Working Document

The Cocoa Value Chain in Ucayali

Analysis to Identify Business Models with Agroecological Potential

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EXECUTIVE SUMMARY

This report provides an update on the state of the art of the cocoa value chain in Ucayali, along with a discussion on its existing business models and their associated challenges and opportunities. This analysis is conducted within the framework of the 13 agroecological principles outlined by the High Level Panel of Experts (HLPE, 2019). Our analysis is based on a review of secondary information, interviews with indirect actors across the value chain in the region, and information provided by representatives of producer organizations in the area, each employing different strategies for their development.

The document begins with a brief overview of the different international cocoa market segments, including their characteristics, sizes, and prices, along with the role of Peruvian cocoa in the market. It continues with a brief description of the context in the department of Ucayali and then presents an update on the department's value chain with a description of its direct and indirect actors, categorized into different chain links and levels. Lastly, it analyzes the lessons learned, challenges, and opportunities for the value chain and its existing business models to enhance performance and sustain the agroecological transition.

Peru is one of the main cocoa bean exporters in Latin America and the second largest exporter of organic cocoa in the world. The country's total exports are on the rise, with a growing emphasis on processing and exporting semi-processed products (butter and powder) within the national value chain. The country also stands out for the production of fine and flavor cocoa, especially native cultivars such as Chuncho de Cusco and Blanco de Piura, as well as spatial arrangements with Trinitario clones, with a stronger presence in the Amazon region. As a result, the Peruvian cocoa and chocolate value chain offers a diverse product portfolio, with conventional, fine and flavor, and certified cocoa, in addition to semi-processed products and chocolates, mainly for export.

The Ucayali region has more than 589,000 inhabitants, who account for 1.8% of the national population. The department has a monetary poverty rate of 17%, which is lower than the national average, although it has a high proportion of young adults who have not completed high school, high rates of informal employment, and high rates of childhood anemia. The department is known for its rich multicultural diversity, housing 296 native communities. It is also marked by areas of social conflict, where the state has granted concessions for forestry, agriculture, and oil exploitation. Additionally, some regions have seen an expansion of coca cultivation and the presence of illegal groups. In economic terms, the agricultural and forestry sector is significant, contributing nearly 12% to the department's gross value added. Cocoa beans rank as the third most important export, following palm oil and timber.

The growth of Ucayali's cocoa chain is largely due to crop substitution and rural development programs and projects that have taken place in recent decades. It went from producing 1,600 tons on 1,900 hectares in 2011 to 22,013 tons on 25,461 ha in 2022. Cocoa production is concentrated in Padre Abad Province, although Coronel Portillo and Atalaya also host considerable production. The department contains more than 5,000 producer families, each cultivating an average of 5 ha of cocoa. Although official figures are not up to date, it is estimated that 95% of the producers have an income of less than one minimum monthly salary, 5% of the producers have agroforestry systems (AFS), and 5% of the farms have an organic certification. About 20% of the cocoa producers are affiliated with associations and it is estimated that 30% of the beans are sold through 19 registered associations and cooperatives in the department. The remainder is distributed through independent collectors or sold directly to local branches of national

processing and export companies. The region has two producer cooperatives that export directly: the Colpa de Loros Agricultural Cooperative for Flavor Cocoa and the Curimaná Agroindustrial Ecological Cooperative. A brief introduction to each is given below. The report also offers insights into different production and marketing channels: the cooperative model, centralized processing plants, the marketing of dry beans, and the evolution of cocoa exports from the region over the past three years.

As for indirect actors, the report offers an overview of their roles and services within the value chain, with a focus on technical assistance, training, research, financial services, and certification, as well as other supporting organizations such as NGOs and development projects. A brief introduction to key public sector entities and their alignment with agroecological principles is also included.

Based on previous findings and considering that limited information is available, conclusions and recommendations are drawn to facilitate the transition process around the following thematic areas:

Associative business models: The Colpa de Loros and Curimaná cooperatives are the two best performing and most consolidated organizations in the region. Their success is due to multiple internal and external factors, such as the consolidation of a working team over the years and the continuous support of committed business partners in their growth process. Given their track record and current status, these organizations are in the best position to strengthen their operations in their corresponding areas of influence, expand their reach, and incorporate agroecological principles in different ways. However, it is worth noting the limitations of the cooperative model, which is not representative in the region and, despite several years of work, still fails to reach more than one-third of the department's producers.

Different views and lack of evidence: Different views exist on development models, in terms of both the varieties to be promoted and implemented among producers (fine and flavor or conventional) and the addition of forest species within cocoa plantations. Considering the lack of conclusive evidence and the presence of diverse objectives and business models, a cautious approach to promoting different varieties is recommended. This approach should also involve recognizing individual and community preferences at different production hubs. Similarly, to reconcile the different interests of producers and indirect actors regarding the promotion of various types of agroforestry arrangements, it is suggested to raise awareness among both support organizations and producers, in addition to promoting investments, financial and non-financial incentives, demonstration tours, and exchanges among producers, in accordance with the principles of justice, diversification, participation, and governance. It is also advisable to continuously monitor and document the various activities being implemented to assess their performance in different contexts.

The discussion also addresses the role of **certifications**, which appear to be necessary but not sufficient for the success of cooperative models in the department. Additionally, the report explores the roles, guidance, and general limitations of **indirect actors** in supporting the agroecological transition. Finally, the report presents **innovations at the farm level**, such as the diversification of food production and the use of bio-fertilizers, guano, compost, and integrated pest and disease management. The strengthening of quality assurance and marketing activities is also discussed as part of the traditional packages of practices that are currently being promoted by different stakeholders, along with more disruptive proposals to be evaluated, such as changes in planting arrangements and densities. The report also presents **value chain innovations**, such as the strengthening of satellite monitoring capability and the integration of Blockchain to strengthen traceability and index-based climate insurance that in turn help decrease production risk and strengthen monitoring capability.

1. INTRODUCTION

This study has been conducted under the CGIAR Initiative on Agroecology (I-AE), which aims at the promotion, application, and measurement of agroecological principles in food systems across a range of countries and contexts to determine (1) whether the adoption of agroecological principles and innovations is more effective than the status quo in the generation of benefits related to social equity, agricultural productivity, profit, and environmental protection; and (2) whether the agroecological transitions taking place in one territory can be effectively scaled up and adapted to other contexts.

To achieve these goals, the I-AE has established the following five Work Packages (WP):

- **WP 1:** Transdisciplinary co-creation of innovations in Agroecological Living Landscapes (ALLs)
- **WP 2:** Evidence-based agroecology assessments
- **WP 3:** Inclusive business models and financing strategies
- **WP 4:** Strengthening the policy and institutional enabling environment
- **WP 5:** Understanding and influencing agency and behavior change

This study is part of WP 3, which aims at analyzing the potential of different business models as tools for agroecological transition as well as co-designing business innovations to strengthen such transition. The work has been conducted within the Peruvian ALL, which is located in the department of Ucayali, and includes districts of Padre Abad Province; Nueva Requena, Campo Verde, Manantay, and Yarinacocha districts of Coronel Portillo Province; and the department's capital, Pucallpa. Additionally, this area corresponds to what the Ucayali Regional Government (GOREU) has called the **Agroecological Corridor** (Pareja et al., 2023).

The report provides an update on the state of the art of the cocoa value chain in Ucayali, along with a discussion on its existing business models and their associated challenges and opportunities. This analysis is conducted within the framework of the 13 agroecological principles outlined by the High Level Panel of Experts (Figure 1) (HLPE, 2019). Our analysis is based on a review of secondary information, interviews with indirect actors across the value chain in the region, and information provided by representatives of producer organizations in the area, each employing different strategies for their development.

Principle	FAO's ten elements	Scale application*
Improve resource efficiency		
1. Recycling. Preferentially use local renewable resources and close as far as possible resource cycles of nutrients and biomass.	Recycling	FI, FA
2. Input reduction. Reduce or eliminate dependency on purchased inputs and increase self-sufficiency	Efficiency	FA, FO
Strengthen resilience		
3. Soil health. Secure and enhance soil health and functioning for improved plant growth, particularly by managing organic matter and enhancing soil biological activity.		FI
4. Animal health. Ensure animal health and welfare.		FI, FA
5. Biodiversity. Maintain and enhance diversity of species, functional diversity and genetic resources and thereby maintain overall agroecosystem biodiversity in time and space at field, farm and landscape scales.	Part of diversity	FI, FA
6. Synergy. Enhance positive ecological interaction, synergy, integration and complementarity among the elements of agroecosystems (animals, crops, trees, soil and water).	Synergy	FI, FA
7. Economic diversification. Diversify on-farm incomes by ensuring that small-scale farmers have greater financial independence and value addition opportunities while enabling them to respond to demand from consumers.	Part of diversity	FA, FO
Secure social equity/responsibility		
8.Co-creation of knowledge. Enhance co-creation and horizontal sharing of knowledge including local and scientific innovation, especially through farmer-to-farmer exchange.	Co-creation and sharing of knowledge	FA, FO
9. Social values and diets. Build food systems based on the culture, identity, tradition, social and gender equity of local communities that provide healthy, diversified, seasonally and culturally appropriate diets.	Parts of human and social values and culture and food traditions	FA, FO
10. Fairness. Support dignified and robust livelihoods for all actors engaged in food systems, especially small-scale food producers, based on fair trade, fair employment and fair treatment of intellectual property rights.		FA, FO
11. Connectivity. Ensure proximity and confidence between producers and consumers through promotion of fair and short distribution networks and by re-embedding food systems into local economies.	Circular and solidarity economy	FA
12. Land and natural resource governance. Strengthen institutional arrangements to improve, including the recognition and support of family farmers, smallholders and peasant food producers as sustainable managers of natural and genetic resources.	Responsible governance	FA, FO
13. Participation. Encourage social organization and greater participation in decision-making by food producers and consumers to support decentralized governance and local adaptive management of agricultural and food systems.		FO

*Scale application: FI = field; FA = farm, agroecosystem; FO = food system
Source: derived from from Nicholls *et al.*, 2016; CIDSE, 2018; FAO, 2018c.

