

PERSPECTIVES AND CHALLENGES IN THE EXTRACTION OF NON-TIMBER FOREST PRODUCTS FOR THEIR SUSTAINABILITY AND CONSERVATION IN PROTECTED AREAS IN THE MAP REGION: A SWOT ANALYSIS APPROACH

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ABSTRACT

The use of non-timber forest products (NTFPs) plays an important role in the local economy in the southwestern Amazon in the tri-national MAP region that comprises the states of Madre de Dios (Peru), Acre (Brazil), and Pando (Bolivia). Protected areas, which are territories recognized by the government by their biological and cultural importance, are key to promote the sustainable use of NTFPs, as among their objectives are the contribution to the wellbeing of the population and the conservation of ecosystem services. Many communities in the MAP region, including the ones living inside protected areas, depend on a combination of NTFPs extraction and agricultural practices for their livelihoods, however, there is little information where these activities have been strategically evaluated using methodologies like the SWOT (Strengths, Weakness, Opportunities, Threats) Analysis approach. In this research, we present a SWOT analysis around the use of several major NTFPs in four natural reserves, the National Reserve Tambopata RNTAMB in Madre de Dios, the Extractive Reserves RESEX, Chico Mendes and Cazumbá-Iracema in Acre, and the Manuripi Amazonian Wildlife National Reserve RNVSA Manuripi in Pando. A SWOT analysis was implemented, through interviews with local stakeholders, considering ecological, economic, and socio-cultural components. We found similarities in the strengths and threats in the three components across the three studied protected areas, whereas we identified opportunities and weaknesses that vary locally. Through the proposed SWOT analysis it was found that the historical construction of the indigenous-rubber tapper amalgam is an extremely important aspect for sustainable management activities of NTFPs. After all, extractivism is at the core of the livelihood and culture in the MAP region, since it is one of the main life-sustaining activities for farmers and producers nowadays. Regarding the threats, we highlight the increase in deforestation and fires, logging, land grabbing, as well as poaching in all the protected areas studied. To improve and leverage the activity of NTFPs management under suitable mechanisms of community participation and cooperation with different stakeholders, we give some strategic recommendations, such as: To safeguard the traditional knowledge as a reference for sustainable management practices, to promote short circuit marketing initiatives for NTFPs; and to strengthen control and inspection actions within communities, and in coordination with public institutions and decision-makers in charge of development policies and conservation, among others.

Keywords: Southwestern Amazon; Ecosystem Services; Livelihoods; Extractivism; Sustainable Forest Management; NTFPs, Protected Areas.

INTRODUCTION

The Amazon is the largest extension of tropical forest in the world, containing half of the world's biological diversity and a quarter of its primary productivity (Soares-Filho et al., 2004 in Duchelle et al., 2010). Within this vast area, a tri-national area of approximately 300,000 km² comprising Madre de Dios (Peru), Acre (Brazil), and Pando (Bolivia) known as the MAP region. The MAP initiative was created by scientists and civil society to address issues related to the environmental impacts of large infrastructure projects in the region (Dourojeanni, 2005, Göpel, 2020). The MAP region has one of the best conserved forest areas in the entire Amazon. The indigenous, extractivist, and riverine communities, such as the local stakeholders, own or manage almost a third of the forests in the region (ZEE, 2006; INRA, 2009; SPDA-INRENA, 2003 in Duchelle et al., 2010). However, there is an advance of the agricultural frontier, and various extractivist activities, as well as an already observable regional shift in climate towards prolonged dry periods, is exerting pressure on large areas of primary and secondary forest (Garcia et al. 2018 in Göpel, 2020).

Within the various economic activities in this region, such as cattle ranching, agriculture, and forestry, there is also the exploitation of various non-timber forest products (NTFPs) which are goods derived from forest ecosystems, excluding timber. NTFPs have been recognized for many years for their potential contribution to socio-economic and environmental objectives, due to the livelihood benefits and associated incentives for forest conservation (FAO, 1992, 1996).

Noteworthy, the MAP region is especially important because it harbors iconic protected areas, and extractive reserves that contribute to the conservation of ecosystems, as well as the economy and well-being of forest dwellers, and indigenous groups living inside these areas (Vadjunec & Rocheleau 2009).

Among the most economically important NTFPs, are products derived from Amazonian plants such as the Brazil nut (*Bertholletia excelsa* Bonpl.), açai (*Euterpe oleracea* Mart.), seringueira/ rubber tree (*Hevea brasiliensis* L.), and the burití /aguaje palm (*Mauritia flexuosa* L.f.). These and other NTFPs are used for food, pharmaceutical, cosmetic, decorative, handcraft, and other purposes, as can be detailed in several reports that describe how to use and exploit these products sustainably in the countries of the MAP region, in Brazil (Shanley, Pierce, & Laird, 2006) Bolivia (Araujo-Murakami et al., 2016), and Perú (FAO, 2002; Held et al., 2015; Melchor-Castro & Bejarano, 2019).

According to Drummond (2013), the extraction of forest products combined with slash and burn agriculture provides livelihoods for most of the Amazon communities. This combination of activities is maintained until today and is part of the traditional and indigenous populations' livelihoods since immemorial times. The extraction of NTFPs is one of the main activities that

ensure the sustainability of life regarding the communities that live in protected areas. How effective the contribution of these areas is to conservation depends highly on the success of improving the management and benefits from NTFPs production for local people.

There are several studies, both in white and gray literature, related to inventories, use, and management of NTFPs in the MAP region, including references to strategic SWOT analysis in the study and surrounding areas framed in the master plans or management plans of the protected areas, but very little information focuses on the study of SWOT analysis of NTFPs (Freitas, 2012; Camacho & Castilla, 2012; SERNANP, 2012, Duchelle et al., 2013; Salto, 2015; Mayta et al., 2017; SERNAP, 2017). SWOT analysis is useful to identify the situation of organizations, and development activities as well as to assist in the understanding of complex realities and elaborate practical planning.

Therefore, this research intended to present a snapshot of the strengths, weaknesses, opportunities, and threats around the use of NTFPs, taking some examples of people who work with these products, like entrepreneurs, protected areas staff, technicians, workers, collectors, among others who work in the public and/or private sector, in order to know the current status of the use and management that they make of them. Hence, with the performed SWOT analysis were identified the elements that favor or provide potential benefits in the future, as well as the conditions that limit or hinder the development or progress of improvement strategies in the gathered examples.

In the same form, we recommend possible strategies to improve and lever actions that address mechanisms that involve the local community and cooperation with different actors fostering the development of the region based on sustainable productive activities related to NTFPs. Finally, the results will be disseminated to the people in the region interested in the conservation of NTFPs (researchers, managers, public institutions, civil society organizations, community associations, among others).

MATERIALS AND METHODS

PRODIGY Project

PRODIGY is a research cooperation between Germany, Brazil, Bolivia, and Peru. The main interest of this project is to understand if greater diversity within systems from soil to economic and social aspects increases the resilience or resistance of the ecological system based on the various factors that threaten it when its impact is excessive, this is called "tipping points". This project's study area is the southwestern Amazon, in the tri-national region MAP in the states of Madre de Dios (Peru), Acre (Brazil), and Pando (Bolivia). Several study groups have been formed to study the socio-economic and environmental dynamics in the MAP

region. The focus of our group is to learn about the current status of utilization, commercialization, and management of non-timber forest products (NTFPs) in protected areas of the MAP region. For contextualization purposes, the study region we chose for our research is located within the MAP region and is, therefore, part of the PRODIGY Project study area.

Study region

The study was conducted in the tri-national MAP region, which covers the State of Acre in Brazil), the Province of Pando in Bolivia, and the Department of Madre de Dios, in Peru. Within this region, considering the protected areas encompassed by the Prodigy Project we selected four of them, the *i.e.* Extractive Reserve - RESEX¹ Chico Mendes and RESEX Cazumbá-Iracema in Acre, the National Amazonian Wildlife Reserve Manuripi in Pando, and the National Reserve Tambopata in Madre de Dios (Figure 1).

