PULANG PISAU

2015

Green Growth Strategy

Pulang Pisau

Central Kalimantan, Indonesia

Pulang Pisau
Green Growth Strategy

Produced by:

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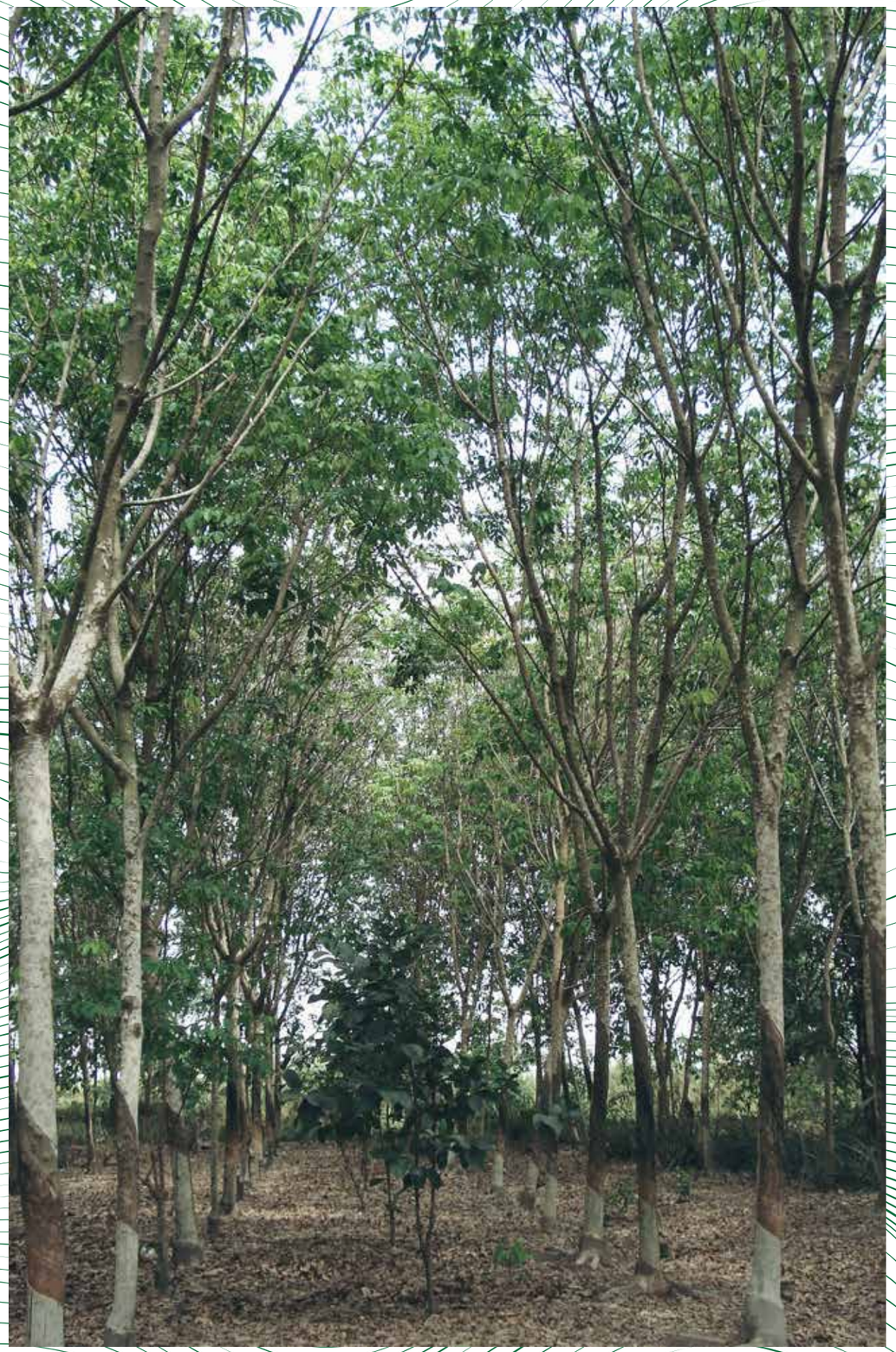

Foreword

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> The objective of this Green Growth Strategy is to maintain high-levels of economic growth while minimizing the impacts of development on the environment.

Since its establishment in 2002, Pulang Pisau district continues to promote development in accordance with Pulang Pisau's Long Term Development Plan (RPJPD) 2006-2025. The Medium Term Development Plan (RPJMD) of the district for the period of 2013-2018 has been formulated in reference to the RPJPD. The vision of the RPJMD is: "Realization of a Pulang Pisau community that is peaceful, developed, just and prosperous." In achieving this vision, seven missions have been identified:

1. Accelerate improvements to the district's infrastructure, spatial plan and settlements.
2. Improve human resources.
3. Improve community welfare through community-based economic programs.
4. Improve agricultural productivity from agro-business into agro-industry.
5. Improve natural resource management and increase environment quality.
6. Implement a clean, prestigious, professional and accountable government apparatus.
7. Empower the development of religious, socio-cultural, youth and woman organizations.

Some targets have been determined based on the vision and missions. One of the targets is the GDP growth that delivers economic performance and community welfare. In the RPJMD 2013-2018, the district aims to realize a GDP growth rate of 7.5% by 2018. In order to achieve this target, the identification and development of key sectors are necessary. Based on the analysis of the economic performance, the identified key sectors include food crops, plantation, livestock, forestry and fisheries. These sectors are central of the economy because their products have great economic competitiveness and growth potential. They have also been proven to possess resilience against the global economic crisis.

As a land-use sector, agriculture development depends heavily upon the natural resource base. Therefore, the utilization of natural resources has to be managed properly to minimize negative environmental impacts. Without appropriate management, the carrying capacity of the district's natural resources will diminish. The question is; can economic growth of 7.5% be achieved while minimizing the impacts of development on the environment?

This is the objective behind the drafting of Pulang Pisau Green Growth document by Pulang Pisau Government, facilitated by the Global Green Growth Institute (GGGI). This document explores the sectors that generate the biggest contribution to economic growth as well as greenhouse gas emissions, and maintain the economic equity (or commonly known as inclusive development). The focus sectors are forestry, aquaculture, plantations and renewable energy, while a number of cross-sectoral actions are also proposed. Interventions, along with key activities, have been identified in each of these sectors to deliver green growth. It is expected that Pulang Pisau SKPDs use this document as a reference for future development plans and budget formulation.

This document is strategic considering that green growth has been acknowledged by PPN Ministry/BAPPENAS as one of the pillars in sustainable development framework.

May Allah SWT bestow His grace and guidance to our joint efforts to achieve the greatest prosperity of the community, and manage the environment for the future generation.

Yours truly,

—H. EDY PRATOWO, S.Sos., MM. District Head of Pulang Pisau

01 Introduction

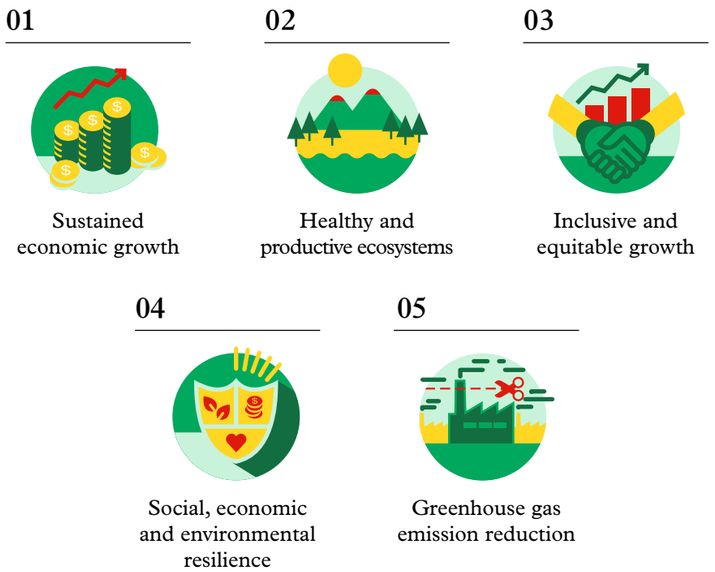
OVERVIEW

The strategy identifies and outlines green growth interventions across four of Pulang Pisau's key sectors: forestry, aquaculture, plantations and renewable energy.

Pulang Pisau's Green Growth Strategy (from now on referred to as the 'strategy') outlines and explores the opportunity for the district to shift to a new economic growth pathway that delivers prosperity whilst reducing poverty and achieving environmental sustainability. This strategy identifies and outlines interventions across four of Pulang Pisau's key sectors; forestry, aquaculture, plantations and renewable energy. Each intervention aims to support efficient, productive economic activity, job creation, social inclusion, while minimizing environmental risks. The strategy provides a rationale for why each sector is important for green growth and then describes the key interventions within each sector that will support sustainable economic development. The potential locations for each intervention are identified, where possible, and a list of key stakeholders for each of the sectors are provided. A range of cross-cutting interventions are also identified, which support sustainable economic activities across all sectors. This strategy covers a three year period that is aligned with the current administration's time in office and a high-level timeline is provided for the interventions within each sector. Annex 1 includes a logical framework for the strategy, including the goal, outcome, outputs, actions and specific, measurable, assignable, realistic and time-related (SMART) indicators at each level, while Annex 2 provides an overview of the finances of the Pulang Pisau district government.

The five desired outcomes of green growth

These outcomes were defined by the Government of Indonesia - GGGI Green Growth Program (2013)



a

Background

This strategy is the result of a partnership between the Pulang Pisau district government and the Global Green Growth Institute (GGGI), an international organization with its headquarters in Seoul, Republic of Korea. This work has been carried out as part of the Government of Indonesia's (GoI) collaboration with GGGI, known as the GoI-GGGI Green Growth Program. The objective of this program is to promote green growth in Indonesia that recognizes the value of natural capital, improves resilience, builds local economies and is inclusive and equitable. Following extensive stakeholder engagement, the five desired outcomes of green growth were identified as (i) sustained economic growth, (ii) healthy and productive ecosystems, (iii) inclusive and equitable growth, (iv) social, economic and environmental resilience, and (iv) greenhouse gas emission reductions.

In November 2013 the Governor of Central Kalimantan, one of the program's pilot provinces, selected Murung Raya and Pulang Pisau districts for initial support from GGGI. The collaboration between Pulang Pisau and GGGI began in early 2014 and work on this strategy commenced at the district-level Green Growth Visioning Workshop in Pulang Pisau in September 2014. Pulang Pisau's Regional Development Planning Agency (*Badan Perencanaan Pembangunan Daerah*/BAPPEDA) leads the cooperation with GGGI, while also coordinating the engagement with the relevant district government agencies (*Satuan Kerja Perangkat Daerah*, SKPD) and other stakeholders.

Next steps

Implementation of this strategy can be achieved in two ways. Firstly, the interventions and actions can be included in the district's future planning documents and budgets. The strategy has been written to be aligned with Pulang Pisau's existing development goals and this 'mainstreaming' work has already started. Secondly, it is hoped that this strategy will generate interest from donors and investors, who can finance the identified programs and activities. The strategy has been developed using a 'logical framework' approach with a green growth vision (or goal), sector-specific outcomes, an output for each intervention and then an underlying set of actions. As a result, the strategy's structure should facilitate the development of operational program proposals that can be submitted to both international and national funds that support green growth in the context of sustainable development. The final chapter of the strategy provides more details of these next steps.

b

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B © Benjamin Tular GGGI

02 Green growth vision

With a predominantly land-based economy, the relationship between Pulang Pisau's environment and economy is fundamental to its future development pathway. As a result, the management of the district's predominant ecosystem, peatlands, will play a significant role in determining whether Pulang Pisau achieves sustainable economic growth. Unsustainable land management practices and plantation expansion in inappropriate locations can create short-term profits but these activities degrade the district's natural capital and create new risks to medium-term prosperity. In particular, drained peatlands are particularly susceptible to fire and floods, which causes environmental, health and economic damage to Pulang Pisau.

While there has been increasing global attention on the CO_2 stored in Central Kalimantan's peatlands, these fragile ecosystems also provide a range of other important ecosystem services, such as water filtration and flood mitigation, that underpin Pulang Pisau's economic activities. Ensuring that the district's land-based sectors produce high-quality commodities in an efficient manner, while ensuring the ongoing provision of valuable ecosystem services is central to achieving green growth. This will involve optimizing Pulang Pisau's degraded lands, either by planting an appropriate crop or through rehabilitating the land to its previous state.

The Kahayan and the Sebangau rivers are the lifeblood of Pulang Pisau's communities, providing trade opportunities while supporting sensitive aquatic and forest ecosystems. All economic sectors that rely upon the district's water resources, including agriculture and aquaculture, need to be responsibly managed to prevent damaging these important hydrological systems. Finally, with many communities lacking access to electricity or clean energy sources, all of the district's waste-to-energy opportunities should be exploited to support equitable rural economic development.

Achieving green growth in Pulang Pisau will require continued investments in people, planning, technology and natural capital. As the district lacks rich deposits of coal, hard rock minerals, oil or natural gas, prosperity will need to be achieved by maximizing the potential of the land through informed, science-based decision-making, and developing value-added products. Previous business models that focused on resource extraction need to be abandoned and all segments of society must collaborate to achieve Pulang Pisau's long-term development objectives.

Pulang Pisau's green growth vision

> "A sustainable economy that delivers prosperity equitably to the people of Pulang Pisau while minimizing greenhouse gas emissions and maintaining our natural capital stocks for future generations."
>
> — H. Edy Pratowo, S.Sos, M.M.
> Bupati, Pulang Pisau district

Context

This green growth vision defines the overall goal of this strategy and is aligned with the objectives of the district's medium-term development plan (RPJMD) for 2013 – 2018. This strategy is focused on four sectors that are central to the district's economy and environment; forestry, aquaculture, plantations and renewable energy. The achievement of green growth in Pulang Pisau depends on ensuring that these sectors follow a path towards greater sustainability, while improving governance and valuing natural capital across all sectors.

These interventions and the underlying actions include both new solutions for overcoming the challenges related to operating in the district and also build off the existing efforts of the government, private sector and broader society to achieve sustainable development in Pulang Pisau. In addition, this strategy proposes actions that are aligned with Central Kalimantan's regional action plan for the reduction of GHG emissions (*Rencana Aksi Daerah Penurunan Emisi Gas Rumah Kaca*, RAD-GRK) and the regional strategy to reduce emissions from deforestation and forest degradation (*Strategi Daerah*, STRADA REDD+), two key documents that guide the province's path to sustainable development.

Measuring green growth

It is vital that the Pulang Pisau district government establishes a robust monitoring system to assess the district's performance towards its green growth vision. This requires a measurement framework that captures the comprehensive and integrated nature of the five desired outcomes of green growth, and a set of performance indicators to track the district's progress.

Table 1 outlines a 'dashboard' of 12 districtwide green growth indicators for Pulang Pisau. In addition, each sector chapter in this strategy includes a set of specific indicators to measure the green growth performance of that sector. Annex 1 includes a definition of each of these 12 districtwide indicators and the strategy's logical framework, which includes indicators for each sector, intervention and action.

Table 1 — A dashboard of green growth performance indicators for Pulang Pisau district

No.	Indicator	Desired Green Growth outcome
1	Annual GDP growth rate (%)	Sustained economic growth
2	GDP per capita (IDR)	
3	Gross capital formation (IDR)	
4	Employment/population ratio (%)	Inclusive and equitable growth
5	Population below the poverty line (%)	
6	GINI coefficient	
7	Greenhouse gas (GHG) emissions per capita (tons of CO_2e)	GHG emissions reduction
8	Net annual change in above and below ground carbon stocks (tons of CO_2e)	
9	High Conservation Value Area (HVCA) (ha)	Healthy and productive ecosystems
10	Environmental Quality Index (EQI)	
11	Fiscal capital index	Social, economic and environmental resillience
12	Household Vulnerability Index (HVI)	

03 Green growth sectors

Green growth vision

A sustainable economy that delivers prosperity equitably to the people of Pulang Pisau while minimizing greenhouse gas emissions and maintaining our natural capital stocks for future generations

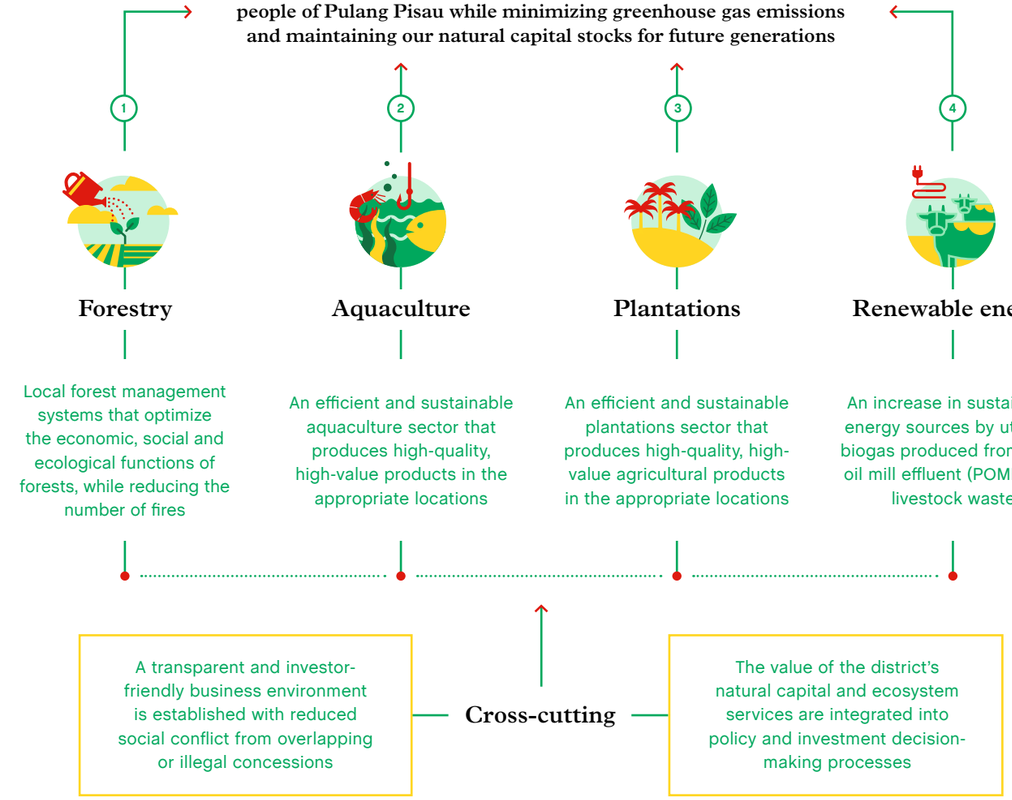
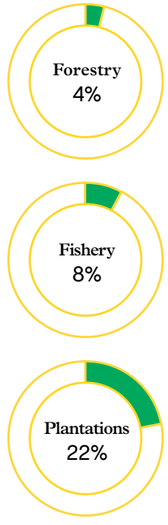


Figure 1 — Pulang Pisau's green growth vision and the desired outcomes of the four key economic sectors

This strategy focuses on four key sectors that are central for achieving green growth in Pulang Pisau due to their contribution to the economy and impact on the environment.

This strategy focuses on four key sectors that are central for achieving green growth in Pulang Pisau due to their contribution to the economy and impact on the environment. In addition, a series of cross-cutting interventions are identified that are fundamental to the sustainable and equitable economic development of the district. Activities within the forestry, aquaculture, plantations and renewable energy sectors all have the potential to be profitable and create livelihoods in the district. Management of the proposed interventions and activities in these sectors must be done properly, so they can strengthen the economic performance of each sector while minimizing negative social and environmental impacts. This will allow the district to achieve its long-term development goals. Below is a high-level introduction to the sectoral and cross-cutting interventions in this strategy, and Figure 1 outlines the desired green growth outcome of each of the sectors.

Sector's contribution to the district's GDP



1

Forestry

Revitalizing Pulang Pisau's forestry sector will require a coordinated effort to address a legacy of unsustainable logging in the district. Two persistent barriers to improved land management are unclear land tenure and forest management approaches that are disconnected from the needs of local communities. Addressing these challenges while supporting income generation from forest and peatland regeneration will balance the need for economic development and environmental sustainability. This strategy proposes two interventions to achieve these goals; establishing forest management units (*Kesatuan Pengelolaan Hutan*/KPH) and promoting community based forest and peatland management.

2

Aquaculture

The Pulang Pisau government hopes that the aquaculture sector will be one of main contributors to economic development in the district and provide an increasing number of employment opportunities for local communities. In addition, aquaculture has also been identified as a priority for ensuring food security at the provincial and district level. However, the conversion of mangroves for aquaculture farms can cause serious local and global environmental impacts, which will ultimately undermine the sustainability of the district's growth. In order to integrate aquaculture development and mangrove conservation, this strategy proposes establishing silvofishery systems in appropriate mangrove ecosystems, developing a district-level regulation on sustainable aquaculture and introducing better management practices (BMPs) for aquaculture.

