

## **Chapter 11**

### **Economic drivers in the Amazon from the 19th century to the 1970s**



Gado e visto em área de fazenda próximo a floresta (Foto: Bruno Kelly/Amazônia Real)

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Graphical Abstract

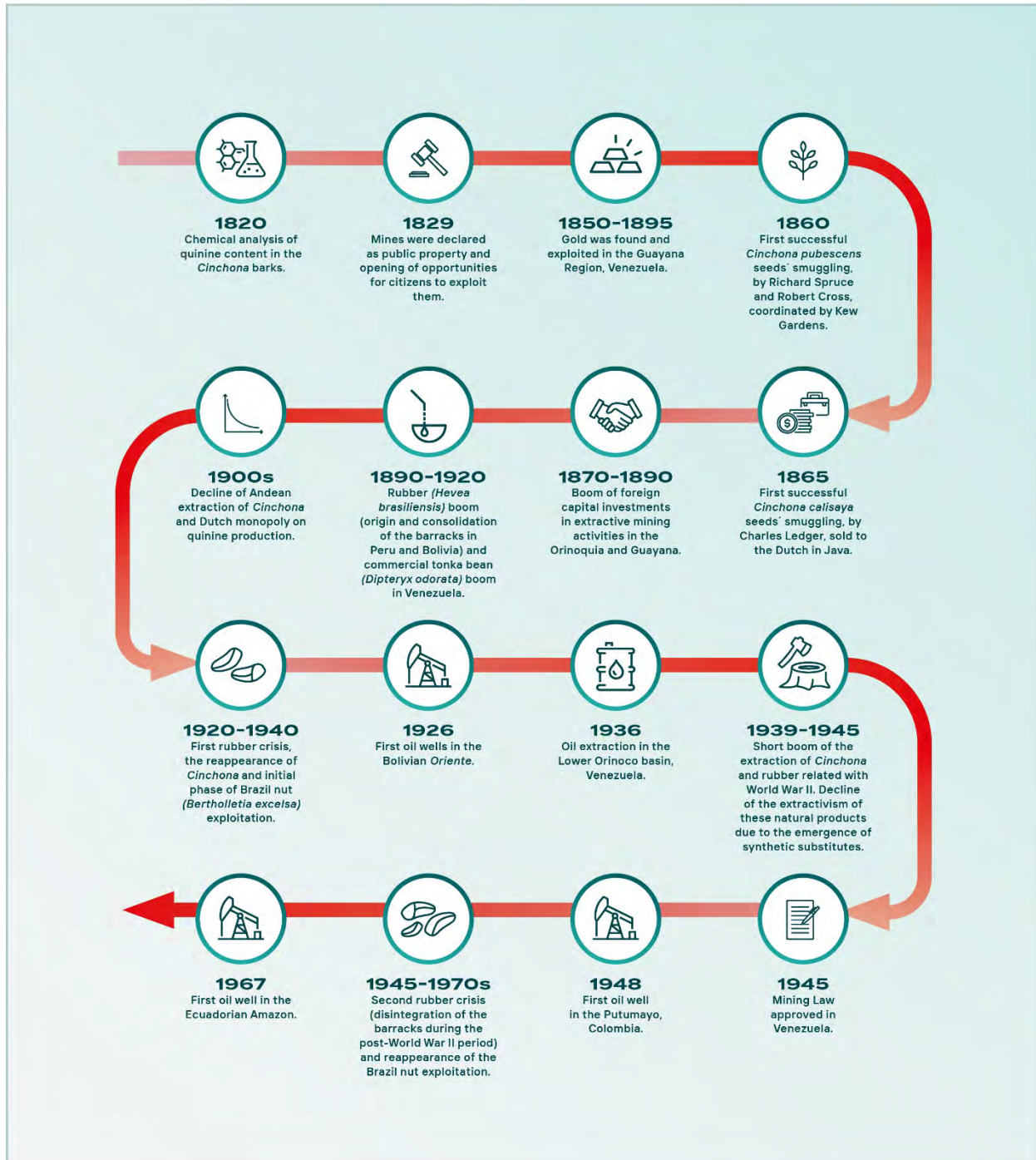


Figure 11.A Graphical Abstract

# Economic drivers in the Amazon after European Colonization from the Nineteenth Century to the Middle of the Twentieth Century (the 1970s)

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## Key Messages

- During the nineteenth and twentieth centuries, there were boom and bust cycles for various natural products such as Cinchona and rubber. Processes such as the extraction of gold continued, and the exploitation of oil was initiated, both existing to this day. The exploitation of some products created the conditions necessary for the exploitation of the others, as in the change from Cinchona to rubber and then from rubber to the Brazil nut.
- The extractivisms always occurred with the support of the States, in association with national and foreign investors, taking advantage of Indigenous labor and colonizers, often in exploitative conditions. Access to the Amazon and the extraction of these products has continued to be through rivers, as in previous centuries, but new roads and highways have been built since the twentieth century.

## Abstract

The objective of this chapter is to identify the main economic processes that occurred in the Brazilian, Andean, and Guyanese Amazon during the nineteenth and twentieth centuries until the 1970s. Specifically, the chapter describes the history of extractivism and the effects of geopolitical reconfiguration in the Amazon after the processes of emancipation or decolonization. It analyses the extractive history based on *quina* barks (species of the genus *Chinchona*, Rubiaceae) and rubber (*Hevea brasiliensis*, Euphorbiaceae), as well as the characteristics and practices developed by social actors related to the local and regional economy that arose from these exploitations. It also includes a synthesis of the history of the emergence of the extractive economy based on the exploitation of oil, minerals (mainly gold), and the beginning of wildlife trafficking and the basis for the emergence of mechanized agriculture, intensive livestock herding, and mega-infrastructure, among others. Finally, it identifies the main lessons learned and key messages from the use of “historical commodities” in the Amazon and their implications in contemporary patterns of use of other resources in the Amazon, such as the Brazil nut (*Bertholletia excelsa*, Lecythidaceae).

*Keywords:* History of extractivism, Cinchona, rubber, oil, natural gas, gold, NTPF.

### 11.1. Introduction

Over the last two centuries, the Amazon oil, minerals and biodiversity have been used intensively as

a result of national and international economic interests. Public policies promoted by Amazon countries have sought to ensure sovereignty and gradually, private and state investment, creating a com-

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plex configuration of socio-ecological systems (Homma 2003; Hecht 2011; Bottazzi *et al.* 2014; Pinho *et al.* 2015), even creating “parallel states” (Cuvi 2011; Hecht 2011; Hecht and Cockburn 2011). In the nineteenth and twentieth centuries, examples of “parallel states” were those derived from the extractivism of non-timber forest products such as *Chinchona* spp. or rubber (*Hevea brasiliensis* in Brazil, Bolivia, Colombia, Ecuador and Peru (Hvalkof 2000; Homma 2003; Hecht and Cockburn 2011). These processes had consequences on the current patterns of use and occupation (Hecht 2011; Schmink 2011) including the violation of the rights of Indigenous peoples and colonizers who were used as low-cost labor in the region. The so-called eco-harvest of the Brazil nut (*Bertholletia excelsa*, Lecythidaceae), which is currently one of the economic engines of the southwestern Amazon (Peru, Brazil, and Bolivia), is a legacy of the rubber period, which in turn was a legacy of the Cinchona period (Stoian 2000, 2005; Duchelle *et al.* 2012).

Since the early 1960s, the predominant perception among the national governments about their Amazon territories was that there were empty “unused” spaces, with formidable natural heritage reserves (minerals, oil, hydroelectric energy, wood, agriculture, and plants for pharmaceutical, cosmetic, and agrochemical uses, among others) and with their sovereignty at risk (Fearnside 1987; Hecht 2011; Clement *et al.* 2015). Several countries established policies and programs with the objective of occupying and accelerating the integration of the Amazon into national and regional economies (Fearnside 1987; Valentim and Vosti 2005). This was achieved through the construction of new roads, improvement of existing roads and investments in large hydroelectric plants, mainly in Brazil. Governments also provided tax incentives and subsidized credit for private investment in oil and mineral extraction, extensive agricultural and livestock projects (Valentim and Vosti 2005). The impetus for the occupation was enforced by policies that promoted large-scale initiatives linked to government and private settlements for the relocation of landless families from other parts of their coun-

tries (Valentim and Vosti 2005; Hecht and Cockburn 2011; Valentim 2015; Fearnside 2016). In Brazil, these initiatives were complemented by a pilot project for the implementation of an Industrial Free Zone in the city of Manaus, capital of the state of Amazonas (Aloise and Macke 2017).

All of these policies and processes led to an acceleration of socioeconomic and environmental changes from the early 1960s to the late 1970s. These changes were characterized by rapid population growth in rural and urban areas, accompanied by the acceleration of deforestation and urbanization processes (Valentim and Vosti 2005). As the myth of the Amazon as an empty “unused” space was discredited, there was a sharp increase in territorial conflicts between new settlers and traditional Indigenous peoples (Valentim and Vosti 2005; Hecht and Cockburn 2011). Towards the end of the 1970s, there was a large number of conflicts of interest over the rights and uses of the land and its natural resources, which went hand in hand with a growing global perception of the key and fundamental role of the Amazon for global sustainability (Hecht 2011; Schmink 2011). This was the vessel for the emergence of organized socio-economic movements that, in association with the growth and effectiveness of national and international political actions, continue to struggle to reshape existing social policies and new ecological systems towards sustainable and inclusive development of the Amazon (Hecht 2011; Schmink 2011).

