Lesson Learned for Natural Rubber/Latex: Analysis and its Opportunities in Forestwise Collection Area.

P4G Project	December 2024	PT Forestwise Wild Keepers

Background

Non-timber forest products (NTFPs) play a critical role in supporting the livelihoods of forest-dependent communities and promoting sustainable forest management. Conservation International defines NTFPs as any products other than timber that are naturally produced in forests and can be harvested for human use without cutting down trees. Forestwise, a company committed to sustainable forest management and community empowerment, develops markets for sustainable rainforest products. Their goal is to identify and evaluate viable natural products that can be sustainably harvested, processed, and sold both locally and internationally.

This lesson learned explores the opportunities and challenges associated with utilizing natural rubber/latex within the Forestwise collection areas in West Kalimantan. Forestwise collaborates closely with local communities to foster sustainable livelihoods and conserve the region's biodiversity, aiming to increase the value of the rainforest through the production of high-quality, high-value products.

Natural rubber is a prime example of a non-timber forest product (NTFP), as it is sustainably harvested from the latex of rubber trees without the need for cutting down the trees. This aligns with the principles of NTFPs, which promote ecological preservation while supporting the livelihoods of forest-dependent communities.

Collecting NTFPs from the forest without harming the land can increase the value of the rainforest substantially through the production of high-quality, high-value products.

This report provides a comprehensive overview of lessons learned from the feasibility study conducted on the potential of natural rubber/latex. Building on past experiences, the study identifies key factors that influence the successful harvesting, processing, and marketing of this product. Key considerations include:

- **Product usage**: Particularly in the cosmetics and food industries.
- **Market demand**: Understanding current and future opportunities.
- **Processing technologies**: Assessing existing and needed innovations.
- **Legal frameworks**: Navigating regulations and compliance.
- **Production volume**: Evaluating potential scalability.
- **Environmental sustainability**: Ensuring minimal ecological impact.
- **Livelihood impact**: Supporting local communities' welfare.
- **Lesson learned**: Challenges and opportunities of Natural Latex in the area.

By reflecting on these factors and incorporating lessons from previous initiatives, this report provides actionable insights to address challenges and capitalize on opportunities. It offers recommendations for focusing resources on the most promising natural rubber/latex opportunities to maximize both economic returns and social benefits. The report highlights successes, obstacles, and a focused shortlist of the most viable options for future development.

Objective

The objective of this lesson learned report is to assess the viability of natural rubber/latex for sustainable harvesting, processing, and marketing. It also seeks to analyze the benefits and challenges of diversifying Forestwise's product portfolio beyond Illipe nuts. By focusing on Forestwise's collection areas in West Kalimantan, this report reflects on past experiences to identify new opportunities that align with the company's mission of rainforest preservation and community empowerment. The findings provide valuable guidance on sustainable practices, market potential, and the economic feasibility of natural rubber/latex.

Natural Rubber/Latex

1. Introduction

Rubber plantations can be found in several areas of Kalimantan, particularly in the provinces of West Kalimantan and Central Kalimantan. Places like Pontianak and Palangkaraya are known for rubber production. Rubber offers several benefits in both the cosmetics and food industries. In cosmetics, it serves as a binding and thickening agent, improving the texture and stability of products like creams and lotions. Rubber can also act as an emulsifier, aiding in the blending of oil and water-based ingredients. Additionally, it provides film-forming properties and protects the skin from moisture loss in moisturizers and lip balms.

In the food industry, rubber-based materials are used as edible coatings, extending the shelf life of fruits and vegetables. They also enhance texture and stability in processed foods and serve as glazing agents for confectionery products, imparting a glossy finish. These versatile applications make rubber a valuable ingredient in both cosmetic and food formulations.

Rubber plant and rubber seeds

Next to uses in these industries familiar to Forestwise, rubber is used in a huge variety of industries of which many are looking to make their supply chains more sustainable and traceable and are actively looking for partners who could supply this more sustainable rubber. With its strong local presence, this could be an interesting opportunity for Forestwise.

West Kalimantan is abundant in rubber plantations, with many of them having matured over several decades. Consequently, a significant portion of the local population relies on rubber farming for their livelihoods. The plentiful availability of rubber in this region presents a potential marketing opportunity for Forestwise. Importantly, it should be noted that utilizing this resource does not necessitate land clearing, as it can be harvested from the existing plantation land, which can be diversified by intercropping. This approach not only minimizes environmental impact but also contributes to supporting the local

community by providing them with extra income from their rubber seeds and the other crops grown on the land.