3

Plantations

In Pulang Pisau small-scale agriculture is an important part of the economy; however, there is significant potential to improve community-based cultivation by promoting intensification, best management practices (BMPs) and supporting linkages to upstream markets. While rubber is the most important commodity for local livelihoods, this strategy aims to improve the performance of smallholder rubber, coconut and coffee plantations by providing BMP training and supporting the adoption of inclusive business approaches (IBA). With increasing demand for sustainable palm oil, Pulang Pisau must ensure its palm oil plantations are in line with the requirements of the provincial regulation on the sustainable management of plantations. In particular, to optimize its land resources, any further palm oil expansion must avoid deep peat and target appropriate low conservation value areas, such as degraded lands.

4

Renewable energy

Pulang Pisau's energy sector is currently a direct financial cost as energy is imported from outside the district. Furthermore, limited access to energy limits communities' development opportunities. This strategy proposes two parallel interventions that focus on the opportunity of producing energy from existing sources of agricultural waste; palm oil mill effluent (POME) and livestock manure. Methane capture for biogas production has significant economic and environmental benefits, including reduced household energy costs and a decreased GHG emissions, and can provide an efficient form of renewable energy for both households and business.

Cross-cutting

Achieving green growth requires a number of cross-cutting interventions that support productive and sustainable activities in all economic sectors. Green growth needs private sector investment and good governance is at the core of an attractive business environment. In particular, social conflict is seen as a significant risk by potential investors, so must be minimized. Therefore, an intervention on improving the licensing systems across all sectors is essential for green growth. Equally, a systematic approach to integrating the value of the district's natural capital into policy and investment decision-making processes is fundamental to deliver economic growth that is compatible with environmental sustainability. This can be aided by carrying out a High Conservation Value (HCV) assessment and finalizing the strategic environmental impact assessment of the district's spatial plan.

04 District overview

Biophysical environment

Pulang Pisau district is located in the southeast of Central Kalimantan province, which sits in the southern quadrant of the island of Borneo. The district's southern border is the Java Sea and it is surrounded by Gunung Mas district to the north, Kapuas district to the east, and both Katingan district and Palangka Raya city to the west, all within Central Kalimantan. Pulang Pisau covers about 900,000 hectares (ha) of land and the district's biophysical characteristics exemplify the lowland forest and peat swamp ecosystems found across Kalimantan. However, Pulang Pisau's topography varies with a plateau and sandy hills rising to 100 meters (m) above sea level in the north of the district. In contrast, the southern part of Pulang Pisau consists of peat swamps, coastal mangroves, estuaries and sandy beaches, along with mineral soils that are already used for rice production (see Figure 3 and 6).

Pulang Pisau sits upon two large peat domes, which consist of organic soil formed by dead plant materials decaying in waterlogged conditions. Peatlands cover more than 60% of the district, covering the majority of the central and southern regions, see Figure 2, and the peat depth ranges from 0.5 m to more than 10 m,[1] storing globally significant stocks of carbon. Although a considerable amount of the district's peatlands have been degraded, the remaining pristine peat swamp forests have high biodiversity, including indigenous species of trees and fish, along with 63 recorded mammal species, including nine primate species.[2] The Sebangau National Park was formed in 2004 and covers almost a quarter of the district; however, before its establishment the Sebangau area was heavily logged and is currently undergoing restoration efforts.

Figure 2 — Peat dome map

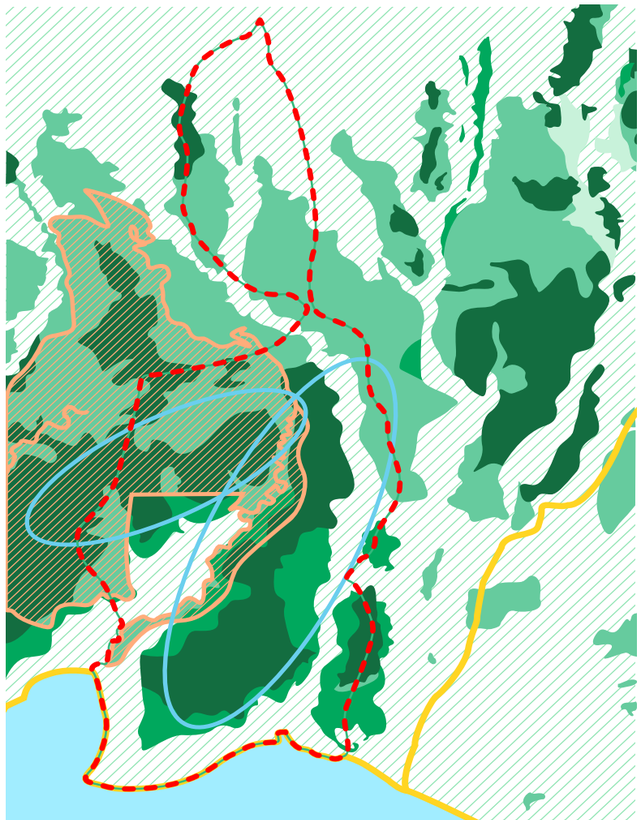


Figure 3 — Graphic of forest cover loss in Pulang Pisau district in 2001-2012

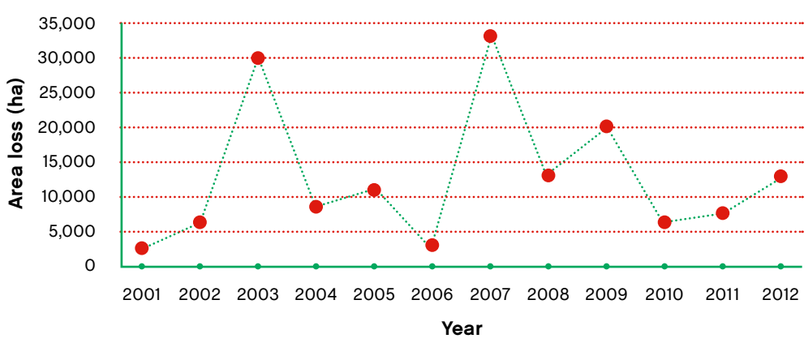
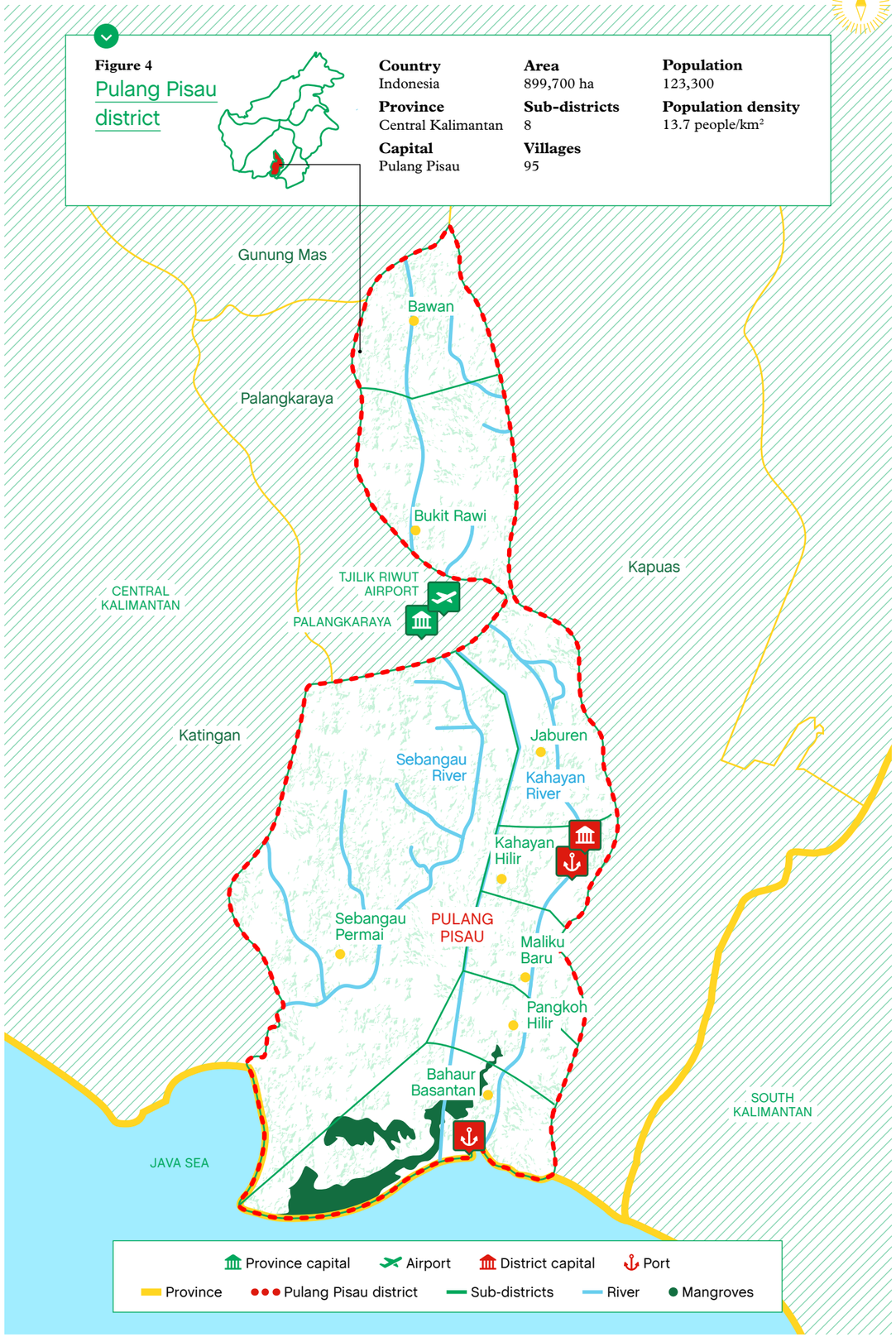


Figure 4
Pulang Pisau district

Country Indonesia	**Area** 899,700 ha	**Population** 123,300
Province Central Kalimantan	**Sub-districts** 8	**Population density** 13.7 people/km²
Capital Pulang Pisau	**Villages** 95	



Approximately 70% of Pulang Pisau is designated as state forest (621,700 ha)[3] and this land is primarily classified as production forest, national park or protected forest, see Figure 5. The remaining area of the district is designated for other land uses, including palm oil and rubber plantations, livestock areas, rice fields, urban settlement and transmigration areas. According to data from the Ministry of Environment and Forestry, at least 15 large oil palm concessions are licensed and extend over 160,000 ha.[4] Many of these concessions are located on peatlands, some bordering conservation areas (e.g. Sebangau National Park), and have caused significant environmental damage to important ecosystems.[5] Between 2000 and 2012 the district lost 128,299 ha of forest cover at an average of 10,692 ha/year, equivalent to 1% of the district's total area per year (see Figure 3 and Figure 6).[6]

The two main rivers in the district, the Kahayan (600 km long) and the Sebangau (200 km long), flow southerly to meet the Java sea and serve as important transport routes that support commodity production. The Kahayan River is the largest river in Central Kalimantan originating from the mountainous region in the Heart of Borneo and is a primary service artery for Pulang Pisau and also the provincial capital, Palangka Raya. The Sebangau River is a blackwater river that meanders through peat swamps and discontiguous forest areas, and contains populations of orangutan and other iconic fauna. The region has an annual rainfall of 2,000 - 3,000 mm.[7]

Figure 5 — Pulang Pisau spatial plan

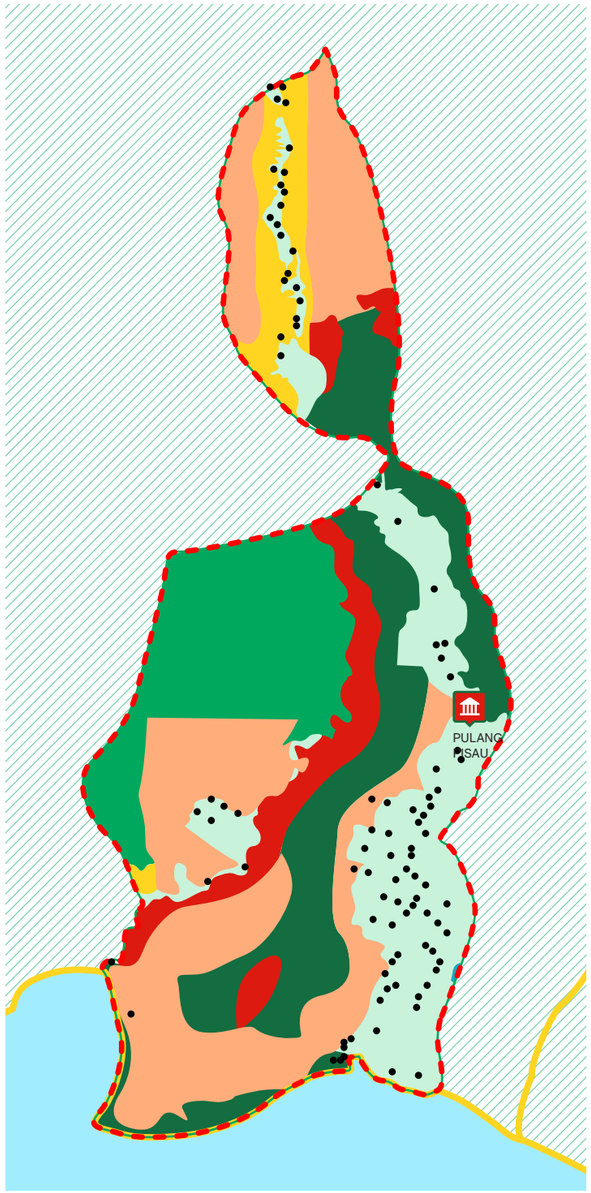
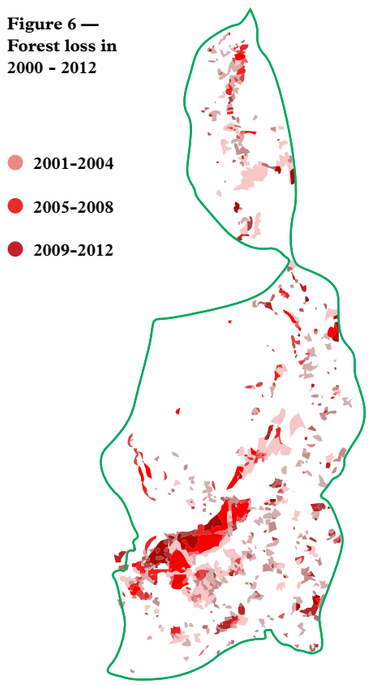


Figure 6 — Forest loss in 2000 - 2012



Socio-economic profile

Pulang Pisau achieved an annual growth in gross domestic product (GDP) of 6.98% in 2013, resulting in a GDP of IDR 897,379 million (constant price).[8] The district government is aiming for a GDP growth rate of 7.2% in 2015 and 7.5% in 2018.[9] The district's economy is predominantly land-based with the plantations, food crops, fishery, forestry and husbandry sectors making up 53.7% of the district's GDP in 2013.[10] The plantation sector made the largest contribution to GDP (22.0%), whilst the trade, hotel and restaurant sectors (17.9%) were the largest outside of the land use sectors.[11]

Analysis of Pulang Pisau's agricultural sector has demonstrated that it is more competitive than Central Kalimantan province and has significant potential to stimulate further economic growth in the district.[12] Furthermore, the sector's strong performance during the global financial crisis in 2009 demonstrated that it is also resilient to external shocks.[13]

Smallholder agriculture is the dominant land-use, with oil palm and rubber representing the major crops. The majority of smallholder rubber farms are extensive and low input, while others are more intensive, using improved varieties and fertilizer inputs. In the fertile regions surrounding the lower Kahayan River rice cultivation, horticulture and livestock are important sources of income for local communities. Industrial scale agriculture is evident, but the majority of the companies are in the process of obtaining licenses due to inconsistencies related to land status. Mining and downstream industries are non-existent or severely underdeveloped.

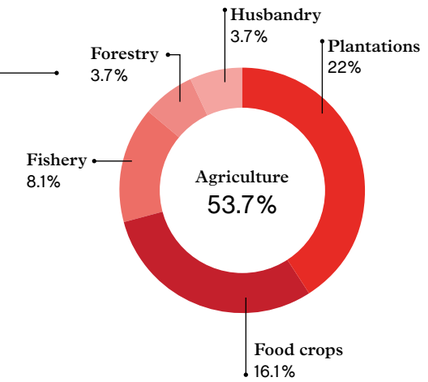
Pulang Pisau is made up of eight sub-districts, 95 villages and four sub-divisions, and in 2013 the population was 123,300.[15] In 2012, approximately 6,340 people lived under the poverty line, accounting for about 5.25% of the district's population.[16] The unemployment rate in Pulang Pisau District is relatively low, at 2.59% in 2012, and over half of the population work in agriculture sector.[17] The rest of the population mainly worked in the service, trade-hotel-restaurant, mining and construction sectors.[18]

Although the furthest edge of the district is less than 150 km from Palangka Raya (see Figure 4), many communities in Pulang Pisau remain remote and isolated with only limited access to skills training or quality healthcare. In 2013, the district of Pulang Pisau had 31,500 households[19] of which 24,763 (79%) had access to the electrical grid supply by PLN. Nevertheless, this figure is still above the provincial average, estimated at 65%.[20]

Annex 2 includes a summary of the revenues and expenditures of the Pulang Pisau district government.

Table 2 — Sector's contribution to Pulang Pisau's GDP in 2013[14]

Agriculture	53.7%
Trade, hotel & restaurant	17.9%
Construction	10%
Services	8.7%
Processing industry	5.8%
Finance, leasing & company service	1.9%
Transportation and communication	1.7%
Mining and extraction	0.2%
Electricity, gas and water	0.2%
Total	100%



Box 1

Ex-Mega Rice Project (EMRP) area

In 1995, Indonesia's President issued the Decree No. 82 Year 1995, which targets the conversion of up to a million hectare of peatlands and lowland swamps for rice cultivation in Central Kalimantan province. The implementation of this decree was known as the Mega Rice project, which covered four districts, including Pulang Pisau district. The project area in Pulang Pisau district covered roughly 618,543 ha. However, this ambitious project has been viewed unsuccessful because the designated location of this project was not suitable for paddy cultivation. Moreover the construction of thousands of kilometers of canals led to serious degradation and deforestation of the area, caused by peat drainage and wildfire.[21]

The Central Kalimantan government is analyzing the current use of the ex-Mega Rice Project area in all the relevant districts in order to assess whether the land is now being used for agriculture or plantations.[22]

Based on these findings, the Pulang Pisau government will consider whether any of the land inside the ex-Mega Rice Project area can be used to help achieve the district's food security goals. This will require comprehensive analysis of the land's suitability to ensure that any crops are planted in appropriate locations.

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5.1 Forestry

RATIONALE

Pulang Pisau contains a state forest area (*kawasan hutan negara*) of 621,700 hectares,[23] consisting of protected, production and conservation forests and covering just under 70% of the district (see Figure 6). Despite this vast forest area, the contribution of the forestry sector to the district's GDP continues to decline, decreasing from 4.9% in 2009 to 3.7% in 2013.[24] This poor performance is due to unclear land tenure, a lack of management over forest areas, illegal logging in supposedly protected forest areas, forest fires and incentives to establish new plantations. The vast forest area is a huge potential for the district and with proper management, it could play important role in achieving green growth in the district. Stabilizing and revitalizing the forest sector needs to be a priority of the district government in order to generate jobs, reduce carbon emissions through peatland management and restore timber stocks for future generations.

Stabilizing and revitalizing the forest sector needs to be a priority of the district government in order to generate jobs, reduce carbon emissions through peatland management and restore timber stocks for future generations.

Decades of private sector exploitation of Pulang Pisau's production forests has resulted in degraded forest ecosystems devoid of high economic value timber stocks, which has left the forestry sector greatly diminished. The district, once a significant producer of timber, has difficulty meeting even local demands for construction needs.[25] No logging concessions or industrial forest plantations are currently operating in the district. This situation has left the majority of production forest areas vulnerable to illegal activity due to a lack of commercial management units responsible for monitoring these areas.

Pulang Pisau's land cover consists of primary and secondary peat forest, scrub, plantation areas and paddy fields. Based on the district's strategic environmental assessment (*Kajian Lingkungan Hidup Strategis*, KLHS) (2014), land use change in peatlands and forest areas poses a major challenge in shifting to an economy that delivers both sustainable growth and environmental sustainability. In 2010 and 2011, deforestation and forest degradation occurred mainly as a result of forest conversion and forest fires. Illegal mining in upstream areas has also led to the degradation of forest resources in downstream areas. This conversion makes land use change the largest source of CO_2 emissions in the district.

Around 64% of the district area is covered by peatland, which requires careful planning and management to preserve these sensitive ecosystems.[26] The majority of the peat areas are located within the state forest area including Sebangau National Park, which contains 144,837 ha of peatlands in Pulang Pisau. Before the establishment of the national park, the Sebangau area was heavily logged and it is currently undergoing restoration efforts to improve the hydrological functioning of the degraded peatlands. Outside of the national park, a significant proportion of the district's peatlands are part of the now defunct 'mega rice project', which drained the peatlands in an attempt to establish rice plantations. These areas are in desperate need of rehabilitation as the draining caused the ground water levels to drop leaving the area susceptible to annual fires.