Figure 1. The 13 agroecological principles. Source: HLPE (2019).

The objectives of this study are to (1) summarize the state of the art of cocoa production and marketing in the region, placing it within a global context; (2) describe and analyze the different production models and marketing channels in the region; (3) identify and characterize indirect actors across the chain at the local and national level as well as their role and position in the agroecological transition; and (4) identify

challenges, opportunities, and lessons learned to strengthen the value chain at different levels, based on the 13 agroecological principles.

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This report is complementary to the following documents: **Contextualization Report on Peru: An Analysis of the Context and Agroecological Principles** (Pareja et al., 2023) [in Spanish]**, Stakeholder Mapping for the Agroecological Living Landscapes (ALLs) Emergency in Ucayali, Peru** (Tristan, 2022a) [in Spanish], and **Overview of Multi-Stakeholder Platforms in Peru: An In-Depth Description of ALLs at the National and Regional Level** (Tristan, 2022b) [in Spanish], which provide more in-depth information on context and relevant stakeholders for the development of agroecology at the national and regional level.

2. International Cocoa Market and the Role of Peru

For the 2020–2021 season, the International Cocoa Organization (ICCO) reported a global production of 5.24 million tons of cocoa, of which 77% came from Africa, 17.8% from the Americas, and 4.8% from Asia and Oceania (Figure 2) (ICCO, 2022). This production can be classified into different categories according to quality, varieties, market segments, and purchase prices, among others. Cocoa is commonly classified as conventional (or bulk) and specialty; the former represents 90% of global production and the latter the remaining 10% (Rios et al., 2017; CBI, 2020). Some industry experts have attempted to categorize cocoa according to varieties, designating Trinitario and Criollo as specialty cocoa and Forastero as conventional cocoa, but this classification is not always enforced at the time of purchase and price differentiation (Rios et al., 2017). In general, conventional cocoa corresponds to cocoa traded at stock exchange prices and used mainly for the production of butter and chocolate products for mass consumption. On the other hand, specialty cocoas are recognized as an outstanding and valued product in the market for certain distinctive characteristics, such as genetics, origin, postharvest quality, and certifications (CBI, 2020). This category includes Fine or Flavor Cocoa (FoF), so named by the ICCO because of its distinctive organoleptic attributes. It should be noted that this designation is still controversial, as there are no universally recognized criteria for classifying cocoa as FoF (ICCO, n.d.), and the export prices of the countries designated as FoF main places of origin do not always show a significant price differential vis-à-vis international prices.

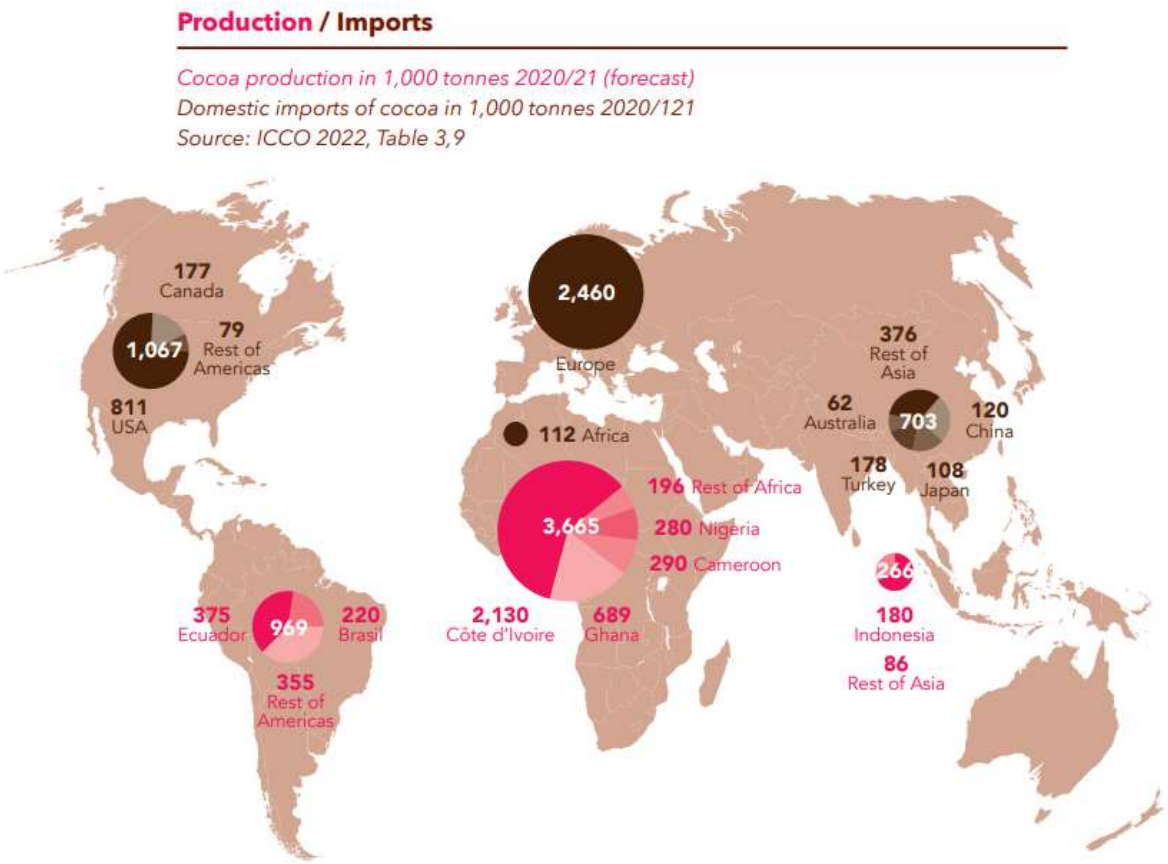

Figure 2. Global cocoa production and imports. Source: Fountain and Hütz-Adams (2022).

Rios et al. (2017) identify three categories within specialty cocoa: (1) **Fine and Flavor Cocoa;** (2) **Premium Origin Cocoa,** which includes cocoa with a Designation of Origin or coming from a specific farm or region; and (3) **Sustainably Produced Cocoa,** which includes certified cocoa (i.e., organic, Fairtrade, and Rainforest Alliance, among others). A CBI (2022) report provides three chocolate categories according to market segment and cocoa type: **Low End**, representing 80–85% of the market, comprising products with a lower cocoa content for conventional use, and that might contain certifications such as Rainforest Alliance; **Middle Range**, accounting for approximately 10% of the market, comprising chocolate products of good quality, certified for sustainability and origin standards, for which storytelling is important; and **High End**, representing 5–7% of the market, comprising chocolates with a higher cocoa content, FoF cocoa, single origin, and under bean-to-bar models.

Finally, a study by Gaia Cacao (2021) presents a more disaggregated and detailed bean market segmentation. Initially, two segments are differentiated: **Bulk** and **Premium.** The Bulk segment, in addition to the conventional cocoa previously described, includes a **Bulk certified** sub-segment, which in terms of quality can be designated as conventional cocoa, but it has some form of certification. These beans follow stock exchange prices and, although a premium price is not guaranteed, it is usually negotiated at sale.

The **Premium** segment has three sub-segments: (1) **Premium Certified**, (2) **Specialty**, and (3) **Ultra-Premium.** The **Premium Certified** sub-segment has a better quality than bulk cocoa and also has certifications. Prices for this cocoa are based on the international market price plus a premium for the certification and an extra recognition of the additional effort to achieve quality. The **Specialty** sub-segment is characterized by its lack of defects and the presence of fine flavor and aromas, in addition to the story behind the product and its uniqueness. Export prices are usually not based on international prices and range from USD 3.50 to USD 6.00 per kg. Finally, the **Ultra-Premium** sub-segment is characterized by its extremely high quality and absolute absence of defects and impurities. Prices might exceed USD 6.00 per kg and reach as high as USD 12.00 per kg.

The role of Peru in the international cocoa market

With more than 160,000 tons produced in 2020, Peru is the ninth largest cocoa producer in the world and the second largest producer of organic cocoa (MIDAGRI, 2023; Alvarado and Iturrios, 2017). Furthermore, according to the ICCO, 75% of its production can be classified as FoF cocoa.

The country has been able to obtain above-market prices thanks to its focus on the certified and specialty cocoa segments. Among its specialty cocoas, cultivars Blanco de Piura and Chuncho de Cusco stand out, as they are highly recognized in the international market for their special profiles (Zavaleta et al., 2022). Additionally, the spatial arrangements of FoF cocoa and Trinitario clones ICS-1, ICS-6, ICS-95, ICS-39, IMC-67, TSH-565, and UF-613 have been promoted since 2014–2016 (Gómez et al., 2014). In 2014, it was estimated that 53.6% of the country's plantations corresponded to conventional cocoa (Romero, 2016).

According to Willer et al. (2022), by 2020, the country had 52,000 ha with an organic certification and more than 21,000 ha in transition. According to MIDAGRI (2020), 20% of national production in 2018 had an organic certification, with 36,946 ha, and exports of certified beans (mainly Organic, Rainforest Alliance, UTZ, and Fairtrade) in the same year accounted for 31% of the exported value. The national value chain is also characterized by the evolution of its industrial capacity, as exports of butter, powder, cocoa paste, and chocolates have grown rapidly in recent years and accounted for 46% of the total value exported in 2020 (Charry et al., 2022).