Leveraging its current market share, Forestwise can play a vital role in facilitating the sale of rubber products and enhancing the economic well-being of the local population. By seizing this opportunity responsibly and sustainably, Forestwise can further strengthen its presence in the rubber industry while making a positive social and economic impact on the communities in West Kalimantan.

Hevea brasiliensis, commonly known as the rubber tree, is the primary source of natural rubber obtained from its latex sap. These tall evergreen trees have smooth bark, compound leaves, and small flowers that develop into fruit capsules containing seeds. Through tapping, the latex sap is extracted and processed to remove impurities, resulting in solidified rubber with excellent elasticity and water resistance. This natural rubber is widely used in various applications, including tires, non-tire industrial products (such as hoses and belts), and latex products (like gloves and balloons).

Indonesia plays a crucial role in the global rubber market, with extensive rubber plantations and smallholder farmers mainly located in Sumatra and Kalimantan. Rubber plantations can be found in several areas of Kalimantan, particularly in the provinces of West Kalimantan and Central Kalimantan. Places like Pontianak and Palangkaraya are known for rubber production. Empowering these farmers can lead to increased productivity, improved livelihoods, and the promotion of sustainable practices such as agroforestry. Indonesia exports natural rubber in different grades, including concentrated latex. Encouraging the production of stabilized concentrated latex, among smallholders would not only benefit their products but also contribute to the growth of Indonesian natural rubber production and export volumes.

2. Current situation and challenges

The rubber farmers in West Kalimantan are currently cultivating rubber in two different systems, conventional monoculture systems using clone rubber and often using chemical fertilizers and pesticides, as well as ‘wild’ forest rubber, using local rubber species that are

grown in agroforestry type systems and use no chemical fertilizers or pesticides. Especially the monoculture system, is inefficient in land-use, harms biodiversity, degrades soil and landscapes. At the same time, productivity is low and farmers struggle to make a living. Forced to acquire more and more land expanding into pristine natural areas the farmers become a driver of deforestation.
Therefore, an intervention with the goal to provide viable, regenerative livelihood opportunities for farmers that eliminate the need for farm expansion into the forest, could provide a significant social and environmental benefit. At the same time the interactions between the existing and degraded farms and the ecosystem are to be improved drastically.

3. Usage and Benefits

Rubber plays a vital role in the cosmetics industry, particularly in cosmetic packaging, beauty tools and accessories, and personal care products. Rubber components like seals, caps, and dispensers provide secure and airtight closures, ensuring product integrity and preventing leakage. In beauty tools and accessories, rubber materials enable smooth application and blending of cosmetics, resulting in even coverage and desired effects. Rubber bands, hair ties, and elastic components in cosmetic products offer elasticity and flexibility for a secure hold and comfortable use. The use of rubber in the cosmetics industry provides benefits such as product protection, efficient application, and an enhanced user experience, ensuring the freshness, quality, and safety of cosmetic products while facilitating seamless makeup application and providing convenience and reliable performance.

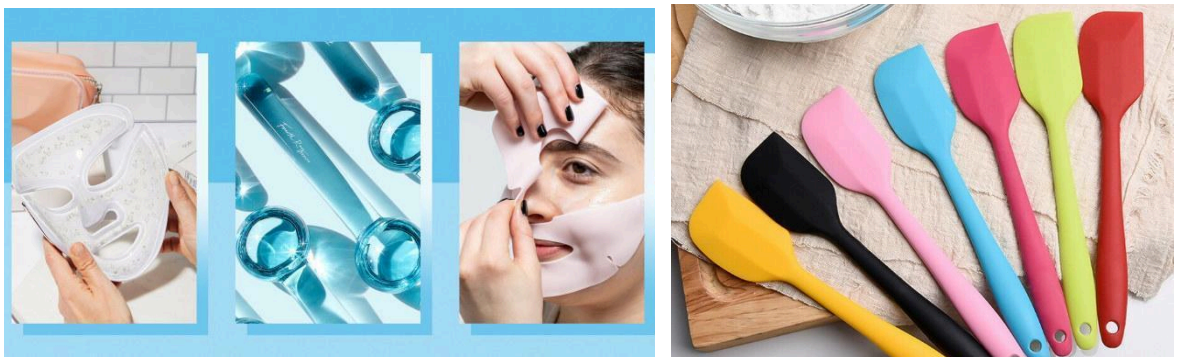


Illustration of rubber utilization in the cosmetic and food industry

Rubber also plays a critical role in the food industry, particularly in food packaging, food processing equipment, and food preparation tools. Rubber seals, gaskets, and closures in food packaging provide a secure and airtight seal, preserving the quality and safety of packaged food products and extending their shelf life. In food processing equipment, rubber conveyor belts, hoses, and seals ensure efficient and hygienic operations, facilitating the movement of food products and preventing leaks or contamination. Rubber

