Just Transition in Indonesia: Coal and Nickel Sector







JARINGAN ADVOKASI TAMBANG MINING ADVOCACY NETWORK S U L A W E S I T E N G A H





Author

Tresa V. Z. Silvi D. A. Moh Taufik Sandy P. M. Taufik I. Teresia Muslim Pius Ginting

Reviewer and Editor Arianto Sangadji

Design and Layout

Syaviera Said

This publication is supported by the Rosa Luxemburg Stiftung (RLS) with funding from the Federal Ministry for Economic Cooperation and Development of the Federal Republic of Germany. This publication or any part thereof may be used by others as long as proper reference is made to the original publication.

Publication based on a study conducted by AEER supported by Mining Advocacy Network of East Kalimantan (JATAM East Kalimantan) and Mining Advocacy Network of Central Sulawesi (JATAM Central Sulawesi)

The contents of this publication are the sole responsibility of the Perkumpulan AEER and do not reflect the position of RLS.

Published by

Perkumpulan Aksi untuk Ekologi dan Emansipasi Rakyat (AEER) http://aeer.info Talavera Office Park, 28th floor Jl. TB Simatupang Kav 22-26, Jakarta 12430

December 2021





Acknowledgments

We would like to express our gratitude to our colleagues who accompanied us during our trip to Central Sulawesi: Syahril, Rafli, Fauzan, Om Arif, Tauhid, Badung, and Tam. We would also like to thank the people of Lembah Sumara Village, Tamainusi Village, and Tambayoli Village, who participated in our interviews. Our gratitude also goes to our colleagues who assisted us during field research in East Kalimantan and the residents of Santan Ilir, Santan Tengah, and Santan Ulu villages. Finally, we thank all our colleagues who assisted us during data collection in North Sumatra, Mr Sapri and the people of Pintu Air Village, Pulau Sembilan Village, and Pulau Kampai Village.



Table of Content

Ackowledg	gemen	ts	i
Table of Co	ontent		iii
List of Tables List of Pictures Executive Summary			vii
			vii
			viii
Chapter 1	Intro	duction	13
	1.1	Background	14
	1.2	The Concept of Just Transition	17
	1.3	Research Purpose	19
Chapter 2	Resea	arch Method	21
	2.1	Research Location	22
	2.2	Tools and Materials	23
	2.3	Interview Method	24
Chapter 3	Results and Discussion		25
	3.1	Central Sulawesi	26
		3.1.1 Context	26
		3.1.2 Lembah Sumara Village	28
		3.1.3 Tamainusi Village	31
		3.1.4 Tambayoli Village	33
	3.2	East Kalimantan	35
		3.2.1 Context	35
		3.2.2 Company Profile	36
		3.2.2.1 PT Indominco Mandiri	36
		3.2.2.2 PT Graha Power Kaltim	38
		3.2.3 History of Santan Village	39
		3.2.3.1 Santan Ilir Village	40
		3.2.3.2 Santan Tengah Village	45
		3.2.3.3 Santan Ulu Village	50

Table of Content

		3.2.3.4 Lok Tanggul Village	51
	3.3	North Sumatera	52
		3.3.1 Context	52
		3.3.2 PLTU Pangkalan Susu	54
		3.3.3 Pintu Air Village	55
		3.3.4 Pulau Sembilan Village	57
		3.3.5 Pulau Kampai Village	60
Chapter 4	Study	v of Potential	63
Chapter 5	Biblic	ography	67





List of Tables

Table 4.1.	Assessment of the potential	in three islands 6	64

List of Pictures

Picture 2.1.	Research location	22
Picture 3.1.	Location of data collection in Central Sulawesi	26
Picture 3.2.	The condition od the rice fields in the Lembah Sumara Village	29
Picture 3.3.	Research location in East Kalimantan	35
Picture 3.4.	Condition of PT Graha Power Kaltim	39
Picture 3.5.	Map of Santan Ilir	40
Picture 3.6.	Residents' coconut plantations	41
Picture 3.7.	PT Indominco Mandiri donation of access to clean water	43
Picture 3.8.	Residents' cows eating grass in a coconut garden	45
Picture 3.9.	Map of Santan Tengah Village	46
Picture 3.10.	The activities of the Young Coconut Milk Farmer group in making coconut milk	49
Picture 3.11.	Research location in North Sumatera	52
Picture 3.12.	Supporting drilling wells from PLTU in Pintu Air Village	54
Picture 3.13.	Panoramic conditions at Jigo Beach tourist attractions	56
Picture 3.14.	The condition of the barge tugboat leaning on the sea in Pulau Sembilan Village	59
Picture 3.15.	Processed shrimp paste made by local women and youth groups in Pulau Kampai Village	62

Executive Summary

Earth is facing its biggest problem: climate change which threatens human life and biodiversity. The climate crisis has driven the increase of the planet's temperature, contributed mainly by greenhouse gas emissions, produced by human activities, primarily burning fossil fuel. Moreover, fossil fuel has become the backbone of modern life through the massive consumption of power plants, transportation, and natural resource-based industries.

To handle the climate crisis, we must reduce emissions as low as possible. Therefore, the extreme reduction in the use of fossil energy is inevitable. At the same time, the decisions to shift the power source to renewable energy in transportation, infrastructure, agriculture and home industries are urgently needed. This step must be carried out through several priority actions: the gradual cessation (phase-out) of PLTU [state power plant based on fossil energy] operations, coal mine production, and mass public transportation.