Historical development of the crop in Peru

Peru is considered one of the main centers of origin of cocoa because of a high diversity and genetic variability, which can be ascertained in the different populations, native varieties, and ecotypes of cocoa that can be found in all cocoa-producing areas (Revista Agraria.pe, 2020). In this regard, 60% of the existing cocoa biodiversity (genetic material) in the world is found in Peru, where the following varieties of genetic groups are produced: Trinitario, 53.3% (Junín); Forastero Amazónico, 37.3% (Cuzco and Ayacucho); and Criollo, 9.4% (northern area of San Martín, Amazonas, and Cajamarca).

Several studies claim that cocoa originates in Peru; however, its commercial development began only in the decade of 1930, along with coffee. In the 1960s, the department of Cuzco had the largest cocoa production, followed by Huánuco. From 1970 to 1980, its production expanded to other areas with suitable climatic conditions. In the 1980s, cocoa was threatened by the increase in coca leaf cultivation, which was more profitable and required less management activity, a situation that was complicated by the violence generated by terrorism. During this same period, the crop was severely affected by moniliasis, a disease that led to economic losses surpassing 90% in cocoa-growing areas nationwide. This, together

with socio-political problems and drug trafficking, led to the abandonment of plantations in several areas of the country (Paredes, 2003).

In response to this problem and with the purpose of eradicating coca leaf, in the decade of 2000, the Peruvian government started crop substitution and alternative development programs using cocoa as one of the crops promoted. Such programs, led by the United Nations Office on Drugs and Crime (UNODC), the National Commission for Development and Life without Drugs (DEVIDA), the Ministry of Agriculture and Irrigation (MINAGRI), and the United States Agency for International Development (USAID), provided farmers with agricultural inputs, planting material, financing mechanisms, and technical assistance (Morales et al., 2015). These efforts have evolved and continue to the present in the Amazon region through the Peru Cocoa Alliance initiative (2012–2022), a USAID-funded public-private partnership aiming to enhance cocoa production and marketing in San Martín, Huánuco, Ucayali, and Pasco. The initiative has benefited more than 35,300 producer families across 70,000 ha, with a technical package of good agricultural and environmental practices (Andina, 2022; Alvarado and Iturrios, 2017).

The main period of growth in this sector nationally began in 2007, when the first crops entered production, with the development of the national cocoa industry, and with the promotion of exports. During this period, San Martín became the main cocoa-producing department in the country. From 2000 to 2005, production remained constant at about 24,000 tons, increasing substantially to 108,230 tons in 2016. Since 2005, plantation productivity has also increased steadily; in the last decade, national average yields increased by more than 50%, ranking among the highest in the world (Alvarado and Iturrios, 2017). Despite the lack of updated figures, it is estimated that, by 2011, variety CCN51 (not considered as FoF) covered 54% of the total area under cocoa (García Carrión, 2010), with substantial differences across departments. While in San Martín CCN51 represents about 90% of the varieties planted, in Huánuco and Ucayali it represents at least 50% (García Carrión, 2010; Gobierno Regional de Ucayali, 2019), and in Piura it is estimated that 95% of the varieties planted are national varieties (Rios et al., 2017; Charry et al, 2020).

3. UCAYALI DEPARTMENT

The Ucayali region is in the Peruvian Amazon basin, in the central-eastern part of the country (Figure 3). It is bordered by Loreto on the north; by Huánuco, Pasco, and Junín on the west; by Cuzco and Madre de Dios on the south; and by Brazil on the east. It has an extension of 102,410.55 km^2 (7.97% of the national territory) and consists of four provinces: Atalaya (capital Atalaya), Coronel Portillo (Pucallpa), Padre Abad (Aguaytía), and Purús (Puerto Esperanza), which are composed of 15 districts.

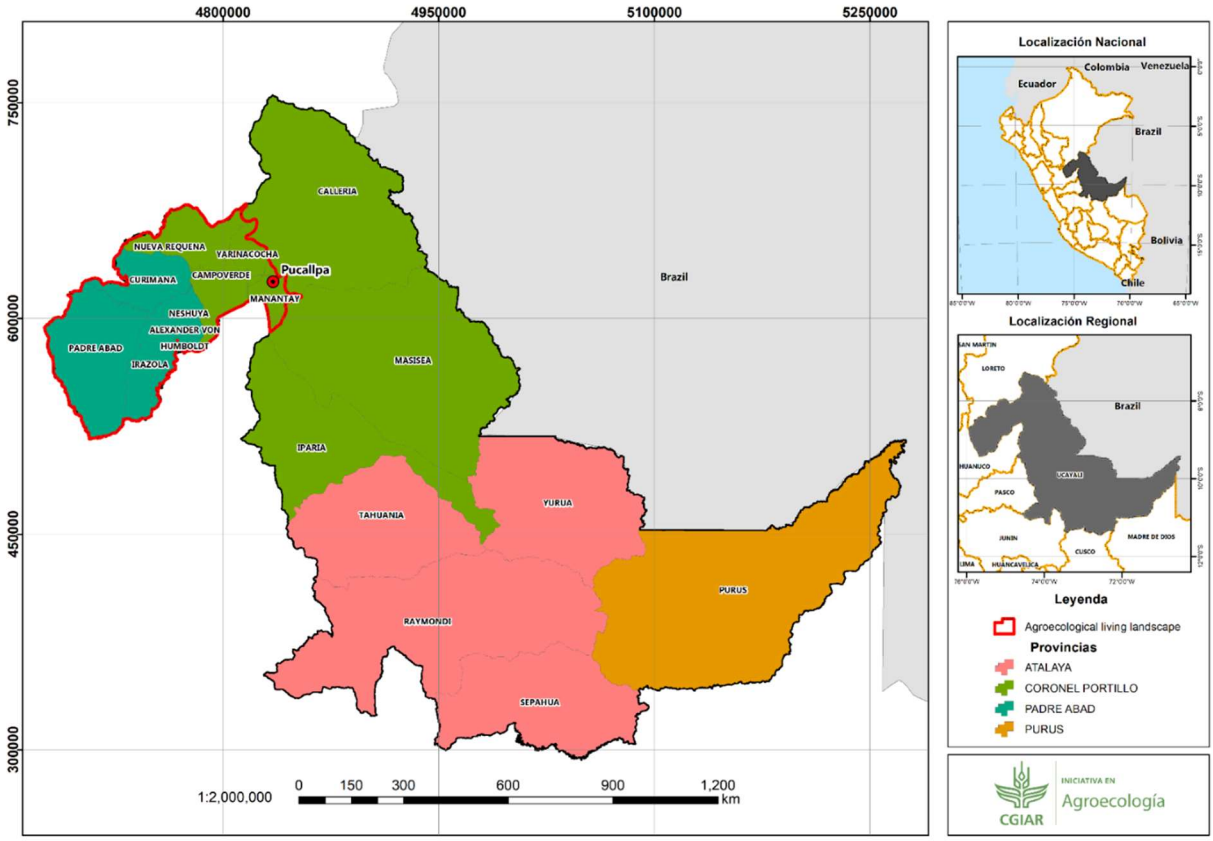

Figure 3. Political divisions of Ucayali Department and location of the Agroecological Living Landscapes (ALLs) (outlined in red). Source: Pareja et al. (2023).

According to projections by the National Institute of Statistics and Informatics (INEI), the department had a population of 589,110 in 2020, 1.8% of the total national population, including 296 native communities with 63,344 inhabitants (GORE Ucayali, 2008). By sex, men represented 52.2% and women 47.8% of the department's total population. The annual population growth rate in 2020 was 2.5% (Cumbicus and López, 2020). According to the 2022 National Household Survey (ENAHO), the average monetary poverty rate in the region was 17.02%, falling below the national average (25.87%); the rate of young people aged 20–29 years who had not completed high school was 36.98%, which is considered high compared with the national average (15.43%). The population of children with anemia is high at 60.75%, ranking second only to the Puno region. Informal employment in Ucayali is 85.30%, higher than the national average of 76.83% (Aramburu and Sotelo, 2022).

The migratory phenomenon in Ucayali dates to the late nineteenth and early twentieth centuries, when it was a center of attraction due to its fishing resources and rubber exploitation. It became particularly prominent in the 1980s and 1990s, with the highest growth rate in the country (5.3%), well above the national average (2.0%), influenced by increased timber extraction and trade as well as native crops. But in 2007, migration dropped by 50% vis-à-vis 1993 (Díaz, 2007). From 1981 to 1993, the population quadrupled; this is correlated with the boom in the expansion of coca leaf plantations. From 1993 to 2007, growth reached 2.6% and the rural population (especially youth) began to move to urban areas in search of employment opportunities (Díaz, 2007).

Multicultural expressions have a strong presence. Such is the case of Padre Abad Province, where there are native communities made up of the Cacataibos, Shipibos, and Cashibos, and, on the other hand, a migrant population comprising ethnic groups of settlers, known as *mestizos*. At the same time, there is a strong presence of different Adventist religious sects, which influence their ancestral cultural practices, giving them a different dynamic and a new rhythm to their customary life and regulatory system. These cultural expressions are often ignored by public or private institutions, which aggravates their living conditions, and the support they get to solve their problems is minimum. There are also some conflict areas in territories where the state has granted concessions for logging and timber exploitation as well as oil exploration zones (the Shipibos in Santa Rosa, in Padre Abad Province) (Municipalidad Provincial Del Padre Abad, 2009). Public unrest and threats to forests also exist because of coca leaf production across the department (Vera, 2021).