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These fires generate significant public health risks in Kalimantan and are a source of transnational haze.

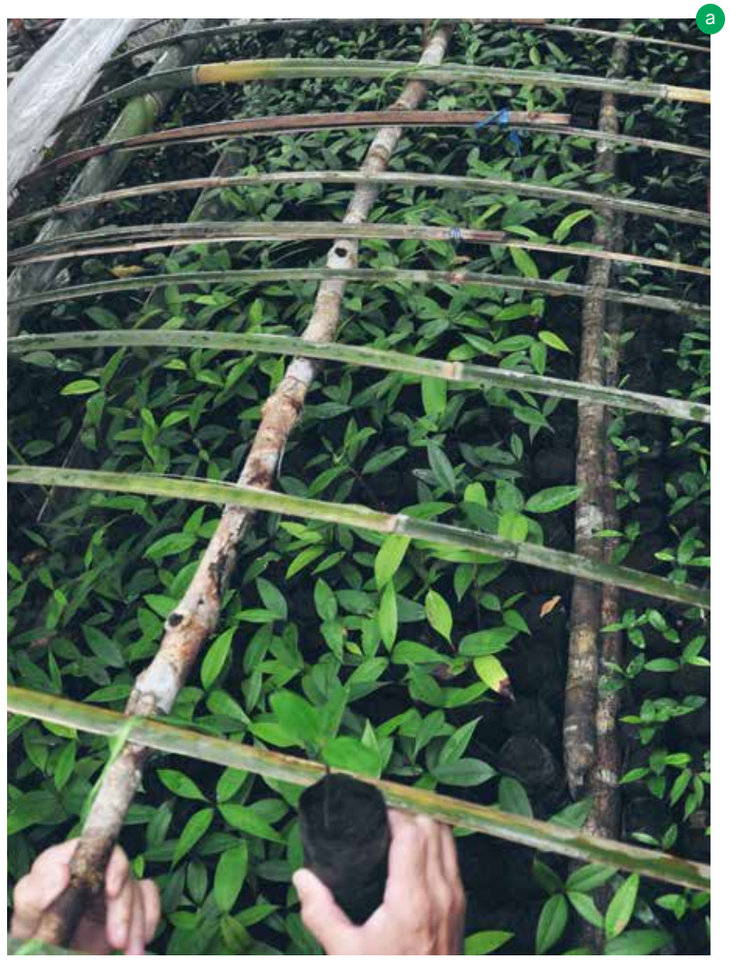
Peatland areas play an important role in global climate change mitigation, due to high levels of CO_2 stored in the organic peat soil. Large areas of Pulang Pisau's peatlands are already in a poor condition due to agricultural activities, plantation expansion, transmigration settlement and forest and land fires. Considering the ecological importance and economic value of peatlands, it is imperative to maintain and restore the district's remaining peatland ecosystems. In response to these challenges, the district's Plantation and Forestry Agency has outlined a vision to optimize sustainable forestry in order to generate prosperity for Pulang Pisau's communities.

The main objectives of the Plantation and Forestry Agency's Strategic Plan (RENSTRA) are to improve the forest function and to decrease the amount of unused land. This will be achieved by involving communities, farmer groups and third parties in forest and land rehabilitation activities, while enhancing forest management and developing appropriate planning system. The Agency will also increase the protection and conservation of natural resources, as well as increase production of forest products.

In order to achieve this target, the agency has defined a number of activities, including revitalizing forest ecosystems and land rehabilitation, improving the hydrological status of peatlands through canal management, afforestation programs and training of village forest management units. In terms of forest planning, management and development, the district government plans to conduct a forest inventory, prevent forest and land fires, and illegal logging, and facilitate the establishment of a forest management unit (*Kesatuan Pengelolaan Hutan*/KPH). Finally, to ensure that the community will benefit from the forestry program in the district, the Plantation and Forestry Agency aims to strengthen the capacity of community institutions, facilitate community participation, and support the processing and marketing of sustainable forest products.

OVERVIEW OF GREEN GROWTH INTERVENTIONS

Revitalizing Pulang Pisau's forestry sector will require a coordinated effort to address a legacy of unsustainable logging in the district. The restoration activities in Sebangau National Park demonstrate how collaborative ecosystem revitalization can be effective. This green growth strategy outlines some district-wide interventions beyond the national park to balance the need for economic development and income generation with forest and peatland regeneration. Two persistent barriers to improved land management are unclear land tenure and forest management approaches that are disconnected from the needs of local communities. This strategy proposes two interventions to revitalize the forest sector by establishing a KPH and promoting community based forest and peatland management.


a

A © KFCP
B © KFCP

F1

Support the establishment of forest management units

Establishing KPH is a major initiative of the national, provincial and district governments, and government funds have already been used to develop these institutions. A production KPH in Pulang Pisau will help to revitalize the district's forestry sector by creating stable forest and peatland management systems that reduce the potential for conflict due to inconsistencies related to land status. This will support an increase in productivity of forestry operations while enabling peatland restoration activities through ecosystem restoration concessions.

F2

Promote community based forest and peatland management

Communities are key stakeholders in the sustainable management of forests and peatlands. Community based forestry is designed to provide clear land boundaries in order to reduce conflict due to inconsistencies related to land status and strengthen management of forest areas that previously lacked a formal management plan. Supporting and promoting Community Based Forestry Management (CBFM) in Pulang Pisau will allow the district to achieve its targets set forth in its RENSTRA for the forestry sector. This intervention will build on the success of the four existing village forests (*Hutan Desa*) to establish a larger network of community based forest management systems across the district.


b

Desired green growth outcome

> The district adopts local forest and peat management systems that optimize the economic, social and ecological functions of forests for future generations, while reducing the number of fires.

— Ir. Slamet Untung Riyanto
Head of Plantations Agency,
Pulang Pisau district

Table 3 — A dashboard of green growth performance indicators for the forestry sector in Pulang Pisau district

No.	Indicator
1	Annual change in forestry contribution to GDP (IDR)
2	Direct investment in the forestry sector (IDR)
3	Annual change in production levels of all forestry-related products (unit/year)
4	Jobs in the forestry sector (#)
5	Number of tenure-related conflicts in state forest area (#)
6	Annual change in area of degraded land within state forest area (ha)
7	All forestry concessions comply with spatial plan (Y/N)

F1

Forestry 1

Support the establishment of forest management units

Background

Regulation PP No. 6/2007 on forest administration and management planning introduced forest management units or FMU (*Kesatuan Pengelolaan Hutan*/KPH), which are government units intended to ensure the sustainable and efficient management of forest resources. Significant tracts of protected forest and production forest are not currently under any form of management by permit holders, leaving these areas vulnerable to illegal activities, which threatens sustainability. Poorly defined rights and limited accountability leads to tenure conflicts, while weak forestry institutions are incapable of addressing tangible problems in the field.[27] Establishing KPH is a strategic solution to address these problems by stabilizing land use within forest areas and is also a priority action in both Central Kalimantan's STRADA REDD+ and RAD-GRK.

The Government of Indonesia has determined the development of KPH as a national priority, as stipulated in the national medium-term development plan (*Rencana Pembangunan Jangka Menengah Nasional*/RPJMN) and the Strategic Plan of the Ministry of Forestry for 2010-2014.[28] A KPH is responsible for enabling and overseeing the implementation of forest resource planning, conservation, harvesting and regeneration by both commercial and community stakeholders on behalf of the district government and for the benefit of the public. KPH have several management activities, including forest use planning, preparation of forest management plans, monitoring and controlling permit holders, forest utilization in specific areas, forest rehabilitation and reclamation, forest protection and nature conservation.[29]

The KPH management will have the mandate to safeguard the forest function, biodiversity, and its public benefits for future generations. KPH establishment will encourage the optimization of community access to the forest resources, enabling dialogue to resolve longstanding conflicts due to inconsistencies related to land status. The engagement of local communities will help shift the forest sector towards inclusive development. In the context of forest production, KPH will provide security for potential investors or private sector companies that are willing to invest in forestry operations or ecosystem restoration concessions. Forest fires tend to occur in forest areas that lack permits, so KPH will act as a management unit responsible to coordinate relevant stakeholders to be more proactive in the prevention and control of forest fires.

The establishment and management of KPH will directly contribute to the achievement of targets and indicators in the RPJMD 2013 – 2018 related to the improvement of environmental quality. In 2008, the district government set a target to rehabilitate 35,300 ha of forest and land, and control forest fires over an area of 100 ha of forest.

Baseline

Based on the 'KPH technical design map' issued by the Central Kalimantan Forestry Agency, there are four KPHs planned in Pulang Pisau; two production and two protection. The district government plans to first establish a production KPH (KPHP) by 2015, followed by a protection KPH (KPHL)[30] and then the other two. The KPHs will promote sustainable peatland management that is based on a clear spatial plan in order to avoid overlaps in land allocation.

Before the KPH is established, all forestry related activities in the district will continue to be implemented by the Pulang Pisau Plantation and Forestry Agency; however, this agency is currently focused on rehabilitation activities. Meanwhile, the management of the four village forests in Kahayan Hilir sub-district, will continue to hold their own management rights and implementation plans.

Desired results

At least 1 FMU operationalized and managed effectively.

F1

KEY ACTIONS

01 Prepare the technical design of the KPH by the Provincial Forestry Agency with data and information support from Forest Gazettement Agency Region XXI. This technical design of the KPH will be based on a analysis of the biophysical and social conditions in Pulang Pisau, along with the considerations of the district head. The technical design document will be submitted to the Governor who then submits it to the Minister of Environmental and Forestry, who will make the final decision on the establishment of the KPH.

02 Develop a 10-year management plan with accompanying annual management plans in accordance with Minister of Forestry regulation No. 6/2010. The KPH will cover a significant area of peatland so the management plans will require an integrated, ecosystem approach to ensure that the areas continue to provide ecological services while providing economic benefit. The management plan of KPH will include:

- A Activities to maintain the remaining intact peatland area, restore degraded peatland by encouraging private sector activities that focus on restoration activities and prevent/control forest and peatland fires;
- B Promotion of the community based restoration activities by planting species that produce high value non-timber forest products such as jelutung (*Dyera lowii*) and gemor (*Nothaphoebe coreacea*) and support the development of sustainable agriculture and plantations suitable for peatland areas.
- C Develop a financing plan that reflects the situation on the ground, accounts for existing community development programs and targets climate/REDD+ finance.

03 Recruit staff for the KPH with the necessary knowledge and human resources. At a minimum, staff must have a proper background in forest management, community empowerment, forestry policy, monitoring and evaluation and development of forestry business.

04 Implement the KPH management plan, including sustainable forest and peatland management, community empowerment and development of forestry business. This will require close coordination with relevant stakeholders from early in the process of KPH establishment. Monitoring and evaluation will ensure that activities are in line with the management plan but the system must be flexible and responsive to accommodate changes within KPH or surrounding areas.

a

F2

Forestry 2

Promote community based forest and peatland management (CBFM) including village forests

Background

Indigenous and local communities living around the forest depend on the forest for their economic and cultural livelihoods. The active participation of these communities is a key factor for successful sustainable forest management and conservation. According to the Forestry Law (No. 41/1999), the Government of Indonesia needs to encourage community participation in the forestry sector.[31] Furthermore, the Ministry of Forestry has set a target to allocate 5.6 million hectares of forest to be managed by the community through schemes such as community forests (*Hutan Kemasyarakatan*, HKM), village forest (*Hutan Desa*) and community plantation (HTR) forest by 2030.[32]

The *Hutan Desa* license is a government mechanism that enables communities to manage state forest areas (both protection and production forests) located within or around their village. This program is regulated by Ministry of Forestry's Decree: P.49/Menhut-II/2008 (as amended in Permenhut No. P.14/Menhut-II/2010 and Permenhut No. P.53/Menhut-II/2011). The permit is given for 35 years with possible extension. *Hutan Desa* is expected to accommodate the local context of forest management, to provide additional revenue for local communities, and to contribute to climate change mitigation activities. The most important benefit is to provide clear land tenure for local communities to manage their forest.[33] Strengthening local communities' status and role in managing forests and peatlands, especially the prevention and control of fires, are priority actions in both Central Kalimantan's STRADA REDD+ and RAD-GRK.

Hutan Desa is a promising mechanism that appears to enable economically, ecologically and socially appropriate solutions, which serve both local and national interests. This scheme recognizes forest and non-timber products in conjunction with forest services such as tourism, ground water filtration and flow regulation, and carbon storage. The involvement of the community also provides them with the additional value of forest security, which results in community awareness of ownership.

b

Baseline

Currently, there are four Hutan Desa in Pulang Pisau: Buntoi Vilage (7,025 ha); Mantaren I Village (1,835 ha); Kalawa Village (4,230 ha); and Gohong Village (3,155 ha). The establishment of these four Hutan Desa was supported by Yayasan Betang Borneo and Kelompok Kerja Sistem Hutan Kerakyatan (POKKER-SHK). As the first district with success in establishing a Hutan Desa in Central Kalimantan Province, the district was chosen as the pilot district in Central Kalimantan for further establishment of *Hutan Desa*. The participating NGOs continue to provide support to the four hutan desas that already have their licenses assisting them to manage their natural resources sustainably. Further, these communities are currently pursuing environmental services certification through the Plan Vivo scheme, allowing the project to generate revenue from credit sales.

Additionally, nine villages in Banama Tingang Sub-district have started initiatives to establish *Hutan Desa*. The target is to have the verification process complete by 2015. Creating hutan desa in the buffer zone of Sebangau National Park is also being pursued.

A © Benjamin Tular GGGI
B © CARE international indonesia

Desired results

A network of at least 13 village forests established and managed effectively.

F 2

KEY ACTIONS

01 Strengthen the capacity of existing *Hutan Desa* institutions (*Lembaga Pengelola Hutan Desa*, LPHD). The NGOs that supported the establishment of the four *Hutan Desa* in the Kahayan Hilir sub-district require further resources to increase their management capacity and implement the management plans.

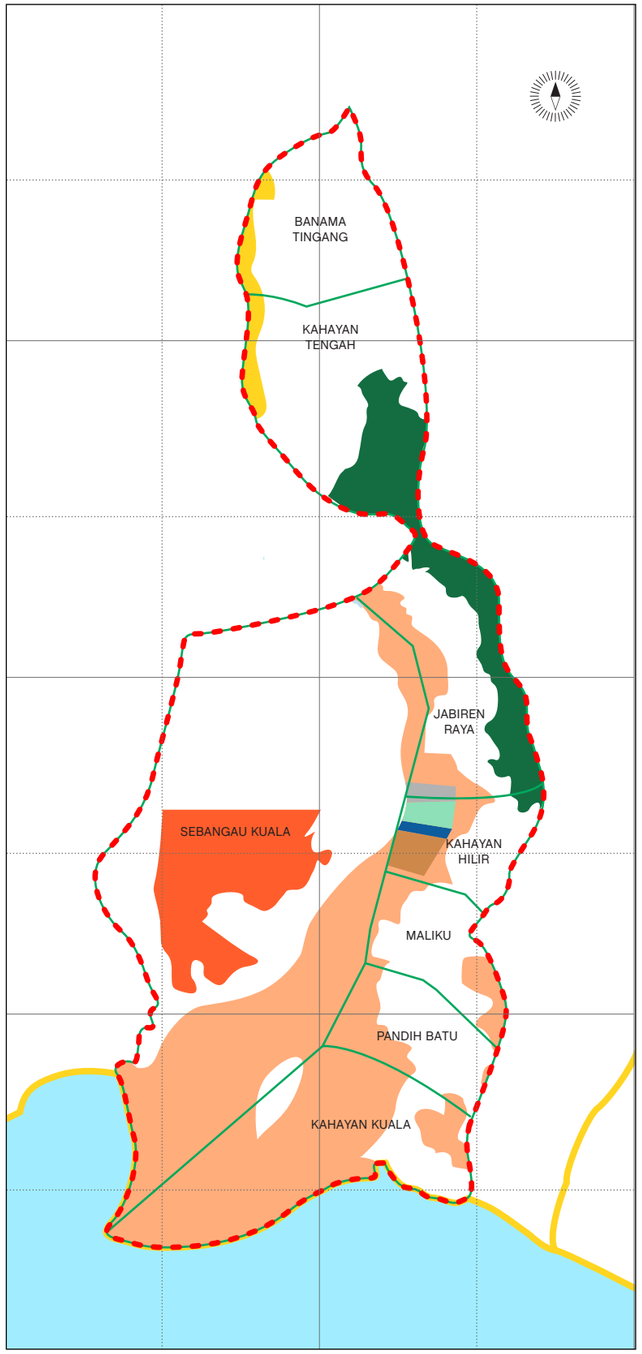
02 Establish new *Hutan Desa* as proposed by nine communities in Banama Tingang sub-district. This should be based on lessons learned from the existing four *Hutan Desa* in Kahayan Hilir sub-district. In addition, a districtwide village forest network and a business cluster based on the sustainable utilization of forest resources should be established.

03 Implement the community-based forest management plan, including managing multiple revenue streams, such as the sale of NTFPs, selective logging, ecotourism, and potentially payments for ecosystem services (PES). This will require gaining access to global markets, where appropriate, and re-investing the revenue into the community-based enterprises. Therefore it is important to assess potential business opportunities and supply chains related to forest products.

04 Create links between management institutions, communities, and commercial markets to establish supply chains for potential products. The creation of community enterprises based on the sustainable utilization of local resources will foster community economic development, but support from local government and other relevant parties is required to develop commercial products and overcome the high costs associated with entering new markets.

05 Provide seed investment and facilitate access to financial institutions to support *Hutan Desa* activities. Before income may be generated from community forestry, the *Hutan Desa* will need financial support to implement initial activities. Financial support may come from various funding sources such as philanthropic funding, CSR funding from private sector operators in the district, impact investors, commercial or development banks, or other financial institution.

Figure 7 — Map of existing hutan desa and potential KPH in Pulang Pisau



Identified locations for green growth interventions

Based on the 'KPH technical design map' issued by the Central Kalimantan Forestry Agency, there are four KPHs planned in Pulang Pisau; two production (unit 22 and 27) and two protection (unit 23 and 26), see Figure 7. The district government plans to first establish a production KPH (KPHP) by 2015, followed by a protection KPH (KPHL) and then the other two. For the community-based forestry mangement, district government will focus on institutional strengthening for the existing four village forests in Buntoi, Gohong, Kalawa, and Mantaren I, and also support the new proposal for the village forest establishment at 9 villages in Banama Tingang sub-district.

Key stakeholders

The planning and implementation of all the strategy's interventions will require a collaborative effort between all levels of government, private companies, communities and other stakeholders. Any changes to the level of government that is responsible for managing this sector related to Law 23/2014 will need to be considered before implementing this strategy. This section identifies the key stakeholders in the forestry sector.

Government

At the government level, there are a few key stakeholders for the interventions outlined in this report. First, the Forestry and Plantation Agency of Pulang Pisau District is responsible for the development of the forestry and plantation sector in the district. The interventions and activities proposed in this strategy are well aligned with the Agency's RENSTRA.

At the provincial and national level, the Forestry and Plantation Agency of Central Kalimantan Province is responsible for preparing the technical design of the KPH in Pulang Pisau.[34] Further, this design should take into account recommendations from Pulang Pisau district head as well as data and information provided by Forest Gazettment Agency Region XXI. The Sebangau National Park Management Unit (under Ministry of Environment and Forestry) also will be as one of key partner in Pulang Pisau.

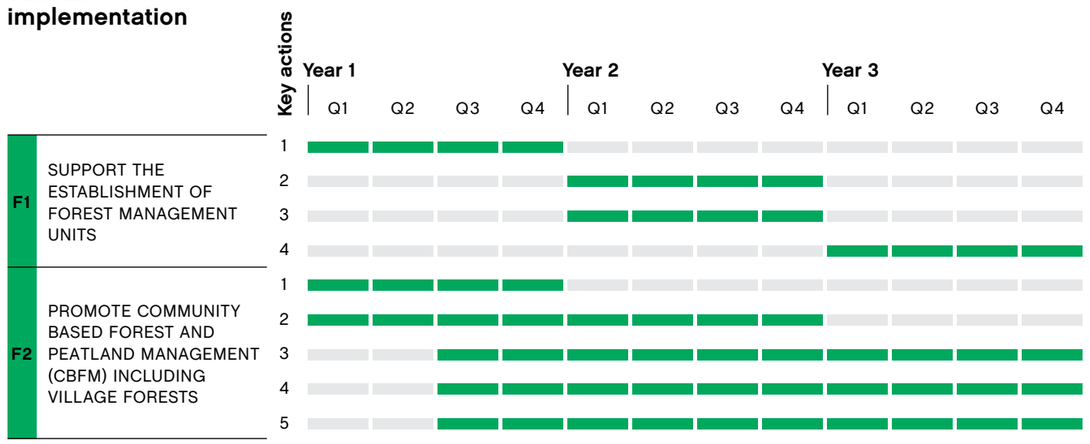
Private

At the commercial level, it is important to encourage private sector to invest in the restoration concession and REDD+ project as the district has vast area of peatland that playing important role in achieved Indonesia emission reduction target. Furthermore the oil palm plantation companies that operate in the district could support development of *Hutan Desa* through their CSR programs. Some of the palm oil companies in Pulang Pisau are PT. Suryamas Cipta Perkasa, PT. Menteng Kencana Mas, PT. Karya Luhur Sejati and PT. Bahaur Eka Sawit Tama.

