2015 MS	1% agroforestry species in CV
Piorno		Lotus jacobaeus Lotus purpureus	Herb leaves	E	Medicinal (traditional)(febre e dores no peito e nas costas (chá – ênfase às Leaves)		D		Santiago	Gomes 2008	
Póo Sobe				N					Santiago	S Rabil	
Prelude Baboga			Leaves	N	Medicinal (traditional, mix with aloe Vera)		D		Marche municipal, santiago 50 C small bag	MS	
Preto	White fever tree				Medicinal		D		Santiago	I	

Name species (CV Creole	Name English /French	Name Scientific	Plant type & Parts used	Status Native Exotic Endemic E-N Exotic naturalized	Uses	Value adding	Users Domestic Industrial Artisanal	Value chain Local International ?=unknown	Habitat/ Locations	Data sources MS=market survey I=Informant S=Survey O=Observation In=Interview	Notes
Prosopis	Prosopis mezquite	Prospis juliflora spp. spineria	Tree	E-N	Fuelwood, charcoal		D	L (BV)	Santiago, Boa Vista (Bofareira, Achada Falcao)	S Stats Biodiv report 2015	6% agorofre stry secies in CV
Purgueira		Jatropha curcas	Tree leaves	N	Medicinal (traditional)(skin problems)	Oil	D	L	Rabil Boa Vista Santiago (Melegueta Santiago, banana lady house Agua de Gato Santiago – tree photo) Mercado Santa Cathrina Mercado municipal Santiago 250 E bottle	In O MS In	
Putona					Food (flour)		D		Rabil Boa Vista		
Rabagat			Leaves		Fodder		D		Fogo	In	
Ratcha pedra					Medicinal		D		Rabil Boa Vista	In	
Riccinou / Riccinau ricino / Mamona / Bafareira djaqui,	Castor, ricin	Ricinus communis	Seeds	N E-N	Medicinal (oil)	Processing	D	L E (old)	Bao Vista, Fogo, Santiago	In MS O Romerias 2011	
Rico de coqueil					Medicinal		D	A	Rabil Boa Vista	In	
Rissimo				N	Medicinal	Oil	D	L	Santiago Santa Catarina 300 bottle E	MS	

Name species (CV Creole	Name English /French	Name Scientific	Plant type & Parts used	Status Native Exotic Endemic E-N Exotic naturalized	Uses	Value adding	Users Domestic Industrial Artisanal	Value chain Local International ?=unknown	Habitat/ Locations	Data sources MS=market survey I=Informant S=Survey O=Observation In=Interview	Notes
Romanie			leaves	N	Medicinal		D	L	Santiago	I AP	
Rotch pedro			leaves		Medicinal (traditional diabetes)		D		Santiago Serre Melgueta	In	
Ruvalvo			leaves	N	Medicinal		D		Amelia Mindez Valeria, Buentrado, Santiago	I +O	
Sabão -de-feiticeira / Erva-de-s.joão		Celsia cystolithica	leaves	E	Medicinal (traditional Tratamento de febre (suco das Leaves em solução aquaosa, utilizada no banho)		D		S. Antão, S. Vicente (extinta) S. Nicolau, Boavista (extinta), Maio (extinta), Santiago, Fogo	Gomes 2008	
Sabon de calpipi				En	Medicinal		D		Cha, Fogo	In O	
San Caetano		Momordica Charantia	Seeds	N	Medicinal (traditional dog ticks)		D		Mercado & Cafe Nana, Orgãos, Santiago	O	
Pimenta rosa		Schilus molis Scarcostema dalchstan	Fruit	N	Food		D	L	Cha de Calderias sold to tourists in season	In	
Seda Árvore de Algodão	Silk cotton tree	Ceiba pentandra		E					Água de Gato Watershed, southern Santiago	Johnson et al 2005	
Septa traeta				En	Medicinal		D		Cha, Fogo	In O	
Serente cor					Medicinal		D		Rabil Boa Vista	In	
Seta		Bidens spp.	Leaves		Fodder		D		Fogo	In	