The territory of Ucayali is made up of three natural levels: the Jungle Eyebrow (1,135 km^2) at an altitude of 1,000–3,000 m.a.s.l.; the Highland Jungle (12,948 km^2) at an altitude of 500–1,000 m; and the Lowland Jungle (88,434 km^2) at an altitude of 0–500 m. With a tropical rainforest climate, precipitation ranges from 1,535 to 2,100 mm/year. There is a dry period from July to August and intense rainfall from November to March. The temperature varies from 19.7 °C (December to March) to 30.6 °C (May to August) and the annual average relative humidity is 83.5%. The Ucayali region has 11 life zones, where forests cover about 85% of the area, and it is characterized by its high heterogeneity, which makes it difficult to manage. Lands suitable for forestry and protected areas cover 82% of the territory, while lands suitable for livestock cover 10%; only 8% of the land is suitable for agriculture, for both clean and permanent crops. Its water resources give rise to several basins, which form the river transit both into the region (Ucayali River and tributaries) and out of the region (Alto Huallaga, Purús, and Alto Yurúa rivers). Two major agroecosystems can be distinguished: (1) non-floodable terrace areas, known as "highland terrains," where soils are shallow and have a high risk of water erosion. These are generally acidic soils with aluminum toxicity problems and lower natural fertility, where permanent crops, such as fruit trees and industrial crops, are grown; and (2) seasonally flooded terraces called *restingas*, with natural soil fertility, but a higher risk of flooding and crop losses. Crops such as rice, maize, cassava, and others are grown in these areas (GORE Ucayali, 2008).

On riverbanks, agricultural activity is diverse and can potentially produce high yields. Some crops, such as rice, plantain, and maize, can generate a profit and good returns for farmers, but they are extremely susceptible to variations in production and marketing conditions in the area. Early flood risks, high river transportation costs, and price instability affect the profitability of agriculture (Labarta et al., 2007). Agriculture-livestock-hunting-forestry activities rank as the fourth economic activity in the Ucayali region, increasing 0.5% in 2020 compared to the previous year. This generates 12.2% of the department's gross value added (GVA). In terms of this sector's 2020 GVA, six crops stood out: plantain, oil palm, cassava, cocoa, rice, and papaya. With 297,000 tons of plantain (12.8% of the national total, third position in the national ranking); 319,000 tons of oil palm (35.5% of the national total, second in the national ranking); 103,000 tons of cassava (7.6% of the national total, fourth in the national ranking); 22,000 tons of cocoa (13.5% of the national supply, third in the national ranking); 65,000 tons of rice (1.9% of the national total, 11th in the national ranking); and 52,000 tons of papaya (27.9% of the national total, first in the national ranking). Cocoa and papaya showed significant growth vis-à-vis the previous year (27.4% and 33.1%, respectively), the former due to the entry into production of areas that had been planted in recent years and the latter due to the recent expansion into new areas free of pests and diseases, with a productivity well above the national average (Cumbicus and López, 2020).

Agricultural activity in the highlands faces low yield because of poor soil quality and inefficient production technologies. As a result, the greatest potential lies in the permanent crops native to this ecological environment, which are poised to drive increased sales in the market (such as pijuayo, camucamu, oil palm, coffee, and cocoa) and are generally adapted to the low quality of soils in the Amazonian plains (Municipalidad Provincial Del Padre Abad, 2009).

The major export crops in Ucayali, according to the 2020 regional trade report (MINCETUR, 2021), are palm oil/derivatives (46%), profiled wood (28%), sawn timber (14%), and cocoa beans (12%). The department's agricultural exports showed an increase surpassing 85%, with a notable increase in shipments of palm oil/derivatives from Sol de Palma to Colombia, the European Union, and Kenya, along with increased sales of cocoa beans (>10%) to the EU. The report also reveals the contribution of 40 companies, such as Sol de Palma (46%), Industria Forestal Huayruro (10%), Colpa de Loros Agricultural Cooperative for Flavor Cocoa (7%), Grupo Maderero Amazónico (6%), and Consorcio Maderero (6%).

4. The Cocoa Value Chain in Ucayali

The actors in the cocoa value chain in Ucayali can be classified into (1) **direct actors** and (2) **indirect actors. Direct actors** are those who deal with cocoa and its processed and semi-processed products: producers, collectors, intermediaries and other bean traders, exporters, local processors, international processors, traders of processed products, and end consumers. **Indirect actors** are those who provide inputs and services to direct actors, along with those who carry out regulation, control, and surveillance activities. The former involve suppliers of agricultural and industrial inputs and providers of financial services, technical assistance, research, logistics, certification, sectoral representation, and marketing support, among others. The latter involve government organizations, such as national and regional governments, as well as the relevant entities carrying out phytosanitary control and environmental and trade oversight, among others. It is worth mentioning that some actors are involved in several links of the value chain and at different levels, as in the case of some cooperatives that, in addition to collecting, processing, and marketing cocoa, provide technical and financial assistance services to their members.

In accordance with the objectives of this study, among the group of direct actors, we focus on the chain links concerning production, marketing, and local processing, and, to a lesser extent, we provide information on international importers/processors in the destination markets. The markets for semi-processed products and cocoa by-products are not described. Similarly, among the indirect actors, we limit our focus to those who provide services to actors located in the ALL territory, particularly at the production and cooperative levels, and we include information on some actors at the national level, which were identified through key informant interviews that might be of interest for the development of agroecology along the chain.

The growth of the Ucayali cocoa sector is largely the result of the implementation of crop substitution and rural development programs and projects in recent decades. For this reason, the characteristics of the production systems, the associative models in the area, and the general operation of the value chain have been strongly determined by the objectives, visions, efforts, and evolution of these processes.

In 2011, the department produced approximately 1,600 tons on nearly 1,900 harvested hectares (MIDAGRI, 2023). Following the crop substitution and planting campaigns, and the promotion of the sector during the decade of 2010, in 2022, the department reached 25,461 ha and produced 22,013 tons of cocoa beans (MIDAGRI, 2023). Cocoa production is concentrated in the province of Padre Abad, although Coronel Portillo and Atalaya also host considerable production (Table 1 and Figure 4).

Table 1. Cocoa production, harvested area, and producers in Ucayali in 2022, according to their district and province.

Province	District	Harvested area (ha)	Production (t)	Harvested area (ha)	Production (t)	Producers (no.)
Padre Abad	Padre Abad	4,510	4,428	17,695	15,974	3,692
	Irazola	5,277	4,826			
	A. von Humboldt	1,900	1,661			
	Neshuya	2,028	1,675			
	Curimaná	3,980	3,384			
Coronel Portillo	Nueva Requena	800	628	3,246	2,352	1,154
	Campoverde	1,008	721			
	Yarinacocha	210	170			
	Manantay	39	37			
	Callería	332	166			
	Masisea	580	407			
	Iparia	277	222			
Atalaya	Raymondi	2,899	2,396	4,511	3,680	490
	Sepahua	900	698			
	Tahuanía	692	571			
	Yurúa	20	15			
Purús	Purús	9	6.8	9	6.8	13
Total				**25,462**	**22,013**	**5,349**

Source: Prepared by the authors with data from MIDAGRI (2023).

MIDAGRI (2023) estimates that the department has 5,349 producer families, each cultivating an average of 5 ha of cocoa; however, the area of cocoa per producer varies among provinces, with an average of 4.8 ha in Padre Abad, 2.8 ha in Coronel Portillo, 9.2 ha in Atalaya, and less than 1 ha in Purús. The Regional Competitiveness Plan states that only 5% of the producers have agroforestry systems and 5% of the farms have an organic certification (Gobierno Regional de Ucayali, 2019). The above study also estimates that 95% of the producers have income of less than PEN 1,000 per month (USD 268).

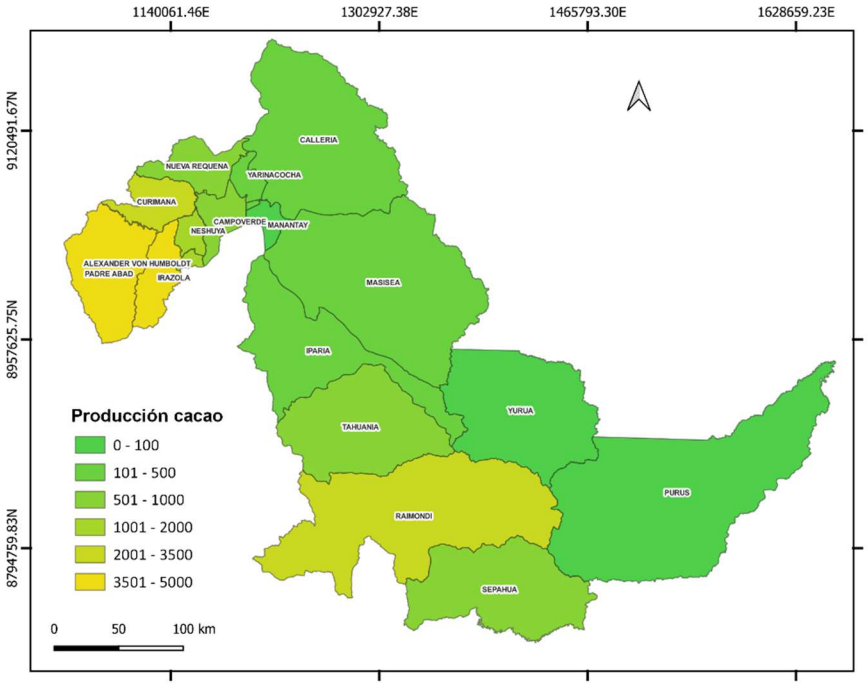

Figure 4. Cocoa production by district in 2022 (in tons).

Source: Prepared by the authors with data from MIDAGRI (2023).

About 20% of the cocoa producers are affiliated with an association or cooperative. According to Charry et al. (2020), approximately 30% of the beans are sold through 19 associations and cooperatives currently registered in the department (DRA Ucayali, n.d.), while the remainder is distributed through independent collectors or sold directly to local branches of national processing and export companies, including Machu Picchu, Romex, Sumaqao, and Amazonas Trading. Associations and cooperatives also tend to trade with these national companies and only a marginal portion of production is destined for local chocolate production.

Some associations have succeeded in exporting directly to international clients, such as Colpa de Loros and Curimaná, as described below.

