



Pemerintah Kabupaten Bolaang
Mongondow Selatan in partnership
with the Non-Aligned Movement Centre
for South-South Technical Cooperation

DEVELOPMENT OF SUSTAINABLE
COCONUT PROCESING INDUSTRI FOR
INTERNATIONAL MARKET DEMAND IN
TANJUNG BINEREAN, SULAWESI UTARA

REPORT IDENTIFICATION OF COCONUT RESOURCES 2023



Report on Identification of Available Coconut Resources

I. INTRODUCTION

A. Background

Tanjung Binerean in Kabupaten Bolaang Mongondow Selatan is home to the endemic maleo bird (*Macrocephalon maleo*) and is located within the Koridor Hidupan Liar Tanjung Binerean, an Essential Ecosystem Area (KEE) in the province of Sulawesi Utara. The region is also known for its coconut farming, which is a significant contributor to the province's GDP, with over 20% of agricultural exports coming from coconut products. However, the region's biodiversity is under threat due to the opening of land for other crops, resulting in deforestation and degradation of river basins, leading to ecological and livelihood issues. To address this, there is a need to develop a sustainable coconut processing industry that focuses on exports to increase the income of coconut farmers and prevent further environmental degradation.

B. Objectives and benefits of the activity

1. Objectives

To identify available coconut resources in Tanjung Binerean, develop a sustainable coconut processing industry that can meet international market demand, and increase the income of coconut farmers in the region.

2. Benefits

- Provides an alternative source of income for coconut farmers, reducing the need for opening land for other crops
- Promotes sustainable practices in the coconut industry, reducing environmental degradation
- Contributes to the economic development of the region and increases the province's GDP
- Preserves the biodiversity of the area by promoting sustainable practices and protecting the Essential Ecosystem Area (KEE)

II. REVIEW OF COCONUT POTENTIAL IN TANJUNG BINEREAN, SULAWESI UTARA

A. Geographic and climatic conditions

Sulawesi Utara is a province of Indonesia with a tropical rainforest climate, covering an area of 14,500.28 km² and a population of 2,659,543. Tanjung Binerean, a coastal village in Bolaang Mongondow Regency, is an important nesting ground for the endemic and endangered maleo bird. The region has various types of soil, including alluvial, which is fertile and suitable for agriculture. A study on the soil properties of the alluvial plain in Donggala region, Central Sulawesi, suggests its potential use for agriculture.