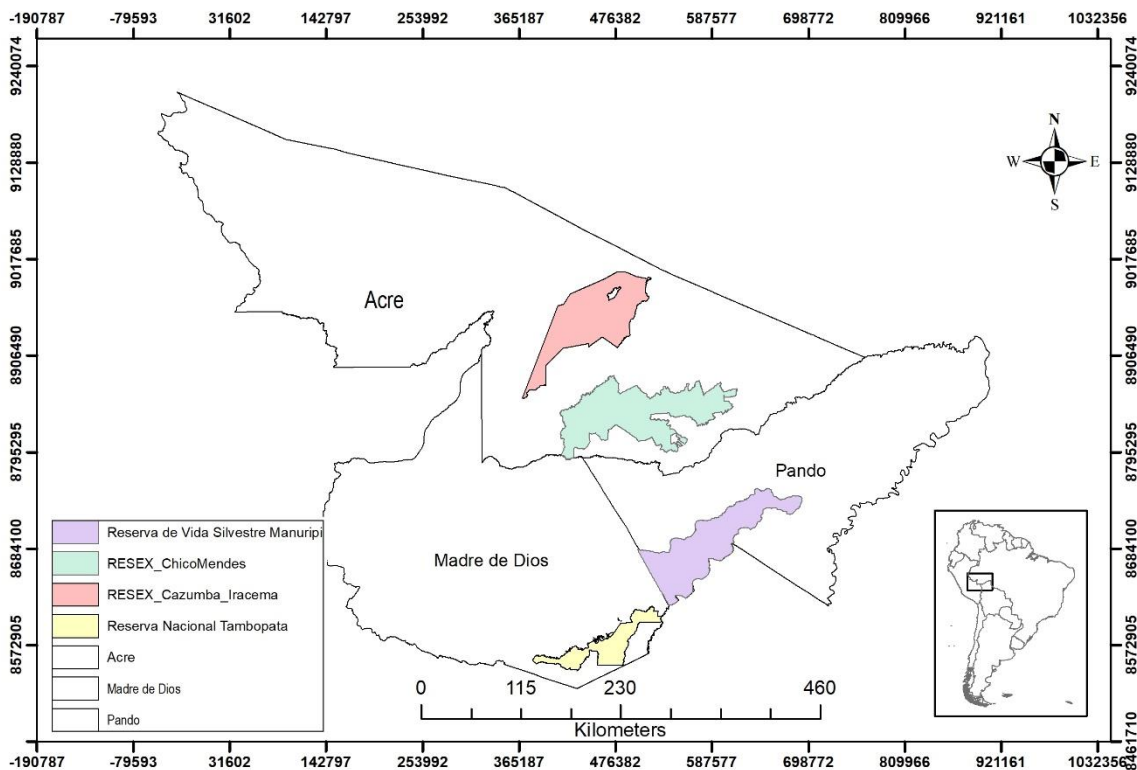


Figure 1. Map of the protected areas in the MAP region in and around which research was conducted (own elaboration, 2021).

¹ RESEX is the abbreviation in Portuguese of “Reserva Extrativista”, or Extractive Reserve. RESEX is the name for this type of protected area in Brazil. The RESEX is liable to use and therefore is classified as a protected area of sustainable use.

- Resex Chico Mendes

The Chico Mendes Extractive Reserve (named in honor of Francisco Alves Mendes Filho “Chico Mendes”, one of the leaders of the rubber tappers movement, who was assassinated in 1988 for his struggle). It is located in the southeastern region of the state of Acre, with an area of approximately 970,570 hectares. It covers the municipalities of Assis Brasil, Brasiléia, Capixaba, Epitaciolândia, Rio Branco, Sena Madureira and Xapuri. The territory has benefited more than 3,000 families, who currently practice subsistence activities such as itinerant agriculture (corn, rice, beans, and cassava), small animal husbandry (chickens, ducks, and pigs), hunting and fishing, as well as the collection and management of wild plants used for medicinal, food and construction purposes. In order to generate income, they extract rubber trees (*Hevea brasiliensis*) - on a smaller scale than before - and the Brazil nut (*Bertholletia excelsa*).

The Resex Chico Mendes Management Plan (Brasil, 2006) is considered an important legal instrument for the management of this protected area. It has these main objectives: Generate guidelines for the Resex management; Promote the management, guided by traditional and scientific knowledge; Define the limits of the geographical areas to be used directly or indirectly in extractivist activities; Characterize and map the environmental components associated with the physical, biotic and socio-economic environment; Highlight the potential for the use of resources not yet explored by traditional communities; Identify the possible economic activities to be carried out by traditional populations, suggesting specific productive projects.

The main activities developed at Resex Chico Mendes are extractivism, small-scale agriculture, and livestock (ACRE, 2010). In terms of production volume, extractivism continues to be the main activity (total production in 2009: 475 tons), followed by agriculture (total production in 2009: 274 tons) and livestock (total production in 2009: 89 thousand units). However, a large part of the families 97%, are dedicated to livestock activities, while 95% of the families are dedicated to extractivism and only 33% of the families are dedicated to agricultural activity (ACRE, 2010).

According to Melo (2006), the mapping of existing production chains within the Resex Chico Mendes identified the following agricultural products: rice, beans, corn, cassava, coffee, copoaçú, pupunha (palm heart), açaí, coco de Jarina, pepper, bacaba, patauá, araçá-boi, vegetables, pumpkin and fruit (pineapple, orange, papaya, watermelon, banana).

- Resex Cazumbá-Iracema

The Resex Cazumbá-Iracema has an area of approximately 754,987.10 hectares, distributed in the municipalities of Sena Madureira (94% of the total area) and Manoel Urbano (6%). It is home to about 270 families (approximately 1,300 inhabitants), who make their living from Brazil nut extraction, fishing, rubber and seeds handicrafts, subsistence farming, animal husbandry, and agroforestry sites. As for marketing, there is an incipient flow of Brazil nuts, rubber latex, copaiba oil (*Copaifera* spp.), and açai (*Euterpe* spp.). Its creation was the result of the conquest of rubber tapper families who, throughout the entire 20th century, were subjected by rubber bosses to the exploitative work of rubber (*Hevea brasiliensis*) extraction. After the collapse of the rubber economy, a series of land conflicts occurred between the communities that lived there, farmers who claimed possession of the land, and the National Institute for Colonization and Agrarian Reform, which wanted to establish a settlement for farmers from other regions to work the land. This series of issues drove the extractivist families (among Brazilian northeasterners, indigenous people, and caboclos) and then rubber tappers who had been living in the area for a long time. Concerned with keeping alive the culture, the extractive economy, and the conserved forest, a group of rubber tappers founded the Seringal Cazumbá Rubber Tappers Association. In October 1999, the association's representatives approached the IBAMA (Brazilian Institute of Environment and Renewable Natural Resources) requesting the creation of an Extractive Reserve, aiming to benefit all the families that lived along the Caeté River basin. The proposal for the creation of the Reserve gained strength and received support from almost all the institutions of public power and civil society in the municipality of Sena Madureira. In this sense, the creation of the Reserve became a priority due to land conflicts. The reserve was created by Decree s/n°, on September 19, 2002, and is currently managed by the Chico Mendes Institute for Biodiversity Conservation - ICMBio.

The non-timber forest products historically extracted in this protected area are rubber latex (*Hevea brasiliensis*) and Brazil nut (*Bertholletia excelsa*). However, possibly due to the lack of public policies that encourage forest management and the extraction of these products, communities have recently converted their economic base into more profitable activities, such as agricultural production of cassava flour (Plese, 2017).

- The National Reserve Tambopata in Madre de Dios.

The Tambopata National Reserve RNTAMB covers an area of 274.690 hectares and is located in the province of the same name in the Department of Madre de Dios, located in southwestern Peru. The area is inhabited by indigenous communities belonging to the ethnolinguistic groups Ese' Eja (communities of Palma Real, Sonene, and Infierno) and Puquirieri (Kotsimba community), as well as the local population of Brazil nut producers,

farmers, and miners, among other actors such as tour operators and researchers who develop their activities in this area. The area has been administered by the Peruvian Service for Natural Protected Areas SERNANP since the year 2000 (SERNANP, 2019).

The NTFP exploitation in the RNTAMB is characterized as an extractive model, based on the use of species such as Brazil nut, aguaje, palmiche, pijuayo, and ungurahui. Other related economic activities include tourism, agriculture, and fishing, the latter two being mainly subsistence activities. About 2,400 people benefit socially and economically directly and indirectly from these activities (SERNANP, 2012).

- The National Amazonian Wildlife Reserve Manuripi in Pando

Reserva Nacional de Vida Silvestre Amazónica Manuripi (RNVSA Manuripi) is located in the district of Filadelfia in Pando, it has a total area of 747 000 ha, 67% belongs to the zoning "Area for harvesting of Non-timber forest products", whose function is to ensure a sustained harvest of the resources by the local people and promote the conservation by sustained use" (Ministerio del Ambiente y Agua et al., 2013). This reserve has a shared governance between rural communities and the Servicio Nacional de Áreas Protegidas (SERNAP), which has the function of guaranteeing the integrated management of the protected area and the conservation of the biological diversity (Coronel & Solorzano, 2017). Inside the Reserve, around 1700 people are living in ten communities. In these communities, the property regime is common, each one makes the internal distribution of the land, so that each family has a plot of land, thus becoming independent in their agricultural work and Brazil nuts extraction. Each family farm has an average of 500 ha, and their economy is characterized by a mixed system that combines agriculture and cattle raising with extractive activities, in a traditional system, mainly of Brazil nuts (Espinoza et al., 2013).

SWOT Analysis

The SWOT analysis can be considered a participatory diagnosis. This methodology is widely used by different institutions to plan activities, as well as to analyze the current scenario in which they find themselves. As a basis for the development of the process, positive (Strengths) and negative (Weaknesses) internal perspectives and positive (Opportunities) and negative (Threats) external perspectives are listed. Historical accounts suggest that this method of analysis was already used more than two thousand years ago, as noted by Araújo & Schwamborn (2013): "Quoted by Sun Tzu (500 BC), it used the concept focus on strengths, recognize weaknesses, seize opportunities, and guard against threats.