This chapter synthesizes the main historical processes as economic drivers that shaped the current landscape and the diversity of socio-ecological systems in the Amazon. It carefully analyses what happened after European colonization, from the nineteenth century to the emergence of national sovereignty projects between the 1950s and 1970s. The main natural resources that were used in this period are described, including a synthesis of those resources that today are part of the economic engines of the region.



## 11.2. History of the Extractive Economy Based on Quina

“Quina” or “cascarilla” are the most frequent names for the plants of the genus *Cinchona*, and some of the genera *Remijia* and *Ladenbergia*. Their barks, in the form of powders, have medicinal properties including the ability to prevent and treat malaria (Achan *et al.* 2011) (Figure 11.1). *Cinchona* bark contains four main medicinal alkaloids: cinchonine, cinchonidine, quinidine and quinine, the last being the most important. Each species has different concentrations of alkaloids, which can vary even within the same species depending on the locality, altitude, soil type, age of the tree and harvest time. There is also a lot of hybridization between species (Garmendia 2005; Maldonado *et al.* 2017). The genus *Cinchona* is widely distributed in the tropical Andes, from the lowlands to above 3,000 m in altitude (Figure 11.2 and 11.4). Only the *C. pubescens* species reaches the mountains of Panama and Costa Rica. The sites with the greatest diversity and endemism are southern Ecuador and central Peru (Andersson 1998). The *quinas* have sometimes been called the “savior plants of mankind”. Over time they became important icons for various national imaginaries: in Peru it has been included in the national emblem since 1825, and in Ecuador it was declared the national plant in 1936 (Acosta 2019).

Like many other historical and contemporary products, the history of the *quinas* connects the Andes and the Amazon with the world at different times. This history is made up of religious, commercial, and scientific controversies. For example, debates have taken place for centuries on whether Indigenous peoples knew about its medicinal properties (see for example, Ruiz 1792 or von Humboldt 1821); in this regard, there was increasing evidence that knowledges were transmitted from natives to Jesuits (Estrella 1994; Ortiz Crespo 1994; Crawford 2016). An erroneous history that has circulated widely, up until the present day, refers to the fact that the Countess of Chinchón was cured of malaria with powders of *Cinchona* bark and then she distributed it to the peoples of Lima. Today we



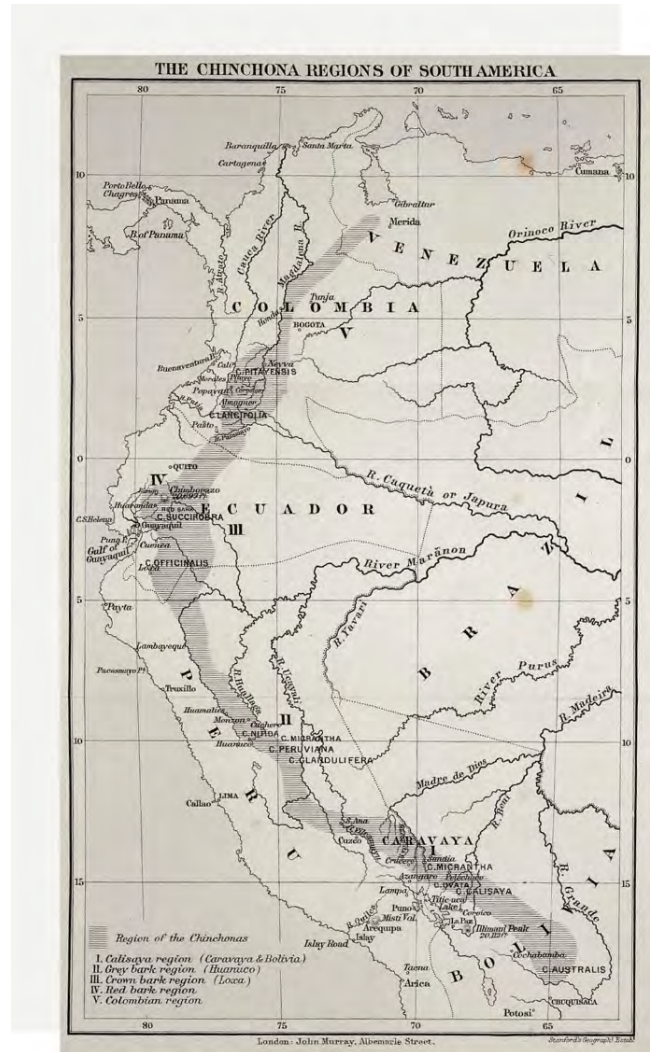
**Figure 11.1** Glass pharmacy jar containing powdered quinine. Source: Unknown maker, Wellcome Collection. The jar is believed to be from the pharmacy of the Milosrdnych Bratri Monastery and Hospital Brno, in the Czech Republic. The painted label written in Latin indicates that this glass pharmacy jar contained powdered quinine. In: <https://wellcomecollection.org/works/ycqazud9>

know that the story is full of errors, beginning with the supposed participation of the Countess (Haggis 1941). However, it served the purpose of validating the medicine among the nobility and the people. The first European explorer to describe these plants was the French academic Charles Marie de La Condamine, who sent specimens to Linnaeus (de la Condamine [1738] 1986). The Swedish botanist gave that Latin name to the plants, convinced of the legend of the Countess of Chinchón. Shortly after, Joseph de Jussieu carried out a more detailed exploration, but his work was not widely known

(Jussieu [1737] 1936). After them, more explorers hunted for *quinas* in South America (WHMM 1930).

The connections of the *quinas* account for the appetite of several international markets, which first led to intensive extractivism and then to the successful smuggling of seeds to Asia, after several attempts by European monarchies and republics since the 18th century (Brockway 1979; Spruce 1996). The European process of colonization of the inner spaces of Africa was fundamental in increasing the demand (Headrick 1981). *Cinchona* was a decisive incentive for the opening of roads to and in the Amazon, later used for other products such as rubber.

The *C. officinalis* species from Loja, in southern Ecuador, also called “fine cinchona”, was the first to be extracted in the 17th century. Due to the growing demand, the *Cinchona* areas of that region were rapidly destroyed, generating lucrative businesses and early warnings about the destructive processes associated with the extraction of bark (Espejo and Estrella 1993). The 18th century witnessed boom and bust processes in Cuenca and Loja (Moya Torres 1994). In the eighteenth-century, demand was so high that the Spanish crown monopolized the product for 38 years (Puig-Samper 1991; Estrella 1994; Crawford 2016) and sent two great botanical expeditions to New Granada and Peru, one of whose main objectives was the discovery of anti-malarial plants. One aim of that royal expeditions was to determine if Loja's fine bark trees were present in other sites, or to find equally effective species (Caldas 1966; Nieto Olarte and Flórez Malagón 2001) Those expeditions helped to increase the knowledge of *Cinchona* to a large extent, but also contributed to the intensification of the conflicts around the taxonomy, distribution and quality of the different species (Fernández 2019). Even the Prussian Alexander von Humboldt intervened in the matter, further confusing the issue and, as in other matters, without giving explicit recognition to the sources of his knowledge (Cuvil 2011).



**Figure 11.2** The Cinchona regions of South America, nineteenth century. Source: Clements R. Markham, Peruvian bark: a popular account of the introduction of cinchona cultivation into British India, 1860-1880. Wellcome Collection. In <https://wellcomecollection.org/works/hjgh4e7c>

There was much controversy over the quality of the *quinas*, an issue associated with frequent adulterations (Crawford 2007). That situation changed in 1820 when the alkaloid quinine was first isolated by Pierre-Joseph Pelletier and Joseph B. Caventou, which led to improved analysis. After that, it was





CINCHONA. (GATHERING AND DRYING CINCHONA BARK IN A PERUVIAN FOREST.)

**Figure 11.3** Gathering and drying of Cinchona bark in a Peruvian forest. Source: Wood engraving, by C. Leplante, c. 1867, after Faguet. Wellcome Collection. <https://wellcomecollection.org/works/werf33s3>

possible to measure the quality of the different species, and to open new sites for extraction in Ecuador, Peru and Colombia, where it helped to configure an Andean-Amazonian space, generating profound transformations of the landscape (Figure 11.3). In those countries, there were three periods of boom, of which the third, between 1877 and 1882, mainly in Santander and on the Amazon slope and foothills, allowed for the improvement of the fragile links between the Amazon and the country and laid the foundations for the subsequent rubber exploitation (Zárate Botía 2001; Palacio Castañeda 2006). Chemical analysis also led to the knowledge that one of the species with the highest

quinine content was *C. calisaya*, distributed between 200 and 3,300 meters of altitude, especially in Bolivia towards the Amazon slope, intensively exploited from the beginning of the nineteenth century (Steere 1943; Andersson 1998; Zárate Botía 2001; Maldonado *et al.* 2017). As in Colombia, the use of this species laid the foundations for the subsequent exploitation of rubber, by involving the native population in its exploitation, defining an economy strongly based on free access and low-cost labor.