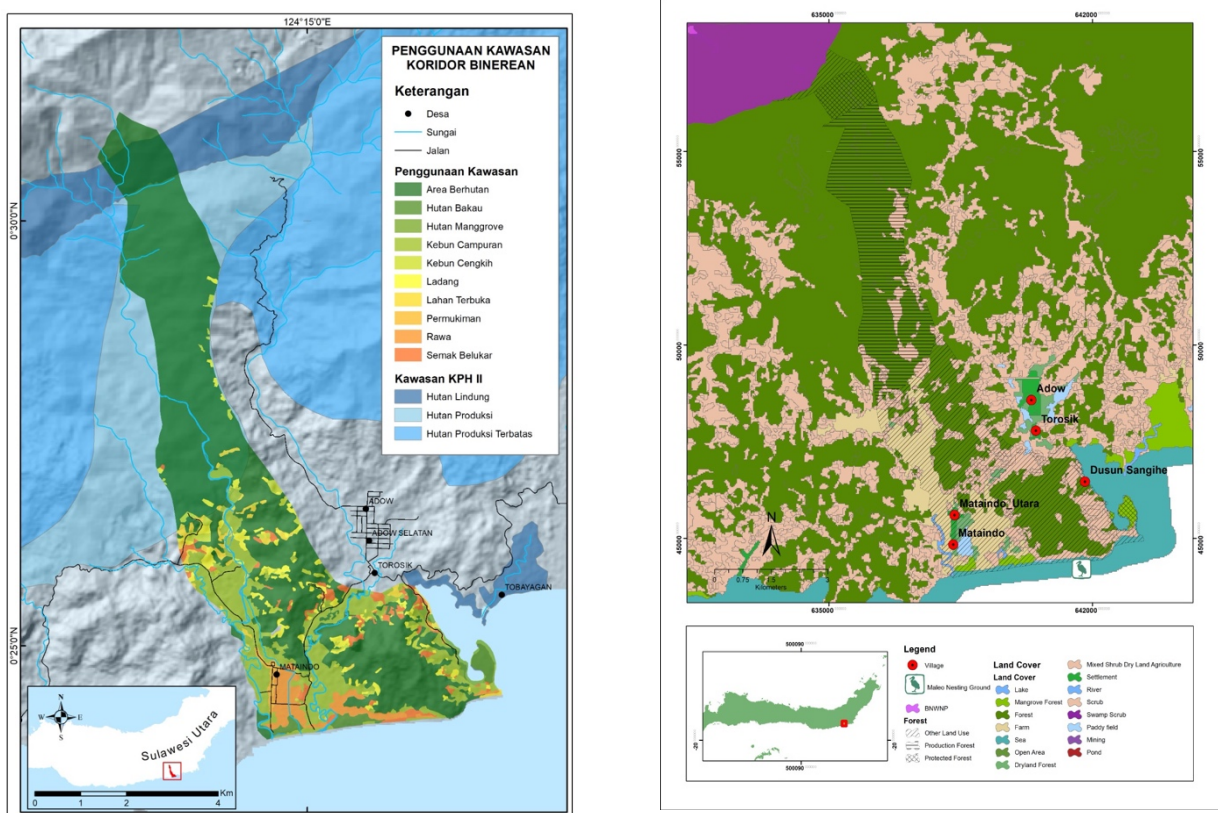


Figure 1 The location of sampling site at Tanjung Binerean nesting grounds

The location of sampling site at Tanjung Binerean nesting ground indicates that it is sun-heated sand beaches.

B. Weather Data in Binerean

South Bolaang Mongondow Regency is a tropical climate area. The average annual rainfall is 1500 mm/year, with average minimum and maximum air temperatures of 23.1°C and 32.9°C, respectively, while the average humidity is 80%. According to the Köppen climate classification, this area falls under the Am class, with a minimum temperature of 21.8°C and an average annual rainfall of 1580 mm/year. The dry period occurs in August-September, and the lowest rainfall is recorded in August (43 mm/month). The Köppen climate classification indicates that the area has a tropical climate with tropical rainforest vegetation. According to the Schmidt-Ferguson Climate classification, this area falls under the B class, which is characterized as a wet region with tropical rainforest vegetation.

According to the Schmidt-Ferguson classification, the number of dry months ($CH < 60$ mm/month) is two months, namely August-September, with nine wet months ($CH > 100$ mm/month) from December to June. According to the Oldeman climate classification, it falls under the D2 class, with three consecutive dry months ($CH < 100$ mm/month) in August-September and four consecutive wet months ($CH > 100$ mm/month) from December to March. This classification indicates that the area is only suitable for planting rice once or one annual crop, depending on the availability of irrigation water.

Tanjung Binerean is located within the Pinolosian Tengah Subdistrict. The Rainfall Observation Post of the Agricultural, Fisheries, and Forestry Extension Center (BP3K) in Pinolosian Tengah recorded the average rainfall from 2018 to 2022. The recorded data indicates that the rainfall characteristics over the past 5 years are generally classified as Normal (N), where the rainfall intensity ranges from 101 to 300 mm.

Keterangan	Tahun 2018											
	JAN	FEB	MAR	APR	MEI	JUN	JUL	AGS	SEP	OKT	NOV	DES
Bolsel KC Bolaang Uki	X	X	X	X	X	X	X	X	X	X	X	X
Bolsel UPTD Pinolosian	206	95.5	114.5	258	395.5	285	561.5	108.5	97.5	15.5	54.5	101.5
Bolsel BP3K Pinolosian Tengah	192	68	159	336	356	238	283	117	180	22	90.4	177
Bolsel BP3K Pinolosian Timur	X	X	X	X	X	X	X	X	X	X	X	X