This matrix offers strategic planning direction because, from internal and external environment assessments, it becomes possible to observe the potentials and vulnerabilities. Furthermore, at the end, it may suggest positive or negative trends, according to the crossing of the information indicated by the variables (Araújo & Schwamborn, 2013).

In our study case, according to Pershing (2006), we consider that the **strengths** or the strong points would be the internal elements related to the management and development of NTFPs in the communities/protected areas, where to act directly. The points to improve, uncertainties, and challenges related to exploration, commercialization, legal aspects, among others from the collected examples are the **weaknesses**. On the other hand, the external elements on which we cannot act directly and involve political, economic, and environmental aspects, but enable further progress are the **opportunities**, and the **threats** are the possible obstacles or factors that prevent the development of activities related to the NTFPs management and commercialization.

The SWOT analysis inputs were conducted through semi-structured interviews that were carried out with eight people between the ages of 30 and 60, from different occupations ranging from producers to technicians, researchers, and local entrepreneurs who exploit various non-timber forest products, especially Brazil nuts (*Bertholletia excelsa*), açai (*Euterpe precatoria*) and rubber “shiringa” (*Hevea brasiliensis*). The interviewees were selected regarding their availability by members of the Prodigy Project team who sought contacts between partners, local leaders, experts on the topic, and extractivists² from each of the regions. Three persons were contacted in the Tambopata National Reserve in the Madre de Dios region of Peru, three more in the Manuripi National Amazonian Wildlife Reserve in the department of Pando in Bolivia and two people in the state of Acre in Brazil, one in the Cazumbá-Iracema Extractive Reserve, and the other in the Chico Mendes Extractive Reserve. Due to the moment of the health crisis that we are experiencing due to the COVID-19 pandemic, the interviews were applied both through an electronic form and by telephone calls. The questionnaire³ can be found in the following links:

<https://docs.google.com/forms/d/1wEaO8p7jqV4yquKJEmEfh5End5oDdYEJcJlrxFVf26w/edit>

(online form in Portuguese)

https://docs.google.com/forms/d/1_CmrpOtCz4v2sqJ3TefJk-4TDaaEL8g8kV_ikMPs--M/edit

(online form in Spanish)

To structure the questionnaire more clearly, we divided the questions into introductory questions (general questions to know the current status and the location of the performed

² The inhabitants of the Amazon region declare themselves extractivists because they traditionally "extract" what they need to live from the forest, most of the time in a sustainable way. So to talk about extractivism is not necessarily negative, so much so that it is possible to establish the existence of several types of extractivism, each one with its own peculiarities in a positive and negative sense (Salgado, 2013).

³ The whole questionnaire can be consulted in the Annex section.

activities by the interviewees) and questions on specific components. Regarding the latter, we describe the components:

Environmental component: It is intended to understand the relationship between the environmental management, production of NTFPs, and their use (food, pharmaceuticals, cosmetics, or industrial production). It aims to identify the main challenges, biodiversity conservation practices, and sustainable use of NTFPs to ensure their production in the future.

Economic component: It is aimed to describe the impacts of NTFPs use and livelihoods in terms of income generation and their contribution to the economic stability of producers. The questions involve NTFPs commercialization process, challenges of the activity, and opportunities to improve the processes, and the consequent increase in family income.

Sociocultural component: It is pretended to understand how social organization and culture influence the production and management of NTFPs and analyze how the use of NTFPs has impacted the quality of life, the customs of the community, and other stakeholders that exploit these products.

To provide the data for the SWOT analysis through the specific questions, for each component, four questions were elaborated to know the Strengths, Opportunities, Weaknesses, and Threats related to the management of NTFPs. At the end of each component, the interviewee could leave a comment or a specific observation.

SWOT analysis strategies

After applying for the interviews, we can make the effort to cross-check the information to improve the understanding of the various scenarios that present themselves. The SWOT analysis could show how the internal factors influence the chances of the external factors being materialized. Thus, analyzing the results of the interview it was possible to build four types of strategies that can be developed according to the crossing of the SWOT matrix quadrants (Furgison, 2019):

1. Offensive Strategy (Strengths x Opportunities): It occurs when a strength helps in the possibility of an opportunity to be materialized. In general, this is a strategy that aims at the growth and development of a positive factor.

2. Confrontation Strategy (Strengths x Threats): This strategy reflects possible actions to minimize the chance of threats to occur. Based on this understanding, it is important to develop strategies to confront this reality.

3. Reinforcement Strategy (Weaknesses x Opportunities): The reinforcement strategy appears to reduce the impacts of a "weakness" by reducing the chance of an opportunity occurring. The actions taken must reinforce the weaknesses by taking advantage of opportunities.

4. Defense Strategy (Weaknesses x Threat): This strategy is for the most critical scenario, which aims to minimize losses and negative impacts that weaknesses and threats can cause in the initiative. The idea is to think about how to minimize the chance of a weakness making a threat to become true.

RESULTS

The complete results can be found in the annex section, here is presented a summarized chart (Table 1) with the main findings.

Table 1. Summarized chart of the results

Region	Component	SWOT Analysis			
		Strengths	Opportunities	Weaknesses	Threats
ACRE RESEX Chico Mendes, Cazumbá - Iracema	Environmental	NTFPs commercialization; good practices of NTFPs management; scientific studies.	An increase in the demand/search for NTFPs; the improvement of appropriate management techniques	Difficulty in transporting and commercializing the production; Lack of knowledge about good management practices.	Land grabbing, livestock, loss of trees due to natural death, and deforestation.
	Economic	Traditional knowledge.	Possibility of improving the production and commercialization of NTFPs.	Lack of financial resources; lack of management capacity and the scarcity of consolidated markets.	Presence of intermediaries; market fluctuation.
	Sociocultural	Traditional knowledge; family support; social organization.	Strengthen associations in aspects related to tourism, and products consumption (food culture appreciation).	The dispute with the industrial scale of production; the lack of appropriate markets without intermediaries that can be directly linked to the final consumers.	Change in customs (extractivist to agriculture cattle breeder); lack of technical capacities.
PANDO RNVSA Manuripi	Environmental	Research in the RNVSA on forest conservation and açai production with the help of NGOs. Use of Integral Forest and Land Management Plans (PGIBT), territorial planning instruments, creation of productive economic organizations OEPs.	Create markets and value non-timber products such as açai and Majo, Strengthening of the OEPs in administrative management, accounting, fixed assets, and others.	Lack of knowledge about the management plans. Ungovernability within the communities. Lack of standardization of harvesting and fruit transformation processes, water and solid waste management.	Illegal timber extraction, expansion of illegal gold mining. Change of land use (cattle ranching with cultivated pastures) and oil exploration and exploitation.

PANDO RNVA Manuripi	Economic	<p>Generation of family incomes with 100% organic production (this strength is not yet exploited).</p> <p>Formation of OEPs based on peasant and private entrepreneurship, linked to açai and other NTFPs, not only Brazil nut.</p>	<p>Creation of public-private partnerships to promote and support the generation of capital and investments by peasant entrepreneurs.</p>	<p>Lack of capacity to meet the demand for products and own resources in the communities.</p> <p>Insufficient financial resources and political will.</p>	<p>Decrease in açai production.</p> <p>Pandemic, corruption, and insufficient financial support.</p> <p>lack of a monitoring and early warning system with localized climate records.</p>
	Sociocultural	<p>Associations of açai and Brazil nut producers, support from the government and NGOs in the culture of consuming organic products.</p> <p>Existence of local leadership, more information on NTFPs, gathering of experiences in the formation of OEP in the past.</p>	<p>Inclusion of women in the leadership of associations.</p> <p>Empowerment of the sector based on individual entrepreneurship.</p>	<p>Mistrust between families and in the participation in associations, lack of commitment and autonomy of some producers.</p> <p>Little marketing of NTFPs (Brazil nuts and açai).</p> <p>Complicated organizational processes that limit the administration and trade for the leadership of the proposed entrepreneurship.</p>	<p>Immigration of people from other regions.</p> <p>Land conflicts, increasing land acquisition by peasants.</p> <p>Lack of clarity in regulations regarding access to and planned use of NTFPs.</p>
Madre de Dios RNTAMB	Environmental	<p>Management and operation plans, plantation and fair-trade product certifications.</p>	<p>Better access to the market, thanks to the certifications obtained and training provided by governmental and private institutions for product commercialization.</p>	<p>The limited administrative and bureaucratic capacity of some entities, lack of trained personnel.</p> <p>Lack of dissemination of knowledge produced by the academy to the community.</p> <p>Illegal extraction of fauna and fishing.</p>	<p>Illegal hunting of unauthorized species by non-community members.</p> <p>Illegal logging, mining, corruption, illegal appropriation of land, etc.</p>

Madre de Dios RNTAMB	Economic	<p>Support from international and governmental institutions.</p> <p>Strengthening of alliances with new domestic and foreign companies.</p> <p>Higher productivity per hectare compared to non-perennial crops and less strenuous conditions for workers (under shade).</p>	<p>Market expansion, new products, alliances with new associations, and the inclusion of more local producers.</p>	<p>Complicated bureaucracy, economic and legal obstacles for the incorporation of new businesses.</p> <p>Lack of subsidies and permanent associativity in some regions depending on market demand.</p>	<p>Lack of financial support and management plans in some regions.</p> <p>Tendency towards more profitable and illegal activities like mining, infrastructure, illegal logging, etc.</p>
	Sociocultural	<p>Strengthened networks among farmers in some regions to have greater access to seeds.</p> <p>Preservation of ancestral knowledge of food NTFPs through family work.</p>	<p>Promote experiential and cultural tourism in the region.</p> <p>Nutrition programs for children and pregnant women.</p> <p>Support local associations and explore other NTFPs-derived products that have not been studied before, e.g. Brazil nut beer.</p>	<p>In some areas, there is no strong associativity among the stakeholders involved.</p> <p>Presence of many intermediaries, limited legislation, and regulations in this matter.</p> <p>Migration of young people due to lack of interest in the activity in search of better jobs.</p> <p>Lack of knowledge on the part of collectors and the indigenous community about the rights of both.</p>	<p>Land grabbing, illegal urbanization.</p> <p>Immigration of people from outside the community for illegal extractive activities (logging, hunting, mining).</p> <p>Lack of adequate infrastructure and quality of education.</p>

DISCUSSION

Acre: Resex Cazumbá-Iracema and Resex Chico Mendes

From the SWOT analysis carried out with a resident of Resex Cazumbá-Iracema and with the manager of Resex Chico Mendes, it was possible to identify positive and negative variables related to the use and management of NTFPs.