Colpa de Loros Agricultural Cooperative for Flavor Cocoa

C.A.C. Colpa de Loros is a cooperative located in the district of Neshuya, Padre Abad Province, with a membership of 515 producers from the provinces of Padre Abad and Coronel Portillo (Ucayali) and Puerto Inca (Huánuco). The cooperative offers a broad portfolio of services and benefits to its members. It began as an initiative of Kaoka (a French chocolate company) and groups of producers in the region who sought to improve the livelihoods of local communities through the production and marketing of fine flavor cocoa with organic and Fairtrade certifications. Kakoka continues to be its main commercial partner, purchasing all of its production at above-market prices, and they have developed an inclusive and close relationship that has produced notable results. The cooperative went from producing 203 tons in 2015 to exporting 892 tons worth USD 2.5 million in 2020. Although after the COVID-19 pandemic the cooperative has had

difficulties in retaining its membership, production, and export levels, it still plays a major role in the cocoa sector in the region.

Curimaná Agroindustrial Ecological Cooperative

C.E.A. Curimaná is a cooperative located in the district of Curimaná, which was founded as a producer association in 2008, and it was registered in 2010 thanks to the support of Sumaqao and Swiss Cooperation, under the framework of the Alternative Development Plan (PDA, its Spanish initials). Over the last decade, the cooperative has been constantly evolving to become a direct exporter of cocoa and being incorporated as a cooperative with an area of influence in the district of Curimaná and surrounding areas. It now has 70 members. It collects dry beans and, to a lesser extent, wet cocoa beans (*en baba*) from its membership and close to 200 additional producers. In addition to its marketing activities, the cooperative provides various services to its members, such as technical assistance, financial support, agricultural inputs, project management, and environmental monitoring, among others. Curimaná markets about 480 tons of dry beans, including conventional, certified organic, and Fairtrade beans, to different clients, mainly in the European Union.

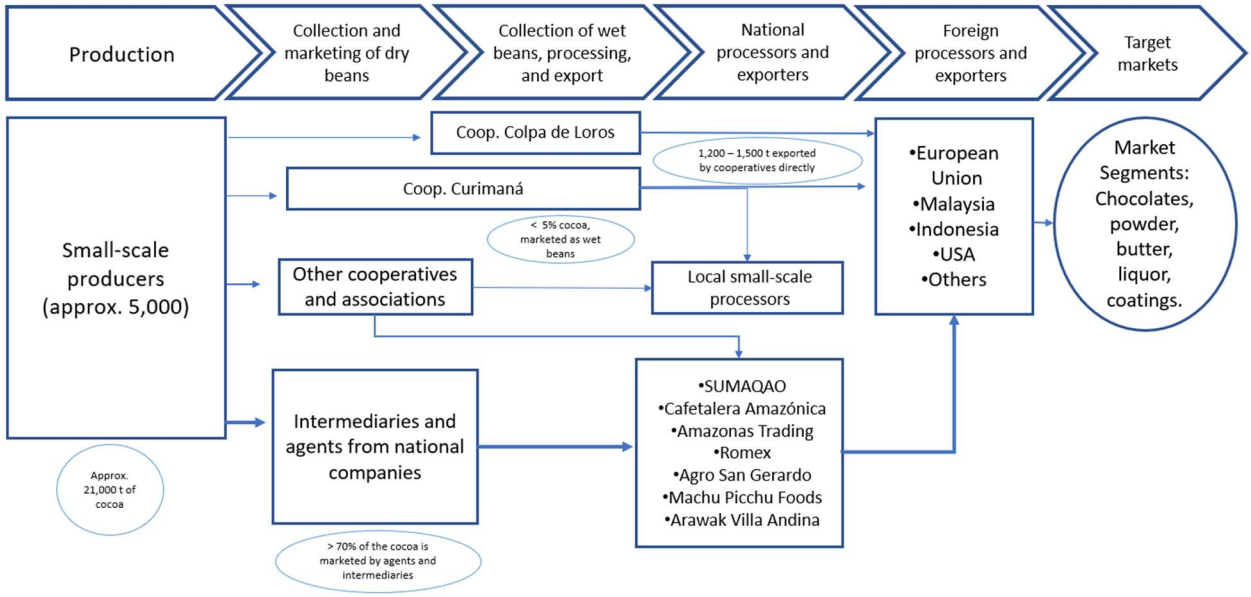

Figure 5. The cocoa value chain in Ucayali.

4.1. Cocoa Production

In the department of Ucayali, the cocoa production system was and continues to be promoted under rural development or coca substitution programs, typically under agroforestry systems that integrate several products at different stages. After clearing and preparing the land, short-cycle crops, such as cassava,

maize, or beans, are planted, which yield one or two harvests (depending on the crop). These are grown only during the system's first production year. In parallel, plantain is usually sown as temporary shade, along with fruit or timber trees (bolaina, capirona, cedar, mahogany, shihuahuaco, and guaba, among others) as permanent shade for cocoa trees. Temporary shade remains in the field for the first 2 to 3 years, depending on the management plan and the system's performance, while the permanent shade timber species are projected to be harvested in 10 or more years, or at the end of the system's useful life expectancy (estimated at 25 years). At present, however, a large number of trees planted in the early 2010s have been removed, and it is common to find cocoa plantations without permanent shade or at very low densities (a median of 13 individuals per hectare) (ICRAF, 2022b).[1]

Planting density and crop management vary significantly among farms and products, especially for crops other than cocoa. The selection and management of the initial short-cycle crop(s) depend directly on the farmer's interests and capabilities. In the case of plantains, they are generally planted at densities ranging from 600 to 1,111 individuals per hectare and are typically included in the inputs provided by development projects. Similarly, fruit and timber trees are usually part of this package and are planted at densities close to 100 individuals per hectare. Lastly, cocoa is normally planted in 3 m × 3 m arrangements, with 1,111 to 1,307 trees per hectare, using different varieties, which have changed depending on the season and interests of the producers and the development projects involved, as well as the evolution of the market and global trends. Secondary information available (García Carrión, 2010; Gobierno Regional de Ucayali, 2019) claims that at least 50% of the cocoa plants in the department correspond to CCN51, which stands out for its resistance and higher productivity, but is not considered fine and flavor cocoa. According to experts consulted, fine and flavor varieties started to be widely introduced in 2016, and they currently coexist in the department with CCN51, although no solid and updated information exists regarding percentages. Different organizations promote different varieties according to their priorities and marketing strategies, either due to a focus mainly on productivity and volume, special markets, and differentiated profiles, or due to different combinations of these. For this reason, production systems may have different characteristics, depending on the area and the cooperatives or organizations operating there. The technological package for fine and flavor cocoa in the country recommends the following varieties: ICS1, ICS6, ICS95, ICS39, IMC67, TSH565, and UF613 (Gómez et al., 2014). According to local experts, the last planting campaign in the department was carried out in 2021 by DEVIDA, through which 800 ha of agroforestry systems with an organic production package were established (1 ha per producer). This intervention was carried out in Padre Abad, San Alejandro, and Curimaná.

According to data from MIDAGRI (2023), the average yield for the department in 2021 was 977 kg/ha; however, a study by ICRAF (2022b) and discussions with experts reveal that the actual value might be considerably lower. Charry et al. (2020) identified three types of producers in the department, which share characteristics related to spatial arrangements and varieties planted, but differ mainly in terms of yield, intensity of production management, and target market. These are (1) **conventional producers,** with yield up to 700 kg/ha, who apply conventional management practices and sell dry beans; and (2) **semi-**

[1] Since most of the crops in the department are more than 3 years old, cocoa is currently the primary or sole commercial product within the system for the majority of the producing families. It is for this reason that our analysis focuses on the cocoa value chain. Future reports are expected to include information on the plantain value chain and other commercially important associated crops. These shall have been identified within the framework of the initiative for their agroecological potential, so long as the strengthening strategies to be implemented include the establishment of new areas, mixed spatial arrangements, or the addition of fruit or forest species to existing plantations for commercial use.

technified producers, who represent a reduced group and are better off financially. These producers manage larger-than-average cocoa fields and achieve yield of approximately 1,500 kg/ha through intensive management and fertilizer use. The third type includes **organic producers,** who are members of cooperatives and market wet (*en baba*) or dry cocoa beans. These producers apply organic fertilizer, obtain yield of about 800 kg/ha, and receive a price premium for their organic production, which reached USD 0.08–0.11 per kg of dry cocoa in the year the study was conducted.[2] Among the different types of organic producers, it is worth mentioning those that are members of cooperatives exporting directly. The members of Colpa de Loros and Curimaná belong to this subgroup, and, although each cooperative has developed a different business model, they are able to offer higher price differentials than those mentioned above, owing to a direct link with their clients and niche markets for certified and/or fine and flavor cocoa (in the case of Colpa de Loros).

4.2. Collection, Processing, and Marketing

Marketing of dry cocoa beans – the in-farm processing model

Although accurate figures are not available, it is estimated that most producers in the department of Ucayali carry out bean processing (fermentation and drying) on their own farms, marketing the cocoa as dry beans through agents from national companies, intermediaries, cooperatives, or producer associations. A marginal proportion of cocoa is sold by some cooperatives to local processors, or it is used in their own artisanal processing initiatives. Using the data collected, we estimate that 92% of the department's cocoa is collected and marketed by intermediaries and producer associations to large national and international processing and exporting companies based in Lima.

According to MIDAGRI (2023), dry cocoa bean farm-gate prices in Ucayali are slightly lower than the national average. In 2021, the average price in Ucayali was PEN 7.06 (USD 1.9), and in 2022 it dropped to PEN 6.89 (USD 1.85), compared with the national average price of PEN 7.63 (USD 2.05) and PEN 7.17 (USD 1.93), respectively.