Bolsel BP3K Posigadan	X	X	X	X	X	X	X	X	X	X	X	X	X
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Keterangan	Tahun 2019												
	JAN	FEB	MAR	APR	MEI	JUN	JUL	AGS	SEP	OKT	NOV	DES	
Bolsel KC Bolaang Uki	X	X	X	X	X	X	X	X	X	X	X	X	X
Bolsel UPTD Pinolosian	157	4	36.5	72.4	306.5	518	344	116.5	38.5	248.2	0	84	
Bolsel BP3K Pinolosian Tengah	262	116	34	52	244.5	419.5	270	70.5	11	184	3	123	
Bolsel BP3K Pinolosian Timur	X	X	X	X	X	X	X	X	X	X	X	X	X
Bolsel BP3K Posigadan	X	X	X	54.5	54	92	55	X	X	X	X	X	X

Keterangan	Tahun 2020												
	JAN	FEB	MAR	APR	MEI	JUN	JUL	AGS	SEP	OKT	NOV	DES	
Bolsel KC Bolaang Uki	X	X	X	X	X	X	X	X	X	95.9	174.3	45.5	
Bolsel UPTD Pinolosian	46	17	163.5	143.5	175.5	785	732.5	547.8	356.5	273.5	121.5	98.5	
Bolsel BP3K Pinolosian Tengah	71	56	245	168	211	417	858	367	288	159	258	207	
Bolsel BP3K Pinolosian Timur	X	X	X	X	X	X	X	X	X	X	X	X	X
Bolsel BP3K Posigadan	X	X	X	X	X	X	X	X	X	29	89.9	9.5	

Keterangan	Tahun 2021											
	JAN	FEB	MAR	APR	MEI	JUN	JUL	AGS	SEP	OKT	NOV	DES
Bolsel KC Bolaang Uki	61.7	153.9	26.7	212.4	563	81.2	495.3	268.6	283.7	155.5	165.2	99.3
	JAN	FEB	MAR	APR	MEI	JUN	JUL	AGS	SEP	OKT	NOV	DES
Bolsel UPTD Pinolosian	72	259	39.5	172	479.5	153	537.5	536	543	138	150.5	38
Bolsel KC Bolaang Uki	154	130.7	163.4	221.1	117.6	76.6	571.7	613.4	160.7	62	185.3	X
Bolsel BP3K Pinolosian Tengah	209	141	29	205	427	132	385	366	418	105	133	183
Bolsel UPTD Pinolosian	64	204.6	100	234.5	140.5	197	735.2	732	417.5	80	253	72.5
Bolsel BP3K Pinolosian Timur	X	X	X	X	X	X	X	X	X	X	X	X
Bolsel BP3K Pinolosian Tengah	282	191	162	143	245	191	722	458.5	182	168.5	311.5	108.5
Bolsel BP3K Posigadan	37.5	68	47	32	198	49.5	314	122.5	509.5	15	45.5	13
Bolsel BP3K Pinolosian Timur	330.5	182.8	125.1	224.5	196.3	144.4	666.2	513.4	198	180.5	179	206
Bolsel BP3K Posigadan	14.5	47	91.1	71.5	136	108.1	887.5	462	216	25.5	55	54

KRITERIA

CURAH

HUJAN BULANAN:

0 - 100 mm RENDAH

101 - 300 mm MENENGAH

301 - 500 mm TINGGI

> 500 mm SANGAT TINGGI

- TIDAK ADA HUJAN

X TIDAK ADA DATA

C. Coconut varieties grown in the area

Tall Variety Coconut Palm

D. Coconut production and export potential

Sulawesi Utara, a major coconut-producing province in Indonesia, exports coconut flour to 29 countries for use in a range of food products. With 255,573 hectares of coconut plantation, coconut is a leading commodity in the region and can thrive in a range of soil types with adequate drainage.

III. IDENTIFICATION OF AVAILABLE COCONUT RESOURCES

A. Location and number of coconut plantations in the area

The main plantation commodities in South Bolaang Mongondow Regency are coconut, cocoa, cloves, nutmeg, coffee, vanilla, pepper, and candlenut. According to Sasue et al. (2017), agricultural productivity in South Bolaang Mongondow Regency increased by 5.28% in 2013 compared to the period of 2010-2014.