Other

Within civil society, there are a number of NGOs supporting community forestry initiatives in the district, including *Kelompok Kerja Sistem Hutan Kerakyatan* (POKKER-SHK) and *Yayasan Betang Borneo* (YBB). In 2013, these two NGOs, in collaboration with *Kemitraan* (Partnership Reform), organized training for Village Forest Management Institution in Buntoi. WWF also actively supports the development of community-based ecotourism and a REDD+ project in the Sebangau National Park.

Timeline for implementation



5.2 Aquaculture

RATIONALE

Aquaculture is the fastest growing food production system in the world[35] and is already a substantial economic sector in Pulang Pisau, contributing 8.1% of the district's GDP in 2013.[36] In 2007 Pulang Pisau had the largest share of Central Kalimantan's fishery production (15,889 tons or 18%)[37] and its key commodities were tiger shrimp, *vanamei* shrimp, milkfish and crab.[38] The district has significant potential for further developing its aquaculture sector with roughly 86,000 ha of brackish water and pilot schemes already operating in Kahayan Kuala sub-district.[39]

The district government hopes that the aquaculture sector will play a growing role in Pulang Pisau's economic development, while providing livelihoods for many smallholders and ensuring food security.

However, aquaculture is a major driver of mangrove loss,[40] particularly in Indonesia, where over 50% of mangroves have been cleared for the establishment of shrimp and milkfish.[41] Mangrove destruction creates multiple risks due to the important goods and services that these fragile ecosystems provide to economies. In particular, mangroves support coastal stability, providing a natural defense to storms and sea swell, and food security, with as much as 80% of global fish catches in the coastal and marine areas linked to the mangrove ecosystem. The results of converting mangroves to aquaculture are often counterproductive. For example, mangrove clearing for shrimp aquaculture in the Mahakam Delta and Bulungan-Tarakan in East Kalimantan led to shrimp pond productivity declining from 400 kg/ha/year to less than 100 kg/ha/year due to water quality issues.[42] As seafood demand is likely to increase throughout Indonesia in the coming years due to population growth, a new approach is needed that allows mangroves and aquaculture to coexist in a sustainable way.

In Pulang Pisau, fish production, including both wild fisheries and aquaculture, has been identified as a strategic sector for the district. In particular, the district government hopes that the aquaculture sector will play a growing role in Pulang Pisau's economic development, while providing livelihoods for many smallholders and ensuring food security at both the provincial and district level. Currently, 1,800 ha of ponds have been established, in which 600 ha were established by government using regional budget (APBD) in 2006, including 20 km of channels. The remaining ponds were established by community members. This development has increased the production and created jobs in the area. Aligned with this, coastal and in-land aquaculture expansion is one of the district government's key development agendas[43] and vast areas suitable for production have been identified.[44] The district has already conducted a feasibility study on aquaculture development and translated the result into a master plan of *minapolitan* development of Pulang Pisau. Since expansion of aquaculture often can lead to disruptions of the coastal ecosystems, particularly mangroves, development of the sector needs to be conducted with strong safeguards in place. Currently the sector's environmental degradation is caused by poor understanding of aquaculture best practices and the impacts of mangroves degradation on production.

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Currently there are roughly 25,762.79 ha of mangroves in the district, distributed throughout the coastal area, particularly in the Hambawang, Bakau and Cemantan areas. These mangrove belts vary between 200 to 700 meters wide. However, these areas could be threatened for clearing as demand for aquaculture products increase. Shrimp and fishponds in Pulang Pisau could be potentially developed in Kiapak, Papuyu III, Cemantan, Sei bakau and Sei Hambawang villages (in Kahayan Kuala sub-district). With a potential area of around 43,000 ha, currently only 1,800 ha areas (4.19%) have been developed into ponds, with main commodities are tiger shrimp, milkfish and crab.[45]

The biodiversity value of Pulang Pisau's coastal areas is relatively low and prone to the disturbance from natural and human activities.[46] Therefore, the district will need to balance its goal of aquaculture expansion and ensure that production systems do not collapse due to environmental degradation. From a climate change perspective, mangroves are also among the most carbon-rich forests in the world and store two to four times more carbon than their better-known and better-protected counterpart, tropical rainforests.[47] Protection of these areas aligns with the province's strategy to reduce emissions from deforestation and forest degradation (REDD+). By highlighting examples of where healthy mangroves and good aquaculture practices have led to a better aquaculture production and diversification of income, farmers can be encouraged to adopt better practices, and mangrove degradation trends in the region can be improved.

OVERVIEW OF GREEN GROWTH INTERVENTIONS

The Pulang Pisau government hopes that in the near future, the aquaculture sector will be one of main contributors to economic development in the district and provide an increasing number of employment opportunities for local communities. Aquaculture has also been identified as a priority for ensuring food security at the provincial and district level. However, the expansion of aquaculture farms can cause serious local and global environmental impacts, which will ultimately undermine the sustainability of the district's growth. On the other hand, when done properly, aquaculture can play a vital role in biodiversity conservation, serve as an additional livelihood for communities participating in conservation efforts and provide incentives for protecting key habitats or species. In order to integrate aquaculture development and mangrove conservation, this strategy proposes the following three interventions.

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A1

Establish silvofishery systems in appropriate mangrove ecosystems

Silvofishery systems integrate community-based aquaculture into mangroves ensuring that sufficient coverage of the mangrove forest is maintained to ensure a fully functioning ecosystem. This approach is not appropriate for all mangroves, so target areas for silvofisheries development need to be determined using spatial analysis. Following site selection, the most appropriate type of silvofishery system must be selected based on the environmental characteristics and carrying capacity of the area. Finally, the chosen locations must be incorporated into the district spatial plan in order to provide clear legal base to the small-scale farmers.

A2

Develop a district-level regulation on sustainable aquaculture

While Indonesia's national policy framework encourages the sustainable use of aquatic resources and mangrove ecosystem management, a district regulation would provide incentives, technical support and capacity building for sustainable aquaculture. This would include the development of clusters, outlining specific tenure policy for aquaculture and supporting certification, to be followed by close monitoring for compliance with the regulation.

A3

Introduce better management practices (BMPs) for aquaculture

BMPs promote the sustainable production of aquaculture commodities, as well as improving market and financial access. A value chain map for each of the district's aquaculture commodities will identify the key actions to increase for small-scale fishers' incomes. After a BMP module has been developed specifically for Pulang Pisau's aquaculture sector, this will be socialized with small-scale fishers in the district, with a focus on strengthening existing or establishing new fishery groups and connecting fishery groups with buyers. Finally, as BMPs can reduce mangrove deforestation, thus avoiding CO_2 emissions, options for carbon finance should be explored.

Desired green growth outcome

> An efficient and sustainable aquaculture sector that produces high-quality, high-value products in the appropriate locations.
>
> — Ir. H. Riduan Syahrani
> Head of Marine Affairs and Fishery Agency, Pulang Pisau district

Table 4 — A dashboard of green growth performance indicators for the aquaculture sector in Pulang Pisau district

No.	Indicator
1	Annual change in aquaculture contribution to GDP (IDR)
2	Direct investment in the aquaculture sector (IDR)
3	Annual change in production levels of aquaculture commodities (ton/year)
4	Families working in the aquaculture sector (#)
5	Area of mangroves (ha)
6	All aquaculture concessions comply with spatial plan (Y/N)

A1

Aquaculture 1

Establish silvofishery systems in appropriate mangrove ecosystems

a

Background

A sustainable alternative to aquaculture pond development in mangrove ecosystems is silvofishery, which is a form of low input aquaculture that integrates mangrove tree culture with brackish water aquaculture.[48] In a silvofishery system, the cultivation practice mimics natural ecosystem functions, requiring less resource inputs and resulting in fewer negative environmental damage.[49] Such an integrated system aims to increase the efficiency, avoid the use of chemicals and medicinal products, decrease waste generation and promote recycling of nutrients. Silvofishery systems integrate conservation and utilization approaches, maintaining mangroves in a relatively intact state while capitalizing on the economic value of brackish water aquaculture.

Developing a silvofishery system requires spatial analysis that takes into account environmental, social and cultural parameters to identify suitable locations for different aquaculture commodities. Any silvofishery programs should also be incorporated into the appropriate coastal plans, recognizing the socio-economic objectives, environmental characteristics and carrying capacity of the area. The silvofishery approach is a labor-intensive system that is most suitable for individual, family and community operations.[50] Also, silvofishery systems are not appropriate for every location, so the community, private sector and government should carry out an evaluation of the investment costs and the potential value of commodities of the alternatives to make an informed decision.

The implementation of silvofishery increases the revenues of the small-scale fishers while diversifying the direct products from mangroves, e.g. firewood. This integrated approach can significantly reduce potential conflict over the use and protection of natural resources, while ensuring that mangroves continue to provide important ecosystem services, including carbon sequestration, coastal stability and breeding grounds for marine fisheries. In addition, silvofishery systems have the potential to create more job opportunities compared to other aquaculture systems.[51]

b

Baseline

The recent district-level strategic environmental impact assessment (*Kajian Lingkungan Hidup Strategis*/KLHS), supported by the USAID IFACS program, has identified extensive deforestation of secondary mangrove forest in Pulang Pisau. In 2010 – 2011, 14,992 ha of mangrove were lost, highlighting the urgent need to stop the deforestation in mangrove ecosystems.[52]

The Pulang Pisau government has already conducted a spatial assessment for the development of the aquaculture sector in coastal and in-land areas. However, the government does not have a concrete strategy to ensure the sustainability of aquaculture farm construction and operations. Mangrove rehabilitation has been discussed but no appropriate approach has been determined yet.

A © Benjamin Tular GGGI
B © Humaspro Pulang Pisau

Desired results

At least 1,000 ha of silvofishery systems established in appropriate areas.

A1

KEY ACTIONS

01 Determine target areas for silvofisheries using spatial analysis to ensure that plans are in line with the area's carrying capacity, e.g. using a siting tool. The analysis should estimate the interaction of the biodiversity, biophysical and hydro-physical parameters to identify specific sites most suitable for certain aquaculture commodities or activities. Note that each type of aquaculture differs significantly in its needs for space and natural resource use.[53]

02 Determine the most appropriate type of silvofisheries for a particular area by identifying the environmental characteristics and carrying capacity of the area. This is important because silvofisheries development entails large-scale modification of the landscape and capability to manage the pond as a 'small ecosystem' during the production cycle. Key factors should be considered to ensure the most suitable silvofisheries model for the area, including mangrove type and distribution, mangrove to water ratio, elevation, distance from water sources etc.

03 Conduct cost-benefit assessment to evaluate the investment costs and the potential value of commodities produced in a silvofisheries pond compared to an extensive aquaculture pond. This will help the community, private sector and government to make informed decisions.

04 Incorporate the land suitability map into the district spatial plan. The map will serve as a guidance that has a clear legal base to provide security to those who apply it.

A2

Aquaculture 2

Develop a district-level regulation on sustainable aquaculture


a


b

A © Sukses Mina
B © Indeks Budidaya

Background

The fishery policies of many developing countries often include regulations that encourage the intensification and expansion of aquaculture;[54] however, this is not the case in Indonesia. The sustainable use of aquatic resources in fisheries' development is emphasized in the Fisheries Law No. 31/2004 and it is the responsibility of the provincial government to implement the law on the management, use and conservation of marine resources. More specifically, the development of aquaculture ponds in mangrove ecosystems must comply with the Presidential Decree No 73/2012 on the national strategy on mangrove ecosystem management.

Considering the government regulation No. 38/2007 on the division of government affairs, district governments can build on the existing policy framework to create a regulation that encourages investment in aquaculture, while minimizing the sector's externalities. This could include promoting the development of aquaculture cooperatives and clusters, outlining a specific tenure policy for aquaculture development, providing licenses to communities that are committed to sustainable aquaculture, implementing community-based fishery management practices and supporting certification arrangement, such as good fishery practices certificate (*Sertifikat Cara Budidaya Ikan yang Baik*/CBIB).[55]

A district regulation on sustainable aquaculture would aim to avoid the current exploitation practices, which causes irreversible damage to the environment and long-term consequences for the economy and human welfare. The regulation will minimize the disturbances to important coastal ecosystems, which help protect marine biodiversity and support the reproductive capacity and distribution of fish species. In addition, the regulation will also help create sustainable livelihoods while supporting food security.

Baseline

The Pulang Pisau government has developed a draft of district regulation on fisheries (*rancangan peraturan daerah tentang perikanan*), which has already been submitted to the district parliament. Prior to this, the Pulang Pisau government developed a comprehensive *minapolitan* master plan for the establishment of fisheries and aquaculture;[56] however, this plan has not yet been implemented.[57] Policy frameworks on sustainable fisheries and aquaculture exist,[58] but the district government is not providing sufficient support to promote sustainable aquaculture. For example, the district government plans to develop a mid- to large-scale fishery industry cluster in Kahayan Kuala but this has not happened yet. Moreover, no NGOs have supported the development of coastal aquaculture sector in Pulang Pisau.[59]

Desired results

All new aquaculture farms comply with district regulation on sustainable aquaculture.

A2

KEY ACTIONS

01 Review the district's current draft regulation on the fishing sector and ensure that environmental and sustainability safeguards are included. This will require a close coordination with the district's parliament to ensure that the establishment or expansion of aquaculture activities will have positive economic and environmental impacts.

02 Advocacy work to support the enactment of the regulation by the district government and/or parliament.

03 Enforce the regulation and monitor compliance. Once the regulation is enacted, the government can focus on site permitting, certification for good fishery practices and regular evaluation of permit holders.

A3

Aquaculture 3

Introduce better management practices (BMP) for aquaculture

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Background

Better management practices (BMPs) for aquaculture provide detailed guidance on pond construction, pre-harvesting (i.e. operations) and post-harvesting (i.e. processing) of aquaculture commodities. BMPs are specific for each type of aquaculture practice and commodity, are based on best available scientific knowledge and are designed to be realistic based on the capacity and knowledge of local farmers.[60] At the same time, BMPs need to be relatively adaptable and allow for changing conditions.[61] Furthermore, increased awareness of the environmental consequences of unsustainable aquaculture has spurred a growing interest in certified aquaculture products.[62]

Training people in the use of BMPs is critically important to ensure the sustainability of aquaculture. Effective training approaches include field schools that support equitable and inclusive participation, particularly from women and under privileged farmers. Field schools are particularly effective when connected to demonstration plots to provide a model that can be emulated by other farmers. Training on how to comply with certain certification standards, e.g. CBIB, is important and should be done in collaboration with the private sector. Finally, the value chain approach should be applied to promote social responsibility and equity, fair prices, safe working conditions, as well as inclusive management and decision-making processes.

It is expected that BMPs empower the coastal communities who are primarily responsible for managing local resources. This can directly reduce pollutants caused by the release of large quantities of nitrogen and phosphorous, and the dumping of uneaten fish feed. The application of BMPs will increase the productivity of aquaculture, directly supporting food security. If management practices comply with certain standards, then the selling price of aquaculture commodities will increase and access to markets will improve. Finally, BMPs can reduce GHG emissions (e.g. having 50% of small-scale traditional aquaculture ponds forested with mangroves), so carbon-financing options should be explored.

Baseline

In Pulang Pisau's medium-term development plan, the district government defines the aquaculture's sector's key objectives as improved productivity, market access and facilities.[63]

However, to date no NGOs or development partners have worked in Pulang Pisau to support aquaculture BMPs, so training for small-scale fishers remains a challenge. Nevertheless, there are a number of existing modules on aquaculture BMPs that can be used to develop training modules specifically designed for Pulang Pisau district.[64]

Desired results

At least 25% of aquaculture farmers adopt better management practices and apply for sustainable aquaculture certification.

A3

KEY ACTIONS

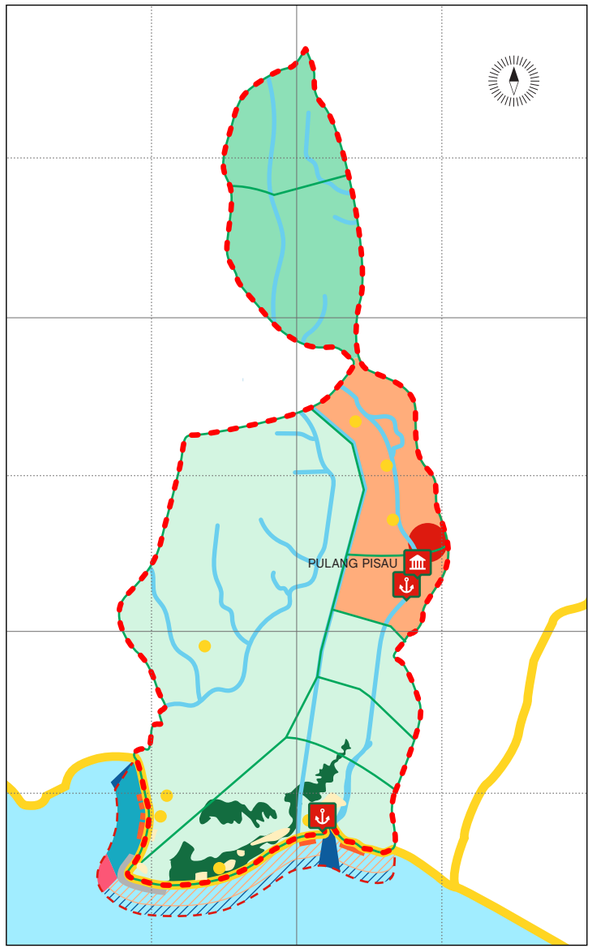
01 Create a value-chain map for each commodity to identify the critical points where incremental changes in management practices can result in substantial increases for small-scale fishers' incomes.

02 Develop BMP module that is site- and commodity-specific for Pulang Pisau.

03 Provide technical training and mentoring to enable small-scale fishers to apply BMPs and/or certification for small-scale farmers. This will include training the trainers (ToT), strengthening existing or establishing new fishery groups, implementing the field school program and connecting fishery groups with buyers.

04 Explore carbon-financing options and gather necessary information on mangrove forest deforestation rates and deforestation drivers in the project areas.

Figure 8 — Potential areas for aquaculture development



- Marine aquaculture
- Marine tourism
- Fisherman village
- Port
- River dock
- Production center
- Mangroves
- Rivers
- Sea boundary
- Aquaculture priority area
- Development area I
- Development area II
- Development area III
- National shipping lane
- Traditional fishing IA
- Traditional fishing IB
- Rumpon
- Marine conservation zone

Identified locations for green growth interventions

Pulang Pisau's Marine and Fishery Agency has conducted a feasibility study to determine zoning management and potential areas for *minapolitan* development, which can be a basis for the aquaculture establishment in the district. The study took into account the bio-physical, socio-economic and legal status of the land. Based on this feasibility study and public consultation, the area planned for brackish water aquaculture in Pulang Pisau district covers 6,017 ha, including areas near Papuyu III, Cemantan (nearby Sawo River), Sei Hambawang, Sei Bakau and Kiapak.[65, 66] The feasibility study states that these ponds must be located behind the coastal area and should not involve the conversion of mangrove forest. The results of the feasibility study have been compiled in Figure 8.

Based on the district's spatial plan, minapolitan development is divided into three "development areas,"[67] comprising of:

- **Development Area I**
  The area around Pulang Pisau City
- **Development Area II**
  The area around Bawan City
- **Development Area III**
  Comprising of Kahayan Kuala, Pandih Batu, Maliku and Sebangau Kuala, with Pangkoh as its development center

In addition, the minapolitan master plan, specifies two traditional fishing zones:

- **Traditional Fishing Zone IA**
  (0-3 nautical miles from beach) for fisherman with unmodified fishing gear and traditional boat without motor with length not more than 10m
- **Traditional Fishing Zone IB**
  (3-4 nautical miles from beach) for fisherman with modified fishing gear, fishing boat with or without motor and length not more than 12 vtm or 5 GT, and purse seine with size less than 150 m.

Key stakeholders

The planning and implementation of all the strategy's interventions will require a collaborative effort between all levels of government, private companies, communities and other stakeholders. Any changes to the level of government that is responsible for managing this sector related to Law 23/2014 will need to be considered before implementing this strategy. This section identifies the key stakeholders in the aquaculture sector.

Government

The aquaculture interventions will be led and coordinated by Pulang Pisau's Marine Affairs and Fishery Agency (*Dinas Kelautan dan Perikanan*/DKP). Other local government bodies that need to be involved are BAPPEDA and the Environmental Agency (*Badan Lingkungan Hidup*/BLH) to integrate the initiative with other government programs, and Public Works Agency (*Dinas Pekerjaan Umun*/DPU) for infrastructure development and spatial planning. The proposed regulation on sustainable aquaculture will need to be approved by the district parliament.