utensils and accessories in food preparation, such as spatulas and gloves, offer flexibility, heat resistance, and ease of use and maintenance, ensuring safe and clean food handling practices. The benefits of rubber in the food industry encompass safety, sealing and protection, and ease of use and maintenance, contributing to the overall quality and efficiency of food production and preparation processes.

4. Potential Volumes

West Kalimantan Province in Indonesia is a significant producer of natural rubber. The province has 14 districts, with natural rubber being one of the primary estate commodities along with oil palm, coconut, and rice. Natural rubber cultivation is widespread in all districts except Pontianak, the capital city.

Rubber cultivation in West Kalimantan is predominantly carried out by smallholders who rely on a seedling-based agroforestry system known as jungle rubber. Many smallholders inherited their rubber plantations from previous generations and follow traditional planting and harvesting practices. Some smallholders own more than 2 hectares of rubber plantation area.

District	Year				
	2016	2017	2018	2019	2020
Sambas	54,233	54,233	54,233	54,233	54,329
Bengkayang	52,477	52,696	53,063	53,275	53,228
Landak	70,864	74,894	74,824	74,824	74,324
Mempawah	12,839	12,833	12,778	12,770	12,767
Sanggau	106,629	106,899	106,933	107,123	107,123
Ketapang	32,262	32,262	32,262	32,262	32,242
Sintang	91,861	95,165	97,167	99,627	99,627
Kapuas Hulu	48,610	49,885	47,673	47,316	47,312
Sekadau	42,930	42,930	44,044	44,144	44,144
Melawi	33,299	33,369	33,537	33,617	33,617
Kayong Utara	3,607	3,607	3,670	3,670	3,670
Kubu Raya	34,329	34,577	34,632	34,632	34,620
Singkawang	10,214	10,314	10,253	10,253	9,351
Total	594,154	603,664	605,069	607,746	606,354

Source : West Kalimantan in Figures, West Kalimantan Central Bureau of Statistic, 2022

Smallholder rubber plantation area (Ha) in West Kalimantan by district

According to the data provided above, the rubber smallholder plantation area in West Kalimantan was 606,354 hectares in 2020. The largest district in terms of rubber plantation area is Sanggau with 107,123 hectares, followed by Sintang with 99,627 hectares and Landak with 74,324 hectares.

However, despite the extensive rubber plantation area, the productivity and production are relatively low due to the age of the rubber plants and traditional practices. In 2020, the total rubber production in West Kalimantan was 266,351 tons, which is considerably less than the plantation area. Sanggau district contributed the highest rubber production with 62,593 tons, followed by Sintang with 39,254 tons and Landak with 30,221 tons.

No	Name	Location	Product	Capacity (Ton/year)
1	PT Bintang Borneo Persada	Kubu Raya	SIR 10/20	33,000
2	PT Giat Usaha Dieng	Kubu Raya	SIR 20	24,000
3	PT New Kalbar Processors	Kubu Raya	SIR 20	42,000
4	PT Star Rubber	Kubu Raya	SIR 10/20	60,000
5	PT GMG Sentosa	Kubu Raya	SIR 10/20	30,000
6	PT Sumber Alam	Pontianak	SIR 10/20	40,000
7	PT Sumber Djantin	Pontianak	SIR 10/20	36,000
8	PT Hok Tong	Pontianak	SIR 10/20	28,000
9	PT Kota Niaga Raya	Pontianak	SIR 20	30,000
10	PT Kirana Prima	Sanggau	SIR 10/20	42,000
11	PT Sumber Djantin Unit Sanggau	Sanggau	SIR 10/20	40,000
12	PT Kirana Putera Karya	Sintang	SIR 10/20	36,000
13	PT Multi Karet Sejahtera	Landak	SIR 20	25,000
14	PT Guangken Rubber	Mempawah	SIR 20	30,000
15	PT Sumber Djantin Unit Sambas	Sambas	SIR 10/20	16,000

Source : Gapkindo Membership Directory 2020, Rubber Association of Indonesia, 2021

Existing CRF located in West Kalimantan, 2020

The existing rubber processing factories in West Kalimantan, as mentioned in Table 3.7, are mainly crumb rubber factories (CRF) producing Standard Indonesian Rubber (SIR) 10/20. These factories acquire raw rubber material in the form of cup-lump and slabs from farmers or middlemen. The CRFs are primarily located in Kubu Raya and Pontianak districts, despite these districts not being the main rubber production centres.