Based on data from the Central Statistics Agency, the coconut production in South Bolaang Mongondow Regency in 2015 was 15,115.38 tons. Coconut production is the largest among the plantation commodities, followed by cloves (669.43 tons), coffee (5.10 tons), and nutmeg (3.48 tons). With the improvement in the price of copra, there has been an increase in the plantation area in 2021, from 8,405.11 hectares to 8,457.11 hectares. The number of coconut farmers also increased in 2020 and 2021. Most of them are crop farmers (petani campuran) and according to the data collected the number of crop farmers is 716 farmers.



Gambar 1. Summary of the area and productivity of coconut plantation commodities in Bolaang Regency (Source: Temporary data from the Department of Agriculture and Plantation of South Bolaang Mongondow, 2022).

NO	NAMA DESA	LUAS (Ha)	JLH POHON	Produksi Ton/Ha	Harga Perbiji /kg(Rp)	Harga Kopra		Harga Arang Tempurung / Kg
						Kopra Putih	Kopra Asap (Rp)	
1	ADOW	17,83	2.786	21,40	2000/kg		11.000	-
2	MATAINDO	126,87	19.823	152,24	-		12.500	-
3	MATAINDO UTARA	38,56	6.025	46,27	-		12.500	-
4	TOROSIK	17,28	2.700	20,74	-		11.000	-
JUMLAH		200,54	19.666,6	240,65				

B. Condition and productivity of coconut plantations

Coconut cropping used both systems; monoculture and intercropping. Those farmers who have big plantations mostly practice monoculture, while small-scale farmers intercrop coconut with corn, dry land paddy, chillies, ginger, papaya, or vanilla. Coconut farming system is traditional. Traditional farmers cultivate a tall coconut variety with less intensive crop care and without using modern inputs such as fertilizers.

The weakness found are many coconut trees are unproductive, many derivative coconut products have not been utilized, there is a shortage of climbers and peelers, farmers need for superior seedlings, and lacks of coconut farmer groups. The most common pest that affects coconut plants in these five villages is the Yaki (*Macaca nigra*), which is a native monkey species in Sulawesi. These monkeys damage the coconut fruits, resulting in reduced yields during harvest. This pest is found in two villages near the Binerean corridor, namely Torosik and Adow villages.

1. Existing Coconut Processing and Utilization Systems

The gestation period for the tall variety coconut palms is 6-7 years, whereas that for hybrid varieties is 4-5 years. Most farmers harvest 3-4 times a year. Some farmers harvest hybrid coconut trees 5 times annually. Harvesting is carried out by climbing the trees or by using bamboo ladders on the shorter hybrid trees. The production of copra, from harvesting to processing, is sometimes carried out by daily wage laborers but usually is done by contracted laborers. The contracted laborers commonly are paid shares when the copra is sold. The laborers' share ranged between a fifth and a half. Typically, the process of making copra occurs on the farms. The process begins by peeling the coconut fruit, using traditional tools called lewang. The peeled coconut is then cut and placed on top of a kiln where it is roasted until mature and dry (when the coconut meat color is brownish). The meat, called copra hari-hari, is next peeled out of the coconut shell (the water content is up to 15 percent). The copra hari-hari is sundried until the water content is reduced to 5 percent. The dry copra, called copra gudang, is sold to traders who transport it to warehouses.

Coconut farming in Bolaang Mongondow Selatan (BolSel) is characterized by low input traditional methods, on small plantations between 2-10 hectares of land. Current conservative assessments indicate that over 500,000 tonnes of copra are sold to Cargill annually from the BolSel area. The majority of this copra is either in or directly adjacent to the forest boundary.

threatened by agricultural activity, as when the distance between the nesting ground and the forest becomes too great, birds simply do not return to the nesting grounds to lay.