Collaboration will also be required with the provincial-level government, through Marine Affairs and Fishery Agency. At the national level, the main fisheries authority in Indonesia is the Ministry of Marine Affairs and Fisheries and this strategy will require engagement with the Directorate-General of Aquaculture Development.

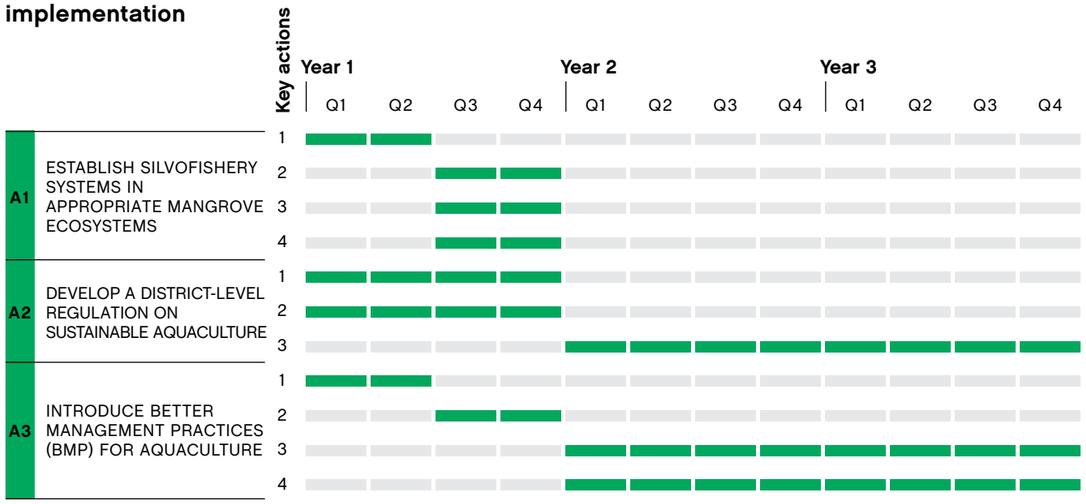
Private

The majority of marine and coastal fishery products from Pulang Pisau are sold to traders from Banjarmasin, South Kalimantan, who then re-sell the products to consumers in Central Kalimantan. The remaining wild fishery and aquaculture products are sold at a fish auction site (*Tempat Pelelangan Ikan*/TPI) in Kahayan Kuala sub-district. The TPI is managed by the district's Marine and Fishery Agency, who then sell the products to smaller fish-sellers in traditional markets. There are no fish factories in Pulang Pisau district or neighbouring Palangka Raya. However, some companies such as PT. Ebi Mas Besar, PT. Kalimantan Fishery, PT. Kalimantan Raya Megah Fishery, which are all located in Banjarmasin City could be potential partners for this strategy.

Other

NGOs can play a vital role as community engagement or facilitator. The district's government can invite and provide written recommendation to the targeted NGOs who have experiences on implementing projects related to aquaculture development.

Timeline for implementation



5.3 Plantations

RATIONALE

As the backbone of the economy, the development of the plantations sector is a key focus of the Pulang Pisau government. Contributing 22% to the district's GDP, plantations were the largest economic sector in 2013.[68]

Rubber, predominantly produced by smallholders, is one of the district's main commodities, with a total planted area of 38,166 ha in 2013, compared to coconut (16,437 ha) and coffee (845 ha).[69] Pulang Pisau's total planted area of palm oil is unclear due a number of plantations operating without the necessary licenses; however, the total area of the district's 15 palm oil concessions is 166,198 ha (approximately 18% of the district's total area).[70] Four of these concessions are currently active, covering an area of 79,973 ha, and are in the process of obtaining land cultivation rights (*Hak Guna Usaha*/HGU).

The district has set the vision to establish sustainable plantations while improving local community income from the sector.

In 2013, there were a total of 21,625 agriculture households (*Rumah Tangga Pertanian*/RTP) in Pulang Pisau district,[71] of which 15,641 of them owned small-scale plantations.[72] About 53% (or 11,537 households) of the total RTP population cultivated rubber while 24% (or 5,188 households) planted coconut.[73] Moreover, about 12% (or 2,544 households) and 4% (or 895 households) of the total RTP cultivated coffee and oil palm, accordingly.[74]

Unclear land status and boundaries in the field have become a key challenge for the sustainable expansion of oil palm. As a result, it is hard to differentiate the land clearing process from unregulated destruction of forest, peatlands, and protected ecosystems. The requirement to obtain a HGU issued by the National Land Agency prior to concession's operation, has also been challenging due to this land status issue. Consequently, there is uncertainty related to community and company rights. Many investors decide that this uncertainty is too great a risk and decide not to invest. Therefore, resolving the spatial plan and improving the license system in the plantation sector should be a priority and integrated into forest and peatland governance.

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This could help improve the performance of the plantation sector, particularly in the aspect of social and environmental impact management, which would create an attractive environment for investors in the long term. In 2013, communities from 15 villages in Pulang Pisau demonstrated against a large-scale oil palm concession as the proposed concession was on land owned by the local community and customary forests.[75] Considering that there are many more areas allocated for large-scale palm oil plantations, resolving land ownership by completing district's spatial and carrying out a comprehensive license review are prerequisites to further expansion of the sector (see cross-cutting chapter).

The conversion of peatland into oil palm plantation usually involves a drainage process and clearing above-ground biomass. This process causes significant environmental damage, both due to the release of CO_2 stored in the peat and land subsidence, which leads to decreasing productivity and abandonment of land for agriculture production.[76] These reasons highlight that developing plantations on deep peat is inappropriate.

Smallholder commodity production in Pulang Pisau is generally extensive rather than intensive, resulting in low productivity of rubber (400 kg/ha/year), coconut (1,000 kg/ha/year) and coffee (150 kg/ha/year).[77] Low yields across these commodities result from farmers using poor quality seeds and a lack of technical expertise.[78] The absence of farmer cooperatives limits the bargaining power on the farmers' side,[79] while there are also specific challenges related to each of these commodities:

- There is great variation in rubber cultivation practices in the district, with many farmers adopting a 'jungle rubber' system, which involves very little active management. Many rubber farmers also have limited market access due to limited number of rubber factories in the district, resulting in farmers having to sell to middlemen at lower prices.[80] Two rubber factories have been established and both are expected to operate from the mid-2015. In addition, the price has furthered declined due to the practice of mixing raw latex known as bokar (*Bahan Olah Karet*) with water and other substances.[81]
- Coconut farming practices are still traditional with the smallholders using local low yielding varieties with little to no inputs, resulting in far lower yields of dried coconut compared to hybrid varieties. In addition, most farmers sell their coconuts directly to collectors, without any process to convert it to dried coconut (*kopra*) and coconut oil, which have a higher selling price.
- Coffee is traditionally cultivated as the intercropping annual tree with coconut and rubber. In Pulang Pisau, both Maliku and Pandih Batu sub-districts have plantations of robusta coffee, a sturdy species of coffee bean. Despite the land availability, the productivity is low due to limited capital, the acidity of the soil condition and lack of information on market demand.[82]

The district has set the vision to establish sustainable plantations while improving local community income from the sector. To that regard, shifting from agro-business to agroindustry and improving productivity of agricultural commodities are two main missions of the district government in the plantation sector.[83]

OVERVIEW OF GREEN GROWTH INTERVENTIONS

In Pulang Pisau small-scale agriculture is an important part of the economy; however, smallholder plantations are generally extensive and low input. As a result, there is significant potential to improve community-based cultivation by promoting intensification, best management practices and supporting linkages to upstream markets. While rubber is the most important commodity for local livelihoods and further work is required to support the district's rubber farmers, to date there have been limited efforts to support smallholder coconut and coffee plantations to increase productivity, access commodity markets and achieve higher prices. With increasing demand for sustainable palm oil, Pulang Pisau must ensure its palm oil plantations are in line with the requirements of the provincial regulation. In particular, to optimize its land resources, any further palm oil expansion must be in appropriate low conservation value areas, such as degraded lands. This strategy proposes the following interventions to ensure its plantations sector contributes towards green growth.

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P1

Improve the performance of smallholder rubber, coconut and coffee plantations

Training smallholder farmers to adopt better management practices (BMP) can increase their productivity, while reducing emissions and other environmental impacts. Inclusive business approaches (IBA) seek to increase the income of smallholders by promoting the production of high-quality products. Developing a BMP and IBA training curriculum that responds to Pulang Pisau's needs and using farmer field schools to implement a capacity building program can improve the performance of smallholder rubber, coconut and coffee plantations. Establishing a quality based price mechanism will generate additional income for farmers who adopt BMP and IBA approaches, while improving smallholders' access to financial services will allow farmers to afford techniques that lead to higher productivity and higher-quality products.

P2

Support the sustainable expansion of palm oil plantations

Pulang Pisau has the potential to increase its palm oil production levels while avoiding the negative environmental and social impacts often associated with the existing plantations in the district. Carrying out a land suitability assessment, in line with the requirements of the provincial PERDA, will identify degraded or under-productive land with low conservation value for further palm oil expansion. Incorporating the land suitability map into the district spatial plan will provide a clear legal basis for responsible companies to invest in certification, ensuring access to global markets, and the other requirements of the PERDA, such as allocating 20% of the total area to plasma scheme.

Desired green growth outcome

> An efficient and sustainable plantations sector that produces high-quality, high-value agricultural products in the appropriate locations.

— Ir. Slamet Untung Riyanto
Head of Forestry and Plantation Agency, Pulang Pisau district

Table 5 — A dashboard of green growth performance indicators for the plantations sector in Pulang Pisau district

No.	Indicator
1	Annual change in plantation sector contribution to GDP (IDR)
2	Direct investment in the plantation sector (IDR)
3	Annual change in production levels of plantation commodities (ton/year)
4	Jobs in the plantation sector (#)
5	Number of tenure-related conflicts in area for other land uses (#)
6	Annual change in area of degraded land within area for other land uses (ha)
7	All plantation concessions comply with spatial plan (Y/N)

P1

Plantations 1

Improve the performance of smallholder rubber, coconut and coffee plantations

Background

Rubber, coconut and coffee have long been priority agriculture commodities (*komoditi pertanian andalan*) of the Government of Indonesia. However, increased production has often come at the expense of natural forests as smallholder producers utilize extensive farming systems with low yields resulting in inefficient expansion of plantations. A shift in focus to optimize existing productive land through intensification and increased agricultural productivity can ensure productions targets are met without further conversion of natural ecosystems. Developing a sustainable plantations sector by revitalizing smallholder plantations is a priority of Central Kalimantan's STRADA REDD+, while the province's RAD-GRK supports the adoption of better management practices (BMP) to reduce emissions and increase communities' incomes.

A combination of adopting BMP and an inclusive business approach (IBA) can help smallholder farmers to increase their productivity and income levels. BMPs are presented in training modules, each addressing a different agronomic aspect of commodity production. These include improved selection of planting materials (i.e. quality seedlings), appropriate fertilization and plant maintenance, pest control, good processing and environmental awareness.

IBA requires engaging with all market actors to develop inclusive and sustainable supply chains. Collaboration between companies, farmers, district governments and local implementing partners can improve both the quality and quantity of end products. In addition, the establishment of farmers' cooperatives improves their bargaining power and ensures they receive a fairer price.

Enhanced agricultural productivity through increased land use efficiency has the potential to drive green growth as higher yields per hectare increase farmers' income and decrease the need for expansion into natural ecosystems. However, increased profits can also incentivize further land conversion, so increased law enforcement to prevent encroachment needs to happen in parallel to productivity gains. BMP also support sustainable approaches to fertilization and pest control that limit the environmental impact of commodity production. Adopting an IBA supports inclusive development by encouraging a fair benefit distribution along the commodities supply chain. The overall impact of this approach is an increase in the plantation sector's contribution to aggregate income while reducing GHG emissions and biodiversity loss caused by deforestation.

Baseline

The intensification for rubber cultivation, specifically on peatlands, and improvements to supply chain have become major concerns of the district government. Under their coordination a range of institution are already working on this area, including the agriculture research agency (*Balai Pengkajian Teknologi Pertanian*, BPTP) and the USAID Indonesia Forest and Climate Support (IFACS) program, which works with Lembaga Dayak Panarung (LDP), Yayasan Cakrawala Indonesia (YCI) and Credit Union Betang Asi. In addition, the Bank of Indonesia has recently begun to provide soft loans for the smallholder farmers. Compared to these numerous rubber initiatives, there has been limited support for coconut and coffee cultivation.

Box 2

Green growth opportunities for other agricultural commodities

Pulang Pisau grows a variety of other agricultural commodities beyond rubber, coconut and coffee that could also benefit from improved stakeholder productivity, for example, albizia, candlenut, sago palm and other fruit commodities. However, it is advised that the intervention primarily targets the commodities that will make the greatest contribution to the district's economy. Therefore, a pre-feasibility analysis of different commodities' potential is necessary prior to the application of this intervention to other commodities.

Desired results

25% of smallholder farmers adopt better management practices and inclusive business approach.

P 1

KEY ACTIONS

01 Create a value-chain map for each commodity by describing organizations, resources and knowledge streams. The objective is to define the relationships and interconnections between the main actors, understand the flow of products, services, information and payments, enhance communication between different stakeholders and identify key leverage points to improve the value chain.

02 Carry out a training needs assessment and develop appropriate capacity building materials for BMP and IBA. This entails a field-based assessment of existing management practices across the supply chain of each commodity. Based on this assessment, a locally appropriate and gender sensitive curriculum and training materials will be developed for each commodity, including guidance on establishing smallholder cooperatives that respond to the needs of the farmers.

03 Pilot and scale-up farmer field schools that use this curriculum to train farmers for each commodity in the selected area. These schools will act as an entry point to improve land management and play as a catalyst towards behavior change from extensive to intensive farming.

04 Develop a quality based price mechanism, which is agreed to by consumers, collectors and farmers. An improved grading and price mechanism that differentiates on quality can directly impact smallholder farmers' income when they change their production approach in line with best practices.

05 Improve smallholder farmers' access to financial services. This is important because the improved supply chain will require better access to financial services to help farmers cope with higher cost of on-farm maintenance, post-harvest application etc.

P2

Plantations 2

Support the sustainable expansion of oil palm plantations

Background

Palm oil is an important commodity for Central Kalimantan and contributes 25% of the province's GDP, generates jobs and provides incomes to approximately 41,380 families.[84] However, palm oil production is often associated with deforestation, which could become an important barrier to accessing international markets, which are increasingly demanding "deforestation-free palm oil". In addition, palm oil plantations on peatland cause significant CO_2 emissions, decrease the provision of important ecosystem services and increase the likelihood of fire. Deforestation could be reduced by increasing the productivity of the existing oil palm plantations and by redirecting the expansion of new plantations onto lands that are already cleared or far below their productive potential. In response to this, the Central Kalimantan government issued a Provincial Regulation (*Peraturan Daerah Provinsi*/PERDA) No. 5/2011[85] to ensure that palm oil plantation development will not cause deforestation or further damage to the surrounding environment. Both the province's STRADA REDD+ and RAD-GRK are aligned with the regulation's goal of preventing further land conversion for plantation expansion.

In order to avoid further expansion into forested areas, suitable areas for sustainable oil palm cultivation must be identified based on the criteria of the PERDA. One approach is to use a siting tool to identify appropriate areas by analyzing a region's biophysical attributes, integrating the results of a high conservation value (HCV) assessment (see cross cutting chapter), and the potential impact of climate change on land suitability.[86] The siting tool produces a Risk Indicator Map, which shows future biophysical suitability combined with an analysis of conservation values. Once suitable locations have been identified for palm oil expansion, the concession holder must follow the requirements of the PERDA, such as allocating 20% of the total area to plasma scheme, engaging the local customary institutions, managing the surrounding environment to prevent wildfires and establishing a transparent registration and monitoring system.

Ensuring that the expansion of oil palm plantations is in line with the provincial PERDA has multiple economic, social and environmental benefits. Certification will guarantee that the palm oil supply will be accepted by the international markets, while also creating a resilient sector with sustainable livelihoods, especially when land and technical support are provided for plasma schemes. In addition, the extra income generated from a productive palm oil sector could allow companies to explore other green growth interventions, such as using palm oil mill effluent to generate electricity (see renewable energy chapter).

Baseline

Pulang Pisau has faced numerous issues related to the expansion of oil palm sector that include illegal forest opening, destruction of peatlands and protected ecosystems, as well as conflict with the local community.[87, 88] Two of the main causes of these problems are unclear boundaries of protected and conservation areas, along with the ongoing opening of areas to make room for oil palm plantations.

In order to resolve these issues, the district government has undertaken a strategic environmental impact assessment (*Kajian Lingkungan Hidup Strategis*/KLHS) (see cross-cutting chapter), which is supported by USAID's IFACS program.[89] The KLHS has already been approved by the district head, while the draft of district regulation on the KLHS is waiting for endorsement and approval from the district legislature. Once the KLHS has been legalized through a district regulation, the government will use it as the input to the district spatial plan (*Rencana Tata Ruang Wilayah Kabupaten*/RTRWK).

Although it provides useful information to support the sustainable expansion of the palm oil sector in Pulang Pisau, the KLHS does not focus exclusively on palm oil, so more detailed spatial analysis is still needed.

Desired results

New palm oil plantations created in appropriate locations.

P2

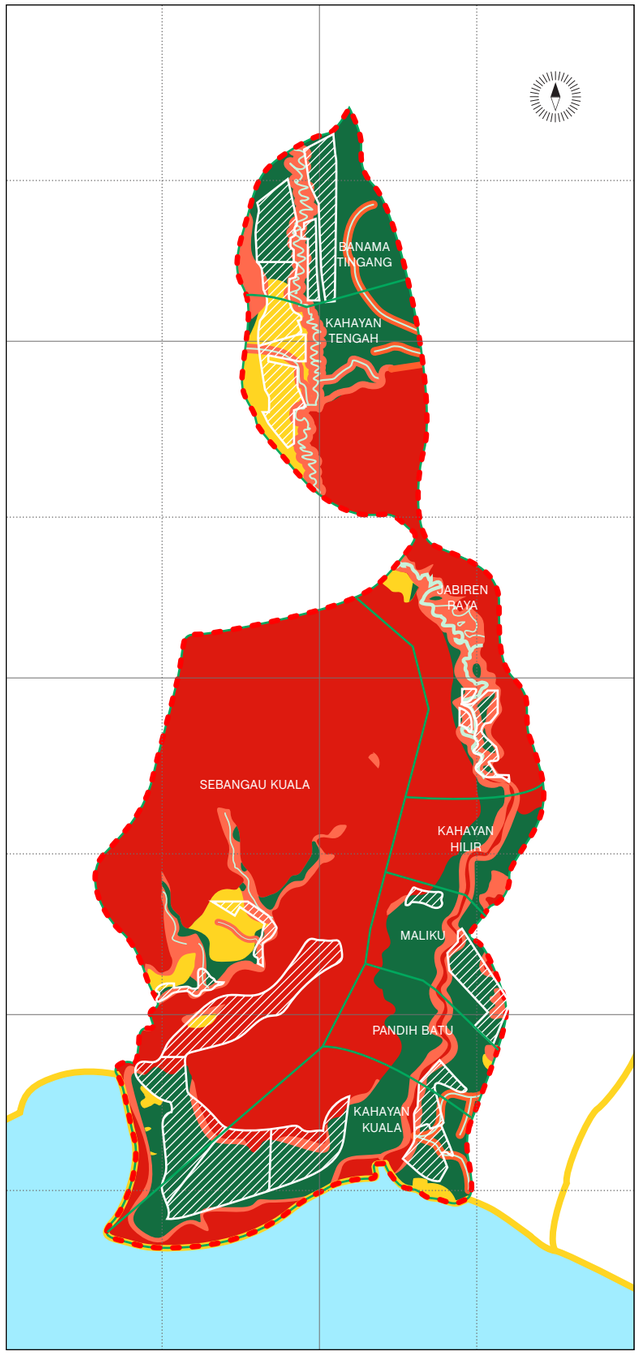
KEY ACTIONS

01 Carry out a land suitability assessment for palm oil that is based on the provincial PERDA definition on palm oil expansion, such as lands that are already cleared or far below their productive potential.

02 Incorporate the land suitability map into the district spatial plan. Once the palm oil suitability map has been developed, it should then be integrated within the district spatial plan. Thus, the map will serve as a guidance that has a clear legal base to provide security to those who apply it.

03 Support the expansion of oil palm plantations by considering provincial regulation mandates, such as assisting the company to allocate 20% of the total area to plasma scheme, managing the surrounding environment especially to protect it from wildfires, engaging the local customary institution within a transparent registration and monitoring system.

Figure 9 — Pulang Pisau HCV risk indicator and palm oil concessions



Identified locations for green growth interventions

Rubber plantations are spread across all of the sub-districts in Pulang Pisau. However, Kahayan Hilir, Jabiren Raya, Banama Tingang and Kahayan Tengah sub-districts will be the priority areas for the rubber intervention, as the rubber plantations are mostly located in these sub-districts. The coconut intervention will focus in Kahayan Kuala, Sebangau Kuala, Pendih Batu and Maliku sub-districts, while the coffee intervention will be focused in Pandih Batu and Maliku sub-districts.