In several enclaves, such as the Cuenca and Loja regions in Ecuador, and in Colombia, Peru and Bo-



livia, there was a direct relationship between political power and “*cascarilleros*” (bark gatherers) (Moya Torres 1994; Zárate Botía 2001). The *quinás* were fundamental in opening up mountain passages towards the Amazon, in addition to strengthening existing ones and motivating the migration of locals and foreigners to the Amazon. Extractive areas proliferated throughout the Amazon. Among other things, it changed transportation routes, that from now on were no longer through the Andes and ports such as Callao, Guayaquil or Cartagena, but also through the Amazon, via Iquitos or Manaus, boosting local economies. It triggered large-scale spatial, social and economic changes, fostering a whole series of productive chains, from the packaging of bark to the provision of food, meat, bananas, sugar cane, cocoa, coffee, cotton, cassava, yam, oats, fruit trees, tobacco and pastures (Zárate Botía 2001). Bolivia even decreed a monopoly on cinchona and created a Bank of Cinchona in 1840 (Pardo Valle 1947).

Among the main users of Cinchona bark were the expansionist European empires, which needed it for their armies in Africa and Asia. They had been trying to smuggle these plants since at least the 17th century, finally succeeding in 1860, when *C. pubescens* seeds were sent from Ecuador to Sri Lanka and India (Spruce 1996), and shortly after seeds of *C. calisaya* from Bolivia to the Dutch colonies on the island of Java in 1865. The British used the alkaloid-poor *C. pubescens* species to make totaquina, while the Dutch received seeds from the powerful *C. calisaya*, which they genetically improved, increasing its quality and creating a new species, *C. ledgeriana*, named in honor of smuggler Charles Ledger, who illegally obtained the seeds from Manuel Inca Mamani, an indigenous man from Bolivia (Gramiccia 1988).

Towards the end of the nineteenth century, South American production reached its peak, and gradually began to stagnate, because Dutch production in Java monopolized the market and British purchases declined. In the first half of the twentieth century, Java already accounted for 90-95% of the global production and market. Only small shipme-

nts departed from South America, representing a marginal percentage of production, sometimes bought out by members of the Kina Bureau to take them off the market (Pardo Valle 1947). When it stopped being profitable, the quineros' investments found different targets. In the Bolivian and Colombian cases, they became rubber barons (Stoian 2005). In Colombia, they also directed their financial capital into the coffee and navigation sectors (Zárate Botía 2001).

During World War II there was a brief, although very intensive, renewed boom in the extraction of Andean quinás (Hodge 1948; Cuví 2011). This led to the reopening or rearrangement of routes from the mountains to the Amazon, also associated with other renewed extractivist actions such as those involving rubber (Bangham 1945; Cuví 2011). An important case comes from Tingo María, in Peru, where, among other things, a colonization front associated with a scientific station was made. During that period, Colombia was the largest supplier of bark, followed by Ecuador, Bolivia and Peru. The scale of the Cinchona Program was unprecedented. In the 18th century, when the Spanish crown exercised a 38-year monopoly over the production of *Cinchona*, 350,000 pounds of bark were shipped to the Royal Apothecary (de Andrés Turrión 1989). In contrast, through the Cinchona Program, between 1941 and 1947, the United States imported approximately 40 million pounds of dried bark. This figure does not include bark processed in Latin America factories (Cuví 2011).

Quinine and other natural anti-malarial alkaloids obtained from *Cinchona* barks remain an important antimalarial drug almost 400 years after their efficacy was discovered, although in a much lower amount. Since the World War II, synthetic compounds such as chloroquine or primaquine, among others, became widely used (Greenwood 1995). The same can be said for synthetic quinine, used since 1944 (Woodward and Doering 1945). There were a few subsequent booms, for example during the Vietnam War, when synthetic resistant strains of malaria appeared (Greenwood 1995). However, over time the demand for the natural product de-

clined considerably, limiting its use to beverages such as tonic water, cosmetics or medicines to combat resistant strains.

The *Cinchona* alkaloids were among the first Andean-Amazonian products to be integrated into European therapeutics. These processes contributed to constructing imaginaries about the potential riches of South America (see Chapter 9), whose products were gradually and constantly incorporated into international markets. The boom-and-bust cycles illustrate how the demand from these markets impacts not only the products themselves, but also the forests that contain them, and local economic, social, communicational, political and geopolitical dynamics. Today we can identify similar cases around *guayusa* and *ayahuasca*, among other products. The case also illustrates the long duration of biopiracy, a process that we still witness, for example, with the bioprospecting of useful plants.

The decrease in demand on the South American *quinares* since the nineteenth century, first owing to the development of plantations in southeast Asia, then to the decrease in demand for natural bark, has changed the status of the *Cinchona* plants, which moved from being on the verge of extinction to not currently threatened. Only one of them, *C. mutisii*, is considered “Endangered” by the IUCN Red List, and three others are Vulnerable. Today, the bigger pressure comes from the continuous destruction of their habitats.

### 11.3. History of the Extractive Economy of Rubber

In the nineteenth century, European capitalism had already established a framework to search for and transfer wild plants that were potentially useful as raw materials for industry and in pharmacy. Although the natives of the Amazon Basin demonstrated the use of rubber products to arriving Europeans since the sixteenth century, it was not until the discovery of vulcanization in 1839 that industrial application of rubber multiplied and a boom in demand took place. Among the many latex produc-

ing species worldwide, those belonging to the genus *Hevea*, especially *H. brasiliensis* (Euphorbiaceae) provide the highest yield of the highest quality latex. The fast-growing rubber demand in the world market led to a boom in rubber production in the Amazon.

Although rubber production (“the trees that produce gold”, Zeitzum Lopez 1991) involves a large number of the countries that make up the Amazon, its history is linked to the lowlands of Brazil, Peru and Bolivia) (Figure 11.4). Towards 1880, the Amazon Basin was the only place in the world producing wild rubber. Brazil supplied 60% and Peru 30% of global rubber consumption (Haring 1986). In Peru, the economy based on the exploitation of rubber coincides in part with the so-called period of the “Aristocratic Republic (1895 - 1919)”, which was after the Pacific War (1879 - 1883), when the country lost territory and access to the exploitation of its exportable renewable resources, guano and saltpeter to Chile (Contreras and Cueto 2013). The defeat was a strong blow to Peru’s extractivist model and its economic position as the primary exporter of these materials, causing its collapse (Penano 1988). Without the deposits of guano and saltpeter, the financial assets of Peru turned to other economic activities, such as rubber exploitation in the Peruvian Amazon territory. This period saw the global consolidation of capitalism, which implied the search for regions in the world that could supply natural resources to major economic powers, as well as the establishment of unequal commercial relationships between countries (Chirif 2011). Peru formed part of this unequal economic model as a supply country. In the case of Bolivia, the use of rubber began at the start of 1860. It was characterized by the fact that many families dedicated to quina- already in decline - moved to this activity and promoted modes of production based on the establishment of barracks that allowed them access and direct control over areas with rubber, to consolidate the participation of Indigenous populations as labor, and gave rise to unequal employer-client relations (Stoian 2005). The rubber boom in Bolivia occurred between 1898 and 1919 and was characterized by high prices rather than volume,

an incentive for the involvement of private capital, mainly foreign, and a state that benefitted from the collection of taxes

without exercising any control over the rights of the forest (Stoian 2005). In Brazil, this cycle started in 1850 and crashed towards 1920 (Weinstein 1983; Dean 1987).

In 1896, the Peruvian merchant Julio Cesar Arana began exploring rubber plantations in the Putumayo River valley, now a territory of Colombia. In 1905, he had already acquired over three million hectares within Colombian territory, using Indigenous labor to extract rubber. In twelve years of exploitation of native rubber, the Indigenous population of this region went from 30 thousand to less than eight thousand, generating revenues of US \$ 75 million from the export of 4,000 tons of rubber. In Brazil, the rubber export houses were mainly concentrated in the cities of Manaus (state of Amazonas) and Belem (state of Pará), which were the main ports of the Amazon River system. At its peak, rubber became one of the leading products in the Brazilian economy, accounting for up to 40% of its exports, second only to coffee (Weinstein 1983; Dean 1987; Becker 1995). In 1876, Henry Alexander Wickham, working for the Royal Botanical Garden of London, collected 70,000 rubber tree seeds in the Tapajós River Valley and took them to England. The produced seedlings were later planted in British colonies in Malaysia, which resulted in extensive high dry rubber yielding rubber plantations. Over a period of 50 years, the British became the largest rubber producers in the world, with disastrous effects on the Amazon economy.