The residents of Resex Cazumbá-Iracema (Seringueiros do Seringal Cazumbá) mentioned that the Brazil nut management occurs in native forests and the transportation route is being maintained once a year.

Environmental component

Regarding the environmental component, the main strengths highlighted were a) the possibility of NTFPs commercialization; b) good practices of forest management; and c) development of scientific research in the region.

The Central Cooperative of Extractive Commercialization of Acre (Cooperacre) was created in 2001, through the articulation of extractivist social movements. Cooperacre aimed at strengthening the commercialization of NTFPs, mainly of Brazil nut. Several training activities regarding good management practices and monitoring of the Brazil nut collection/processing took place in cooperation with Embrapa, making it possible to improve the quality of the products and reduce contamination by aflatoxins. The results of this led to an improvement in the commercialization of Brazil nuts for different regional and national markets.

Another mentioned strength that gives visibility to RESEX Cazumbá-Iracema, as well as encouraging the conservation of agrobiodiversity, is the implementation of several scientific research projects in protected areas. Many studies are going on about: local fauna (Oliveira & Calouro, 2019, 2020), ecotourism as an alternative to local development (Moraes & Irving, 2013), identity and territoriality based on community organization (Miranda, 2006), agrobiodiversity, and agroecological ways of combining food production with biodiversity conservation (Siviero et al., 2008), deforestation detection at the protected area (Craveiro, 2013), specific and differentiated education for the extractivist lifestyle (Clem, 2017), effectiveness of public policies to encourage the extraction of NTFPs in Acre (Plese, 2017), among others.

Regarding the opportunities inserted in the environmental component, the interviewees cited: an increase in the demand/search for NTFPs in local, regional, and national markets and the improvement of appropriate management techniques. Concerning the first highlighted opportunity, in the last decades, there has been a growth in the society's interest in forest products, with emphasis on the Brazil nut from the Amazon region and açaí. However, this trend is linked to the improvement of value chains. This, in

turn, concerns the strengthening of projects and public policies that meet the demand. At the federal level, some important advances are seen in the programs listed below:

- The Direct Subsidy Policy for Extractivists Producers (SDPE) which consists of providing an adequate payment for products coming from extractivists;
- The Food Acquisition Program (PAA) is a policy to support stock formation. The PAA purpose is to provide financial support for the formation of food stocks by supplier organizations for later sale and the return of funds received to the government;
- The National Policy for Technical Assistance and Rural Extension (PNATER) which consists of benefiting rural communities with technical assistance, preferably agroecological, for the development of food production and income generation activities combined with the traditional way of life and the conservation of biodiversity and natural resources.

Regarding the opportunity to improve appropriate management techniques, it is worth noting that both studied protected areas have a Management Plan, which is configured as an instrument for territorial and environmental management of natural resources and biodiversity. In addition, it has several measures written and agreed upon between the community members on how the NTFPs management activities should be carried out. However, it is important to implement social technologies that help to benefit the NTFPs. At the same time, these technologies may promote autonomy and empowerment for the communities themselves to start the management of the production chains, reducing dependence on third parties.

The interviewees reported that the difficulty in transporting, the production commercialization, and the lack of knowledge about good management practices are the main weaknesses. The logistics of production flow hinders the success of the activity and reflects demands related to local infrastructure. Several factors prevent better conditions in the flow and commercialization of NTFPs by families. One of them is directly related to the conditions of transport and access to the extraction sites existing in both protected areas. Depending on the time of the year, these activities can last many days, as they are carried out by river and/or land transport on extremely precarious roads. This condition causes an increase in the operating costs of NTFPs exploration. This factor combined with unattractive values and the current low market demand, contributes to producers' lack of interest in forestry (Plese, 2017).

The main threats highlighted by the interlocutors were land grabbing, livestock, loss of trees due to natural death, and deforestation. As for land grabbing, it can also be added that in recent years, residents of the RESEX have been reporting the occupation and/or settlement of new families. These families are not considered extractivists and they are living within the limits of these protected areas. The purpose of these occupations is to use natural resources and biodiversity illegally, by extracting timber, hunting, and fishing without the permission of the community, disregarding the Management Plan. In addition to this threat, livestock is one of the main ones. In recent years, forest areas are being converted to pasture. According to the National Institute for Space Research (INPE), in 2020 Resex Chico Mendes was the champion in recording outbreaks of fires among all protected areas in the Amazon: 1,127 - representing

23.7% of the total. This large amount of fire is related to the burning of the newly felled forest or the clearing of pastures that have already been opened. Thus, it is observed that deforestation activities are intrinsically related to the economic activity of livestock.

Economic component

The only strength reported by the interlocutors was the traditional knowledge. The “traditional” is perceived as a specific way of life, in which knowledge is practiced and not as specific ancestral contents stagnated in time (Cunha, 1999). In other words, traditional knowledge is a living science, this kind of knowledge is filled with experiences, it is innovative, is continually marked by research and is not simply a repository of knowledge. Thus, it is a science that is based on the observation of other forms of life and the abiotic resources of a territory. It is built by populations that have lived in the same habitat for thousands of years. In this sense, traditional knowledge can be considered a great strength because it is directly related to the way of life and territorial identity. Thus, it is a foundation for the development of different economic activities based on extractivist culture, such as the diversification of the commercialization of NTFPs, community-based tourism, among others.

The interlocutors pointed out the possibility of improving the production and commercialization of NTFPs as opportunities. As previously mentioned, it involves the improvement of the entire production chain on a sustainable basis. To this end, it is necessary to apply public policies aiming at low-cost social technology development. These technologies must, above all, be emancipatory and contribute to increasing the quality of products without compromising the extractivist lifestyle. Some examples are the installation of solar panels to supply energy for the beneficiation places, the development of solar food dehydrators, utensils for making handicrafts, among others.

The weaknesses mentioned were the lack of financial resources, the lack of management capacity, and the scarcity of consolidated markets. All the weaknesses might be related to the lack of effective public policies for the execution of economic activities. The promotion of value chains through COOPERACRE and the state price subsidy programs for extractive products are important examples. In addition, the management capacity involves a great demand for training courses in different subjects (small business administration, financial education, associations, and cooperatives, among others). This training can contribute to the implementation of production chains of family interest. According to Plese (2017), schooling conditions and low information related to the market, technologies, and financial resources, lead extractivists to commercialize their production at very low prices. Often the prices are below those stipulated by the market (for intermediaries, such as marketers and/or middlemen). This situation generates a dependency relationship.

Finally, the threats inserted in the economic component concerned the presence of intermediaries, who overexploit the extractivists, as they normally ask for unfair production values. Due to the lack of options, the extractivists must accept, otherwise, run the risk of losing production. One way to block this dependency is the establishment of cooperatives and associations, such as the example of COOPERACRE.

Another threat cited by respondents was the fluctuation of the NTFPs market. According to Balzon et al. (2004), research shows that consumer interest in NTFPs is growing. Market studies of natural oils have shown that copaiba oils (*Copaifera multijuga* Hayne), andiroba (*Carapa guianensis* Aubl.), ucuúba (*Virola surinamensis* Roll. ex. Rottb. Warb.), and chestnut (*Caryophyllus aromaticus* L.) are used by the pharmaceutical and cosmetics industries.

Sociocultural component

The traditional knowledge was also a strong point in the sociocultural component. In addition, family support and social organization such as associations were also considered as strengths. Family and community cohesion is highlighted as essential for the maintenance of the extractivist way of life and income generation. The strengthening of associations was mentioned as a sociocultural opportunity. The community organization in associations is a dynamic process in which management must be continuous, as well as the update of interpersonal relationships and reciprocity bonds. This process is important to maintain an effective integration between the individual, the collective, and the activities that permeate them. Some other opportunities were mentioned such as tourism and food culture appreciation. Tourism is also an economic activity that ensures income generation from biodiversity and natural resources conservation. This is also linked to the appreciation of food culture which is intrinsically related to the maintenance of the extractivist culture. It is based on the perpetuation of traditional eating habits, in which native and cultivated plant species are the basis of the food including hunting and fishing animal protein, in fact, food habits are a fundamental component when thinking about the implementation of community-based tourism in the studied RESEX.