The results of an initial risk assessment, see Figure 9, show that the palm oil intervention should be focused in Kahayan Hilir, Kahayan Luala, Maliku and Pandih Batu sub-districts. This risk assessment took into consideration peat depth and likely future variations in climate.

Key stakeholders

The planning and implementation of all the strategy's interventions will require a collaborative effort between all levels of government, private companies, communities and other stakeholders. Any changes to the level of government that is responsible for managing this sector related to Law 23/2014 will need to be considered before implementing this strategy. This section identifies the key stakeholders in the plantation sector.

Government

The interventions within the rubber, palm oil, coconut and coffee will be led and coordinated by Pulang Pisau's Forestry and Plantation Agency (*Dinas Kehutanan dan Perkebunan*/DISHUTBUN). Other local government bodies that need to be involved are Development Plan Agency (*Badan Perencanaan Pembangunan Daerah*/BAPPEDA) to assist the integration of this program and proposed spatial plan for palm oil with other government initiatives, such as PNPM Mandiri Perdesaan. The Industry and Commerce Agency (*Dinas Perindustrian, Perdagangan, Koperasi, Usaha Mikro, Kecil dan Menengah*/DISPERINDAKOP dan UMKM) is also important for the provision and increased market opportunities for the selected commodities.

Collaboration will also be required with the provincial-level DISHUTBUN, BAPPEDA, ad-hoc Spatial Plan Coordination Office (*Badan Koordinasi Penataan Ruang Daerah*/BKPRD), the provincial National Land Agency (*Badan Pertanahan Nasional*/ BPN Provinsi) for the proposed spatial plan work. At the national-level, coordination is needed with the Ministry of Agriculture (*Kementerian Pertanian*), which is in charge of the plantation and commerce of agriculture commodities, the Ministry of Environment and Forestry and the Ministry of Agrarian and Spatial Plan (*Kementerian Agraria dan Tata Ruang*) should also be involved.

Private

In case that the government can facilitate direct selling from the smallholder farmer groups to the processors, then the government can apply the inclusive business approach to improve the market chain.

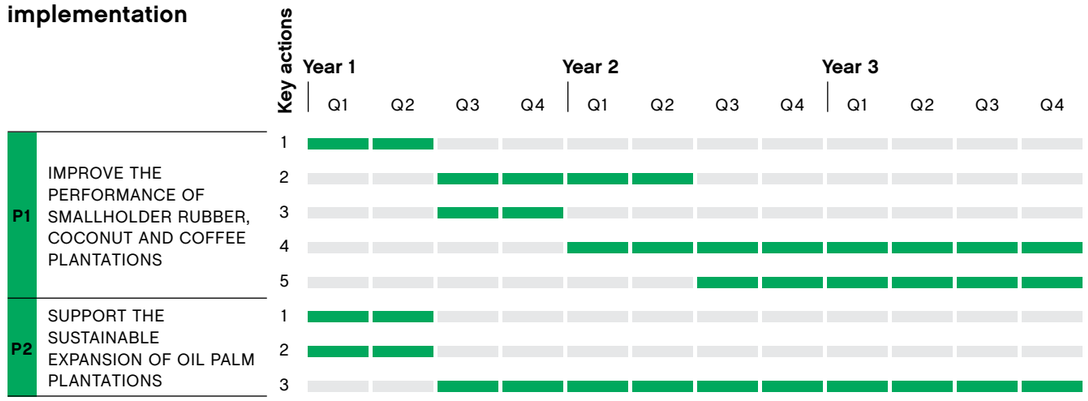
Within rubber supply chain, the pri vate sector plays as processors (factories), such as the new rubber factory in Pulang Pisau namely PT. Kahayan Berseri, and PT. Borneo Abadi. In oil palm supply chain, four active oil palm plantations, PT. Suryamas Cipta Perkasa, PT. Menteng Kencana Mas (Plasma), PT. Bahaur Eka Sawit Tama and PT. Berkah Alam Fajar Mas can play similar role.

The processors in South and Central Kalimantan are also attached into an association called GAPKI (*Gabungan Pengusaha Kepala Sawit*) for palm oil and GAPKINDO (*Gabungan Pengusaha Karet Indonesia*) for rubber. These institutions can be an important partners for government as they responsible for providing input for pricing and sharing the daily price of rubber to the media.

Other

NGOs can play a vital role in community engagement or facilitation. The district government can invite and provide written recommendation to the targeted NGOs who have experience of implementing projects related to sustainable commodity development. At the village-level, the program needs to be owned by the smallholder farmer groups, while the University of Palangka Raya should be engaged to contribute ideas taken from their research and expertise.

Timeline for implementation



5.4 Renewable energy

RATIONALE

Electricity in Central Kalimantan is primarily supplied by the state electricity company (*Perusahaan Listrik Negara*, PLN) through the Barito system, which is a high voltage (150 KV and 70 KV) transmission line originating in neighboring South Kalimantan province. This system primarily uses coal to produce electricity and the majority of the load is within South Kalimantan. Central Kalimantan draws 58.3 MW of installed capacity from the Barito system, approximately 20% of the system's total capacity, and the electricity is primarily used in the provincial capital, Palangka Raya, and surrounding Katingan district.[90]

In 2013, the district of Pulang Pisau had 31,500 households[91] of which 24,763 (79%) had access to the electrical grid supply by PLN.[92] This is above the provincial average of 65.1%.[93] However, only 48% of the households in the district have grid access. The remaining households are being served by local electrical grids powered by diesel generators. There are plans to develop a 2 x 60 MW coal-fired power plant in Pulang Pisau with the aim of addressing the current deficit of electricity supply in Central Kalimantan province. However, as the district does not contain significant deposits of thermal coal, most of the supplies for the power plant would need to be imported from outside of the Pulang Pisau, potentially utilizing the Kahayan River.

In Pulang Pisau, many households rely on diesel, kerosene and fuelwood as energy sources for daily needs, such as cooking, lighting and electricity. The result is poor indoor air quality, unsustainable harvests of forested areas, GHG emissions and high household expenses to purchase fuel.

In Pulang Pisau, many households rely on diesel, kerosene and fuelwood as energy sources for daily needs, such as cooking, lighting and electricity. The result is poor indoor air quality, unsustainable harvests of forested areas, GHG emissions and high household expenses to purchase fuel. For communities with limited incomes, the cost of purchasing diesel, kerosene or collecting wood comes at the expense of basic health or education. A typical household in Central Kalimantan spends around IDR 660.000/month on diesel.[94] In terms of health, woman and children are disproportionally affected by poor indoor air quality as they work in badly ventilated spaces, especially during the rainy season, increasing the incidences of chronic respiratory diseases.

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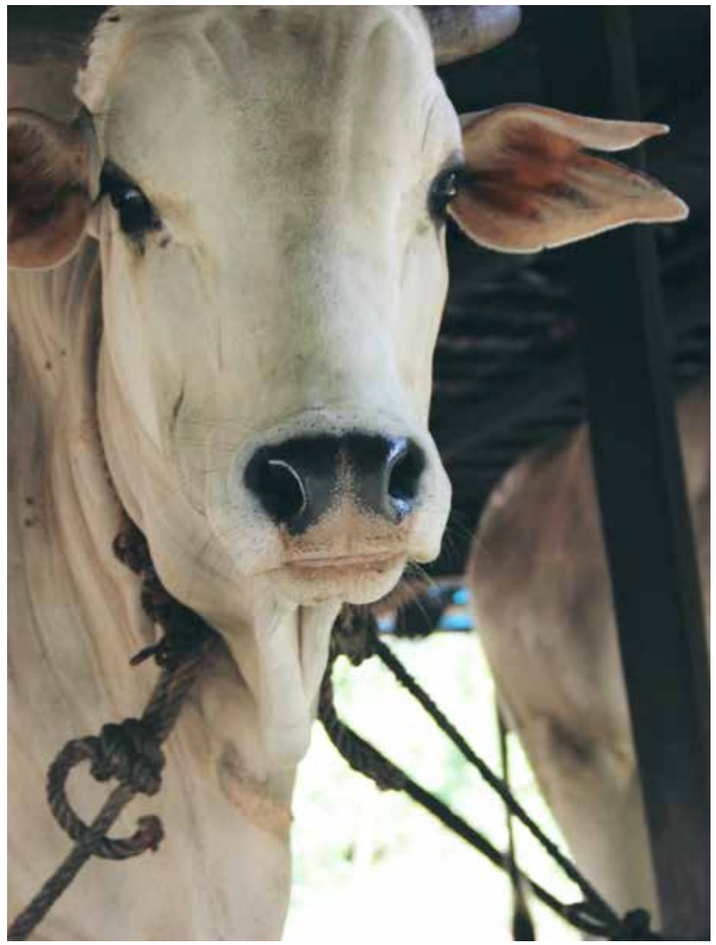
As a predominantly land-based economy, there are various agricultural sectors in Pulang Pisau that produce waste with high calorific value that could be used as an energy source. Capturing biogas from agricultural waste and burning it to produce electricity not only provides Pulang Pisau with new domestic energy sources but it also reduces the district's methane emissions, a GHG gas is 20 times more potent than CO_2. The biogas produced by palm oil mill effluent (POME) offers the greatest waste-to-energy opportunity for the district; however, there are not yet any facilities in Pulang Pisau. In addition, capturing biogas from livestock waste can increase access to sustainable energy, especially in rural areas, while also providing multiple environmental and health benefits.

Pulang Pisau's medium term development plan includes an objective to increase local communities' access to sustainable or alternative energy sources. As the district's population increases and other economic sectors expand, especially value-adding industries, identifying and utilizing new energy sources will be important to match increasing demand.

The Provincial Government policy regarding electrification and energy use (Provincial Regulation No. 6/2012) prioritizes the utilization of new and renewable energy from local primary energy sources. This regulation requires all district governments in Central Kalimantan to facilitate and provide incentives for private sector or individuals who want to develop new and renewable energy.

OVERVIEW OF GREEN GROWTH INTERVENTIONS

This strategy proposes two parallel interventions that focus on the opportunity of producing energy from existing sources of agricultural waste in Pulang Pisau: POME and livestock manure. Methane capture for biogas production has significant economic and environmental benefits, including reduced household energy costs and decreased GHG emissions, and can provide an efficient form of renewable energy for both households and business.



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RE 1

Generate electricity from palm oil mill effluent (POME) biogas

Biogas produced by the decomposition of POME is a sustainable energy source that can be used to generate electricity, either for use at the mill or for sale to the grid or other users. Selection of appropriate locations for this technology requires a comprehensive legal and technical review of the district's palm oil mills, along with the local economy. The district government must create an attractive enabling environment that incentivizes palm oil companies to develop facilities, while the construction and operation requires engaging partners with the necessary technical expertise.

RE 2

Generate energy from livestock waste biogas

Producing biogas from livestock waste saves rural households both time and money, while producing health and multiple environmental benefits, including GHG emission reductions. Further, it makes cattle production more economically attractive, which will encourage farmers to increase production, helping the district meet one of its development targets. Suitable locations need to be identified based on numbers of cattle and access to energy. After a capacity building and outreach program has been completed, including the establishment of local management organizations, construction can commence. The district government may provide construction loans and ongoing support through a long-term engagement plan to ensure continued operations of the facilities.

Desired green growth outcome

> The ambition of this strategy is to increase sustainable energy sources by utilizing biogas produced from palm oil mill effluent (POME) and livestock waste.

— Drs. Ali Damrah, M.Si.
2nd Assistant to Pulang Pisau District Government, Pulang Pisau district

Table 6 — A dashboard of green growth performance indicators for the renewable energy sector in Pulang Pisau district

No.	Indicator
1	Annual change in energy contribution to GDP (IDR)
2	Population with access to electricity (%)
3	Population with access to renewable energy (#)
4	Electricity generated using renewable energy resources (%)
5	Investments in renewable energy facilities (IDR)

RE 1

Renewable energy 1

Generate electricity from palm oil mill effluent (POME) biogas

A © Kirkenviro
B © multicoglobalenviro


a

Background

To produce crude palm oil (CPO), significant amounts of water and energy are used to produce steam for sterilization, pressing and filtration. For each ton of fresh fruit that is processed, one ton of liquid waste is generated, known as palm oil mill effluent (POME). Indonesian palm oil mills typically process 30 - 60 tons of fruit per hour, discharging large quantities of POME that is stored in outdoor, open-air holding ponds. Microorganisms then break down the POME through anaerobic digestion, a process that produces methane, which is subsequently released into the atmosphere.

Capturing the biogas released from POME and then using this to generate electricity is a proven technical system, with many facilities already operating in Indonesia, Thailand and Malaysia. Capturing the biogas can be done by constructing a plastic dome (or tent) over the POME cooling pond or and by using large holding tanks for the POME, instead of open-air ponds. After any impurities are removed and any unwanted gases are flared, the clean biogas can then be used generate electricity. This can either be used to power the mill's operations and/or sold to an industrial users or the grid.

Generating electricity from POME biogas is a sustainable source of energy that also improves waste management, resulting in positive environmental and social impacts. Palm oil mills should properly manage the waste, including of POME, as during heavy rains the ponds can overflow contaminating local watersheds and impacting nearby communities. POME-to-energy systems also provide a new income source. The average modern mill in Kalimantan generates sufficient volumes of POME to produce at least 1 MW of power. At the current feed-in tariff rate of IDR 1,050 per KWh, a 1 MW plant could generate approximately IDR 8,400,000,000 (USD 688,000) per year. Finally, capturing POME biogas will result in a tangible decrease in Pulang Pisau's GHG emissions.

Baseline

There are 15 palm oil concessions in Pulang Pisau,[95] mainly located in the southern part of the district, and eight are currently active, covering an area of 141,671 ha. There are four palm oil mills in the district, with a total discharge of over 300 tons of POME per hour. Currently, there are no biogas digesters that utilize POME biogas in the district.


b

Desired results

At least 1 POME biogas digester and generator facilities effectively operating.

RE 1

KEY ACTIONS

01 Carry out a comprehensive review of the district to identify suitable palm oil mills for generating electricity from POME biogas. This review will identify which mills have the necessary permits and are free of spatial overlap, as only owners of fully registered concessions will be willing to inject the necessary capital. This review will also include a technical review of each fully-permitted mill to assess for suitability and a spatial energy profile of the district to identify areas of high electricity demand. Ideally all mill owners in the district will financially support this review to reduce the risk of each mill, and there will be an element of capacity building to introduce and socialize the technology to key stakeholders.

02 Create an attractive enabling environment that incentivizes palm oil companies to develop POME biogas digester and generator facilities. This can include the district government providing direct budget support and tax incentives, and supporting licensing and infrastructure development. In addition, coordination is required to encourage local banks to offer preferable loans and PLN to purchase the excess electricity produced by the mills. Support should also be provided to assist companies in arranging electricity off-take agreements with PLN and the local government can support this process by standardizing off-take agreements.

03 Construct and operate the POME biogas digester and generator facilities at the most suitable palm oil mills. This will need to be led by the company that owns the palm oil mill and a development partner with the necessary technical expertise and experience of constructing similar systems elsewhere in Indonesia. Beyond construction, an effective operations systems will need to be developed, including a maintenance-training program for the facility operators.

RE2

Renewable energy 2

Generate energy from livestock waste biogas

A © CARE International Indonesia
B © Anonymous

Background

Small-scale livestock, that include cattle, sheep, pigs, and chickens, are an important source of income for rural communities in many parts of Kalimantan and offers livelihoods for both the young and the elderly. Livestock farming also has the potential to act as a source of sustainable energy as biogas produced from cattle in particularly can be piped directly to households and used for cooking and heating. Developing livestock waste for bioenergy is a priority action in Central Kalimantan's RAD-GRK.

Biogas digesters can be developed at the community or household scale. Larger community systems are normally between 30 m^3 and 60 m^3 in capacity. A typical 30 m^3 digester is capable of producing about 8,000 liters of biogas every day from about 225 kg of cattle dung mixed with an equal quantity of water, enough fuel for ten households to cook their daily meals. Household scale digesters can be 3 m^3 in capacity and can produce 800 liters of biogas per day requiring 40-50 kg of dung every three days after an initial charge of 0.5-1 tons of dung.[96] Digesters at both scale must be designed to ensure the manure slurries remain active and to prevent gas leaks in the pipes and household stoves. In addition, all biogas systems must be built on stable land areas as shifts in soil can lead to cracks in the system. Training is required to ensure that the users can maintain the digesters and effectively use the solid organic waste (bio slurry) produced by the digester, which is a natural fertilizer.[97]

From a financial perspective, biogas provides households with direct savings as they no longer have to buy alternative fuels, such as wood or kerosene. Furthermore, the time saved from not having to collect firewood or cook with low-tech stoves allows women and children to focus on other economically or socially productive activities. In addition, there are health benefits due to a smokeless kitchen environment. Community biogas digesters reduce GHG emission both by preventing methane emissions from decomposing waste and avoiding the combustion of other fuels. Introducing community cattle sheds and biogas units also reduce the pressure on surrounding forests, as less wood fuel is harvested. The use of bio slurry minimizes the use of chemical fertilizers that have negative impacts on local flora and fauna. Finally, the improved waste management systems required by the digesters prevent animal waste from polluting waterways.

Baseline

In terms of agricultural production, in 2014 there were 29,140 head of cattle in the district, a 7% increase from 2012.[98] Based on that figure, approximately 260 tons of faeces can be produced per day. Looking forward, the district has the potential to increase cattle production, which is mainly concentrated in two sub-districts of Maliku and Pandih Batu. Furthermore, there are nearly 1,181,325 poultry in the district, whose waste could also be used to produce energy.[99]

In 2013 ten biogas digesters were developed in Pulang Pisau, with technical support provided by SNV, and funding from the Energy and Environment Partnership (EEP) Indonesia. These facilities are both at the household- and community-scale, and supply energy to 84 families. The district government has also proposed new communal digesters in six sites (five in Maliku and one in Pandih Batu sub-districts). Key lessons from these pilot digesters include how to construct the tank and pipe network, the importance of maintenance, community engagement, local expertise and community-level institutions.

Desired results

At least 16 livestock waste biogas facilities effectively operating.

RE 2

KEY ACTIONS

01 Produce a comprehensive review of the district to identify suitable locations for livestock waste biogas digester and generator facilities. This will include a baseline survey to identify communities that have at least 50 head of cattle and limited access to energy, relying mainly on forest biomass and kerosene. A suitable local partner should be identified for this work, such as the University of Palangka Raya.

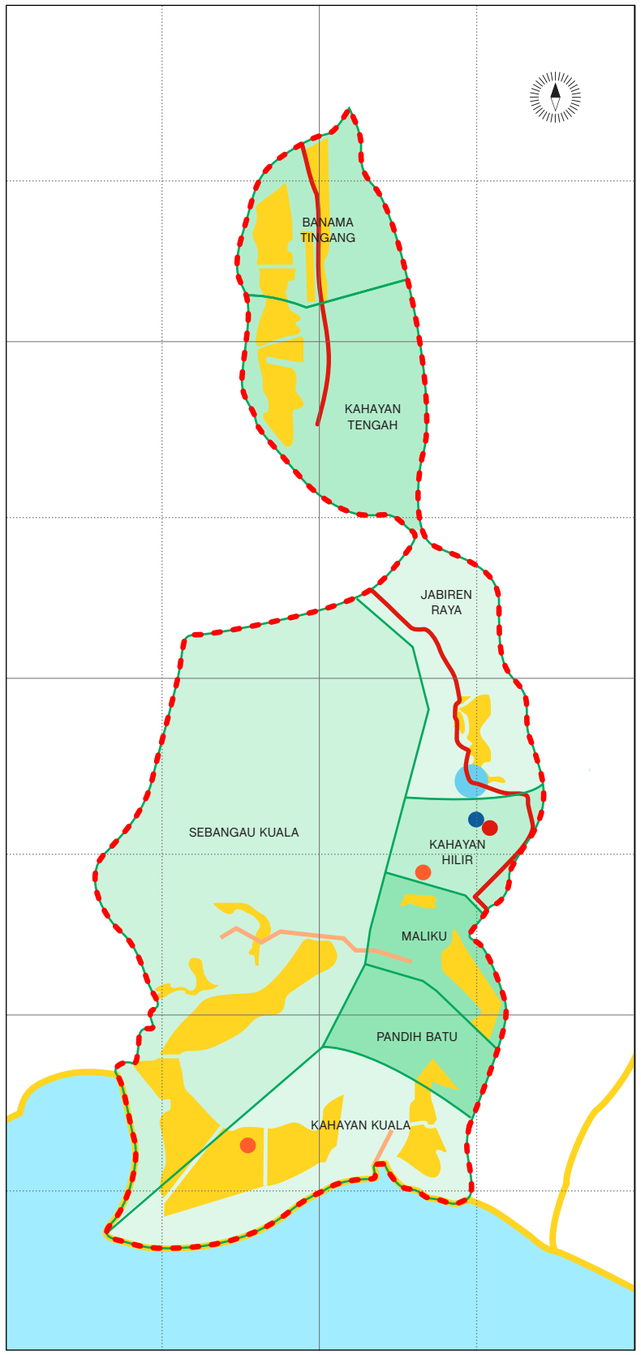
02 Carry out a capacity building and outreach program to ensure that all key stakeholders have the necessary knowledge and skills. This will start with improving communities' awareness about using livestock waste biogas to generate electricity and finish by supporting the establishment of a local organization that is capable of managing the facility, including its operations, governance, and finances. This organization should be inclusive to ensure that women are part of the decision-making process. This program should adopt a 'train the trainers' approach, potentially collaborating with a strategic partner, to accelerate the overall implementation of the program.