In the Sintang District, which was the focus of the field survey, rubber cultivation plays a significant role in the local economy. The district has a total rubber smallholder plantation area of 98,537 hectares, with Sepauk, Dedai, and Kelam Permai sub-districts having the largest areas. The rubber production in Sintang was around 39,000 tons, with Kelam Permai and Tempunak sub-districts being the highest producers.

Overall, West Kalimantan has substantial potential for rubber production due to its large plantation area. However, there is a need for improved productivity and modernization of processing facilities to maximize the economic benefits of the rubber industry in the province.

5. Market Analysis

- **Market demand and potential**

Natural rubber is predominantly cultivated in tropical and sub-tropical climates across Southeast and South Asia, South America, and Africa, with Southern China also engaging

in its production. Notably, Thailand, Indonesia, Vietnam, Malaysia, China, and India are the key natural rubber-producing nations, wherein Vietnam, China, and India have recently emerged as top producers, surpassing Malaysia. Over the past five years, Southeast Asia contributed to the global natural rubber output with an average of 34% from Thailand, 26% from Indonesia, 9% from Vietnam, and 5% from Malaysia. The primary market demand for natural rubber is concentrated in the Asia Pacific region, with the European Union and North America following suit. China stands as the largest consumer, accounting for 41% of global consumption, trailed by India, the US, Japan, and South Korea.

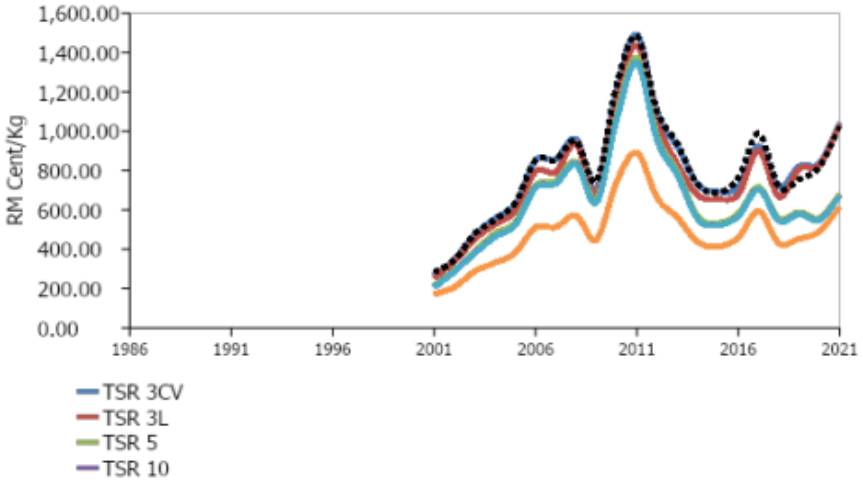
Country	Year (000 Ton)				
	2016	2017	2018	2019	2020
China	5,011	5,386	5,692	5,674	5,535
India	1,034	1,082	1,220	1,144	1,040
USA	932	958	987	1,003	810
Japan	676	679	706	714	570
Korea	381	384	367	354	298
Thailand	650	653	627	774	692
Indonesia	601	619	626	640	598
Malaysia	506	518	542	545	543
Vietnam	194	214	225	230	238
Others	2,742	2,835	2,906	2,832	2,500
Total	12,727	13,328	13,898	13,910	12,824

Source : Natural Rubber Statistic 2021, Indonesian Rubber Board, 2021

Global Consumption of Natural Rubber 2016-2020

- **Pricing**

The pricing of natural rubber is influenced by a multitude of factors, encompassing the interplay between supply and demand, crude oil prices, GDP growth, currency exchange rates, market sentiment, and climate conditions. Over time, natural rubber prices have experienced fluctuations. In the early 2000s, prices surged significantly due to the "China Factor," driven by China's industrialization and consequent high demand.



Source: Malaysian Rubber Board, www3.lgm.gov.my, 2022

Figure 6 Trend of natural rubber price volatility

Global economic crises, such as the one in 2008, can lead to temporary decreases in natural rubber prices. Distinctions in pricing exist among different grades of natural rubber, with higher-grade technically specified rubber (TSR) typically commanding better prices compared to lower-grade TSR. Concentrated latex (CL) prices tend to be relatively low, although their value can be higher when calculated based on the dried form, allowing for greater bargaining power.