In Peru, the rubber economy was based in the city of Iquitos, a center that collected rubber from the rubber-producing areas. Accessing Iquitos via Lima, the Peruvian capital, was difficult. For this reason, this economic center was naturally more efficiently connected with the world's economic circuits through the Amazon River, and not so with the Peruvian capital. This connection increased after 1853 when an agreement was reached with Brazil for the navigation, circulation and trade of Peruvian ships on the Amazon River (Pennano 1988). By

this time, Charles Goodyear had discovered the rubber vulcanization process in 1839, with a subsequent increase in international demand, meaning Brazil became the first and most important producer of this product. The city of Iquitos, Peru, achieved its rubber economic boom after Manaus (Chirif 2011). Export records show that the export of rubber grew exponentially from both 1862 - 1870 and 1884 - 1910, although the following year, 1911, there was a sudden export decline due to the drop in international market prices (García 1982; de la Rosa 2004).

In Peru, rubber was exploited in the Putumayo basin (now Colombian territory), and in the Madre de Dios region, where an intensive searches for new areas with rubber-producing trees took place. In Putumayo and Madre de Dios, this activity disrupted the lives of local Amazonian populations, who were captured and subjected to slavery and consequent massacres ("Putumayo massacres"), in order to extract rubber and meet its growing international demand (García 1982; Casement 2014). Toward 1870, as demand grew, the harvesting of rubber spread to new areas and led to the rise of Iquitos and Manaus as large rubber centers. As Iquitos became an important economic hub, commercial relations were established with its Brazilian counterparts, as well as with England and the United States. At the same time, in Madre de Dios new routes were sought for the extraction and trade of rubber (de la Rosa 2004). As such, the extractivism based economy was consolidated in the Peruvian Amazon. Ancestral knowledge about the management of rubber forests was used (Pennano 1988), and those who had that knowledge were enslaved.

The Amazon was integrated into the global economic order supplying rubber to distant economic centers and establishing trade relations between countries (Chirif 2011). In the case of Bolivia, the rubber economy was concentrated in the north of the Amazon (Yata, Mamore, Itenez, Orthon, Tahanu, and Madre de Dios rivers). Its decisive and key participant was the so-called "Casa Suarez" - Nicolas Suarez and his brothers - that based



its success on its control of the vertical supply chain (of meat and other foodstuffs) for the barracks, along with a labor system based on debt-peonage (in Spanish “*habilito*”, in Portuguese “*aviamento*”), which became widespread throughout the region and which persists today in the case of the Brazil nut (*B. excelsa*). On the other hand, Casa Suarez bet on the control of the transport route (eg. Cachuela Esperanza, Beni) and then on the control and administration of the territory, specifically, the barracks (Weinstein 1983; Stoian 2000, 2005).

In both Peru and Bolivia, before intensive rubber exploitation was established, local populations went deep into the Amazon forests to extract latex using native techniques. It was then transformed and transported to the small shipping ports for sale (Pennano 1988; Stoian 2000, 2005). In the case of Peru, specifically Putumayo, native manual labor was used for this extraction, while in Madre de Dios both Andean migrants and the local Indigenous population participated in the process (García 1982; Pennano 1988). Around 1890, with the increase in this activity, the Regatón figure appeared, which later became the “*aviador*”, thus monopolizing the local rubber trade (Pennano 1988). As the *aviador* knew the needs of the rubber collectors, he granted them credit on account of future collection, but added interest to the loan. The *aviador* easily found the backing of a banker to trade the rubber while over time, the local producer could not repay the loan and were left in debt-peonage, at the expense of the *aviador*. In both countries, the first rubber colonies were made up of a boss, the rubber tappers and the peons (García 1982; Stoian 2005). The boss was the owner, who paid a fixed salary to the rubber tappers, while the peons, mostly Indigenous, received a piece-rate payment, condemning them to permanent debt-peonage and no power to leave the rubber areas. The rubber economy was then based on a local chain economic system, in which the rubber tapper depended on commercial companies for credit, employed workers to take care of the land, and, in some cases, Indigenous people were semi-enslaved for the direct extractive work of rubber under the debt system mentioned above (Stoian 2005 and others).

The rubber seeds were also taken from the Americas, creating large plantations in other colonies, which were equipped with roads, railways, cheaper labor, and better possibilities to reach international markets. The opposite happened in South America; except for the isolated trials by Harvey Firestone and Henry Ford in Brazil or Roberto Crawford (Pichis River) in Peru (San Román 1994). On the Amazon and Napo rivers, rubber estates were created from relatively small legal grants of land, which became joint ventures that commercialized rubber and agricultural products (Weinstein 1983; Becker 1995). On the border of Brazil, Peru and Colombia, powerful rubber exploitation lineages were established and came into constant conflict with one another while a border dispute between Peru and Bolivia in Madre de Dios was permanently fueled by the expansion of rubber production. Returning to the commercial *boom* developed in Iquitos (Peru), Cachuela Esperanza (Bolivia), and Acre (Brazil), its success was based on a regional commercial monopoly, companies or powerful families with investment capacity, access to credit along with channels and incentives to export (Weinstein 1983).

During the twentieth century, World War II interrupted the supply of cultivated rubber from Southeast Asia to the Allied Forces and increased the demand for rubber production from collectors who extracted latex from native rubber trees scattered throughout the Amazon rainforests. In response to this demand, the Brazilian government organized the “Battle for Rubber” to increase rubber production in the Amazon. More than 30,000 “rubber soldiers” were recruited, mainly from the northeast region of Brazil, and sent to work in the Amazon’s rubber plantations. With the end of World War II, most of the financial support from international governments for these projects was stopped and the region’s economy faced a decline of almost two decades that affected not only Brazil but also Peru and Bolivia (Weinstein 1983; Dean 1987; Pennano 1988; Stoian 2000, 2005, and others). The extractivist economy based on the exploitation of rubber completed the integration of the Amazon into the world economy; however, it depended heavily on

the drop in cinchona activity, participation of foreign capital, a system of barracks that was gradually consolidated and remained “intact” for decades. It was also later deeply affected by the reorganization of access to forest resources and the redistribution of land that resulted from agrarian reform processes, especially in Peru, Bolivia, and Brazil.

#### 11.4. Other “Commodities” from the Amazon: Harvest of Wildlife and Non-Timber Products

Since pre-Hispanic times, the flora and fauna of the Amazon Region have been the object of consumption and trade and exchange with other areas of the American continent, under the control of different Amerindian peoples and with the management of biodiversity conservation (Chernela 1985; Lopez-Zent 1998). However, since the nineteenth century with the global industrialization process and the imposition of the extractive economic model, the balance has shifted to have a negative impact on ecosystems and local populations. An enormous amount of wildlife from the Amazon region has been extracted to the United States and several European and Asian countries to meet the commercial demand for leather, skins and feathers, among other products. This has caused extinction and threatened the existence of several indigenous species. The eight Amazonian countries have made lists of threatened species of flora and fauna in the region, which include more than 12,000 native species (Sinovas *et al.* 2017) such as timber and non-timber plants, including cedars, mahogany, palm trees, lianas, vines, orchids, as well as small and large animals such as reptiles, mammals, fish, frogs. All these wildlife species are sought after for industrial (pharmaceutical, food, cosmetic, textile, fashion, furniture), medicinal, and ornamental purposes, as well as for the pet market.

National governments have enacted laws and legal measures have been taken to reduce this pressure on native biodiversity, such as the creation of forest reserves or protected areas, regulation of the hunting of certain species and the breeding of

plants and animals in nurseries for commercialization. However, the lucrative uncontrolled and illegal extraction of wildlife continues to exist (Mayor *et al.* 2007; Rodríguez and García 2008). During the 16th and 17th centuries, some animal species were traded, such as the manatee (*Trichechus inunguis*), for its meat, skin and oil and the macaw or parrot (*Ara macao*) for its feathers or exotic flavor. Between the eighteenth and nineteenth centuries, the Amazon and Orinoco turtles were almost exterminated by the enormous collection of their eggs to make oils, just as the Orinoco caiman hunt began. From the middle of the nineteenth century to the beginning of the twentieth century, animals such as otters, hawksbills, eagles, and boas were caught for the export of their skins, antlers, and shells. Live birds were also caught for their plumage and as pets; birds, shrimp, snails, shell and nacre lime were dissected; alligator, puma and jaguar hides were stored; insects, oysters, ducks, pearls, water and land turtles (morrocoy) were caught and their shells collected (Rodríguez and García 2008; Sinovas *et al.* 2017). Because of the decrease in the international price of rubber, a forest animal hides, and skins trade developed during the 1920s in Bolivia, and the “Casa Suárez” in Cachuela Esperanza became an important shipping point (Letellier 1964). In the 1970s, the main demand for wild fauna skins for the fashion catwalks increased. The same happened with butterflies, tarantulas, colorful frogs, lizards, snakes, ornamental birds, and fish such as paiche or pirarucú, among others, to be used as pets, for biomedical and ethological research, and for advertising aimed at tourists (Sinovas *et al.* 2017).