03 Build, operate and manage the livestock waste biogas-to-energy systems in the selected communities. This will need to be a collaborative effort between the local community, the district government and any facilitating or technical partners. The construction of the facility could be managed through a cost recovery model. Third party sponsorship and local government support is required for the initial planning and training, but construction costs, operations and maintenance should be funded by the communities themselves. The district government may provide construction loans but the local community should manage the systems and collect revenues from end-users. This will require training workshops for contractors and craftspeople to teach them how to build and operate the facilities.

04 Design and implement a long-term engagement plan to ensure continued operations of the facilities. This will allow the district government to remain engaged with the communities and provide ongoing support, when necessary. Efforts to continually improve the management and operations of the facilities will avoid the digesters end up in a state of disrepair. This can be delivered through a regional network of community biogas operators, who can coordinate peer-to-peer learning and skills development.

Identified locations for green growth interventions

Figure 10 — Palm oil concessions and cattle distribution map in Pulang Pisau



Box 3

Other bioenergy options for Pulang Pisau district

The district's Agriculture and Livestock Agency has identified bioethanol and biodiesel as two other potential sources of bioenergy production in Pulang Pisau. In 2012, the district government allocated funds to develop four pilot ethanol distilleries that use cassava as the feedstock. However, at the time, the cost of producing a liter of ethanol was more expensive than a liter of kerosene, so the project was not economically feasible for local markets. Another option for the district is the commercial production of biodiesel from palm oil. However, a detailed feasibility study on both biodiesel and bioethanol production should be carried out before investment is committed to these two bioenergy sources.

Key stakeholders

The planning and implementation of all the strategy's interventions will require a collaborative effort between all levels of government, private companies, communities and other stakeholders. Any changes to the level of government that is responsible for managing this sector related to Law 23/2014 will need to be considered before implementing this strategy. This section identifies the key stakeholders in the energy sector.

Government

In the absence of Mining and Energy Agency (*Dinas Pertambangan dan Energi*/DISTAMBEN) in Pulang Pisau, these specific interventions will be managed by the related sectoral agency, i.e. POME under the Plantation and Forestry Agency (*Dinas Perkebunan dan Kehutanan*/DISHUTBUN), and cattle biogas under the Agriculture and Livestock Agency (*Dinas Pertanian and Peternakan*/DISTANAK).

These agencies will play a critical role in mobilizing these biogas facilities by allocating funding and collaborating with communities, private sector companies and NGOs to select their locations. In addition, the government agencies will also work with the financial sector to develop the necessary fiscal framework to finance these operations.

Finally, the government will have to implement the necessary regulatory changes to create incentives for commercial entities. When the biogas facilities are operational, the Industrial and Commerce Agency (*Dinas Perindustrian dan Perdagangan, koperasi dan UMKM*/DISPERINDAGKOP dan UMKM) must facilitate connections between farmers and markets if they want to sell the byproducts, e.g. bio slurry.

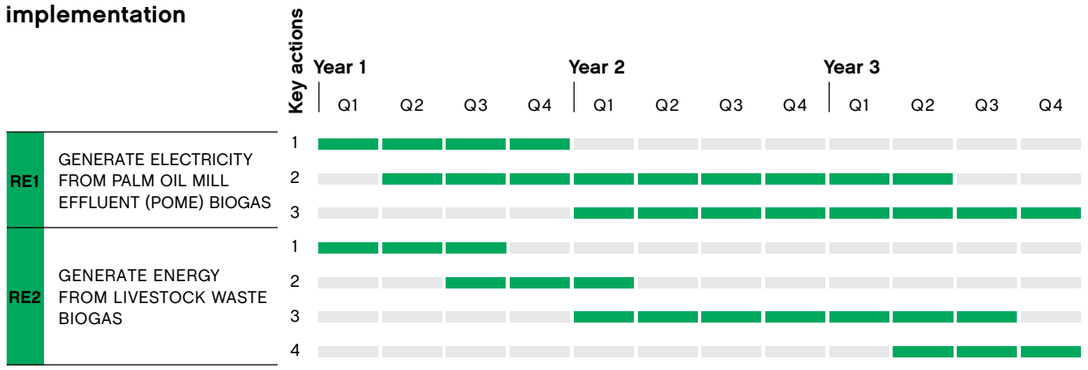
Private

The oil palm companies are also crucial stakeholders as they own the CPO facilities and the POME resources. Further, private and state-owned banks will be crucial partners as without stable private sector financing for project development, the government will not be able to achieve its desired outcomes. Finally. The private sector will be the key agents for project construction.

Other

The primary stakeholder group consists of the communities in which the biogas digester facilities will be constructed. Many of these communities will be the cattle farmers. Further, NGO's play a major role as biogas engineers who can provide the technical assistance for the construction of the digester and lead community engagement efforts.

Timeline for implementation



5.5 Cross-cutting

RATIONALE

While this strategy proposes a range of a sectoral interventions, achieving green growth also requires a number of cross-cutting actions that support productive and sustainable activities in all economic sectors. Ensuring transparency and stakeholder engagement in policy and investment decisions will help establish a foundation of good governance and reduce social conflict, a significant risk to potential investors. An attractive business environment that attracts private sector investment in sustainable activities is essential for green growth. Equally, a systematic approach to integrating the value of the district's natural capital into policy and investment decision-making processes is essential to deliver economic growth that is compatible with environmental sustainability. This section outlines four cross-cutting interventions that support green growth.

Desired green growth outcomes

There are two
cross-cutting green growth outcomes

> A transparent and investor-friendly business environment is established with reduced social conflict from overlapping or illegal concessions.

— Drs. Ali Damrah, M.Si.
2nd Assistant to Pulang Pisau District Government

> The value of the district's natural capital and ecosystem services are integrated into policy and investment decision-making processes.

— Drs. Karlin, M.Si.
Head of Pulang Pisau's Development Planning Agency

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Table 7 — A dashboard of green growth performance indicators for cross-cutting interventions in Pulang Pisau district

No.	Indicator
	RELATED TO A TRANSPARENT AND INVESTOR-FRIENDLY BUSINESS ENVIRONMENT IS ESTABLISHED WITH REDUCED SOCIAL CONFLICT FROM OVERLAPPING OR ILLEGAL CONCESSIONS
1	Direct investment in the district (IDR)
2	Allocations of DAK and DAU as percent of GDP (%)
3	Credit growth (%)
4	Capital outflow (IDR)
5	Incidences of tenure-related conflict (#)

No.	Indicator
	RELATED TO INTEGRATING THE VALUE OF NATURAL CAPITAL AND ECOSYSTEM SERVICES INTO POLICY AND INVESTMENT DECISION-MAKING PROCESSES
1	**Other indicators included elsewhere:**
•	HCVA (ha) at the impact level
•	Spatial plan compliance indicators in forestry, mining and plantations sectors

a

A © KFCP
B © Benjamin Tular GGGI
C © Benjamin Tular GGGI

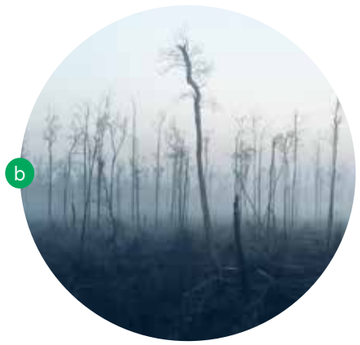
Improve the licensing system

Desired results

All land use licenses are declared valid and free of competing claims.

The rapid decentralization in Indonesia following the reform period resulted in unclear licensing responsibilities, which has led to conflict between license holders and local communities. Addressing data gaps between central, provincial and district governments, resolving conflicts and establishing transparent licensing systems are essential to providing greater legal certainty to the government, businesses and communities. In Pulang Pisau, the licensing process should take into account the forest status, distribution of peatland and communities' traditional utilization areas. This will provide legal certainty to communities, investors and government, and promote long-term investment, reduce extractive pressure on natural resources and decrease the likelihood of conflict over land use.

In Pulang Pisau, a first step to improving licensing systems is to create a licensing information management system that covers all key land-use sectors, is accessible by the public and includes all relevant business documents. A legal compliance audit should be carried out to identify overlapping concessions and propose action against any unlicensed activities, including revoking concessions that do not have the necessary permits. Finally, licensing mechanisms can be strengthened by reforming underlying legislation and providing both institutional and individual capacity building to build efficient systems and improve human resources.



b

Carry out a High Conservation Value (HCV) assessment

Desired results

All new concessions avoid HCV areas and all HCV areas within existing concessions are protected.

Ecosystems provide a range of goods and services that underpin economic activity but which are not valued by market systems resulting in policy and investment decisions that degrade existing stocks of natural capital. Often it is the poorest and most vulnerable communities who depend most on ecosystem services, so they are most effected by policies that under-value natural capital. Indonesia's forests provide a range of ecosystem services, including sequestrating carbon dioxide, regulating hydrological systems, maintaining soil quality, preventing erosion, hosting biodiversity, and providing timber, non-timber forest products (NTFPs) and aesthetic, cultural and spiritual values.

A first step is to recognizing the value of ecosystem services of Pulang Pisau is to identify areas of High Conservation Value (HCV), i.e. "a biological, ecological, social or cultural value, which is considered to be of outstanding significance or critical importance."[100] A districtwide HCV assessment provides guidance to decision makers on appropriate locations for economic activities and supports the development of appropriate management and monitoring plans to ensure that high value areas are maintained or enhanced. Carrying out an HCV assessment can help to determine the optimal levels of economic activity in an area, including mining, forestry and plantation operations, while not exceeding an ecosystem's carrying capacity. Along with a desk study, it is important to use participatory approaches to gather site data to engage local communities in the process and strengthen their knowledge of ecosystem services. When the assessment is finished, the results should be adopted into the licensing mechanisms to ensure concessions are not issued in HCV areas.

Conducting a strategic environmental impact assessment of the spatial plan

Desired results

The spatial plan is updated to reflect the recommendations of the strategic environmental impact assessment.

The Law on the Environment (Law 32/2009) requires a strategic environmental impact assessment (*Kajian Lingkungan Hidup Strategis*/KLHS) to be conducted as a basis for all proposed development and spatial plans. The KLHS process includes analysis of the impacts of the proposed plans, considers alternatives and makes recommendations to mitigate the impacts. A KLHS should be undertaken if the policy creates risks related to climate change, loss of biodiversity, increases in intensity and areas affected by floods, landslides, draught or fires, decreases the quality and abundance of natural resources, increases in change of function of the state forest area, increases the number of people in poverty or threatens the sustainability of a group of people, or increases the risks to the health and safety of people. The Ministry of Environment issued KLHS guidelines in 2011 that emphasize the participation of stakeholders to identify key sustainable development issues related to environment, society and the economy.

c

06 Next steps

This strategy outlines a range of interventions that will help Pulang Pisau achieve inclusive green growth based on the sustainable and efficient use of its natural resources.

This strategy outlines a range of interventions that will help Pulang Pisau achieve inclusive green growth based on the sustainable and efficient use of its natural resources. Reaching this target will require coordinated action from the district government, private companies, local communities and non-governmental organizations. Shifting from the 'business as usual' growth pathway requires these stakeholders to establish new partnerships and institutions, apply new skills, analytical tools and technologies, create new incentives and markets, reform existing policies and ensure they are enforced in a fair and even manner. All of these actions need financial support, which must come from a range of different public and private sources. This chapter highlights the next steps for Pulang Pisau to implement this strategy by utilizing the district's own financial resources and by attracting investment from external sources.

District government budget

Indonesia's budgeting process is embedded within the planning system, so in order to receive finance from a government budget the actions in this strategy must be incorporated into the appropriate development plan. The district government budget receives revenues from a range of sources, including tax and non-tax revenue sharing, the general allocation fund (*Dana Alokasi Umum*, DAU) and the special allocation fund (*Dana Alokasi Khusus*, DAK), see Annex 2 for Pulang Pisau's district government revenues and expenditures. There are a number of options for 'mainstreaming' this strategy's actions into the district's development plans:

Through the annual development planning and budgeting processes

Every year the 'musrenbang' process allows local residents to meet and discuss the issues facing their communities and decide upon priority development needs. This bottom-up process presents an opportunity for the green growth actions in this strategy to be discussed within communities and, potentially, included in the list of priorities. Each communities' requests then proceed though a series of meetings at the village level (January), sub-district level (February) and district level (March). In parallel, there is forum for local government agencies (February/March), coordinated by Bappeda, which also provides a venue for discussing the strategy's green growth actions. The final development priorities are included in the district government's annual work plan (Rencana Kerja Pemerintah Daerah, RKPD) and the work plans for each SKPD (*Rencana Kerja*, RENJA). These plans are then used as a basis for the budget (*Anggaran Pendapatan dan Belanja Daerah*, APBD), which must be approved by the local parliament (*Dewan Perwakilan Rakyat Daerah*, DPRD).

Through the district government's budget revision process

Every three months local governments hold a meeting to track and evaluate the progress of RKPD implementation (*Rapat Koordinasi Pengedalian, rakordal*). Every August, the local government agencies can change their activities and budget allocations by submitting a document (*Dokumen Pelaksanaan Perubahan Anggaran*, DPPA) to the budget revision committee and then Bappeda. The DPPA process is an opportunity for district government agencies to support the green growth actions in this strategy by changing budget allocations or including new budget lines for activities, if necessary. Because this budget revision takes place with only five months remaining in the year, this option only provides an opportunity for funding small-scale activities, such capacity building or the purchase of low-cost equipment.

Adoption into medium-term development plans and strategic plans

When Pulang Pisau's next RPJMD is being developed, this strategy can be used as a basis to ensure that the district's development priorities are aligned with green growth. The green growth vision chapter and sector rationale sections outline the district's key development challenges, which should be included in the RPJMD's analysis of strategic issues. The logical framework in Annex 1 includes a number of indicators and targets that the district could adopt to measure its performance towards green growth. Finally, the strategy's interventions and actions could be included within the RPJMD's priority programs, which would then be included in future budgets. Once the RPJMD is finalized, the local government agencies, SKPD, can also use this strategy for integrating green growth indicators, targets and actions into their RENSTRA.

The mainstreaming of this strategy into these government processes will be more effective with the legal endorsement of the district head. Therefore, a Bupati's Decree (*perbup*) for the strategy should be pursued as a priority to move towards green growth implementation.

Other sources of finance

Achieving green growth will require financial commitment from the district government along with a range of external partners. Investment will need to be attracted from both public and private sources, both from within Indonesian and overseas. The interventions and actions from this strategy will need to be packaged into suitable business cases or proposals to attract potential investors or donors, respectively. A number of options for potential sources of finance are listed below:

International donors and development partners

Supporting green growth in developing and emerging countries is a development priority for a wide range of developed country governments. Many countries already fund development programs in Indonesia that support low-carbon activities and many are looking for new opportunities. In addition, a number of multilateral development partners support Indonesia to achieve sustainable developed by offering technical assistance, grants and loans, including the World Bank, the Asian Development Bank, the United Nations and the Global Environment Facility (GEF). There are also many international NGOs working in Indonesia on green growth-related work, including WWF and TNC. Following an assessment of the geographic and sectoral priorities of these potential partners, the green growth interventions and actions in this strategy can be packaged into program proposals and submitted to the appropriate partner. The strategy's logical framework (see Annex 1) provides a starting point for the production of operational program proposals that are ready for submission.

Private sector companies

The implementation of this strategy will require private companies operating in Pulang Pisau's forestry, mining, plantations and energy sectors to commit their own resources and expertise. This will only happen if the green growth opportunities present an attractive return on investment with a suitable and manageable level of risk. The district government and development partners must actively engage with private companies managing land and natural resources in Pulang Pisau to highlight the financial and economic benefits of adopting sustainable practices. This will require the development of feasibility studies and business cases that include market analysis, technical requirements, risk assessments and full economic cost and benefit analysis that include social and environmental factors that do not have a market value. In addition, the district government must endeavor to create an attractive investment environment, starting by ensuring clarity on land tenure (see forestry chapter) and a full license review (see cross-cutting chapter).

Provincial and national government funds

There are many opportunities within the Government of Indonesia's internal funding mechanisms to support green growth activities in Pulang Pisau that are outside of the district government's budget. These include the deconcentration fund (*Dana Dekonsentrasi*) and the co-administration fund (*Dana Tugas Pembantuan*, TP), which are both sourced from the national budget for regional programs. Another option is the national program for community empowerment (*Program Nasional Pemberdayaan Masyarakat*, PNPM), which awards small grants to communities to support the construction of roads, irrigation, schools, and health centers. The 'Green PNPM' supports communities understand the negative and long-term impact of their actions on the surrounding environment and natural resources, and is particularly relevant for achieving green growth.

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Monitoring and evaluation

A simple and transparent monitoring and evaluation system is a vital component to ensure that this strategy is effectively implemented. Monitoring refers to the routine collection and analysis of information to track progress against set plans and targets. Evaluation involves identification and reflection of the effects of what has been achieved and judging their worth.[101]

Annex 1 of this strategy provides a logical framework that can be used as a basis of the implementation of the monitoring and evaluation process. This "log frame" includes indicators for the strategy's;

Impact

A dashboard of indicators to assess districtwide progress towards the green growth vision.

Outcomes

Indicators for each of the strategy's sectors and cross-cutting themes (both related to a transparent business environment and valuing natural capital).

Outputs

A clear target for each of the strategy's interventions and an underlying series of indicators to monitor progress for the necessary actions to achieve the desired results.

This log frame supports the implementation of the proposed interventions with precise, evidence-based reporting. It will also contribute to the SKPDs' and other stakeholders' learning and knowledge sharing. Making the district's performance against this log frame public will uphold accountability and allow for feedback from relevant stakeholder, especially targeted beneficiaries.