2. Availability of Coconut Raw Materials for Processing

In North Sulawesi, coconut is a primary tree crop with a plantation area of 254,573 hectares. Coconut raw materials can be used to produce various products such as coconut flour, oil, and milk. A study on the coconut raw material transaction model in the coconut flour industry found that the supply chain actors include raw material suppliers such as PT. Unicotin, and importers from Germany, the Netherlands, the United Kingdom, Poland, Egypt, Russia, and China. The study highlights the need for companies to address inconsistent raw material supply and establish long-term partnerships with shipping services to ensure timely and smooth product deliveries.

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D. Availability of coconut raw materials for processing

In Sulawesi Utara, coconut is the major tree crop with 255,573 hectares of coconut plantations. Coconut raw materials can be used to create various products such as coconut flour, oil, and milk. A study on the transaction model for coconut raw materials in the coconut flour industry found that supply chain actors include raw material suppliers, PT. UNICOTIN, and importers from Germany, Holland, England, Poland, Egypt, Russia, and China. The study suggests that the company needs to solve inconsistent raw material supplies and establish long-term cooperation with shipping services to ensure timely and smooth delivery of products.

IV. SUSTAINABLE COCONUT PROCESSING INDUSTRY DEVELOPMENT STRATEGY

A. Concept of environmentally friendly and sustainable coconut processing

The concept of environmentally friendly and sustainable coconut processing in Tanjung Binerean, Sulawesi Utara involves implementing practices that minimize negative impacts on the environment and promote the efficient use of resources. This can be achieved through the use of renewable energy sources, waste reduction and recycling, and water conservation. The aim is to produce high-quality coconut products while preserving the ecological health of the area. Sustainable practices will also include ensuring fair and ethical treatment of workers, promoting biodiversity conservation, and reducing greenhouse gas emissions. By adopting these practices, Tanjung Binerean can establish itself as a leader in sustainable coconut processing, meeting international market demand while safeguarding the environment and supporting local communities.

B. Use of technology and innovation in coconut processing

In addition to sustainable practices, the use of technology and innovation can further enhance the efficiency and quality of coconut processing in Tanjung Binerean. For instance, the implementation of modern machinery and equipment can improve the processing speed and reduce manual labour, thereby increasing productivity and reducing costs. Automation can also improve the accuracy and consistency of processing, ensuring consistent product quality. Furthermore, the use of advanced packaging and preservation

techniques can prolong the shelf life of products, thereby reducing waste and increasing product availability. The integration of technology and innovation with sustainable practices can help establish Tanjung Binerean as a leading producer of high-quality and environmentally friendly coconut products for the international market.

C. Development of partnerships with coconut farmers and local communities

The development of a sustainable coconut processing industry in Tanjung Binerean, Sulawesi Utara also involves establishing partnerships with local coconut farmers and communities. By working together, the industry can ensure a reliable supply of high-quality raw materials while also promoting fair trade and ethical treatment of workers. Local communities can benefit from job opportunities and economic development, while the industry can benefit from local knowledge and expertise. Additionally, partnerships can help establish traceability and transparency in the supply chain, which is becoming increasingly important to consumers.

V. CONCLUSION

A. Summary of the results of coconut resource identification

The identification of coconut resources can provide valuable insights into the abundance, distribution, and potential utilization of coconuts in a particular region. The results of coconut resource identification may include the following:

1. **Quantity and Distribution:** The identification process can determine the total number of coconut trees or plantations in a specific area and provide information on their spatial distribution. This data helps in understanding the overall availability and concentration of coconut resources.
2. **Varieties and Genetic Diversity:** Coconut resource identification can reveal the different varieties or cultivars of coconuts present in the area. This information is important for genetic conservation, breeding programs, and understanding the diversity of coconut populations.

3. **Productivity and Yield:** The identification process may assess the productivity and yield of coconut trees, providing insights into the potential economic output of coconut plantations. It can involve measuring parameters such as nut yield per tree, copra production, or other coconut-derived products.
4. **Utilization and Value-Added Products:** Coconut resource identification may involve assessing the current uses and value-added products derived from coconuts in the region. This includes identifying traditional uses, such as food, oil extraction, or handicrafts, as well as exploring potential innovative uses for coconut by-products.
5. **Socioeconomic and Environmental Impacts:** Understanding coconut resources can provide insights into their socioeconomic importance, such as employment generation, income generation for local communities, and contribution to local economies. Additionally, the identification process can assess the environmental impacts of coconut cultivation, such as land use patterns, water usage, and potential ecological benefits.
6. **Challenges and Opportunities:** The identification process can also highlight challenges and opportunities related to coconut resources. This may include identifying pest and disease threats, land management issues, market trends, or potential areas for improvement in coconut cultivation practices.