There was also a high demand for timber species for exportation, such as red cedar (*Cedrela odorata*) and mahogany (*Swietenia macrophylla*), primarily to the USA and Mexico. In Venezuela, due to the over-exploitation of these timber species, the national government mandated the creation of forest reserves during the 1950s-1960s, but the legal logging that was permitted always removed valuable timber species above the legal size and left the

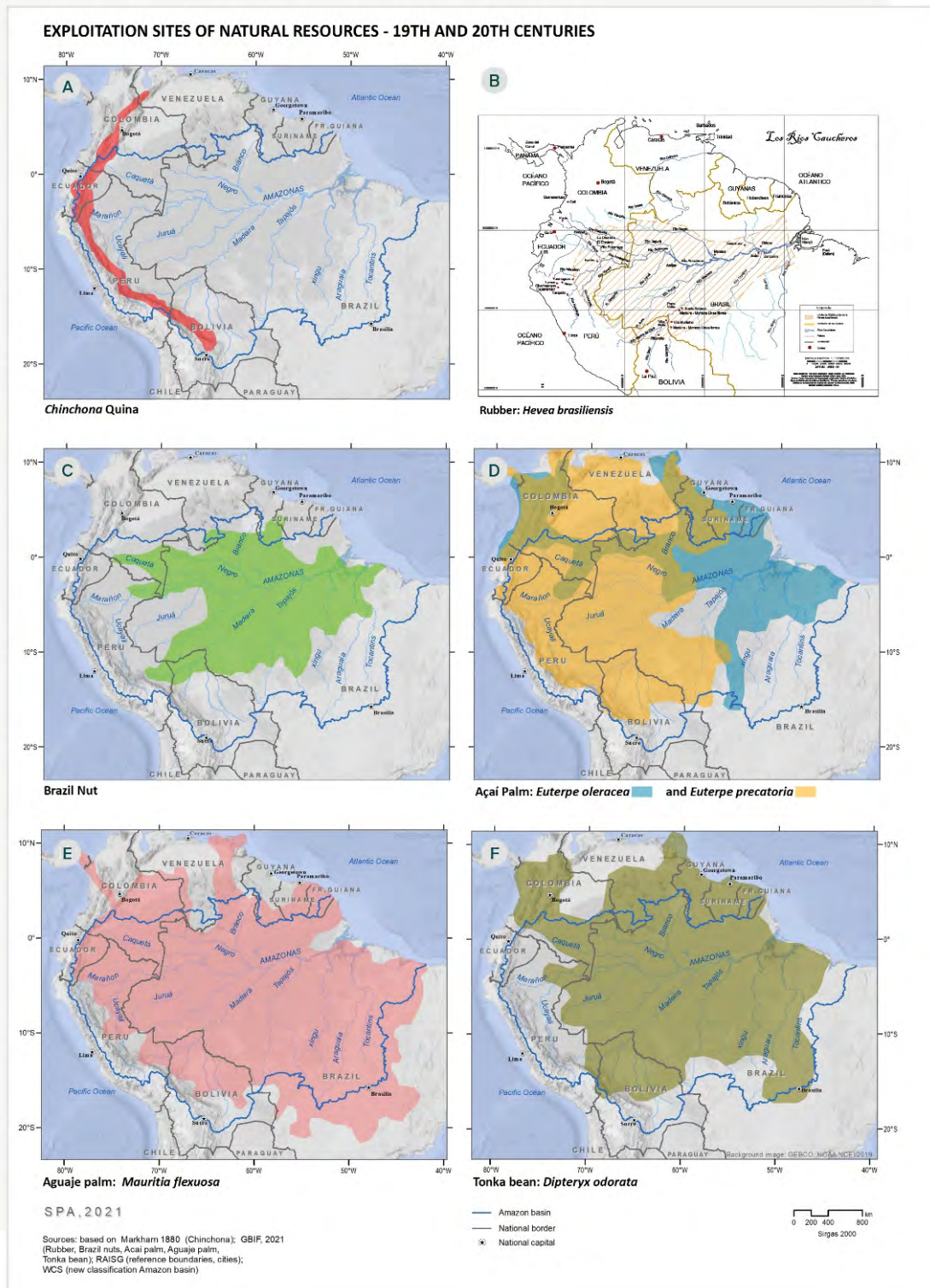
remnant damaged. Also, due to pressure from private companies, many forested areas of these reserves were deactivated. The demand in the country for these timber species increased sharply from 1946 to 1960s. To meet the demand, other lower-quality species such as *Anacardium excelsum* (“mijao”) and *Tabebuia rosea* (“apamate”) were felled. In 1970, the system of temporary legal grants of time lots for exploitation in the forest reserves began, but these were used unscrupulously and illegally by the logging companies, without any control or nurseries to promote the reproduction of timber trees (Kammesheidt *et al.* 2003). One example is the Imataca Forest Reserve, which extends through the states of Delta Amacuro and Bolívar, where the ancestral territories of several Indigenous peoples are located, and which was declared a World Heritage Site by the United Nations Educational, Scientific and Cultural Organization (UNESCO). Today, the Mining Arc has destroyed an important part of the area of the Imataca Reserve, where the legal and illegal exploitation of various minerals and intense deforestation occur.

Furthermore, non-timber plants of great importance for the biodiversity of tropical forests, but also of great commercial appeal for various industries and as raw materials, are palm trees such as moriche palm (COL), aguaje palm (PER), palma real (BOL) (*Mauritia flexuosa*) (Figure. 11.4), mamure (*Heteropsis spruceana*), and chiquichique (*Leopoldinia piasava*) (Clement *et al.* 2015; Levis *et al.* 2017, and others). Additionally, tonka bean trees (*Dipteryx odorata* and *D. punctata*, Fabaceae), have been removed from the forests with great commercial impact since the nineteenth century, thanks to their aromatic fruit used mainly in the perfume industry (Torrealba 2011). There are different species of tonka bean tree on the continent, which are found in Brazil, Peru, Bolivia, Ecuador, Colombia, Trinidad, Venezuela and the Guyanas (Torrealba 2011, Figure 11.4). In Venezuela, for example, wild tonka bean trees (“sarrapia”) are located in the Amazon, Bolívar and Delta Amacuro States, but the highest concentration of trees or “sarrapiales” is found in Bolívar State, specifically in the Sucre and Cedeño municipalities, in the territory that expands from

the northern Amazonas state, on the Suapure and Parguaza rivers to the Bajo Caura. During the rubber era (1875-1920), in this region of Venezuela, the commercial tonka bean boom occurred (Scaramelli and de Scaramelli 2005). Its commercialization process played an important role in the economic and cultural dynamics of various Indigenous peoples (Mapoyo, Panare, Piaroa and Jiwi) and some sectors of the Middle Orinoco peasants. Its use was followed by migratory waves of workers from different parts of Venezuela in the period 1890-1965, with significant demand during the consolidation of the extractive economy in Guyana and the institutionalization of debt-peonage (Torrealba 2011, among others.). Its production is still in force on a smaller scale. Its seeds have always been highly valued by Europe and the United States throughout its production cycles and have been widely used in the manufacture of perfumes, in the tobacco industry, in the pharmaceutical industry and in food production. Furthermore, evidence of both the use of cocoa has been found in the southeast of present-day Ecuador, and the upper Amazon was the center of domestication and origin of this plant (Zarrillo *et al.* 2018). However, in both colonial and early post-colonial times, the coast had the largest number of plantations, which reached their production in the late nineteenth and early twentieth centuries and then collapsed due to pests (McCook 2002). To this day, the Amazonian territories represent only a marginal proportion of national cocoa production.

The period of intense extraction of cinchona, which occurred during the nineteenth century and part of the twentieth, was followed by a period of intense extraction of rubber, which was accompanied at the beginning of the last century by the harvest of the Brazil nut (Figures 11.4), an economic activity that replaced rubber after its definitive collapse. The rubber period left behind an Amazonian territory characterized by the appearance and dilution of the “barracks” and the formation of new rural settlements (Stoian 2000, 2005). The Pará region in Brazil is largely covered by the Tocantins basin where Brazil nut harvesting began in the middle of the nineteenth century (Clement *et al.*





**Figure 11.4** Areas of historical distribution of use of: A) cinchona (species of the genus *Chinchona*, Rubiaceae), B) rubber (*Hevea brasiliensis*, Euphorbiaceae)<sup>1</sup>, C) Brazil nut (*Bertholletia excelsa*, Lecythidaceae), D) açai palm (*Euterpe precatoria*, Arecaceae), E) moriche/aguaje/palma real (*Mauritia flexuosa*, Arecaceae) and F) tonka bean (*Dipteryx odorata*, Fabaceae).

2015; Levis *et al.* 2017). There are records that mention the export of Brazil nut to Europe as early as the seventeenth century and although the harvest was relatively intense in Brazil after the collapse of the rubber industry, the lower operating and labor costs ended up favoring the growth of activity in the Madre de Dios region (Peru) and in Pando and Riberalta (Bolivia), consolidating their position as the main Brazil nut exporting regions worldwide in the present day (Clay 1994, 1997). In both regions, the emergence and consolidation of the extractivist economy based on Brazil nuts benefited from the socio-economic context (agro-extractivism based on the collection of raw materials from the forest) and knowledge and use of the forest characterized by the legacy of rubber production (Stoian 2000, 2005).