07 Annexes

7.1 Logical framework

IMPACT		
Indicators (district level)	**To contribute towards establishing a sustainable economy that delivers prosperity equitably to the people of Pulang Pisau while minimizing GHG emissions and maintaining natural capital stocks for future generations**	1. Annual GDP growth rate (%) 2. GDP per capita (IDR) 3. Gross capital formation (IDR) 4. Employment/population ratio (%) 5. Population below the poverty line (%) 6. GINI coefficient 7. Greenhouse gas (GHG) emissions per capita (tons of CO_2e) 8. Net annual change in above and below ground carbon stocks (tons of CO_2) 9. High Conservation Value Area (HCVA) (ha) 10. Environmental Quality Index (EQI) 11. Fiscal capital index 12. Household Vulnarebility Index (HVI)

OUTCOMES	① **Forestry: Local forest and peatland management systems that optimize the economic, social and ecological functions of forests, while reducing the number of fires**	
Indicators (district level)	1. Annual change in forestry contribution to GDP	IDR
	2. Direct investment in the forestry sector	IDR
	3. Annual change in production levels of all forestry-related products	unit/year
	4. Jobs in the forestry sector	#
	5. Number on tenure-related conflicts in state forest area	#
	6. Annual change in area of degraded land within state forest area	ha
	7. All forestry concessions comply with spatial plan	Y/N
OUTPUTS	1.1 **Forest management unit (FMU) operationalized and managed effectively**	
2015-18 Target Indicators (action level)	**At least 1 FMU operationalized and managed effectively**	
	1. FMU approval received from Ministry of Environment and Forestry	Y/N
	2. Stakeholders participating in development of the FMU management plan	#
	3. 10-year FMU management plan completed	Y/N
	4. FMU staff recruited and completed necessary training	#
	5. Area of intact peatland sustainably managed within FMU area	ha
	6. Area of degraded peatland restored within FMU area	ha
	7. Revenue from timber production within FMU area	IDR
	8. Revenue of non-timber forest products produced within FMU area	IDR
OUTPUTS	1.2 **Community-based forest management systems (e.g village forests) established in areas adjacent to Sebangau National Park and managed effectively**	
2015-18 Target Indicators (action level)	**A network of at least 13 village forests established and managed effectively**	
	1. Staff of existing four village forests institutions completed additional training	#
	2. New village forest permits approved by Ministry of Environment and Forestry	#
	3. New village forest management institutions established	#
	4. Community-based forest management plans developed	#
	5. Seed investment provided to village forest	IDR
	6. Revenue generated by village forest from NTFPs, selective logging and ecotourism	IDR
	7. A sustainable forest resources business cluster established	#

OUTCOMES	② **Aquaculture: An efficient and sustainable aquaculture sector that produces high-quality, high-value products in the appropriate locations**	
Indicators (district level)	1. Annual change in aquaculture contribution to GDP	IDR
	2. Direct investment in the aquaculture sector	IDR
	3. Annual change in production levels of aquaculture commodities	ton/year
	4. Families working in the aquaculture sector	#
	5. Area of mangroves	ha
	6. All aquaculture concessions comply with spatial plan	Y/N
OUTPUTS	2.1 **Silvofishery systems established in appropriate areas**	
2015-18 Target Indicators (action level)	**At least 1,000 ha of silvofishery systems established in appropriate areas**	
	1. area of environmentally and socially appropriate land identified	ha
	2. Districtwide plan with locations specified for eacg silvofishery type	Y/N
	3. Cost/benefit analysis for silvofisheries completed	Y/N
	4. Land suitability map integrated into spatial plan	Y/N
OUTPUTS	2.2 **A district regulation on sustainable aquaculture is enacted and enforced**	
2015-18 Target Indicators (action level)	**All new aquaculture farms comply with district regulation on sustainable aquaculture**	
	1. Draft legislation on fishery incorporated the environmental and sustainability safeguards	Y/N
	2. Meetings with key stakeholders on aquaculture policy framework	#
	3. Final sustainable aquaculture regulation approved by local parliament	Y/N
	4. Aquaculture permits issued with sustainability criteria met	#
	5. Area of certified aquaculture activities	ha
OUTPUTS	2.3 **Aquaculture farmers' capacity to apply better management practices (BMP) improved**	
2015-18 Target Indicators (action level)	**At least 25% of aquaculture farmers adopt better management practices and apply to sustainable aquaculture certification**	
	1. A value chain map and analysis for each aquaculture commodity	Y/N
	2. A BMP module that is site- and commodity-specific for Pulang Pisau	Y/N
	3. Aquaculture farmers trained on BMPs and aquaculture certification	#
	4. Mangrove assessment report completed, including deforestation rates and drivers	Y/N

OUTCOMES	③ **Plantations: An efficient and sustainable plantations sector that produces high-quality, high-value agricultural products in the appropriate locations**	
Indicators (district level)	1. Annual change in plantation sector contribution to GDP	IDR
	2. Direct investment in the plantation sector	IDR
	3. Annual change in production levels of plantation commodities	ton/year
	4. Jobs in the plantation sector	#
	5. Number of tenure-related conflicts in area for other land uses	#
	6. Annual change in area of critical and fire prone land within area for other land uses	ha
	7. All plantations concessions comply with spatial plan	Y/N
OUTPUTS	3.1 **The performance of smallholder rubber, coconut and coffee plantation is improved**	
2015-18 Target Indicators (action level)	**25% of smallholder farmers adopt better management practices and inclusive business approach**	
	1. Value-chain map and analysis for each commodity	Y/N
	2. A training needs assessment for BMP and IBA	Y/N
	3. Locally appropriate and gender sensitive curriculum and training materials	Y/N
	4. Farmer field schools established	#
	5. Smalllholder farmers that participate in farmer field schools	#
	6. Smallholder farmers that engage with quality based price mechanism	#
	7. Smallholder farmers with access to financial services	#
OUTPUTS	3.2 **New palm oil plantations created in environmentally and socially appropriate locations**	
2015-18 Target Indicators (action level)	**New palm oil plantations created in appropriate locations**	
	1. Area of environmentally and socially appropriate land identified	ha
	2. New area for palm oil plantations expansion integrated into district spatial plans	#
	3. Palm oil companies inspection to meet requirements of provincial regulation on plantation	#

OUTCOMES	4 Energy: An increase in sustainable energy sources by utilizing biogas produced from palm oil mill effluent (POME) and livestock waste	
Indicators (district level)	1. Annual change in energy contribution to GDP	IDR
	2. Population with access to electricity	%
	3. Population with access to renewable energy	#
	4. Electricity generated using renewable energy resources	%
	5. Investments in renewawble energy facilities	IDR
OUTPUTS	4.1 A series of POME biogas digester and generator facilities constructed and managed effectively	
2015-18 Target Indicators (action level)	**At least 1 POME biogas digester and generator facilities effectively operating**	
	1. Districtwide review to identify appropriate palm oil mills	Y/N
	2. Palm oil mill owners take part in POME biogas capacity building	#
	3. Finance allocated in district budget to support POME biogas digesters	IDR
	4. Commitments by local banks to provide preferable loans for POME biogas digesters	Y/N
	5. Standardized off-take agreement with PLN	Y/N
	6. Feasibility studies of POME biogas digester facilities	#
	7. Local communities trained in effective operations systems	#
	8. Electricity produced by POME biogas digester facilities	KWh
OUTPUTS	4.2 A series of livestock waste biogas digesters constructed and managed effectively	
2015-18 Target Indicators (action level)	**At least 16 livestock waste biogas facilities effectively operating**	
	1. District-wide review to identify suitable locations for livestock waste biogas digesters	Y/N
	2. Local communities take part in awareness program	#
	3. Local organizations established to manage livestock waste biogas facilities	#
	4. Feasibility studies of livestock waste biogas digester facilities	#
	5. Local communities trained in effective operations systems	#
	6. Biogas produced by POME biogas digester facilities	m^3

OUTCOMES	5 Cross-cutting 1: A transparent and investor-friendly business environment is established with reduced social conflict from overlapping or illegal concessions	
Indicators (district level)	1. Direct investment in the district	IDR
	2. Allocations of DAK and DAU as percent of GDP	%
	3. Credit growth	%
	4. Capital outflow	IDR
	5. Incidences of tenure-related conflict	#
OUTPUTS	5.1 A transparent licensing systemes for all land use activities is established	
2015-18 Target Indicators (action level)	**All land use licenses are declared valid and free of competing claims**	
	1. Establishment of a publicly available licensing information management system	Y/N
	2. District government staff trained to assess concession legality	#
	3. District government staff trained to use Geospatial Information Systems (GIS)	IDR
	4. Concessions identified with competing claims	Y/N
	5. Concessions revoked due to missing permits	Y/N
	6. District licensing mechanism updated to improve transparency	#

OUTCOMES	6 Corss-cutting 2: The avlue of the district's natural capital and ecosystem services are integrated into policy and ivestment decision-making processes	
Indicators (district level)	Indicators already included elsewhere:	
	• HCVA (ha) at the impact level	
	• Spatial plan compliance included in forestry, aquaculture and plantations sectors	
OUTPUTS	6.1 Economic activity does not take place in areas of High Conservation Value (HCV)	
2015-18 Target Indicators (action level)	**All new concessions avoid HCV areas and all HCV areas within existing concessions are protected**	
	1. Completion of a districtwide HCV assessment	Y/N
	2. Local communities involved in the HCV assessment	#
	3. Licensing mechanisms and underlying regulations updated to recognize results of HCV assessment	IDR
	4. Owners of existing concessions with HCV areaas agree to protect these areas	Y/N
OUTPUTS	6.2 A strategic environmental assessment (SEA) of the district's spatial plan conducted	
2015-18 Target Indicators (action level)	**The spatial plan is updated to reflect the recommendations of the strategic environmental impact assessment**	
	1. SEA ToR that identifies key environmental and socio-economic issues	Y/N
	2. Collection of baseline data related to key issues	Y/N
	3. Major impacts and consequences of proposed spatial plan identified	Y/N
	4. Mitigation measures to prevent, reduce or mitigate impacts proposed	Y/N
	5. People that participate in public consultations on SEA	#
	6. Amendments to district spatial plan proposed	Y/N

Definition of green growth indicators

No.	Indicator	Definition
1	Annual GDP growth rate (%)	The percentage change in Gross Domestic Product (GDP) from the previous year. GDP is the monetary value of all the finished goods and services produced within a jurisdiction over a specific time period. This indicator provides insight into the general direction and magnitude of growth for the overall economy.
2	GDP per capita (IDR)	The value of the Gross Domestic Product (GDP) divided by the population. The GDP per capita is the output of a jurisdiction's economy per person. This indicator provides insight into the average prosperity level of a jurisdiction's population.
3	Gross capital formation (IDR)	Gross capital formation consists of expenditure on fixed assets in the jurisdiction, including land improvements (e.g. ditches and drains), machinery, the construction of roads, railways, schools, offices, hospitals, and residential, commercial and industrial buildings. This indicator shows the level of domestic public and private investment activity in an economy.
4	Employment to population ratio (%)	The employment rate of a jurisdiction is measured as the employment to population ratio. This is the percentage of the working-age population (from 15 to 64 year) that is gainfully employed. This indicator provides insight into the labor market conditions of the jurisdiction.
5	Population below the poverty line (%)	The World Bank defines 'moderate poverty' as an income of less than US$ 2 per day. Based on this, the poverty rate in a jurisdiction is measured as the percentage of the population with an income of less than US$ 2 day. This indicator provides insight into the relative size of the population living in poverty.
6	Gini coefficient	The Gini coefficient (or index) is a measure of the income distribution of a jurisdiction's residents. The index is the extent to which the distribution of income or consumption expenditure among individuals or households within an economy deviates from a perfectly equal distribution. This indicator provides insight into the inequality in a jurisdiction (0 = perfect equality and 100 = perfect inequality).
7	GHG emissions per capita (tons of CO_2e)	The amount of greenhouse gas (GHG) emissions produced within a jurisdiction divided by the population. GHG emissions, including carbon dioxide (CO2), methane (CH4) and fluorinated gases (e.g. HFC), contribute to climate change. This indicator is a measure of the emissions per population of a jurisdiction.
8	Net annual changes in above and below ground carbon stocks (tons of CO_2)	The total annual changes in the terrestrial carbon stocks in a jurisdiction. This is a measure of both the additions and reductions in the carbon stored both above the ground (e.g. in forests) and below the ground (e.g. in soils). This indicator shows whether a jurisdiction is losing carbon into the atmosphere or accumulating carbon from the atmosphere, and the scale of this loss or gain.
9	High conservation value area (HCVA) (ha)	A 'high conservation value area' (HCVA) is a natural area with environmental, socioeconomic, biodiversity or landscape value. The HCVA approach is an important tool for responsible natural resource management. Before an assessment is carried out to identify the HCVA within a jurisdiction, an interpretation of HCV definitions in the local context is required.
10	Environmental Quality Index (EQI)	Indonesia's Environmental Quality Index (EQI) was developed by the Ministry of Environment in 2014. The EQI monitors aspects of environmental performance and includes a framework for capturing data to inform environmental management systems. The EQI measures key environmental indicators, including water and air quality and forest cover, across industry sectors.
11	Fiscal capacity index	The fiscal capacity index is used by the Indonesian government to allocate budget expenditures to sub-national governments. It is calculated by dividing the net revenue that a government receives by the number of poor people in the jurisdiction. This indicator provides insight into the public finance resilience of a jurisdiction, as the higher the ratio, the more fiscal capacity a government has to spend on non-poverty related expenditures.
12	Household Vulnerability Index (HVI)	The Household Vulnerability Index (HVI) is a statistical index to measure household vulnerability. The index defines vulnerability as the "presence of factors that place households at risk of becoming food insecure or malnourished". The HVI is focused on agriculture and food security, and can be used to assess a population's resilience to external shocks.

7.2

Financial information

Government revenues

There are three types of government revenue:

Regional real income (PAD/*Pendapatan Asli Daerah*)

This comprises of regional tax, retribution, revenue from regional wealth management and other PAD revenues.

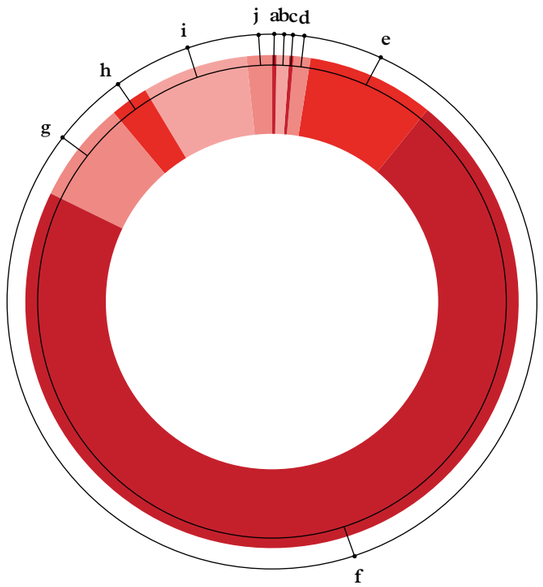
Transfer fund/grants

This includes tax revenue sharing/non-tax revenue sharing, the general allocation fund (DAU/*Dana Alokasi Umum*) and the special allocation fund (DAK/*Dana Alokasi Khusus*).

Other legal income

This involves tax revenue sharing from the province or other governments, adjustment fund & special autonomy fund, and financial aid from the province or other governments.

Figure 11 — Break down of Pulang Pisau Government revenues in 2013



a	Tax revenue	0.31%
b	Retribution	0.89%
c	Regional wealth management	0.24%
d	Other legal PAD	1.3%
e	Tax share/non-tax share	8.24%
f	DAU	71.28%
g	DAK	6.69%
h	Tax share from other provincial and regional governments	2.68%
i	Adjustment and special autonomy fund	6.83%
j	Financial aid from other provincial and regional governments	1.54%

The government of Pulang Pisau obtained a total revenue of approximately IDR 636,602,362,000 (USD 48,969,412) in 2013, which was primarily composed of the regional fiscal balance funds (86% or IDR 548,812,812,000).[102] Other legal revenues contributed 11% (IDR 70,347,203,000) of the total revenue while the regional real incomes (PAD) shared 2.7% (IDR 17,442,347,000) in the same year.[103]

Under the 'regional fiscal balance fund' category, the general allocation fund (DAU) made the largest contribution (IDR 453,776,884,000), followed by tax and non-tax shares (IDR 52,427,998,000) and the special allocation funds (IDR 42,607,930,000). The General Allocation Fund (*Dana Alokasi Khusus*/DAK) aims to equalize the regional financial capacity to fund regional needs and implement decentralization programs.[104] The DAU is a "block grant" and the sub-national government decides how it is used based on an assessment of their priorities and needs. The legal basis for the DAU is the Act 33/2004 on Financial Balance between National and Sub-National Governments and Government Decree 55/2005 on Balance Fund. The DAU is allocated for the province and district by using a formula based on the 'basic allocation' (*alokasi dasa0072*) and 'fiscal gap' (*celah fiscal*). The DAU equals the basic allocation added to the fiscal gap. The calculations for the basic allocation and fiscal gap are specified by the two regulations mentioned above.

Government expenditure

Meanwhile, there are two types of government expenditure:

Direct spending

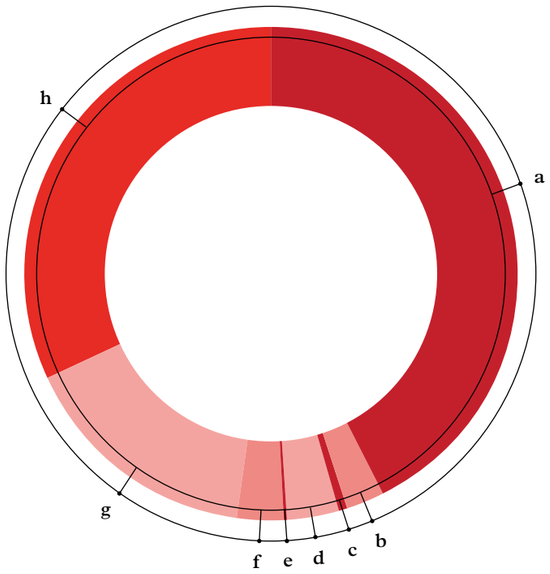
This includes expenditures on civil servants, goods and services, and capital spending.

Indirect spending

This comprises expenditures on civil servants, subsidies, grants, social aid, revenue sharing, financial aid and unexpected items.

In 2013, the Pulang Pisau district government's total expenditure reached approximately IDR 586,961,441,000 (USD 45,150,880) resulting in an annual budget surplus of IDR 49,640,921,000 (USD 3,818,532).[105] The indirect expenditure accounted for IDR 289,721,797,323 or 49.4% of the total government spending, whereas the direct expenditure totaled to 297,239,644,013 or 50.64.[106] The district government's expenditure was predominantly civil servant's indirect expenditure (42.6%), capital expenditure (31.7%) and goods and services (15.8%).[107]

Figure 12 — Break down of Pulang Pisau Government spending in 2013



a	Civil servants (indirect expenditure)	42.64%
b	Grants	2.49%
c	Social aid	0.64%
d	Financial aid for province/district/city and village government	3.43%
e	Unexpected expenditure	0.22%
f	Civil servants (direct expenditure)	3.04%
g	Goods and services	15.81%
h	Capital	31.73%

Pulang Pisau district experienced a 17.1% increase in its government spending between 2013 and 2014 to roughly IDR 665,352,355,217 in 2014.[108] Most of the government spending was directed to Pulang Pisau Education Agency (35.9%), followed by the Public Work Office (25.7%).[109] Meanwhile, government expenditure for the primary land use sectors of Pulang Pisau district was marginal. Only 3.8% of the total spending was allocated to the Agriculture and Livestock Agency and both the Plantation and Forestry Agency and the Marine and Fishery Agency received about 2.5% of the total spending.[110] All together, an estimated IDR 58,715,650,959 or 8.8% of the total government budget was allocated for these sectors,[111] even though these three sectors are the key income sources for most of the district's population. For example, in 2012, about 58.1% of Pulang Pisau population aged 15 years and above worked in the agriculture, plantation, forestry and fishery sectors.[112]

Table 8 — Pulang Pisau government expenditure in 2014 for all SKPDs

SKPD	Expenditure in 2014	% of the total government's expenditure
Education office	239,016,116,761	35.92%
Health office	34,885,492,988	5.24%
Public work office	171,272,018,578	25.74%
BAPPEDA	9,378,155,107	1.41%
Transportation, Communication and Informatics office	3,555,387,414	0.53%
Environment office	5,018,856,147	0.75%
Population and civil registry office	4,230,559,203	0.64%
Woman empowerment and family planning office	3,022,284,847	0.45%
Social, labor and transmigration office	4,715,002,897	0.71%
Regional disaster prevention office	2,395,854,280	0.36%
National unity, politics and community protection office	3,819,736,503	0.57%
***Pamong praja* police unit office**	2,747,391,353	0.41%
Regional secretariat	35,639,701,098	5.36
Legislative secretariat	10,790,742,011	1.62%
Regional income, finance and asset management office	12,314,748,503	1.85%
Inspectorate	3,624,894,579	0.54%
Education and training employment office	4,909,696,808	0.74%
Food resilient, agriculture, fishery & forestry extension implementation office	8,438,673,785	1.27%
Community and village empowerment office	4,404,985,305	0.66%
Regional achieves library and documentation office	1,679,891,546	0.25%
Agriculture and livestock office	25,481,464,176	3.83%
Plantation and forestry office	16,844,040,994	2.53%
Marine and fishery office	16,390,145,789	2.46%
Industry, trade, cooperatives, and SMEs office	5,204,401,196	0.78%
Total expenditure in 2014	665,352,355,216	

Footnotes

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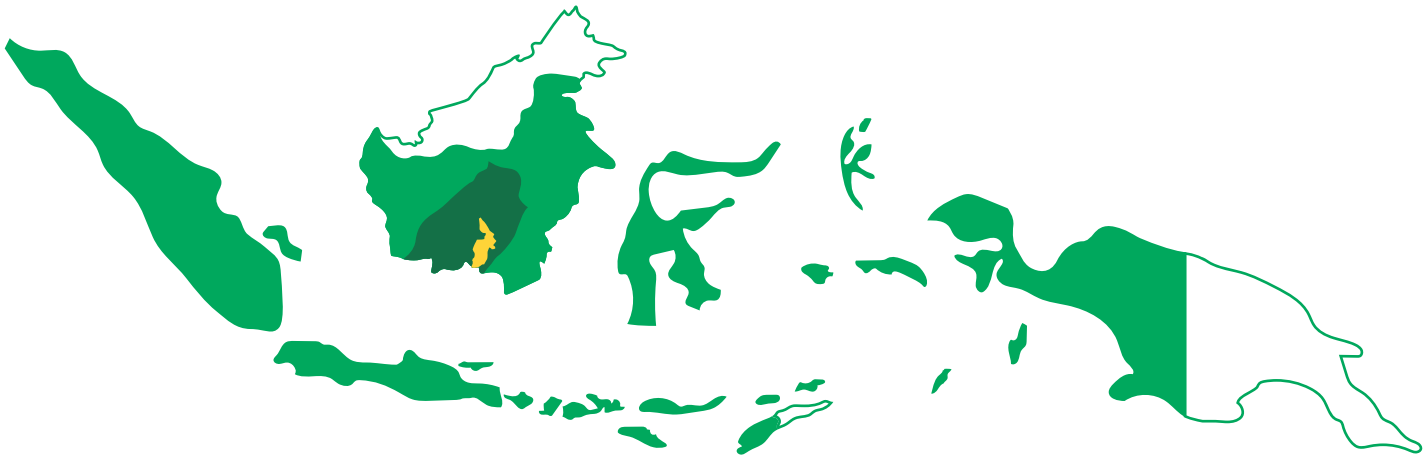

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