B. Potential and benefits of developing a sustainable coconut processing industry

Developing a sustainable coconut processing industry has the potential to bring numerous benefits to both the environment and local communities. Here are some potential advantages and benefits of such an industry:

1. **Environmental Sustainability:** A sustainable coconut processing industry can contribute to environmental conservation and sustainability in several ways. Coconuts are a renewable resource, and their cultivation does not require significant amounts of chemical fertilizers or pesticides. Additionally, coconut trees help protect against soil erosion and can improve the quality of the soil. By promoting sustainable cultivation practices, such as organic farming and reforestation efforts, the industry can have a positive impact on the environment;
2. **Economic Development:** The coconut processing industry can serve as a source of economic development for regions where coconuts are grown. It can create employment

opportunities and generate income for local farmers and communities. Processing activities, such as coconut oil extraction, coconut milk production, and coconut-based product manufacturing, can provide value-added opportunities and contribute to the local economy;

3. **Diverse Product Range:** Coconuts offer a versatile range of products, including coconut oil, coconut water, coconut milk, coconut flour, and coconut-based cosmetics. Developing a sustainable coconut processing industry allows for the exploration and expansion of these product options, meeting consumer demand for natural and organic alternatives. This diversification can lead to increased market opportunities and revenue streams;
4. **Health Benefits:** Coconut-based products are known for their potential health benefits. Coconut oil, for example, is rich in medium-chain triglycerides (MCTs) that can be easily digested and provide a quick source of energy. Coconut water is a natural electrolyte drink and an excellent hydration option. By promoting the consumption of coconut-based products, a sustainable coconut processing industry can contribute to healthier lifestyles and well-being;
5. **Waste Reduction and Circular Economy:** Coconut processing can be designed to minimize waste and promote a circular economy. Coconut shells, husks, and fibers, which are often considered byproducts, can be utilized in various ways. They can be turned into activated carbon for water filtration, used as a biofuel source, transformed into natural fiber products, or used in horticulture as a substrate or mulch. By valorizing these byproducts, the industry can reduce waste, promote resource efficiency, and minimize environmental impact;
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7. **Social and Community Development:** A sustainable coconut processing industry can support social and community development. By providing employment opportunities and income sources, it can contribute to poverty reduction and improve livelihoods. Furthermore, empowering local farmers and communities through capacity building and education programs can enhance their skills and knowledge, promoting sustainable practices and creating a sense of ownership and pride.

Overall, developing a sustainable coconut processing industry can bring about environmental, economic, and social benefits. By focusing on sustainable cultivation, responsible processing practices, and product diversification, this industry has the potential to contribute to a greener and more inclusive future.

C. Next steps for implementing the industry development activity

Implementing the development of a sustainable coconut processing industry involves several key steps. Here are some next steps to consider:

1. **Conduct Market Research:** Start by conducting thorough market research to assess the demand and potential for coconut-based products. Identify target markets, consumer preferences, and trends to determine which coconut products have the highest potential for success. This research will help guide your business strategy and product development;
2. **Develop a Business Plan:** Create a comprehensive business plan that outlines your goals, strategies, and financial projections. Include details about your target market, product portfolio, production processes, marketing and distribution plans, and a timeline for implementation. This plan will serve as a roadmap for your activities and help attract investors or secure financing if needed;
3. **Establish Partnerships:** Identify potential partners and stakeholders who can contribute to the development of the industry. This could include coconut farmers, cooperatives, processors, distributors, retailers, and research institutions. Establish collaborations and partnerships to leverage expertise, resources, and networks that can support your venture;
4. **Implement Sustainable Farming Practices:** Work closely with coconut farmers to promote sustainable farming practices. Provide training and support to help them adopt organic farming techniques, reduce the use of pesticides and fertilizers, and manage soil erosion effectively. Encourage practices such as intercropping, agroforestry, and composting to enhance biodiversity and soil health;
5. **Set up Processing Facilities:** Invest in processing infrastructure and equipment needed to convert raw coconuts into value-added products. This may include facilities for coconut oil extraction, coconut milk processing, or coconut flour production. Ensure that these facilities adhere to sustainable and energy-efficient practices, and implement quality control measures to maintain product standards;