It is important to highlight the Pará region to which the name of the Brazil nut alludes, since other species of contemporary economic importance historically come from this region, such as the açai palm (*Euterpe oleracea*, *Arecaceae*, Figure 11.4), a name that comes from the Indigenous word Iaçá, which written backwards is açai, whose fruits were important elements in the diet of the Indigenous peoples of the central Amazon. The palm hearts of several species of açai palm were exploited intensively during the 1940s in Brazil's south and southeast regions (*E. edulis* and *E. oleraceae*), even affecting other species during the 1960s and 1970s (*E. precatória*) and, in the case of Bolivia, even up to the 1990s (Stoian 2004, Figure 11.4). Its use was also a consequence of the collapse of the rubber industry (Stoian 2004, 2005). Market contraction, as well as differences in cutting cycles and intensities, increasing distances between supply areas and processing plants, and the detection of botulism caused the activity to slowly diminish, giving way to other species managed in cultured systems, such as, *Bactris gasipaes*. The intense use of palm hearts, which implied the felling and death of the palm tree, probably affected the populations of these species, especially those of *E. precatória* (Johnson 1996; Stoian 2004). However, evaluations on this topic are scarce. On the other hand, in recent decades, supply, production, and distribution

and export chains have been consolidated for the pulp or derivatives of açai fruits (*E. oleracea* and *E. precatória*), especially in Brazil. Such processes are still being strengthened in other countries such as Colombia and Bolivia.

An economy based on cinchona and rubber, in the recent past, on the tonka bean and açai palm and, today, the Brazil nut, reveal that the extractivist economy is part of the history, occupation and re-occupation of the Amazon. During the nineteenth and twentieth centuries, such economic activities resulted from national security policies that promoted colonization of and migration to the Amazon, promoted by republics in the process of stabilization, especially Brazil, Ecuador, Venezuela, and Colombia. These occupation processes were decisive in initiating and consolidating the geography and geopolitics of large-scale exploitation, as is the case of rubber. Added to this were the agrarian reform processes that took place from the middle of the last century, which defined new structures and configuration of land ownership, such as the concept of *latifundios* (large estates) in the Bolivia lowlands that ended up favoring the existence of extensive private estates for mechanized agriculture and intensive cattle raising, leaving extractive activities to peasant and Indigenous communities. On the other hand, dozens of promising NTFP species have been identified, many of them multi-purpose palm species part of the pre-Columbian history of the Amazon (Homma 1992; Clement *et al.* 2015; Levis *et al.* 2017). All these species face considerable challenge of becoming a viable alternative to the deforestation of the Amazon Forest and, in the case of Amazonian fruit species, facing the paradigm about their domestication and commercialization through agroforestry systems.

### 11.5. Historical Gold Mining

The rumors about the immense natural richness of the Amazon began with the same process of European conquest (Simón 1882; Rivero 1883; Whitehead 1988). Various explorations and productions have confirmed the existence of metallic and non-metallic mineral deposits: iron, gold, nickel, silver,

coltan, thorium, clay, sand, limestone, bauxite, diamond, quartz, jade, titanium, dolomite, phosphate, granite, plaster, zinc, and copper, among others (Tinoco 2000; Martiz 2019). The most influential and impactful mining has been, without a doubt, that of gold). Many current populations owe their existence to the fact that they were enclaves of the exploitation of this resource. Legal and illegal gold mining coexist in the Amazon and the legislation relating to this area has undergone significant modification over the years. The Europeans reported that there were gold mines that the Amerindians used in regional and interregional exchange, in various communities of the Orinoco and Amazonas (Whitehead 1990, 1991). In the 16th century, the colonial system established that mines were the property of the crown, and in 1783, the Mining Ordinances of New Spain, expanded this to include precious stones, non-metallic minerals, and coal (Cartay 1988; Fernández 2001).

In the case of Venezuela, in 1829, Simón Bolívar decreed that the mines were the property of the Republic and gave citizens the opportunity to exploit them under certain conditions set by the Federal Executive. In 1854, José Gregorio Monagas, then Governor of the Guayana region, enacted the first Mining Code of Venezuela, while his brother, José Tadeo Monagas, was president of the Republic (Martiz 2019). The most significant exploitation of minerals in the area occurred in the period 1850-1890. The first discoveries of gold in the area of El Callao, led to applications for the first licenses, the registration of mines and the installation of factories for the production of gold bullion (Baptista 1997; Paülo and Ángel 2006). This period was also characterized by the boom in foreign capital investments in extractive mining activities (gold, iron and oil), in forest resources (balata, rubber, etc.) and transportation (railways and trams). In the case of Guyana, the leading companies and factories for the processing of gold were created, such as Compañía Minera El Callao (1870), Compañía Austin (Orinoco Exploring and Mining), South America Mining Co, Compañía Minera de Nacupay, Chile, Alianza de Cicapra, El Porvenir,

Nueva Hansa, Potosí, Buen Retiro, San Salvador, La Concordia, among others (Torres 2001).

During the period 1866-1895, the deposits with the highest-grade ores known in Venezuela were extracted (Torres 2001), and crushing mills with pylons were installed in the mines belonging to Nacupay, El Callao, Panamá, Mocupia and Potosí. Gold Field of Venezuela LTD (1898-1946), an English company, bought part of the companies operating in the area and worked with the old mills of the Potosí company. Most of its gold extraction was directed to exportation because Venezuela did not have enough processing plants to produce industrial parts. In 1945, the Mining Law was approved in Venezuela, in which mineral deposits were declared to be of public utility. However, institutional criteria in its application promoted corruption and other acts outside the law. In 1977, Decree 2039 was approved, eliminating the right to acquire a legal grant of land through the use of a simple mining request (area delimited by UTM coordinates) before the authorities, along with free exploration and exploitation (Chacín 1998; Martiz 2019) increasing the accountability of the process.

In 1970, the Compañía General de Minería de Venezuela C.A. (CVG MINERVEN), was in charge of investments for modernizing the mines of Guayana, whose primary gold deposits in Bolívar state are located in Tumeremo, El Callao, El Dorado and El Manteco, in the Cuyuní river basin and the regions drained by the Yuruarí, Botanamo, Caroni, Venamo and the Caura rivers (Egaña 1979; Noguerol *et al.* 2000; Martiz 2019). Since the 1970s, these mining developments have had a significant impact on rivers, jungles and savannas, as well as on the original Indigenous populations of the region, such as, Pemón, Yekuana, Sanemá, Lokono, and Warao, among others. Also impacted were Afro-descendant towns located in the Caura basin, which originate from ancient “*cumbes*” (escaped slave hideout towns) due to the mass migration of miners from other areas of the country and other neighboring countries. Additionally, in the period 1970-1980, other gold deposits were found in Venezuela in the



Ventuarí, Alto Orinoco, Atabapo, Guainía, Casiquiare and Negro rivers, among others, in the Amazonas state, as well as in Colombia in the mountains of Nakén (Guainía), in Panapaná (Cuiari) and the hills of Taraira, in the Vaupés (González Bermúdez 1996).

As happened in several areas of the Amazon, many young Indigenous people of different ethnic groups moved to work in the legal and illegal gold mines, abandoning their jobs as teachers and nurses. This activity was only moderately profitable for them, or not profitable at all, due to the high prices of the merchandise and the excessive work, under the supervision of the foremen in charge of the productivity of the mines (González Bermúdez 1996). Some Indigenous people began to work in extended families with alluvial gold, isolated and separate from the mines controlled by the Creoles, but the proliferation of violence, the arrival of merchants, prostitution, and alcohol generated high conflict situations and confrontation. The significant immigration of non-Indigenous miners and their work system caused a destructive impact on the natural environment, on communities, Indigenous territories and their economies, leading to murders, drug trafficking, and theft, as well as forms of modern slavery of mining labor.

The destructive effect of legal and illegal or informal activity, of small and large mining, especially the chemical agents used in the processing of gold (mercury, cyanide) is well-known. In Venezuela, the instruments used in traditional non-Indigenous mining were the shovel, pick, machete, and wooden tray. Extractivist companies and national governments have taken little interest in studying the system and methodology of exploitation of gold by Indigenous peoples, who knew how to conserve natural systems. In ancient times, they exploited gold and considered it to be rays of sunlight (Whitehead 1990, 1991). They knew about goldsmithing and gold alloys, with silver and copper, they made carvings of idols and geometric, anthropomorphic and zoomorphic figures, as well as thin sheets or sheets of gold for commercial transactions and local, regional exchange or on a large scale. For many

Indigenous Carib and Arawak peoples today, the extraction of alluvial gold has no ritual restrictions. The exploitation of gold in open-pit mines or excavation requires rituals to obtain authorization from supernatural beings and ancestors, as tokens of respect and love for Mother Earth.

Legal mining, with legislation that has undergone modifications over the years, has coexisted illegal gold mining in the Amazon. Both have had substantial impacts on the geographies and situations of Indigenous, Afro-descendant, and peasant populations, among others (Whitehead 1990; Tinoco 2000; Arvelo-Jiménez 2014). Europeans reported seeing many gold garments and jewelry that adorned members of the local elite and other Indigenous individuals, and it has been documented that there were gold mines that were exploited for regional and interregional exchange, in various communities of the Orinoco and Amazon. The original peoples of the Amazon already practiced artisanal forms of mining, without causing destructive changes in the environment. The ancestors of the Amazonian Amerindians had knowledge of goldsmithing and alloys of gold, silver, and copper; they made carvings of idols and geometric, anthropomorphic or zoomorphic figures, as well as thin sheets of gold for commercial transactions and local or large-scale exchange (Whitehead 1990, 1991). For many of today's Carib and Arawak peoples, the extraction of alluvial gold has no ritual restrictions; but open-pit mining or excavation, if it is restricted and requires rituals, based on love and preservation of life. These limitations to certain forms of mining are political actions to respect and protect the Amazon, which have been ignored by economic efforts that are only interested in the extraction of raw materials, dehumanizing local populations and destroying the Amazon.