Marketing of dry cocoa beans – the centralized processing model

The Curimaná and Colpa de Loros cooperatives report that their share of centralized processing of cocoa beans is different. Currently, Curimaná has collection routes and two processing plants, where it is able to control the fermentation and drying parameters of a share of the cocoa collected, thus generating higher quality products. The cocoa is sorted into specific lots to be shipped to some of its customers or it is mixed with other beans to improve the quality of export lots. Nevertheless, it should be noted that, at present, the cooperative mainly purchases dry beans. The cooperative exports conventional cocoa and cocoa with organic and Fairtrade certifications and is able to receive price premiums of USD 300 per ton for cocoa with an organic certification (variable) and USD 240 for cocoa with a Fairtrade certification.

[2] It is important to clarify that these yields are from a study of a qualitative nature and therefore are used only for indicative purposes; they are not statistically representative of the territory.

Colpa de Loros has four collection centers in its main production hubs, where it collects the cocoa beans. The cooperative has collection routes and its own vehicles, which transport the cocoa beans to the processing plant located at its headquarters in Neshuya. It has also implemented a selection and traceability system, along with specific fermentation and drying protocols, to obtain a higher quality product. In September 2022, the cooperative paid its producers PEN 9.7 (USD 2.61) per kg of dry equivalent and sold the entire cocoa harvest to Kaoka at stock exchange price, plus price premiums for organic and Fairtrade certifications, as well as an additional price differential for quality.

Exports in the region

In 2018, the main cocoa exporter based in the region was Colpa de Loros, which recorded exports of USD 2.5 million, followed by Curimaná (USD 0.8 million). The main cocoa bean export destinations were the Netherlands, with USD 2.8 million, and Italy, with USD 0.8 million (MINCETUR, 2018). In 2020, the Agro San Gerardo company first appeared among the department's cocoa exporters, reaching close to USD 740,000, while Colpa de Loros recorded USD 3.3 million and Curimaná USD 1.1 million. In 2021, the situation was different, as the effects of COVID-19 on the value chain caused a major setback to the operation of associations across the region. Agro San Gerardo recorded exponential growth, reaching USD 4.9 million, while Colpa de Loros dropped to USD 2.3 million and Curimaná to USD 193,000. Furthermore, in the first half of 2022, Agro San Gerardo continued to consolidate its leadership in exports in the region with USD 4.4 million, followed by Curimaná with USD 526,000 and Colpa de Loros with USD 477,000. According to data from MINCETUR (2022), the main destinations for Ucayali cocoa beans during the first half of 2022 were the European Union (74%), Mexico (17%), and Malaysia (8%).

4.3. INDIRECT ACTORS

Technical assistance, training, research, and knowledge transfer

Cooperatives and producer associations: Colpa de Loros, Curimaná, and other producer associations in Ucayali have technical staff to provide technical assistance and extension services to their membership. Technical assistance usually addresses concerns related to good crop management practices, such as pruning, harvest, pest and disease management, as well as the practices and inputs required to obtain certifications. However, they claim that their reach is limited and they do not have enough staff to provide the technical assistance required by their entire membership.

Peru Cocoa Alliance (ACP): This is a USAID-funded public-private partnership, composed of more than 30 companies and cooperatives engaged in the cocoa sector in the regions of San Martín, Huánuco, and Ucayali. During the life of the initiative, it aided 4,600 families across the region, of which 1,200 were affiliated with an organization. In the opinion of producers in the department, it was the major provider of technical assistance; however, the program ended in 2022, which poses a great challenge to the continuation of technical assistance services provided to producers, especially those who are not members of any cooperative.

National Commission for Development and Life without Drugs (DEVIDA): This is the government agency responsible for designing and implementing the National Anti-Drug Strategy. It is an integral component of the region's alternative and sustainable development model, involving the allocation of resources to

various implementing entities associated with the sector, in collaboration with regional and local governments.

National Agricultural Research Institute (INIA): INIA has had a research center in Pucallpa for 50 years. The center specializes in rice, maize, bean, plantain, and coffee, and has a team specialized in the cocoa value chain, which is currently implementing a project with Korean cooperation funds for the development of an agroforestry system with fine and flavor cocoa. The spatial arrangements promoted integrate several elements of agroecological principles with practices such as decreasing the use of synthetic inputs, using microorganisms, planting against the slope, using mulch, and introducing tree species and short-cycle crops, among others. It is noteworthy that producers actively co-create these systems, participating in the diagnosis and decision-making regarding the inclusion of forest species in the spatial arrangements. On the other hand, on several occasions, it was also evident that there is a lack of articulation between their work and the Ucayali Regional Government (GOREU).

According to a representative we interviewed, the organization (as well as the region) has human capital qualified to address the different technological aspects needed in cocoa research, but significant budgetary constraints prevent it from expanding its operations. Among the main weaknesses observed, it is necessary to improve the institutional infrastructure and laboratories, and there is no plant pathology and plant breeding area.

The Alliance of Bioversity International and CIAT: Through the Agroecological Regenerative Cocoa and Agroecological Transitions projects, the CGIAR Initiative on Agroecology, and the BIOTrails project, the Alliance aims to strengthen actions for the sustainable production of cocoa through research and activities related to soil restoration, agroforestry systems, genetic characterization of cocoa, and biodiversity, among others, thus enhancing opportunities for cocoa cooperatives and other stakeholders in the chain.

Financial services

The department has different sources of financing for producers, such as public and private banks, municipal savings banks, microfinance institutions, and producer cooperatives; however, the use of credit in the sector is relatively low. According to a report by ICRAF (2022a), 22% of the producers included in their study obtained credit for their agricultural activities. Of this group, 11% secured funding from Agrobanco, 8% from municipal savings banks, but only 1% indicated they received credit from their cooperatives.

Agrobanco is the public bank of the Peruvian state that aims to promote and facilitate loans to small-scale agricultural producers in Peru. Nevertheless, in earlier stages, the bank employed different intervention approaches that proved to be less suitable, resulting in the bankruptcy and liquidation of two institutions.

Agrobanco operates with its own funds. These are transferred by the government and also obtained through the administration of public funds, such as Fondo Agroperú and Fund for the Financial Inclusion of Small Agricultural Producers (FIFPPA), which allow Agrobanco to offer rural populations financial services for agricultural activities prioritized directly by the Ministry of Agrarian Development and Irrigation.

In this last stage, Agrobanco has focused its intervention on small-scale agricultural producers, trying to help strengthen producer organizations through financial products that meet the funding needs of both producers and organizations. Consequently, credit conditions for small-scale producers affiliated with organizations are more favorable than those for independent producers.

Enrique Orezzoli (general manager) and Sergio Flores (business manager) indicated that cocoa is Agrobanco's third top product in terms of loans, after coffee and cattle fattening. The cocoa sector has shown rapid growth in total loans, representing approximately 20% of the total loan portfolio, compared to just 5% two years ago. It should be noted that, according to our interviewees, "60% of Agrobanco's customers are new clients to the financial sector."

Agrobanco's restructuring process has faced different internal and external challenges. Internally, it was found that the software used to support financial intermediation processes, called *Core Financiero*, is more than 20 years old and currently is not suitable for efficient credit management. Externally, it was observed that limited access to telecommunication networks increases the costs and hampers implementation and operations at offices in the most rural areas of the country. Although they believe that there have been improvements in recent years, these are still not enough.

In addition to their credits for association members, Agrobanco emphasizes its credits for communities for maintenance of forest plantations, noting that the bank has a social and environmental component. In this sense, Agrobanco stated that "the goal is to develop products leading to environmental protection." For instance, they closed a line of credit to establish yellow maize in the Amazon despite its commercial success, because it had a negative environmental impact. Moreover, the bank seeks to become a driver of rural financial inclusion by developing a specific credit line for women, although it does not have any focusing on youth or ethnic groups.

Certification

Peru has multiple certification agencies providing such services. For example, 11 agencies are currently registered at the National Agrarian Health Service (SENASA) as providers of organic certifications, including Biolatina, Control Union, IMO, Ecocert, Maya, and CERESPERU, among others (SENASA, 2022). A representative from Ecocert, which certifies one of the department's cooperatives, contributed the following.

Ecocert is a certification agency founded in France in 1991. It operates in more than 80 countries and it provides more than 150 certifications on national and international, public and private standards. Its main competitors in Peru are Kiwa and Control Union. According to the representative, 70% of its clients are small-scale producers organized in associations or cooperatives, which often have access to certifications through financial support from regional or local governments. She also highlighted that the absence of records in associations is one of the most significant and common barriers to the certification process.

As for the principles of agroecology, the representative stated that different certifications tend to focus more on some of them. For example, the **Rainforest Alliance** certification is aligned with the fifth principle, promoting the conservation of biodiversity as its cross-cutting evaluation axis. The **RAS (Responsible Alpaca Standard)** certification is aligned with the fourth principle, as it seeks to prevent animal abuse in agricultural activities. The **ROC (Regenerative Organic Certified)** certification is more aligned with the third principle, as it has soil health as a key pillar in its evaluation processes. Nevertheless, most certifications include soil health among their evaluation criteria.

Another important aspect of agroecology considered by certification processes is the incorporation of local knowledge generation and transfer processes through "replication systems, with training of internal auditors in agreement with regional governments. These systems can include characteristics of the area but must be based on the standard's criteria."

Public sector and third sector

Ucayali Regional Government (Ucayali GORE) – Regional Directorate for Agriculture: Instruments exist for the agricultural and commercial development of the region, such as the Ucayali 2011–2021 Regional Concerted Development Plan, the 2019–2022 Regional Climate Change Strategy, Ecological Economic Zoning, and the Ucayali 2019–2029 Cocoa Competitiveness Plan, which the regional government has been implementing through public investment projects for the improvement of 10 agro-industrial products.

The Ucayali GORE's regulatory framework for the cocoa supply chain aims to be "a reference and guide for the chain's development," according to the interviewed representative of the organization. The Ucayali GORE is actively involved in promoting and developing the cocoa supply chain in the region through various support and promotion activities: "we work with companies, providing them with technical assistance, advice on process improvement, support with certifications, such as HACCP, marketing support, and participation in fairs." The Procompite Program provides cash resources with matching funds from the Ucayali GORE to organizations to help them implement projects.