The weaknesses reported were the dispute with the industrial scale of production and commercialization of NTFPs and the lack of appropriate markets that are independent of intermediaries and that can be directly linked to the final consumers. The sociocultural weaknesses are directly related to the economic ones. Possibly, because economic activities are the main tools to achieve sociocultural cohesion. As for the bottleneck pointed out about the presence of intermediaries, there are some initiatives promoted by civil society organizations (Instituto Socioambiental - ISA, Imaflora, the Community that Supports Agriculture - CSA), which work with the valorization of NTFPs from its fair commercialization and short circuits. To this end, conscious consumer groups are organized to make collective purchases directly from producers, without the interference of intermediaries. In addition, an important instrument to avoid the condition of dependence on third parties are public purchases of food to supply schools, hospitals, orphanages, etc., through programs such as the National School Feeding Program (PNAE) and the Food Acquisition Program (PAA). For this, it is necessary to have a good relationship with the municipal and state public authorities, in addition to political will.

Regarding the threats, the interlocutors mentioned the change in customs, mainly with young people due to the influences of the urban way of life and the "country" culture that is associated with livestock activities. This can be considered as one of the main threats, because by devaluing the forest culture,

there is a loss of social, cultural, and territorial identity, which can trigger the acceleration of other environmental and economic problems, such as the conversion of forests into pastures. One strategy would be the formation of groups that discuss the valorization of the extractivist way of life through the generation of income with NTFPs management sustainably. The lack of technical training was also identified as a threat. The absence of training on biodiversity conservation economic activities and sociocultural organization makes the implementation of interest activities more difficult. This absence also harms the appreciation of the extractivist way of life and opens loopholes for the involvement with new activities like agriculture and livestock.

Madre de Dios: National Reserve Tambopata

Regarding the interviewed persons, the sites of NTFPs extraction are located in the buffer zone of the RNTAMB. There are concessions authorized by the government to exploit various non-timber forest products, mainly Brazil nuts and derived products such as oils, soaps, and essences of rosewood (*Aniba rosaeodora* Ducke), orange (*Citrus sinensis* (L.) Osbeck), coconut (*Cocos nucifera* L.), olive (*Olea europaea* L.), Brazil nut (*Bertholletia excelsa*), aguaje palm (*Mauritia flexuosa*), shiringa (*Hevea brasiliensis*), tamishi (*Thoracocarpus bissectus* Vell. Harling), and ungurahui (*Oenocarpus bataua* Mart.), and local products such as plantain *Musa* spp., chili *Capsicum* spp., and cacao *Theobroma cacao* L.

Not all interviewees are currently participating in local organizations or associations due to the lack of presence of some of them; however, two of them are linked to ASCART (Asociación de Castañeros de la Reserva de Tambopata), which has allowed them to better manage their products. The main transportation route for the products is by the Madre de Dios River to Puerto Maldonado, where it takes an average of 8 hours, and sometimes by unpaved road where it can take one or two days depending on conditions.

Environmental component

Among the interviewed participants, both strengths and threats are factors that are shared in common and are based on the state of conservation. The strengths have been the result of the Peruvian government's work and legislation and the certification of concessions for the exploitation of products, and the natural resources management plan in general (AIDER, 2010) Nevertheless, the actions that negatively affect them, like poaching, illegal mining, and logging, which are fully identified and have been attempted to be mitigated through various monitoring and control measures or actions (SERNANP, 2019) However they have not been sufficient or very difficult to implement according to the interviewees.

However, the opportunities and weaknesses vary at the local level, they are not presented in the same way in each place, for instance, one of the highlighted alternatives are the alliances and support through old and new partner institutions like AIDER Association for Research and Integral Development and Conservation International to perform more research and aiming to promote the good quality of the

products and gain more access to the market, an example of these actions have been the promotion of agroforestry systems in the prioritized sectors of the Buffer Zone in the reserve (SERNANP, 2019) Some weak aspects are the lack of administrative, technical and bureaucratic capacity of various entities, and also few personnel to attend local issues, and also in lesser extent the extraction of fauna or hunting and fishing, besides creating awareness the *barraqueros* (landowners) to make a better management of the solid waste to not pollute the area.

Economic component

It is observed that the strengths and opportunities are elements that are allowing progress in productivity, improving profitability, an example are the alliances established with new business partners and funding and support with new foreign associates. like the Flemish Rainforest Fund from Belgium, USAID, WorldWildlife Fund – WWF among others (Benites, 2017; Ormeño & Gregory, 2017), which has improved the productivity levels of some NTFPs such as Brazil nut, which decreased by 80% in 2015, possibly due to a decline in pollinators due to burning or natural cycles or age of the Brazil nut trees. This has been strengthened with enrichment programs of chestnut trees with other NFTP-producing species such as unguharui *Oenocarpus bataua* and pashaco *Schizolobium parahyba*. (SERNANP, 2012, 2019).

Nevertheless, the lack of associativity or permanent linkage of some producers, procedures, and economic support, bureaucratic obstacles weaken the improvement actions at the local level, as well as the miscommunication between the government and the inhabitants. This has been expressed since the diagnosis of the master management plan in 2012 (SERNANP 2012; Benites, 2017).

On the other hand, the threats that are presented are varied and are related to social aspects like the migration of the local population for better economic opportunities, lack of improvements in some management plans, rather than external fluctuations in the market. Nonetheless, illegal extractive activities like mining, lodging, and land grabbing have also had a negative impact on the local economy (AIDER 2010; SERNANP, 2012; SERNANP, 2019; Melchor-Castro & Bejarano, 2019).

Sociocultural component

Among the activities expressed as strengths, there are few, and they differ among the interviewees and are based on the family work and the cultural and nutritional importance of NTFPs besides the preservation of the extracted resources; the role of the products is the *raison d'être* for the communities that sustain their livelihoods and well-being from them (SERNANP, 2012; Melchor-Castro & Bejarano, 2019).

On the other hand, the potential for opportunities is greater in terms of the experienced-based tourism offers and exploration of new uses of the already exploited products e.g beer extracted from the Brazil

nut that is an initiative supported by the ETH Swiss Federal Institute of Technology in Zürich. Also the development of new programs focused on the nutritional benefits of Brazil nuts, and açai, for pregnant women and children. The nutritional and medicinal uses of these plants are well documented, for example, chestnut seeds are high in Omega 3, 6, and 9, and açai is consumed in salads and is also used to treat kidney problems (Melchor-Castro & Bejarano, 2019).

The weaknesses are similar to those of the economic part, and also lack of schools or educational centers, and intermediaries that are useless for some procedures, as they are linked to each other, in addition to the threats that are related to factors that also affect the environment, such as illegal extractive activities like mining and logging as well as the immigration of foreign people to occupy the land illegally and migration of young people to work in the city, and following the threats that are currently most prevalent are as follows: illegal mining and immigration 70% lodging 30% and 20% land grabbing for agriculture and illegal settlements. Although these are data presented by the interviewees, they can be taken as an approximation, however, it is estimated that an area of 400 hectares in average has been affected by these activities (SERNANP, 2019).

Pando: Manuripi Amazonian Wildlife National Reserve

In Pando, NTFPs are very important for the rural economy, which is based on familiar productive systems, with Brazil nut (*Bertholletia excelsa*) as the main product, complemented with other subsistence activities like agriculture. Forests provide a high diversity of other NTFPs like cacao (*Theobroma cacao*), sinini (*Annona muricata* L.), camu camu (*Myrciaria dubia* McVaugh), and açai (*Euterpe precatoria* Mart.), which demand and commercialization has recently increased, becoming an opportunity to improve rural communities welfare (Araujo-Murakami et al., 2016).

The interviewees were two technicians/managers and one researcher, with experience working with NTFPs in Pando and the reserve for between 5 and 15 years. The NTFPs mentioned as most important was açai followed by Brazil nut, burití, shiringa, cacao, and Copoazu. The forests in the area were described as primary forests with a high abundance of Brazil nuts, açai, and burití, and difficult access, especially in the rainy season.

Environmental component

Different instruments that facilitate the management, production, and commercialization were highlighted as strengths in this section, possibly due to the effects that they could have on the environment. Among these instruments are the Planes de Gestión Integral de Bosques y Tierra (PGIBT), which are documents presenting the productivity potentials, productive systems, and internal normative for the sustainable use of natural resources and land (FAO, 2017), currently 5 communities inside the reserve have a PGIBT. As instruments of territorial planning, are the *título ejecutorial* issued by the Instituto Nacional de Reforma Agraria (INRA), granting legal security to communities as landowners, in the RNVSA Manuripi, 23 % of the area is titled in favor of 10 communities (INRA, 2008; Orosco, 2013).

Other facilitating instruments were the formation of *Organizaciones Económicas productivas* (OEP) and different protocols across the production chain and for commercialization.