Name species (CV Creole	Name English /French	Name Scientific	Plant type & Parts used	Status Native Exotic Endemic E-N Exotic naturalized	Uses	Value adding	Users Domestic Industrial Artisanal	Value chain Local International ?=unknown	Habitat/ Locations	Data sources MS=market survey I=Informant S=Survey O=Observation In=Interview	Notes
Sisal	Sisal	Agave sisalana	Leaves Stems	E-N	Casa de animais, Artisanal (ropes, hats,baskets)	Processing weaving	D	L	Santiago Fogo	O I MS In Romeiras et al 2011	
Sphinho branco	Black acacia	nilotica		E-N			D	L	Santiago (Nursery Flor de Lakan)	In	
Tagde			Leaves	N	Medicinal (traditional)		D		Santiago (Riua Vas)	I AP	
										Romeiras et al 2014	
Tamareira	Date palm	Phoenix atlantica A.Chev., Arecaceae Phoenix atlantidis P. dactylifera L.	Fruits Leaves	N	Food Forage (goats), Handicraft (Hats, baskets, weaving)	Processing weaving	D A	L	Boa Vista, Santiago Nursery Flor de Lakan (50 Euro seedling)	Romeiras et al 2014 O Web Web S Monteiro et al 2020 In	
Tamarindos Tamarindo Tambarina	Tamarind	Tamarindus indica L., Fabaceae)	Tree Seeds	E-N	Shade Food		D A	L	Santiago Mercado municipal Santiago 100 E bag Nursery Flor de Lakan	Johnson 2005 I MS Romeiras et al 2014, 2011 MS In	
Texeirinha		Chenopodium ambrosoides L.	Texeirinha		Medicinal (traditional tea, fractures)		D		Fogo	InIn	
Tortolho		Euphorbia tukeyana	wood	N	Firewood, tanning		A D		Fogo	In Web	
Tortuge			Leaves	N	Medicinal		D	L	Santiago	I AP	
Tosa			Leaves		Fodder		D		Fogo	In	

Name species (CV Creole	Name English /French	Name Scientific	Plant type & Parts used	Status Native Exotic Endemic E-N Exotic naturalized	Uses	Value adding	Users Domestic Industrial Artisanal	Value chain Local International ?=unknown	Habitat/ Locations	Data sources MS=market survey I=Informant S=Survey O=Observation In=Interview	Notes
Tres Maria		Seasanum radiatum Shum & Thonn	Leaves Stems	N	Medicinal (hair conditioning)		D	L	Santiago Santa Catarina 150 E	MS	
Tribina					Medicinal		D		Rabil Boa Vista	In	
Trie			Leaves	N	Medicinal	Dried (tea)	D			I AP	
Urzela / Urzella	Lichen	Roccella tinctoria DC.		N	Dye (historically used)	Processing	A	I	Santiago Boa Vista	In Monteiro et al 2020	
Uva-caneta Uva canec Uvo cornella	Chinese gooseberry	Physelia peruviana	Fruits	E-N	Food		D		Fogo	In	
Xalie / Chloe / Shelie		Cymbopogum citratus Stapf	Leaves	N	Medicinal		D	L	Boa Vista, Fogo	I AP	

APPENDIX 7 BOOM AND BUST NATURAL PRODUCTS ON CABO VERDE

Plants commodified as popular, commercialised cash crops, with dramatic histories of booms and bust cycles include:

Endemics with trade leading to near extinction:

- If the bark of the endangered, endemic, slow growing Dragoerio or Dragon's Blood Tree (Dracaena draca) is incised or the leaves are crushed, the tree secretes a reddish fluid. In the Middle Ages this was associated with witchcraft and seen as the blood of dragons. Until the mid-19th century, dragon's blood was used in the cosmetic industry, as a colouring and colouring agent – with Italian violin builders using it in varnish. It is also added to the local rum drink grogue. to give colour and medicinal properties (Gomes, Gomes et al. 2003).

- Urzella or orseille - a lichen from Sal used as purple dye in the end of the 1800s (Hoffmann 2016)

- Carqueja de Santiago (Limonium lobinii) a lichen mixed with soil to produce a traditional white paint, used and sold until about the 1970s on Boa Vista.

Introduced exotics, now naturalised and common but no longer cash crops:

- Sisal (Agave sisalana) for fabrics and ropes, in terracing and against soil erosion, as a boundary marker

- Anil or indigo (Indigofera tinctoria) for its blue colouring as a dye (Romeiras, Catarino et al. 2011, Lesourd 2017)

- Castor or riccinau (Ricinus communis L.) for medicinal use (Chevalier 1935, Romeiras, Catarino et al. 2011)

- Moringa (Moringa oleifera Lam.) became subject to much hype, described as wonder product in 2014-2015 and "the subject of unrestrained demand in the interior of Santiago for trade ... and in the market in the city of Praia and the sales leader among medicinal plants. Cape Verdeans became aware of its therapeutic properties and on the avenues of the capital, only the trunks of this tree are left. The hunt for Moringa intensified after a report made by public television, which stated that the plant has medicinal properties to cure more than 300 diseases and in addition to its nutritional value, superior to the foods we consume daily" by Ocean Press on Facebook and YouTube