The representative believes that cocoa farming is a relatively new activity in the region and is still under development. However, four bottlenecks are limiting cocoa farming's growth: lack of market access, lack of support and technical assistance, lack of information on farm locations (which limits the implementation of monitoring and follow-up processes), and lack of access to financing.

The representative believes that agroecology is a tool for achieving land use planning, but that it cannot achieve this alone. He believes that agroecology allows for the development of a model of activities within certain value chains, which, in turn, enables the coordination of activities in conjunction with chains.

Ucayali Regional Environmental Authority (ARAU): The purpose of ARAU is to formulate, execute, evaluate, direct, control, and manage environmental plans and policies in the region, in accordance with national plans. ARAU is implementing a project on the "Improvement of Support Services for the Sustainable Use of Biodiversity in the Ecosystems of *Restingas* and Estates along the Federico Basadre Highway, km 15 to 195, in the Provinces of Coronel Portillo and Padre Abad," which includes the implementation of cocoa agroforestry systems and the use of timber and non-timber species. The project has a budget of USD 44.7 million and aims to reach 61,797 beneficiaries.

National Forest and Wildlife Service (SERFOR): It developed the Forest Zoning management tool SERFOR-CAF and it also provides funds for implementing reforestation plans and establishing cocoa agroforestry systems.

National Agrarian Health Service (SENASA) – Ministry of Agriculture and Irrigation: It conducts a diagnosis of the phytosanitary conditions of cacao plantations and provides recommendations to solve the problems. The institution is struggling to cover the entire region, indicating that the most remote areas face greater pest problems.

Agrosalud de Ucayali: This is a pastoral NGO supported by the Diocese of Pucallpa, which calls itself "the Agroecology Champion." The line of action for its interventions is "Contribute to strengthen and improve healthy eating in sustainable agroecological spaces in rural areas." Its intervention is divided into four work streams: Agroecological Participatory Research, Healthy Eating, Agroecological Rural Extension, and Empowerment of Rural Women.

Agrosalud de Ucayali promotes agroecological techniques, soil conservation, composting, bio-fertilizers, the introduction of forest species as windbreaks (using material produced in their nurseries), traditional

conservation of native seeds, and crop diversification. It also provides support for housing improvement and linking agroecology with health and quality of life. It works in small areas of less than 1 ha to a maximum of 5 ha per family, since the area is limited by the maximum labor capacity of the families: "Even though there are families with 10 children and enough manpower available, the issue is economic viability and social sustainability."

Agrosalud de Ucayali is currently operating in Nolbert hamlet in Alto Uruya, with a project involving 21 villagers, and with Shipibo Conibos communities living along the riverbanks. The project is a five-year initiative and the first year of implementation has been completed.

Sustainable Productive Landscapes in the Amazon (PPS) Project (PNUD): This project operates in two provinces: Padre Abad in Ucayali and Puerto Inca in Huánuco. The project has three objectives: (1) improve the policy, planning, and governance framework for the sustainable use of land and prevent deforestation; (2) promote incentives and financial mechanisms for sustainable production by giving producers access to certification standards and markets; and (3) strengthen technical capacity to restore and preserve ecosystems.

The PPS works across three supply chains: cocoa, oil palm, and livestock. The intervention approach for cocoa is based on ensuring its sustainability through three components: agroforestry systems, productivity, and quality. More generally, "In order to reduce deforestation pressure, activities need to be more efficient and productive." The work focuses on finding credits for production, providing technical assistance, and linking producers with supply chains.

In the PPS area of influence, two types of cocoa producers have been identified: producers working on common lands, with a planted area of 2–3 ha and a productivity of about 300 kg/ha, and producers working on private lands, with an average area of about 5 ha and a productivity of about 600 kg/ha.

According to the representative, two main bottlenecks exist for the modernization and improvement of the cocoa value chain. First are transition times for the implementation of new technologies, which usually exceed two years, and visible improvements take up to five or more years after the adoption of practices. Second are cultural factors, such as resistance to change and innovation.

Based on the project's experience, significant differences exist in working with indigenous people and settlers. For this, they have a differentiated proposal, and their teams comprise specialists who are knowledgeable in working with local native communities.

They work on natural restoration, the creation of corridors, and the promotion of native species, encouraging the use of nitrogen-fixing species. They offer field schools, demonstration plots, support for entrepreneurs, market linkages, and strengthening of existing participation platforms.

Other entities of potential interest to the initiative

CONVEAGRO: It is a solid, representative, and well-established national agrarian forum, with negotiating power and a focus on sustainability, social inclusiveness, and self-sustainability. It serves as a mediator for the needs of agrarian organizations, peasant and indigenous communities, and institutions engaged in agriculture. It generates policy proposals and has the capacity to influence and monitor the implementation process to enhance the competitiveness of producers, thus helping to improve their quality of life (https://conveagro.org.pe/).

PERUVIAN AGROECOLOGICAL CONSORTIUM: It is a pluralistic civil society organization that brings together farmer organizations, consumers, scholars, and NGOs, as well as national and international institutional networks, as its members. It aims to promote agroecological food systems while respecting cultural traditions and the preservation of natural resources. (https://consorcioagroecologico.pe/).

Peruvian Organic Agriculture Network (RAE): This is a non-profit civil association established in August 1989. They align themselves with the principles of organic farming and agroecology as a science. They promote and encourage the transition of agriculture toward sustainable, competitive, and market-integrated agroecological systems. The network is composed of 13 institutions and 12 individual members across the country (https://raeperu.org/).

Rabobank Foundation: This foundation is part of the Rabobank Group (headquartered in The Netherlands) that has been providing financial intermediation in Peru since 2006, offering financial mechanisms to producer organizations. Jonatan López, senior advisor for Latin America, indicates that cocoa is the second largest crop in their portfolio, for which loans represent close to 40% of the total, surpassed only by coffee. The Rabobank Foundation can offer various credit options, including short-term, medium-term, and long-term solutions, tailored for both working capital and investments. Nevertheless, owing to the organizations' risk profiles and inability to meet financing requirements, it has predominantly focused on providing short-term working capital credits.

It considers itself as an "incubator" providing very small loans and often being the initial financial supporter of the producer organizations it collaborates with. It indicates that the interest rate offered to its clients has increased from an average of 6% APR to 8.0–9.5% (compared with an average of 11–12% among other social investors). However, according to Mr. López, in many cases, "The (effective) cost of credit is zero or even negative, as the technical assistance provided to the organizations has a higher value than the financial income generated."

FOGAL: Fondo de Garantía Latinoamericana is a Peruvian financial institution, established with support from Belgian cooperation. It provides guarantees to producer organizations to facilitate their access to financing. According to its general manager, Wilfredo Necochea, the organization is in the process of designing "guarantee mechanisms for producer organizations that incorporate environmental protection and sustainable production guidelines."

Root Capital: It is a social investor, founded in 1999 in the United States, working in Latin America, sub-Saharan Africa, and Southeast Asia. It acts as an intermediary for credit funds from foundations (44%), individual investors (40%), governments and multilateral agencies (9%), and corporations (7%). Root Capital "seeks to improve the lives of rural farmers by connecting them with the formal economy. We invest in the growth of agricultural enterprises so they can transform their communities." It offers its customers (producer organizations and agricultural companies) two types of services: loans and advisory services, which are provided together or separately, depending on clients' needs. In Ucayali, Root Capital has implemented a technical assistance program for the Curimaná power plant. In Peru, it has a significant group of technical experts who offer different services to producer organizations in the coffee and cocoa value chains. Thus, it is positioned as one of the leading providers of advisory and technical assistance services for organizations in these sectors.

Alterfin: This is a social cooperative founded in 1994 in Belgium. It has more than 6,000 individual and 200 institutional members. Alterfin helps its members "invest money more fairly from a social, environmental, and economic point of view." Alterfin finances two types of organizations: microfinance

institutions and sustainable smallholder agricultural organizations. Alterfin works in Latin America, Africa, and Asia. With its investments, it seeks to "enable the most vulnerable people to secure a decent income and help protect the environment to create a sustainable world." In Peru, it is a major player in financing organizations engaged in the cocoa value chain.

LESSONS LEARNED, CHALLENGES, AND OPPORTUNITIES FOR THE AGROECOLOGICAL TRANSITION OF THE VALUE CHAIN

The cooperative associations in the department have been an effective tool to identify project beneficiaries and facilitate information gathering and exchange; they have also helped in channeling investments and support from different public and private institutions to producer families. As a result of these efforts, numerous families and organizations have been strengthened in several dimensions, in accordance with certain agroecological principles. Issues such as recycling, efficient use of inputs, income diversification, soil health, collaborative knowledge creation, trade connectivity, and engagement have been included as objectives or criteria to varying degrees in public and NGO development programs. Association and environmental criteria are becoming increasingly important to national banks and international financial institutions.

Nevertheless, the associative model reaches only a segment of the cocoa-producing population in the department and, except for a few cases, it has not translated into higher prices and a fairer distribution of benefits among producers. In this regard, it is important to continue encouraging association, but also to review the mechanisms that have promoted it as an end, not a means, and to address the limitations of an exclusive focus on associated producers, which might neglect some groups unable or unwilling to associate.

Currently, most cocoa producers in the department are not associated, and those who are, are mostly linked to conventional markets and prices. This situation is not necessarily positive or negative, since the conventional segment of the market has been the main destination of cocoa production in the department, and it has been growing in the last 10 years. Furthermore, it has been capturing an increasing share of local production after the COVID-19 crisis. Thus, organizations seeking to promote agroecology must take this reality into account and jointly develop differentiated strategies and goals for different types of producers. For non-associated producers, it is necessary to better understand the role of cocoa in their livelihoods. Organizations must first collect information about their use of family resources, collaborative knowledge creation and sharing, engagement in local decision-making, and control over land and natural resources, especially in areas with legal restrictions. It is also important to understand how they connect with different consumers and markets.