- **Market outreach**

Market outreach in the natural rubber industry is influenced by various factors, including the downstream rubber industry, with particular significance placed on the rubber glove manufacturing sector in Malaysia. Indonesia's natural rubber production lags behind Thailand's due to lower productivity, primarily attributed to smallholders who cultivate ageing rubber trees with limited output. Estate-owned and private plantations encounter difficulties in managing their rubber farms due to declining and unprofitable rubber prices, leading some to convert their plantations to alternative crops like sugar cane and palm oil. Looking ahead, it is projected that Thailand, Indonesia, and Vietnam will maintain their positions as the leading global natural rubber-producing countries, followed by China and India.

Overall, there is a growing global demand for natural rubber, with Asia Pacific being the primary market. However, challenges such as low productivity, fluctuating prices, and competition from synthetic rubber exist. Market outreach efforts should focus on enhancing productivity, improving quality, and diversifying into higher-value products to capitalize on the potential demand.

6. Legal Aspect

Rubber plantations in Indonesia are typically established on privately owned land or under concession agreements with the government, and land ownership and rights are regulated by laws such as the Agrarian Law and Forestry Law. To establish and operate a rubber plantation or processing facility, obtaining licenses and permits is necessary, including land use permits, environmental permits, business registration, and other relevant licenses from local and national authorities.

Environmental regulations aim to ensure sustainable land use, biodiversity conservation, and environmental protection in rubber plantation activities, requiring compliance to prevent deforestation, soil erosion, water pollution, and other negative impacts. Labour laws and standards cover aspects such as minimum wages, working hours, occupational health and safety, and employment contracts, ensuring the fair and ethical treatment of workers in rubber plantations.

Export and trade regulations govern rubber exports from Indonesia, involving export permits, quality standards, customs procedures, and compliance with international trade agreements. Rubber businesses are subject to taxation regulations, including income tax, value-added tax (VAT), and other relevant taxes, and compliance with financial reporting requirements and tax obligations is crucial for legal and transparent business operations.

7. Processing Technology

The processing technology for fresh latex from *Hevea brasiliensis* or natural rubber (NR) trees involves converting it into various types of raw rubber products. Fresh latex contains around 30%-35% rubber, along with non-rubber constituents such as protein, resins, carbohydrates, and minerals. The latex particles are covered with lipid and protein layers, with proteins playing a role in stabilizing the latex.

To process fresh latex into raw rubber, several types of rubber products can be produced, including Ribbed Smoked Sheet (RSS), Thin Pale Crepe (TPC), SIR 3CV (Constant Viscosity), SIR 3L (Light), SIR 3WF (Whole Field), and concentrated latex. RSS, TPC, SIR 3CV, SIR 3L, and SIR 3WF rubber are traded as solid rubber, while concentrated latex remains in a liquid phase. Concentrated latex is obtained by separating water and some non-rubber constituents through processes such as creaming, centrifugation, electro-decantation, and evaporation.

In the creaming process, a cream agent like ammonium alginate is mixed with field latex, resulting in the separation of concentrated latex (upper layer) with a higher rubber content and low-rubber serum (lower layer). Centrifugation involves using centrifuge machines to separate field latex into concentrated latex (higher rubber content) and skim latex (lower rubber content). The evaporation process utilizes heating at low pressure and high temperature to evaporate water from the latex, resulting in latex concentrate with a higher dry rubber content. Electro-decantation utilizes electrodes and semi-permeable membranes to separate the cream trapped on the membrane's surface.

The production capacity of a concentrated latex plant depends on factors such as market opportunities, availability of raw materials, human resources, utilities, and production facility capabilities. The capacity of a centrifuge machine, such as the Alfa Laval LRB 810, is often chosen based on considerations of efficiency and capacity. A production capacity of 465 litres of concentrated latex per hour is a common choice, yielding a rubber content of 60% DRC. As an example, a basic production plant for concentrated latex with one centrifuge and a capacity of 500 tons per annum would require an investment of approximately USD 500.000.

The availability of raw materials, such as field latex, is a crucial factor. The potential availability of raw materials can be estimated based on the production of cup lumps or field latex from specific regions. The production projections for the next 10 years can also be estimated, considering improvements in plantation performance. The daily production

capacity of concentrated latex depends on the field latex supply and the effective time for the centrifugation process.