Research and information about the biodiversity in the area were mentioned as a strength. Currently, different NGOs like ACEAA, WWF, and CIPCA, support the development of the NTFPs providing knowledge and technical support to communities (Torres et al., 2019)

The opportunities mentioned were more related to the benefits that commercialization, strengthening of the economic organizations, and value chain could bring to the conservation and valorization of the NTFPs. Weaknesses covered different dimensions like the lack of knowledge about the management plans, lack of standardization in productive processes, lack of valuation and knowledge about the benefits of NTFPs, and deficiencies in incorporating them in the economic system, which shows the deficiencies that value chains have. External threats were all related to land use change due to illegal mining, oil extraction, and agriculture.

Economic component

Economic strengths identified were related to the conformation and strengthening of peasant economic organizations of NTFPs mainly for açai and the possible extra economic benefits that they could regenerate, as they come from natural forest and from organic production which potential is not yet utilized. The increasing international demand for these products and public-private arrangements for the development of peasant entrepreneurship were mentioned as opportunities, for example, in Pando, there is an interinstitutional platform *Plataforma Interinstitucional de Articulación de Complejos Productivos de Frutos Amazónicos* (PICFA), which objective is to create a space for coordination and articulation of private and public institutions to promote the production of Brazil nut, cacao, açai and copoacú in Pando, working with different links of their productive chain and commercialization to improve rural families and organizations economy.

All interviewees coincided that the lack of economic resources was an important weakness, because rural communities may don't have enough resources and capacities necessary to trade and be part of the market. Threats mentioned were varied, among the ones that were more specifically related to economic aspects, where the lack of financial support, corruption, and the idea that other unsustainable, like livestock raising activities, are more economically profitable.

Sociocultural component

People's cultural habits of organic and ecological consumption were mentioned as a local strength that increases the value of NTFPs nutritional values, and therefore could be also a trigger for increasing demand. Another cultural strength was the habit of the inhabitants working with NTFPs, which could be explained by looking at the social background of the population. Communities settled in Pando, arrived as colonizers for the rubber rush, and after the drop of its price, they found in Brazil nut activities an

important source of income, explaining their long tradition of basing their economy in NTFPs exploitation (Orosco et al., 2013).

The existence of local leaderships and associations were mentioned as an opportunity for the strengthening of local individual and associated entrepreneurship, nevertheless as mentioned before, they still have some limitations, like in the financial aspects. The weaknesses identified were related to some other organizational limitations, like the organizational and administrative lack of capabilities to face challenges when commercializing NTFPs. This is in line with Belcher & Schreckenberg (2007), who mentioned that one of the main obstacles that rural organizations have to deal with, is their formalization and bureaucratic requirements necessary to sell NTFPs at a large scale. Regarding the threats, land related problems were again identified, these included the increasing request for land, migrations from people with different cultures, and the migration of young people to other places due to the limited access to land, which demonstrate that there are still issues to solve related to the land distribution in the area.

FINAL CONSIDERATIONS AND STRATEGIC RECOMMENDATIONS

Acre: RESEX Chico Mendes and RESEX Cazumbá Iracema

It can be inferred that the main strengths concern the cultural and territorial identity that the extractivists have with the place where they have lived for dozens of years. The historical construction of the indigenous-rubber tapper amalgam is an extremely important aspect for sustainable management activities of NTFPs, after all, extractivism is at the core of the way of life in the forest, since it is one of the main life-sustaining activities.

As for opportunities, most of the reports referred to ways to guarantee income generation from the management of NTFPs. It is believed that this is one of the main prerogatives to make the maintenance of the extractive way of life viable.

The main weaknesses mentioned that hinder the continuous development of projects related to the management of NTFPs are the lack of financial resources, technical training, and short circuits for the commercialization of products. Finally, concerning threats, we can highlight that the main one concerns the increase in deforestation in both protected areas.

Madre de Dios: National Reserve Tambopata

In general, the strengths are enhanced by the role of the existing associations and the certification and management plan of products mainly açai, Brazil nut, and rubber, which are related to each other among the different aspects and the conservation and management status of the products. On the other hand, internal alliances are a strong point that consolidates the management actions carried out so far.

In terms of opportunities, there is a greater offer of actions to enhance the use of the products, focused on experiential and cultural tourism, as well as continuing to expand the market at the national and international level, which is expected to further exploit the potential of the exploited products.

Weaknesses vary depending on each area and each component, but in general, they are based on complicated bureaucratic aspects and are more accentuated at the economic and sociocultural components

On the other hand, the factors perceived as threats as such do not directly affect NTFPs production and exploitation in this area, however, their regional impact is notorious since they affect all aspects transversally and the tendency to increase is greater due to the lack of local control over the illegal economic activities like artisanal and small-scale gold mining, (USAID, 2020).

Pando: Manuripi Amazonian Wildlife National Reserve

According to the strengths identified, it can be inferred that the formation of producer associations and the several instruments related to NTFPs production that promote their sustainable production and commercialization are important advantages. Other important strengths are the information available in the area and cultural habits of consumption and production of NTFPs.

Regarding the opportunities, it can be said that there are chances of increasing the value of NTFPs in the area, as there is an increasing demand for cacao, açai, and copoacú, and factors as the communal land ownership and support received from different institutions are advantages for improving their production.

The weaknesses identified were varied, but the most mentioned ones were the lack of economic resources, organizational and commercialization capacities from the side of rural communities, which shows that external support to improve their capacities is necessary to promote NTFPs production.

As for threats, the most frequently reported were related to land use change and ownership, it can be seen that despite the land communal land policies, there are still problematic issues and interests in other economic activities like agriculture, livestock, or mining.

Recommendations: SWOT analysis strategies

In order to improve the results and recommendations, including quantitative analyzes, it is important to expand the sample, increasing the number of interviewees and involving a greater variety of stakeholders.

An overview of the strengths, opportunities, weaknesses, and threats raised during the interviews indicates some strategic actions that can leverage the activity of NTFPs management in the MAP region. An example of this is shown in the table below (Table 2) that summarizes four types of strategic recommendations.

Table 2. Proposed strategic recommendations to improve NTFPs management

STRATEGIC RECOMENDATIONS	OPPORTUNITIES	THREATS
<p>STRENGTHS</p>	<p>Offensive strategy:</p> <ul style="list-style-type: none"> - To strengthen NTFPs productive chains on a sustainable basis. - To strengthen public policies of agriculture/forest technical assistance. - To strengthen capacity building/training activities for legal extraction of products. - To safeguard the traditional knowledge as a reference for sustainable management practices. - To value local food culture. - To strengthen community organizations, public policies, and articulation with educational institutions and civil society organizations to promote tourism as an alternative for local development. - To strengthen institutional support from different entities, which has fostered community organization, making products more visible to new and potential national and international markets. - To promote the nutritional and organic production potential of the NTFPs to expand the market. - To promote the proper use of and fulfillment of management instruments e.g. management plans. - To promote the organizational capacities of the rural organizations through training and institutional support. 	<p>Confrontation strategy:</p> <ul style="list-style-type: none"> - To strengthen control and inspection actions to reduce deforestation and land grabbing practices (community and public institutions supervision). - To promote short circuit marketing initiatives for NTFPs. - Intervention and internal/external oversight of public and private organizations in the region in compliance with measures to reduce and mitigate illegal extractive activities. - To seek greater financial support for investment in the use of NTFPs.
<p>WEAKNESSES</p>	<p>Reinforcement strategy:</p> <ul style="list-style-type: none"> - To strengthen training activities on topics such as sustainable forest management, community 	<p>Defense strategy:</p> <ul style="list-style-type: none"> - To improve transportation routes. - To encourage income generation through sustainable activities.

<p>WEAKNESSES</p>	<p>organization, and administration.</p> <ul style="list-style-type: none"> - To implement policies for rural financing, since the lack of financial resources can make unfeasible the improvement of NTFPs management activities. - To take specific actions to facilitate access to credit, procedures to strengthen businesses, and consolidate existing associations, through the potential of the activities that are developed or are planned to be carried out related to experiential tourism and exploration of new products. - To promote the standardization of products' quality to improve the access to markets. 	<ul style="list-style-type: none"> - To promote capacity building/ training on entrepreneurship for small and medium business. - To encourage organizations through associativism and cooperativism. - To value the extractivism way of life. - Effectiveness and clarity of legal actions that prohibit the illegal land occupation and therefore the development of illegal extractive activities. - To create educational centers that provide adequate schooling and training centers in the proper exploitation of NTFPs. - To strengthen normative regarding land use change and land designation.
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NTFPs, biodiversity conservation, and protected areas

NTFPs production and extraction in protected areas, and elsewhere are usually regarded as beneficial to forest and biodiversity conservation. In the MAP region, protected areas regulation, allow local communities to usufruct NTFPs extraction as part of the recognition of local and indigenous customs and habits. Our SWOT analysis and strategy suggest the need for actions to ensure the benefits of NTFPs exploitation improve social welfare, equity, and governance of forest dwellers and indigenous groups living within and around the protected areas. In economic terms, the profitability of NTFPs products is highly variable and depends on multiple factors (Neumann and Hirsch 2000). Studies of Brazil nut, show that this product can contribute to around 45% of total income in Pando, while only 2% in Acre. On the other hand, a recent study in Acre shows, that açai (*Euterpe precatoria*) contributes 17% to total family income (Duchelle et al., 2014; Lopes et al., 2018); although, in both cases, this is not enough to cover local livelihood needs.