6. **Promote Product Diversification:** Explore product diversification opportunities beyond traditional coconut oil and coconut milk. Consider developing coconut-based cosmetics, snacks, beverages, and other innovative products that cater to market trends and consumer preferences. Conduct research and development activities to refine formulations and ensure product quality;
7. **Implement Sustainable Packaging:** Pay attention to sustainable packaging options for your coconut-based products. Minimize plastic usage and opt for eco-friendly materials such as biodegradable or compostable packaging. This demonstrates your commitment to sustainability and appeals to environmentally conscious consumers;
8. **Establish Certifications and Standards:** Obtain relevant certifications and adhere to international standards for organic, fair trade, or sustainable production. Certifications such as USDA Organic, Fairtrade, or Rainforest Alliance can enhance the credibility of your products and open up access to premium markets;
9. **Develop Marketing and Distribution Channels:** Develop a marketing strategy to promote your coconut-based products. Utilize digital marketing platforms, social media, and influencer collaborations to create awareness and build your brand. Identify distribution channels that align with your target market, such as supermarkets, health food stores, online platforms, or direct-to-consumer sales;
10. **Monitor and Evaluate:** Continuously monitor and evaluate your operations to ensure that sustainability goals are being met. Regularly assess the environmental impact, social benefits, and financial performance of your activities. Adapt your strategies as needed based on feedback, market trends, and emerging opportunities;

By following these steps, you can lay a strong foundation for the development of a sustainable coconut processing industry and work towards creating a thriving and environmentally friendly business.

Matrix of Data and Information Needs for Coconut in the Tanjung Binerean Wildlife Corridor and South of Bolaang Mongondow regency in general:

Data and Information needs	Source of data (Available)	Source of Data (Unavailable)
II. A. Geographic and climatic conditions		
<ul style="list-style-type: none"> Weather forecast 	<ul style="list-style-type: none"> WCS - Data cuaca di Tanjung Binerean sejak 2018 	<ul style="list-style-type: none"> BMKG - Data cuaca dari stasiun klimat terdekat (Mataindo dan Gontung) BPBD?
II. B. Coconut varieties grown in the area.		<ul style="list-style-type: none"> DISTAN Bolsel Penyuluh pertanian di Pinteng BSIP
III. A. Location and number of coconut plantations in the area	<ul style="list-style-type: none"> WCS – Data laporan POLIMDO Renaksi KEE 	<ul style="list-style-type: none"> Data BPS DISTAN Kab. Bolsel
<ul style="list-style-type: none"> III. B. Condition and productivity of coconut plantations 	<ul style="list-style-type: none"> BPS (2015) – Data produksi kepala di Bolsel. (15.115,38 Ton). Luas Perkebunan kelapa di Bolsel 8 402,45Ha 	<ul style="list-style-type: none"> Kecamatan - Data produktivitas kelapa di Kecamatan Pinteng, per desa. DISTAN Kab. Bolsel Penyuluh pertanian di Pinteng
III. C. Existing coconut processing and utilization systems	<ul style="list-style-type: none"> Journal 	<ul style="list-style-type: none"> BSIP
V. A. Summary of the results of coconut resource identification		
V. B. Potential and benefits of developing a sustainable coconut processing industry	<ul style="list-style-type: none"> Feasibility study of Tanjung Binerean RIPPARKAB BOLSEL High Conservation Value Kab. Bolsel 	
V. C. Next steps for implementing the industry development activity	<ul style="list-style-type: none"> RIPPIN Document 	