Overall, the processing technology for converting fresh latex into raw rubber involves various separation processes to obtain concentrated latex with higher rubber content. Factors such as raw material availability, processing equipment, and production capacity play significant roles in establishing a concentrated latex plant.

8. Environment and Livelihood Impact

- **Environment Impact**

Since last year, Forestwise has been conducting a pilot project in collaboration with reNature to convert monoculture rubber plantations into biodiverse, regenerative and organic rubber plantations. The environmental impact of this project is intrinsically linked with the productivity of farmland and, thus, the prosperity of its farmers. The species planted in between the rubber trees provide more income for the rubber farmers and also help to enrich the soil. This healthier soil in turn helps to increase the yield from the rubber trees. Agroforestry techniques will also improve the management and retention of water through ground cover and shading. It will counteract erosion and desertification, whilst implying a farming system that is more resilient to climate change. This will improve the climate impact of the project. Combined with tapper training and simple techniques such as the introduction of umbrellas for the tapping containers, are expected to significantly increase the rubber yield of the plantations.

Rubber plantations have a significant potential to have positive environmental impacts. They can contribute to carbon sequestration, help conserve biodiversity through proper management practices, aid in soil conservation by preventing erosion and improving soil quality, and assist in water management by regulating water flow and improving water quality. These positive impacts highlight the importance of sustainable rubber production practices that consider environmental conservation alongside economic considerations.

- **Social, Economic, and Livelihood Impact:**

Rubber plantations provide economic benefits for local communities by creating livelihood opportunities and generating income through the sale of rubber products, as well as side products if cultivated in a regenerative manner. This income helps alleviate poverty, improve living standards, and stimulate local economies. The labour-intensive nature of rubber cultivation creates employment opportunities, while the multiplier effect leads to the growth of supporting industries. The generated income can be invested back into the community, promoting socio-economic development and the improvement of essential services. Fair and equitable practices are crucial to ensure that farmers receive fair prices

and have access to resources for sustainable cultivation, maximizing the positive impact on local communities.

While the improvement of existing rubber farms is focusing on benefits for the farmers' livelihood, there are also opportunities to diversify their farming systems, and to grow additional food, fuelwood or biomass next to the major cash crops.

Lesson Learned

The exploration of natural rubber/latex within Forestwise's collection areas in West Kalimantan has revealed both promising opportunities and notable challenges. As a non-timber forest product (NTFP), natural rubber aligns with Forestwise's mission of sustainable forest management and community empowerment. Its harvesting supports livelihoods without causing deforestation, offering potential for economic growth in local communities while preserving forest ecosystems.

Opportunities:

1. **Market Demand**: Natural rubber holds significant potential, especially in the cosmetics and food industries, where it serves as an emulsifier, binder, and texture enhancer. Its versatility offers new markets that Forestwise could tap into, aligning with growing demand for sustainable, traceable products.
2. **Environmental Sustainability**: Rubber can be harvested from existing plantations without the need for land expansion, reducing pressure on rainforests. Intercropping with other forest products can further boost the resilience and ecological balance of the land.
3. **Economic Benefits**: West Kalimantan's mature rubber plantations present an opportunity to increase productivity, benefiting local farmers and generating additional income through rubber latex, which can complement other forest products like Illipe nuts.

Challenges:

1. **Low Productivity and Inefficiency**: Many rubber farmers use outdated monoculture practices, which lead to low yields and environmental degradation. Shifting to agroforestry and regenerative practices could improve both productivity and sustainability.
2. **Market Competition and Pricing Volatility**: The global rubber market is subject to fluctuations due to factors such as crude oil prices, supply and demand dynamics, and climate conditions. These fluctuations could impact profitability, requiring Forestwise to develop strategies for managing risks in pricing and supply chains.
3. **Processing Infrastructure**: Although the region has a large rubber plantation area, many smallholder farmers still rely on traditional practices, which limit processing

efficiency. Modernizing facilities and training farmers on better harvesting and processing techniques could significantly improve the economic returns.

Key Learnings for Future Development

1. **Diversification:** Rubber can complement existing Forestwise products like Illipe nuts by leveraging shared values of sustainability and traceability.
2. **Training and Support:** Building farmer capacity for sustainable practices is critical to enhancing productivity and environmental outcomes.
3. **Partnerships:** Collaborating with local governments, NGOs, and private sector players can address challenges in scaling, quality assurance, and regulatory compliance.
4. **Innovation:** Investing in technology for efficient tapping, processing, and storage can improve the quality and marketability of natural rubber.

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