Subsidies, and lately payment for ecosystem services are part of the strategies discussed to value the forest and complement the local economy forest dwellers (Richards, 1998; Nunes et al., 2012). In ecologic terms, when a product becomes commercial, the pressure over the resource increases, and conflicts may arise regarding extraction rates, as have been evidenced for the Brazil nut (*Bertholletia excelsa*) which counts with more information related to the abundance, ecology, and sustainable extraction rates than other NTFPs species such as açai (*Euterpe precatoria*), and burití palm (*Mauritia flexuosa*), which are becoming commercially important. The ecological information is important to implement management norms, technology, and extraction rates of NTFPs within the Protected Areas to contribute to

conservation (Neumann and Hirsch 2000). Last but not least, improved market conditions and knowledge of niche markets are required to enhance NTFPs commercialization conditions.

Certified markets, such as fair trade and organic, have the potential to improve marketing conditions for forest dwellers, but there are still challenges for them to finance the cost of the required certifications (Shanley, Pierce, & Laird, 2006).

CONCLUSIONS

From the collected experiences it was possible to have an approximation of the current state of threats and strengths, which are broadly similar in the region, unlike the opportunities and weaknesses that vary even at the local level within each protected area, so that an analysis involving more stakeholders could provide us with a more detailed vision that would allow us to formulate detailed strategic recommendations that could be taken as input by the stakeholders to make decisions at the local level.

We found that all the protected areas studied have a high potential for NTFPs management. There is a wide diversity of species that can be used to help generate income for the communities, improve the relationship between people and the forest, and promote its conservation. A common factor among the protected areas is the existence of a management plan, which is the first step towards the development of value chains. However, we found that each of the studied areas is at a different stage in achieving such development. For example, the Tambopata National Reserve is organized in such a way that community members have achieved certification of the products managed. While one of the main weaknesses of the PAs in Brazil is the existence of intermediaries in the marketing circuits.

Currently, Brazil nuts (*Bertholletia excelsa*), açai (*Euterpe precatoria*), palma real (aguaje) (*Mauritia flexuosa*), and unguahui (*Oenocarpus bataua*) are the most exploited NTFPs for commercial purposes within and outside of the protected areas of the MAP region. According to the experiences collected, it can be seen that the potential of other crops such as camu camu (*Myrciaria dubia*) and sinini (*Annona Muricata*) in Bolivia, tamishi (*Thoracocarpus bissectus*), and unguahui (*Oenocarpus bataua*) in Peru, and andiroba (*Carapa guianensis*), and ucuúba (*Virola surinamensis*) in Brazil, are being exploited according to market demand and this would help to diversify the variety of products which would strengthen the local economy, and contribute to the forest conservation, and the biodiversity of the MAP region, and its protected areas.

After our analysis, we can verify the importance of projects originating from public or private funding to foster the development of value chains in protected areas. Such projects, accompanied by technical training covering different areas of knowledge (low-cost social technologies, sustainable forest management, equipment maintenance, associativism, short marketing circuits, etc.) can be one of the instruments for consolidating the autonomy of communities living in protected areas in so that the

extractivists themselves become emancipated in terms of implementing their own socioeconomic model specific to their livelihoods.

Finally, one of our take-home lessons is to bring scientific studies closer to traditional peoples and communities, to value traditional knowledge and understand it as essential for conservation, as well as to use a transdisciplinary approach to contribute to the implementation of NTFPs management projects, providing low-cost technologies and knowledge exchange programs to develop solutions for complex realities.

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REFERENCES

- ACRE. (2010) Secretaria de Estado de Meio Ambiente do Acre. Diagnóstico socioeconômico e cadastro da Reserva Chico Mendes. Rio Branco, 2010.
- AIDER. (2010). Reducción de la deforestación y degradación en la Reserva Nacional Tambopata y en el Parque Nacional Bahuaja-Sonene del ámbito de la región Madre de Dios – Perú, bajo los estándares de la Alianza para el clima, Comunidad y Biodiversidad CCBA. Asociación para la Investigación y Desarrollo Integral. Lima: Ministerio de Ambiente.
- Araújo, M. G. & Schwamborn, S. H. L. (2013). A Educação Ambiental em análise SWOT. AMBIENTE & EDUCAÇÃO-Revista de Educação Ambiental, 18(2), 183-208.
- Araujo-Murakami, A., Reyes, J.F., Milliken, W. (2016). Frutales silvestres y promisorios de Pando. Herencia/Museo de Historia Natural Noel Kempff Mercado, Cobija, Bolivia. 96 pp.
- Balzon, D. R.; Silva, J. C. G. L. da; Santos, A. J. dos. (2004). Aspectos mercadológicos de Produtos Florestais Não Madeireiros – Análise Retrospectiva. FLORESTA 34 (3), Set/Dez 2004, 363-371, Curitiba - PR. Available at: <https://revistas.ufpr.br/floresta/article/view/2422/2024>
- Belcher, B., & Schreckenberg, K. (2007). Commercialisation of Non-timber Forest Products: A Reality Check. Development Policy Review, 25(3), 355-377.
- Benites, M. (2017). RECOLECTORES Y EMPRESARIOS: ANÁLISIS DE LA AGENCIA SOCIAL EN LA COMUNIDAD CASTAÑERA DE LA RESERVA NACIONAL TAMBOPATA - ASCART. Tesis de Maestría. Lima: Pontificia Universidad Católica del Perú.

BRASIL (2006). Plano de Manejo Reserva Extrativista Chico Mendes. Superintendência do IBAMA no Estado do Acre. 2006. 91p. Available at: https://www.icmbio.gov.br/portal/images/stories/plano-de-manejo/plano_de_manejo_reserva_extrativista_chico_mendes.pdf

Camacho, J. J. H. Castilla, A. A. A. Potencial ecoturístico de los recursos naturales del fundo San Carlos km. 6.5, bajo Tambopata. Tesis Licenciatura en Ecoturismo. Puerto Maldonado, Perú, 1920 p.2012.

Coronel Cisneros, M. & Solorzano Orellana, J. (2017). *Comunidades locales y pueblos indígenas: Su rol en la conservación, mantenimiento y creación de áreas protegidas*. International Union for Conservation of Nature. <https://doi.org/10.2305/IUCN.CH.2017.09.es>

Clem, T.C.F. (2017). Diretrizes para uma política de educação na floresta amazônica: o caso da Resex do Cazumbá Iracema-AC. Dissertação de Mestrado. Instituto Nacional de Pesquisas da Amazônia (INPA).

Craveiro, I.C.P. (2013). Uso de geotecnologias na detecção do desmatamento na Reserva Extrativista Cazumbá Iracema no estado do Acre. *Monografia. Universidade Federal do Paraná*.

Cunha, M.C.D. (1999). Populações tradicionais e a Convenção da Diversidade Biológica. *Estudos avançados*, 13(36), 147-163 pp.

Dourojeanni, M. (14.10.2005). ((o)eco Jornalismo Ambiental . Obtenido de MAP: Madre de Dios, Acre, Pando: <https://www.oeco.org.br/colunas/16374-oeco-14292/>

Drummond, J.A.A. (2013). A extração sustentável de produtos florestais na Amazônia Brasileira. *Estudos sociedade e agricultura*, 115-137 pp .

Duchelle, A., Almeyda, A., Hoyos, N., Marsik, M., Broadbent, E. & Kainer, K. (2010). Taking Stock of Smallholder and Community Forestry: Where do we go from here?, (pág. 40). Montpellier. Obtenido de https://www.researchgate.net/publication/266892129_Conservation_in_an_Amazonian_trinational_frontier_patterns_and_drivers_of_land_cover_change_in_community-managed_forests/stats

Duchelle, A. E., Guariguata, M. R., Less, G., Albornoz, M. A., Chavez, A. & Melo, T. (2013). Evaluación de las oportunidades y limitaciones del uso múltiple de castaña y madera en la Amazonia occidental. In: *Avances y perspectivas del manejo forestal para uso múltiple en el trópico húmedo*, 63.

Duchelle, A.E., Almeyda, A., Wunder, S., Börner, J., Keiner, K. (2014). Smallholder Specialization Strategies along the Forest Transition Curve in Southwestern Amazonia, *World Development*, Volume 64, Supplement 1, Pages S149-S158, ISSN 0305-750X, <https://doi.org/10.1016/j.worlddev.2014.03.001>.

Espinoza, S. K., Dresdner Cid, J. & Chávez Rebolledo, C. (2013). Opciones de gestión para reducir la cacería ilegal: El caso de la Reserva de Vida Silvestre Amazónica Manuripi, Bolivia. *Ecosistemas*, 22(2), 97-103. <https://doi.org/10.7818/ECOS.2013.22-2.14>

FAO. (2017). Guía práctica para la implementación de los Planes de Gestión Integral de Bosques y Tierra.