### **11.6. Historical Oil and gas Exploitation**

Oil is one of the commodities that has influenced the Amazon economies during the twentieth century. It was essential for the consolidation of previous processes, such as those associated with the extraction of quina, rubber and other products. In

Latin America, few commodities have led to the same strong feelings of economic nationalism that arose in response to oil. The political debate has been dominated by critics and promoters of foreign multinationals' investment and participation, with oil policies fluctuating between open-door arrangements to nationalization or expropriation of foreign-owned assets (Bucheli 2010).

Oil exploration in the Amazon dates back to the nineteenth century. However, in the Bolivian Lowlands (*Oriente*), it only started in the 1920s (Klein 1964), in the Venezuelan *Orinoquía*, exploitation has taken place since 1936, in the Colombian Amazon since the 1940s, in Ecuadorian *Oriente* since the 1960s, and in Peru since the 1980s. Brazil has been a major consumer but a minor producer. These processes were marked by the intervention of international companies, sometimes with the participation of domestic ones, always in association with national elites. The degree of openness or national control has varied.

In the Bolivian *Oriente*, various explorations and attempts were made, first with national companies, then international ones (Klein 1964). After several unsuccessful attempts, in 1926 Standard Oil already had eleven production fields in the *Oriente* and others in various parts of that country. However, it had permanent conflicts with the State, related to non-compliance, clandestine installations and other issues. In the 1930s, the outcome of the Chaco War, as in the subsequent Ecuador-Peru conflict, was related to conflicting interests between Standard Oil and Shell. In 1936, Bolivia created the company Yacimientos Petrolíferos Fiscales Bolivianos (YPFB), which increased the conflicts by confiscating everything from Standard Oil, who requested intervention from the US government without much success (Klein 1964; Klein and Peres-Cajías 2014).

Natural gas occurs in the same fields as oil but only became economically important when the main foreign markets opened up: "Indeed, while the first records of natural gas production date back to 1952, it was not until 1972, with the start of exports

to Argentina, that production reached significant levels" (Klein and Peres-Cajías 2014). Since the 1970s, oil and gas have become fundamental engines for the Bolivian economy.

In Venezuela, oil was used by the native peoples of the country, who employed it as medicine, for lighting houses, and caulking canoes (Fundación Polar 2010). In 1800, Humboldt recorded the location of several fields in the region known as the Orinoco Belt Oil Fields (von Humboldt 1826; Fundación Polar 2010). The modern oil period began in 1875, when the national company Compañía Nacional Minera Petrólia del Táchira was founded (González Rincones 1956). However, oil extraction in the Lower Orinoco basin began in 1936, with Standard Oil and the drilling of the La Canoa-1 Well, in the southern areas of Guárico, Anzoátegui, Monagas and Delta Amacuro (Fundación Polar 2010). In 1943, a Hydrocarbon Law was enacted, specifying the duration of licenses, taxes, and controls on foreign companies, which forced them to refine part of their production inside the country (Malavé Mata 1962). During the expansion of the Venezuelan oil industry since World War II (la Plaza 1980 (Quintero 1972), new types of licenses for export were created, as were "national reserves", the royalties from which resulted in an increase in the percentage of the GDP from 15% in 1914, to 50% in the 1960s. The nationalization of oil production followed in 1976. Petróleos de Venezuela S.A. (PDVSA) was created, and that country became a founding member of the Organization of the Petroleum Exporting Countries (OPEC) generating high national profits.

As in the other Amazonian countries, the oil boom has had negative impacts on Indigenous peoples as the case Kariñas. Although they possess colonial titles for lands and received royalties from oil companies, they have had to migrate to other areas in the south of their territory owing to environmental deterioration, which has impoverished their economy and impaired their health (Jiménez and Perozo 1994; Whitehead 1994; Arvelo-Jiménez 2014). In the 1960s, the closure of the Caño Mánamo, the main tributary of the Orinoco Delta,

by the oil industry, caused flooding and an ecological disaster in wetlands, forests and savannas, which destroyed the environmental, cultural, social and economic balance of the Warao Indigenous people up until the present day (Heinen 1992).

In Colombia, the first exploitation of oil occurred on the coast, then in the Orinoquia, and finally in the Amazon. Putumayo's oil history dates back to 1937, with the Saxon Petroleum company. Texaco was in charge of the revitalization of this activity and in 1948 drilled the first well, José María-1, in the jurisdiction of Mocoa (today municipality of Puerto Guzmán). In 1955 the percentage of royalties that oil companies had to pay was reduced as a stimulus to explore the southern Amazon region, which led to Texaco obtaining a license for the exploration of 16,000 km<sup>2</sup> for 30 years in 1959, the most extensive given in Colombia until then. Texaco moved its work from the area near the Caquetá River to the border with Ecuador, where the Orito 1 Well was drilled in 1963, becoming the epicenter of oil activity and was completed in 1971 (Avellaneda Cusarúa 2005).

Oil activity in Putumayo signaled the possibility of consolidating the country as an oil producer and articulating those territories to the nation. Oil activity made it possible to stimulate a new form of colonization, and the transformation of the landscape in a more significant way than is generally expected or attributed to peasant colonization, because the opening of roads led to a “sowing of people”. New municipalities such as Orito, San Miguel, Valle del Guamuez and Puerto Caicedo were created for the purpose of managing some royalties. There were investments in road infrastructure to connect extraction sites. Problems with land titling and ownership continue to cause conflict between residents and companies (Avellaneda Cusarúa 2005).

Initial oil exploration in Ecuador took place in 1921. Geologists from the Leonard Exploration Co., a company that obtained a license for 50 years covering 25,000 km<sup>2</sup> (Wasson and Sinclair 1927), were

ultimately unsuccessful owing to a lack of funding (Gordillo 2003; Rivadeneira 2004). After that, Shell carried out explorations from 1938 (Tschopp 1953); after they obtained a ten-million-hectare license in 1937, they opened roads from the central Andes, built an airport, and caused a significant impact on local Indigenous peoples. They did not find sufficiently lucrative deposits in terms of crude oil quality, and the exploitation had logistical difficulties such as its remote nature. After the 1941 war between Ecuador and Peru, which various people associated with the interests of competing oil companies, the former lost a large part of its territory, including the licensed area, so Shell retired in 1948 (Rivadeneira 2004).

After Shell left Ecuador, the President Galo Plaza stated that “the *Oriente* is a myth”, adding that Ecuador was not designed to be an oil country but an agricultural one (Rivadeneira 2004). However, in 1968, the Texaco-Gulf Consortium, which in 1964 had obtained a license for 1,400,000 hectares for 58 years (Ramón *et al.* 2019), began drilling high-quality fields in the northeastern zone, starting with the Lago Agrio 1 Well in 1967. These explorations were successful, and the country began exporting crude oil in 1972. In part, this was made possible by the already mentioned explorations carried out on the Colombian side of Putumayo in 1963. The corporation built roads and an oil pipeline that crossed the Andes to the coast. It operated for almost 20 years with very little oversight, causing enormous pollution. The company acted as a parallel state in the territory. Other companies also explored diverse areas in the 1960s and 1970s. The *Oriente* ceased to be a myth and the oil rush and its multiple chains attracted thousands of migrants, some as part of the agrarian reform and colonization of 1973. These processes were widely criticized by sectors of the population, including Jaime Galarza Zavala (1974), imprisoned by the ruling Military Junta for protesting. He alluded to the Seven Dinosaurs (Standard Oil of New Jersey, Shell, Mobil, Gulf, Texaco, BP, and Standard Oil of California) that behaved as they pleased in the countries.

### 11.7. The Start of Intensive Cattle Ranching in the Amazon

Livestock, along with road construction and government induced settlement programs, have been the main drivers of the massive deforestation process since the 1960s (Fearnside 1987; Valentim and Vosti 2005). Cattle were introduced in São Paulo, Brazil from Cape Verde (Africa) in 1534 (Homma 2003). In the mid-17th century, Portuguese settlers introduced cattle to the Brazilian Amazon. Initially, the cattle were raised on grasslands established after the deforestation of areas around the city of Belem, capital of the state of Pará. For the next three centuries, until the 1960s, the island of Marajó, in Pará, was the main cattle ranching center in the Brazilian Amazon. Livestock farming was also carried out along the middle and lower sections of the Amazon River, mainly in extensive grazing systems on native pastures in higher portions of temporarily flooded areas (Dias-Filho and Lopes 2020). During this period, most of the major urban cities in the Amazon had to rely on imported meat, sometimes from other parts of the country or from foreign countries to meet their demand. Because of the lack of roads, in many circumstances, meat was transported by air, leading to scarcity and a high-cost products that were only accessible to the highest income segments of the population (Dias-Filho 2014; Dias-Filho and Lopes 2020).