Introduced exotics, now naturalised and common, seen by some as invasive or alien species

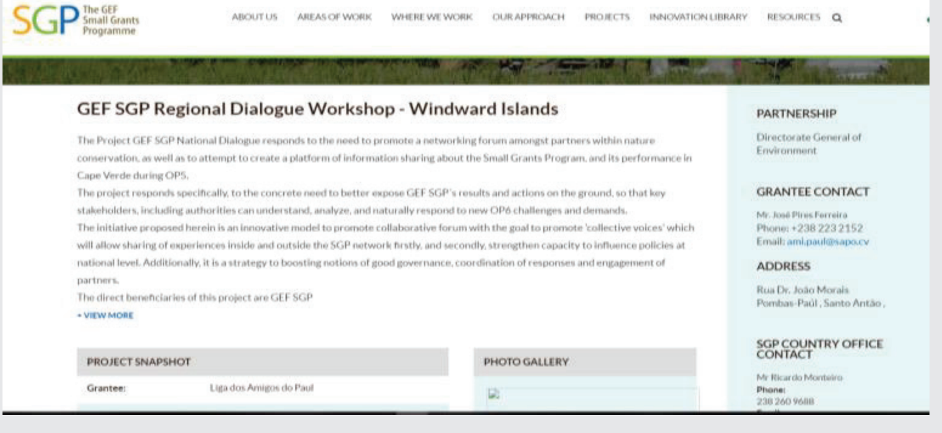
- Jatropha (Jatropha curcas L.) introduced and once popular for medicinal use and for fuelwood (Romeiras, Catarino et al. 2011)

- Prosopis or mezquite (Prosopis juliflora envahissante) introduced by the 1800s for fuelwood and fodder (Chevalier 1935) and by the 1970s was planted extensively, including with a programme of support from the FAO, on farms and in plantations to counter centuries of intense exploitation for fuel, construction, the introduction of goats leading to overgrazing, and agriculture which vastly altered the character of the natural vegetation destroying much of it and exposing soil to wind and rain erosion. By the end of 1993, 12% of the surface area of Cabo Verde had been planted, with an estimated overall survival of 70%. Over 60% of the trees planted were Prosopis which covers many of the more arid lowlands (Harris, Pasiecznik et al. 1996). Only a few plantations are left today, such as near Tarrafal.

APPENDIX 8 LEARNING LESSONS FROM OTHER PROJECTS ON CABO VERDE

UNEP GEF II project Sa nto Antão “Mainstreaming biodiversity conservation into the tourism sector in synergy with a further strengthened protected areas system in Cabo Verde” Ministry of Environment, Housing and Land Planning and (MAHOT) in collaboration with Ministry of Tourism, Investment and Business Development (MTIDE) 2011-2014. The project included NP value chain development and exchanges with Serra Malagueta – many of which appear to have been adopted (Interview ONA-MMA)

GEF SGP Regional Dialogue Workshop - Windward Islands 2014 which aimed to better expose GEF SGP´s results and actions on the ground, so that key stakeholders, including authorities can understand, analyse, and to promote collaborative forum with the goal to promote 'collective voices' which will allow sharing of experiences inside and outside the SGP network firstly, and secondly, strengthen capacity to influence policies at national level (GEF Small Grants Programme 2014).



Crafts persons training in Fogo with no tangible results several years later due to lack of interest by young people and those trained in traditional artisanal crafts (Interview Câmara Municipal São Filipe, Fogo). There has been support from the Luxembourg Development Cooperation to the Government of Cabo Verde on the development of technical and vocational education and training (TVET), PIC 4 from June 2016 - December 2021progressively moving from technical education towards vocational training projects and a programme to support the development of the sector through budget support (10,000,000 EUR). The CVE/081 programme focuses on enhancing the employability of vocational training beneficiaries, especially young people and women, by:

• Organisation and articulation of the actors involved in the sector of vocational training for increased
efficiency;

• Better matching supply with market expectations and strengthening the management of education centres;
and

• Increased technical and financial viability of vocational training institutions.

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Back cover photo:. Baskets on sale in Sucuperia market, Praia, Santiago. Credit: Verina Ingram
Front cover photo: Mural in Bofarreira village, Boa Vista Credit: Verina Ingram

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GCP/CVI/046/EC - CABO VERDE

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