FAO. (2002). Evaluación de los Recursos Forestales Mundiales 2000 - Informe Principal. (O. d. Alimentación, Editor) Obtenido de Capítulo 10. Productos forestales no madereros: <http://www.fao.org/3/y1997s/y1997s00.htm#Contents>

FAO. (1996). Desarrollo de Productos Forestales no Madereros en América Latina y el Caribe. Santiago: Organización de las Naciones Unidas para la Agricultura y la Alimentación.

FAO. (1992). Productos forestales no madereros; posibilidades futuras. Estudio FAO Montes 97. Roma: Food and Agriculture Organization of the United Nations.

Freitas, J. (2012). Efeitos da intervenção governamental na reserva extrativista do Alto Juruá no período de 1990 a 2010: identificação dos pontos fortes e fracos. 2012. 131 f. Dissertação (Mestrado em Desenvolvimento Regional) - Universidade Federal do Amazonas, Manaus,

Furgison, L. (2019). SWOT Analysis Step 5: Developing Actionable Strategies. Obtenido de <https://articles.bplans.com/swot-analysis-challenge-day-5-turning-swot-analysis-actionable-strategies/>

Göpel, J. (17 de 06 de 2020). PRODIGY Soil biodiversity governing tipping points in the Amazon Tropisch Trocken. Obtenido de: <https://prodigy-biotip.org/der-austrocknende-regenwald-vom-einfluss-der-duerre-in-den-tropen/>

Held, C., Pawlowski, G., Paredes, A. & Calo, I. (2015). Cadenas de valor en el sector forestal del Perú Informe diagnóstico y desarrollo estratégico. Unique forestry and land use GmbH, Global Green Growth Institute, German Development Institute. Freiburg, Germany: Unique forestry and land use GmbH.

Lopes, E, B. Soares-Filho, F. Souza, R. Rajão, F. Merry, S. Carvalho Ribeiro. (2019). Mapping the socio-ecology of NonTimber Forest Products (NTFP) extraction in the Brazilian Amazon: The case of açaí (Euterpe precatoria Mart) in Acre, Landscape and Urban Planning, Volume 188, 2019, Pages 110-117, ISSN 0169-2046, <https://doi.org/10.1016/j.landurbplan.2018.08.025>.

Neumann, R.P. & Hirsch, E. (2000). Commercialisation of Non-timber Forest Products: Review and Analysis of Research. CIFOR, Bogor, Indonesia.

Nunes, F., Soares-Filho, B., Giudice, R., Rodrigues, H., Bowman, M., Silvestrini, R., & Mendoza, E. (2012). Economic benefits of forest conservation: Assessing the potential rents from Brazil nut concessions in Madre de Dios, Peru, to channel REDD+. Environmental Conservation, 39(2), 132–143. <https://doi.org/10.1017/S0376892911000671>.

Mayta, M.J.A, Sillo, E.L.A, Chura, C.E.P, Flores, J.G.S. Planeamiento Estratégico de la Provincia de Tambopata - Madre de Dios. Tesis Magister en Administración. Pontificia Universidad Católica del Perú. 225p. 2017.

Melchor-Castro, R. & Bejarano, M. (2019). GUÍA DE PRODUCTOS FORESTALES NO MADERABLES EN MADRE DE DIOS. Servicio Nacional Forestal y de Fauna Silvestre. Lima: Ministerio de Agricultura y Riego.

Melo, Gustavo Mendes de. (2006) Relatório Final: sistematizando todos os resultados obtidos junto às lideranças comunitárias e ao Conselho deliberativo, contendo as estratégias e propostas para os Programas e Subprogramas a serem incorporados ao Plano de manejo de Uso Múltiplo da Resex Chico Mendes. IBAMA, CNPT. Brasília, DF.

Ministerio del Ambiente y Agua. (2013). *Plan de Manejo de la Reserva Nacional de Vida Silvestre Amazónica Manuripi*. 204.

Miranda, J.P. (2006). Identidade territorial e organização social: reserva Cazumbá-Iracema no município de Sena Madureira/Acre, 101p. Dissertação de Mestrado. Universidade de Brasília (UnB), Brasília.

Moraes, E. A. & Irving, M. A. Ecoturismo (2013): encontros e desencontros na Reserva Extrativista do Cazumbá-Iracema (AC). *Revista Brasileira De Ecoturismo (RBEcotur)*, 6(3), 2013. <https://doi.org/10.34024/rbecotur.2013.v6.6346>

Oliveira, M.A. & Calouro, A.M. (2019) Hunting agreements as a strategy for the conservation of species: the case of the Cazumbá-Iracema Extractive Reserve, state of Acre, Brazil. *Oecologia Australis*, 23(2).

Oliveira, M.A. & Calouro, A. M. (2020) Medium-sized and large mammals of the Cazumbá-Iracema Extractivist Reserve, Acre, Brazil. *Check List*, 16, 127.

Ormeño, L. & Gregory, J. (2017). Financiamiento de la conservación y uso sostenible del suelo en la Amazonia Proyecto agroforestal y REDD+ Tambopata-Bahuaja de Althelia. Lima: Forest Trends.

Orosco, S.S.C., Perales, L.L., Coello, I.J., Saravia, L.T. & López, L.Y. (2013). *(short version) Plan de manejo de la reserva nacional de vida silvestre amazónica MANURIPI 2012—2022*. 192.

Pershing, J. (2006). Handbook of Human Performance Technology Third Edition Principles, Practices, and Potential. San Francisco: John Wiley & Sons, Inc.

Plese, N. Avaliação da efetividade local das políticas públicas de fomento ao extrativismo de PFM no Acre: o caso da Resex do Cazumbá Iracema. Tese de Doutorado. Instituto Nacional de Pesquisas da Amazônia (INPA). 163p. 2017.

PRODIGY-BIOTIP. (2020). PRODIGY soil biodiversity governing tipping points in the Amazon. Obtenido de: <https://prodigy-biotip.org/prodigy/prodigy-espanol/donde-trabajamos/>

RICHARDS, M. (1993). The potential of non-timber forest products in sustainable natural forest management in Amazonia. *The Commonwealth Forestry Review*, 72(1), 21-27. Retrieved May 30, 2021, from <http://www.jstor.org/stable/42606942>

Salgado, J. M. (2013). Extractivismos en pugna: Visiones y derechos en el norte amazónico de Bolivia. Fundación Tierra. Obtenido de https://www.ziviler-friedensdienst.org/sites/default/files/media/file/2020/zfd-1-extractivismos-en-pugna-visiones-y-derechos-en-el-norte-amazonico-de-bolivia-2774_0.pdf

Salto, P. (2015). Mapeamento Estratégico da Resex Liberdade com Vistas à Elaboração do seu Plano de Manejo. Ciclo de Formação em Gestão para Resultados do Instituto Chico Mendes de Conservação da Biodiversidade. 54p.

Sanchez, B. (20.9.2019). The World Bank Public Documents. Obtenido de 6. ASL LETICIA, Colombia_ppt Foster Brown : <https://pubdocs.worldbank.org/en/924851569008503058/6-ASL-LETICIA-Colombia-ppt-Foster-Brown>

SERNANP. (2012). Diagnóstico del Proceso de Elaboración del Plan Maestro 2011-2016. Lima: SERNANP - Servicio Nacional de Áreas Naturales Protegidas por el Estado.

SERNAP. (2017). Plan Estratégico Institucional (2016-2020). La Paz: VICEMINISTERIO DE MEDIO AMBIENTE, BIODIVERSIDAD, CAMBIO S CLIMÁTICOS Y GESTIÓN Y DESARROLLO FORESTAL.

SERNAP. (2019). Plan Maestro de la Reserva Nacional Tambopata 2019-2023. Lima: Servicio Nacional de Áreas Naturales Protegidas del Estado.

Shanley, P., Pierce, A., & Laird, S. (2006). Além da Madeira: a certificação de produtos florestais não-madeireiros. Centro de Pesquisa Florestal Internacional. Bogor, Indonesia: CIFOR.

Siviero, A., Raimundo, C. F. E., Lessa, L. S., Delunardo, T. A. & Pardinias, O. B. (2008). FLOUR IN JOINT MANDIOCA COM CASTANHA-DO-BRAZIL: AN ALTERNATIVE TO AGROECOLOGICAL EXTRATIVIST RESERVE CAZUMBÁ-IRACEMA, Congresso da Sociedade Brasileira de Economia, Administração e Sociologia Rural (SOBER), 10.22004/ag.econ.112720.

Torres C., Aviana, E., & Vos, V. (2019). La cadena productiva de Asaí (*Euterpe precatoria*) en la Amazonía Boliviana 84p.

USAID. (2020). Case Study: ARTISANAL AND SMALL-SCALE MINING IN PERU. USAID United States Agency for International Development. Obtenido de <https://www.planetgold.org/sites/default/files/2020-12/USAID.%202020.%20Case%20Study%20ASM%20and%20ASGM%20in%20Madre%20de%20Dios.pdf>

Vadjunec, J., & Rocheleau, D. (2009). Beyond Forest Cover: Land Use and Biodiversity in Rubber Trail Forests of the Chico Mendes Extractive Reserve. Ecology and Society, 14(2), 29.