Across Latin America, livestock expansion since the mid-19th century has largely been a story of the transformation of forests into cultivated pastures (Van Ausdal 2009). This environmental transformation has become more relevant since the early 1960s, when national governments implemented policies to integrate the Amazon portion with the rest of their territories. In Brazil, these policies included the construction and improvement of roads, subsidies for agriculture, and impressive resettlement programs for landless rural families (Valentim and Vosti 2005; Hecht 2011; Dias-Filho 2014; Dias-Filho and Lopes 2020). Extensive ranching systems also became an important strategy for land grabbers and speculators to convert

forests into cultivated pastures and claim unregulated public lands (Fearnside 1987), a process that continues to be an important driver of deforestation in the Amazon today (Stabile *et al.* 2020). By 1975, the cattle herd in the Brazilian Amazon had already reached seven million heads on 20 million hectares of pasture. The resulting livestock load of 0.35 animals per hectare was an indicator of a very extensive production system with low productivity (Valentim and de Andrade 2005).

This land development strategy was based almost entirely on the limited use of technology, in particular forage germplasm and pasture management options brought by farmers who migrated from other regions with different environmental conditions (Dias-Filho 2014). The conversion of the diversified forest ecosystem into extensive areas with homogeneous grasslands established with exotic African grasses in tropical conditions with high temperatures and humidity resulted in cultivated grassland ecosystems with low resilience, which favored the proliferation of pests and diseases (Valentim and Moreira 2001). In addition, farmers adopted poor management practices, such as repeated burning in an attempt to control the regeneration of native herbaceous and wood species, as well as the invasion of exotic plant species (Serão *et al.* 1979). Fire was also misused to try to control the high numbers of pests, such as spittlebug (*Deois* sp. and *Zulia* sp.), which caused rapid and severe degradation of pastures. Repeated burning favored nitrogen volatilization, nutrient leaching in ashes, and erosion of exposed soil, degrading grasslands three to five years after their establishment (Valentim 1989).

Even under these conditions, Margulis (2003) reported that beef cattle farming in the Brazilian Amazon, even with prices 15% to 20% lower than in São Paulo, had a 113% higher profitability. This was the result of substantially lower land and labor prices in the Amazon. Despite being profitable, livestock farming in the Amazon during the 1960s faced several problems such as rapid and extensive degradation of pastures, lack of technical and management expertise among farmers, and insuf-

ficient and inadequate technical assistance services (Valentim 1989; Valentim and de Andrade 2005).

However, reclaiming degraded pastures was difficult and extremely expensive due to a shortage of tractors, plows and harrows and the high cost of limescale and fertilizers. As a result, to provide an adequate forage supply to a geometrically growing cattle herd, farmers accelerated deforestation to expand the area of pastures (Serrão *et al.* 1979). This was facilitated by the legal framework that still prevailed in the 1970s requiring Brazilian farmers to deforest and burn their pastures as proof of “productive land” in order to receive a property ownership title from the government agency (Fearnside 1987; Valentim and de Andrade 2005). Furthermore, the legal framework still provided economic incentives for deforestation (Fearnside 1987), as owners of deforested lands paid lower taxes whereas those with forest lands (considered unproductive lands) paid higher taxes. National and international concerns about rising rates of deforestation in the late 1970s led to increasing pressure on governments to change policies that provided incentives for ranching and agriculture in the Amazon biographical biome (Valentim and Vosti 2005; Hecht 2011).

### 11.8. Origins of Large Roads and Hydroelectric Plants

The end of World War II resulted in the gradual reduction of policies aimed at ensuring an adequate and constant supply of strategic natural resources from the Amazon (McCann 1995). With some exceptions, since then, economic development policies have been dominated by the provision of financial aid and the implementation of deliberate trade-protectionist support to national and multinational industrial groups in import substitution and state-led industrialization frameworks (Brando 2012). Some of the key requirements of this industrialization project were the improvement of the transport infrastructure network and the regular supply of low-cost energy.

Approximately 100 hydroelectric dams were built in the 1950s, 103 in the 1960s and 151 in the 1970s and 1980s (Von Sperling 2012). However, the construction of dams on the Amazonian rivers has provoked clashes between developers, government officials, Indigenous populations and environmentalists (Von Sperling 2012). The Amazon basin, approximately 60% of which is in Brazil, is the focus of a massive program of hydroelectric dam construction. If successful, these plans could eventually turn almost all of the Amazon tributaries into a chain of water reservoirs for hydroelectric production (Fearnside 2015). Rich in rivers, Brazil has always considered hydroelectric energy as a way of fulfilling its ambition of being a great world power (Moran 2016). Brazil has used hydroelectric power since the late nineteenth century, but the 1960s and 1970s set the stage for increased investment in the construction of large plants. Some of the largest Brazilian dams in operation are located in the Amazon and were planned or initiated during this period. This is the case of Belo Monte (11,181 MW), located on the Xingu River, and Tucuruí (8,370 MW), located on the Tocantins River, both important tributaries of the Amazon River (Fearnside 1999, 2006).

Road construction has also been a key method for national governments to ensure sovereignty and the integration of portions of their Amazonian territories in their country’s economy. Brazil began implementing an impressive policy of highway construction from the early 1950s, which accelerated after the 1964 military coup. Several of these highways, such as the Trans-Amazonica (BR-230), BR-163, and BR-319, are still in the process of improvement and paving, raising many concerns about their environmental and socio-economic trade-offs (Valentim and Vosti 2005; Laurance *et al.* 2009; Moran 2016). This is particularly relevant as the density of roads in one county is associated with increased human migration and deforestation in that county and similar side effects in neighboring counties (Pfaff *et al.* 2007).

The construction of new roads in the Amazon also has important implications for previously isolated



rural communities or Indigenous extractive communities affected by their construction (Riley-Powell *et al.* 2018). By the late 1970s, evaluations and concerns about past, present, and future socio-economic and environmental impacts of policies that promoted the construction of roads and hydroelectric dams in the Amazon basin were already on the rise, both in civil society in the Amazon countries and in the international community. At the time, there was a growing debate among researchers and policy makers about the challenges and possible strategies for mitigating them to promote sustainable and inclusive development in the Amazon basin. Various economic processes were intensified throughout the Amazon starting in the 1970s. For example, oil extraction, deforestation, and hydroelectricity. This was accompanied, sometimes motivated by, the strengthening of land access routes and the consolidation of or creation of cities. Those processes continue to this day. The opening of land routes has consolidated issues such as deforestation for timber and the opening of the agricultural frontier.

### 11.9. Conclusions

Most of the economic cycles of the Amazon between the nineteenth and twentieth centuries were motivated by the demand for raw materials from external markets, located in industrialized nations of the Global North. They were part of geopolitical and geographical scenarios in the processes of emergence and consolidation of the republics. They had different degrees of participation by the States, the emergence of powerful elites, and the perception of Indigenous peoples and rural communities as low-cost or even free labor (“dehumanization” of the Amazon). These extractive processes continue in part to this day, when products such as beef cattle, oil, or soy, among others, are produced especially for export from Amazonian countries.

The Amazon has witnessed cycles of rise (*boom*) and fall (*bust*) in the exploitation of raw materials, which have shaped diverse social, economic, Here, in the case of rubber map, is it possible to use the

same template as the other maps? Maybe RAISG colleagues could help us with this. and spatial structures, sometimes to the detriment of previous territorial arrangements. Products such as *Cinchona*, rubber and others led to the opening of waterways, roads, cities, settlements and collection and distribution centers, as well as population movements. Those economic booms associated with commodities attracted migrants who gradually took over territories, almost always to the detriment of ancestral populations.

There are two great continuities within the extractivist economy from the nineteenth century to 1970: 1) a neocolonial or postcolonial system derived from the extraction of raw materials, with enslaved or recruited cheap labor, and export of the final products, and 2) the management of lowland forests and ancient tropical savannas maintained by Indigenous, Afro and some peasant peoples. Without identifying, revaluing and adopting the important contributions of Indigenous knowledge and practices to the management of the Amazon, the region will continue to be an heir of the colonial system, which today entails the irreversible destruction of the forests and other ecosystems of the Amazon.

The Amazon has been seen as a reservoir of raw materials, such as rubber and chinchona of strategic global value, particularly in times of crisis. In the 1950's national governments started to promote the occupation and integration of the Amazon identified as empty spaces with their sovereignty at risk, through policies focusing on road construction, exploitation of minerals such as gold, oil and iron, hydroelectricity projects, resettlement of poor landless populations, and the promotion of deforestation and subsidized agriculture and cattle ranching projects.

### 11.10. Recommendations

- Looking to the future, it will be key to learn from thousands of years of successful experiences of Indigenous groups in sustainably

managing, shaping and guarding natural resources. How to develop economic models that avoid asymmetric exploitation practices, such as, debt-peonage is perhaps the big challenge.

- Various Andean-Amazonian products have generated enclave economies throughout the centuries, with boom-and-bust processes. Economic activities must be carried out in sustainability frameworks over time, guaranteeing the long-term well-being of Amazonian communities.

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