In the case of associated producers, although more information is available regarding their productive, agronomic, and commercial characteristics, there is still a lack of information concerning social and community aspects. Despite these limitations, some general conclusions and recommendations to strengthen the agroecological transition of the cocoa chain in Ucayali follow.

Associative business models

The Colpa de Loros and Curimaná cooperatives are the two best performing and most consolidated organizations in the region. Even though these organizations have faced several difficulties, they have established a robust and reliable marketing system; assembled a highly committed, dynamic, responsible, and constantly trained management team; and have diversified their services to engage with their members. They are currently the only organizations that export directly. Both cooperatives have received support from national and international commercial partners since their inception, accompanying them in a decade-long process of learning, experimentation, and maturation. Given their track record and current status, these organizations are in the best position to strengthen their operations in their corresponding areas of influence, expand their reach, and incorporate agroecological principles in different ways.

Associations that have not yet attained comparable levels of commercial and business maturity also serve as crucial conduits to reinforce the agroecological transition. They function as communication channels connecting producers from various regions within the Agroecological Corridor with support organizations in the sector. Nevertheless, the reliance of these organizations on competitive funds and project-based support to sustain a significant portion of their social and environmental initiatives raises concerns about the overall efficacy of associations as the instruments to drive systemic transformation. It also casts doubt on the anticipation that technical assistance, training, financing, and services for improving livelihoods, aligned with the 13 agroecological principles, will predominantly be delivered through cooperatives and associations.

Different views and lack of evidence

Even within more successful associations, various production models exist. Some prioritize fine and flavor (FoF) varieties, while others gravitate toward robust and highly productive options, such as CCN51. The debate over varieties for this region continues, with supporters on both sides. Advocates for FoF varieties argue that, when properly managed, these varieties can yield impressive harvests. Furthermore, they contend that the specialty cocoa sector provides more favorable pricing and is experiencing the highest growth within the industry. They also point out that the Peruvian cocoa sector faces challenges in competing within the conventional international market. In addition, they cite market studies indicating that consumers are increasingly seeking distinctive flavor profiles in their chocolates. Building upon these hypotheses, entities such as ACP have been progressively investing in the promotion of spatial arrangements to include FoF varieties. It's noteworthy that, in the case of Ucayali, price premiums for fine-flavor profiles are offered by dedicated customers who have made long-term investments to secure a stable supply of raw materials and to support the well-being of their suppliers.

Supporters of CCN51 argue that its enhanced resistance and productivity result in increased income for producers and a higher product volume for the association (which has frequently posed a challenge for exports). They claim that it is feasible to attain highly competitive prices in the bulk-certified market. They further assert that the widespread adoption of this variety across the department and the expressed preference of numerous producers serve as indicators of its strong economic performance.

Sufficiently robust evidence for comparing the performance of models with CCN51 alone, FoF alone, or various combinations at different gradients has not been found. As a result, determining the specific conditions in which one model outperforms the other, or when a combination is advisable, has not been possible. Considering that both models might align with agroecological principles to varying degrees, we

recommend exercising caution in advocating for different varieties and acknowledging the unique preferences of individuals and communities in various production hubs.

Similarly, there is a debate on the relevance and desirability of including shade in cocoa plantations in the department of Ucayali. On the one hand, studies and experts suggest that effective shade management extends the lifespan of cocoa plants. In the region, it is advisable to begin with initial plantings of up to 156 individuals per hectare for permanent shade, gradually decreasing the number to as low as 22 (21 × 21 m), 30 (18 × 18 m), or 40 plants. These values vary depending on the species used, local conditions, and different authors (Paredes, 2003; Gómez et al., 2014). In general, experts and certifications recommend from 30% to 50% permanent shade for an adult cocoa plantation.

On the other hand, some actors interviewed in the region express a preference for shade-free cultivation within their plots, declaring that the shade decreases production and increases the incidence of pests and diseases. This perception is clearly evident in the current low density of forest species within cocoa plots throughout the department. As an alternative, stakeholders promote planting trees along the plantation boundaries (mainly forest and fast-growing fruit trees).

Support organizations and the general public tend to favor agroforestry systems that incorporate shade within the plot, as opposed to those that incorporate shade only along the plot boundaries. With regard to productivity, multiple studies have confirmed that cocoa yields are generally lower in shaded systems, particularly during the initial years of the plantation (Niether et al., 2020; Schneider et al., 2017). However, shaded cropping systems have greater biodiversity, soil quality, and carbon capture (Jacobi et al., 2015; Asigbaase et al., 2021), and can achieve comparable economic performance and higher overall productivity (Niether et al., 2020; Schneider et al., 2017; Utomo et al., 2016). Considering the economic vulnerability of producers, their limited awareness of the different agroforestry arrangements (including dynamic agroforestry systems), and the fact that they do not readily perceive the environmental benefits, it is understandable that they often prioritize higher cocoa yields in the short term and a simpler management. Resolving disparities in interests between producers and indirect actors can be achieved through the gradual alignment of support organizations with the technical and economic needs and limitations of producers. This can be facilitated by training producers on effective shade management and raising their awareness regarding the economic and environmental advantages of proven agroforestry arrangements that are suitable for this region. This can be achieved by facilitating demonstration tours and exchanges among producers who are involved in experimental projects that show promising results (ongoing). Adhering to principles of justice, diversification, and governance, the above approach can be complemented with step-by-step benefits tailored to the specific agroforestry arrangements promoted by the organizations. These might include offering financial incentives (such as carbon credits, payments for biodiversity, and other environmental services), facilitating access to preferential credit, and providing inputs, training, and other services.

In this regard, plot designs should be established by striking a balance between the expectations, objectives, and needs of individual producer families and those of their association, which serves as the community's decision-making and marketing entity. Continuous monitoring and documentation of the implementations is also recommended to verify their performance in different contexts.

Certifications – an additional common factor

Although the impact of certifications on producers' livelihoods varies and depends on multiple factors (Waarts et al., 2015; Dompreh et al., 2021; René et al., 2022), successful cooperative models in the region

emphasize that they can provide higher prices to their producers and cover their operational costs and services only through price premiums associated with organic and Fairtrade certifications. Among the challenges facing the cooperative model is the risk of contamination due to the improper use of agrochemicals, which can lead to a decrease in the collection of organic product or potential loss of organic certifications due to failures in the traceability system.

When it comes to certifications, it is advisable for associations in the process of transitioning to cooperatives and aiming for Fairtrade certification to initiate the certification process once the transition is complete. This is because a change in a corporate name triggers the need to restart the certification process (this is not the case for organic certification).

Indirect actors

Although there is clear political and institutional will to enhance processes related to agroecology and sustainable cocoa development within the region, various interests and interventions generally focus on environmental and productive aspects independently, rather than being presented within an integrated conceptual agroecology framework. The ecosystem of local and national organizations varies in terms of their understanding of and alignment with diverse agroecological principles, particularly at the farm level. Additionally, some specialized organizations have significant potential to contribute to the technical and operational strengthening of the initiatives to be carried out. On the other hand, it is often acknowledged that considerable budgetary constraints limit the expansion of their activities. Furthermore, there is a risk of duplication and overlapping of activities, which underscores the need for improved communication, coordination, and an increase in the coverage of technical assistance regionally. These challenges are likely to hinder the effective transfer of new knowledge.

Innovations at the farm level

Actors interviewed agree on the importance of different types of interventions. In general, they argue that producer families require greater diversification in their productive activities. In response, strategies promoting food sovereignty, such as family gardens, raising minor livestock species, and strengthening the production of other crops for self-consumption, are encouraged. There is consensus among the actors about the significance of addressing environmental aspects, such as supporting the conservation and connectivity of forest remnants.

When it comes to cocoa, unanimous agreement also exists on the importance of increasing production while enhancing quality and marketing. For the first point, the actors promote incorporating inputs and adopting organic management practices in technological packages (including the use of bio-fertilizers, guano, composting, and integrated pest and disease management), as well as continuous training in good production practices. For the second point, they emphasize the provision of tools and training to improve the processing of cocoa. Special attention is placed on the promotion of FoF varieties and the development of distinct brands or regional profiles.

Although these traditional approaches are acknowledged as structural and necessary elements in recent years, it is essential to remain open to the exploration of more disruptive innovations proven successful in other contexts, and these can be evaluated at the local level. One example is experimenting with different planting arrangements and densities. Modifying planting arrangements is a relatively easy-to-implement technology because of its low knowledge and resource requirements. Yet, it has the potential to yield significant impacts. In Ecuador, companies have successfully established FoF cocoa plantations in

organized rows and at increased densities. This approach has not only resulted in improved yield but has also substantially decreased labor demand by streamlining the agronomic management and harvesting processes. With labor costs representing a significant proportion of production costs, this might mark a paradigm shift.

Innovations across the value chain

With the growing demand for traceability in food safety, traces of agrochemicals, and due diligence throughout the value chains derived from the EU Deforestation Regulation (EUDR), which restricts the export of cocoa and related products to the European Union from deforestation processes occurring after 31 December 2020 (Preferred by Nature, 2022), both the tasks and operational costs of producers and associations aiming to maintain their links to this market are likely to rise. In this context, it is imperative to continue enhancing the capability of the associations' technical teams for satellite monitoring, and to consider the adoption of technologies such as Blockchain, which can streamline processes and strengthen the organizations' traceability systems (Musah et al., 2019; Iswari and Arkeman, 2019; Chong et al., 2020). Similarly, the development and rollout of index-based crop insurance tailored for cocoa in the Peruvian Amazon can help mitigate the increasing risk of losses due to climate variability.

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