This solution requires a just transition, a concept and a concrete step to shift from fossil to renewable energy. The transition process aims to ensure that it will be conducted without compromising the people's lives whose work is directly dependent on carbon-intensive industries. The steps include the creation of alternative green jobs, including developing the economic potential of the local community; providing new skills for workers employed by industries that caused environmental damage to encourage them to work in pro-environment initiatives; eliminating all forms of destruction in the local communities and indigenous peoples territories such as deforestation and land grabbing practices carried out by extractive industries; prompting the parties (government and industries) to develop sustainable, affordable and high-quality public transportation and at the same time, reducing the use of private vehicles; developing a favored approach in education that implement and promote equitable transitions, which embeds environmental education at all levels in the educational curriculum. Following the issues, we have conducted studies in three provinces where the carbon-intensive industries are located. Namely; the nickel industry area in Central Sulawesi, the coal industry area in East Kalimantan, and the coal power plant (PLTU) in North Sumatra. This study shows the negative impacts on the people living around these industrial areas. In particular, the existing industries have directly impacted the site, such as environmental pollution and damaged local socio-economic lives.

In Central Sulawesi, nickel ore mining activities have a significant impact. Illegal mining threatens the Morowali Nature Reserve and the Orang Wana minority who inhabit the area. In addition, villagers are dealing with the land dispute with the company where their farmland overlaps with the mine areas and air-water pollution issues that are believed to cause the number of catch fishes to decrease. Another problem; the mining company employs several local villagers, but it is primarily temporary as the workers return to farming due to the uncertainty in the workplace.

In East Kalimantan, coal mines are causing flooding that destroys agricultural businesses. Its dust threatens the health of the residents and pollutes the river/water, disrupting the local fishing industries. Locals living near the PLTU area (coal is their primary energy source) experience similar problems. Both locals who work in coal mining and PLTU are also vulnerable in the workplace, where the company could unilaterally discharge them.

In North Sumatra, the PLTU appears to benefit villagers as it provides electricity. However, the company activities caused pollution and harmed local fishing industries; the activities destroyed the fishing nets. Due to the operation, the fishermen are forced to fish in areas distant from their village. Even though many villagers nearby the PLTU area are employed as laborers, they are only hired as unskilled laborers. In addition, the PLTU only focuses on recruiting workers from the closest village, not all the impacted areas. Based on the finding, actions are urgently needed to be taken. Firstly, prevent mining in conservation areas through strict law enforcement. Secondly, gradually close mines and PLTU that damage the local economic life and violate environmental management regulations. Finally, to conduct in-depth research on developing the potential local economy and build a sustainable community economic model.





CHAPTER 1 INTRODUCTION



Chapter 1 Introduction

1.1 Background

Greenhouse Gas Emissions (GHG) are the main cause of increasing earth's temperature or global warming. This climate change results in rising average temperatures, extreme weather, shifts in wildlife populations and habitats, rising sea levels, and other impacts. These changes occur as humans add heat-trapping greenhouse gases to the atmosphere (Masin 2009).

Studies have shown that anthropogenic increases from human activities are sources of GHG concentrations. These activities have resulted in the emission of carbon dioxide (CO2), methane (CH4), nitrogen oxides (N2O), and fluorine gas (F-gas). Currently, carbon dioxide accounts for 76% of global GHG emissions, followed by methane 16%, nitrogen oxides 6% and F-gas 2%. Fossil fuels and industrial processes account for 65% of global GHG emissions (EPA). The International Energy Agency, IEA, (2021) said that global carbon dioxide emissions per capita rose from 3.9t CO2 per capita (1990) to 4.4t CO2 per capita (2019). Meanwhile, Indonesia experienced a rapid spike from 0.7t CO 2 per capita (1990) to 2.3 t CO 2 per capita (2020).

The increase in GHG concentrations has mainly occurred in the last 300 years. In 2019, carbon dioxide concentrations in the atmosphere were the highest in the last 2 million years, and methane and nitrogen oxides concentrations were higher than at any time in at least 800,000 years. Since 1750, increases in carbon dioxide (47%) and methane (156%) concentrations have far exceeded. Increases in nitrogen oxides (23%) have equated to natural multi-millennial changes between the glacial and interglacial periods in at least the last 800,000 years. (IPCC 2021).

There were concrete steps to accelerate the decarbonization of the global

economy to respond to the climate change crisis. After countries failed to reach an agreement since 1992, the milestone was the birth of the Paris Agreement at the Conference of the Parties (COP) 21 in Paris on 12 December 2015. The agreement was signed by 196 countries as a multilateral agreement binding. All countries have agreed to control global temperatures so that the average is below 2 degrees Celsius and limit temperature increases to 1.5 degrees Celsius above the era before the industrial revolution (UNFCCC, 2016). The Paris Agreement is an important step for all countries to fight climate change and its impacts. It is a decarbonization agreement to implement zero emissions by 2050. Indonesia has ratified the Paris Agreement with Law Number 16 of 2016 concerning the Ratification of the Paris Agreement to the United Nations Framework Convention on Climate Change (President of the Republic of Indonesia 2016).

Stopping the increase in GHGs requires an accelerated transition to a sustainable energy system. The most important target is control of the electricity sector because this sector contributed 25% of GHG emissions globally in 2010 (IPCC 2014). So far, in the global electricity sector, coal-fired generation accounts for 72% of carbon dioxide emissions from all types of power generation. Gas and oil-based plants accounted for 22% and 5%, respectively (IEA 2020). Coal is still the world's main source of energy for power generation. The contribution of this carbon-laden generator reaches more than 36%. By 2021, global coal-based power generation capacity is expected to reach 2,140 GW (IEA 2020).

As one of the world's main coal-producing countries, Indonesia had produced 562.5 million tons of coal by 2020 (APBI ICMA 2021). One hundred fifty thousand workers supported this industry in 2019 (ESDM, 2020). 72% of coal production in 2020 was exported to international markets. Meanwhile, nearly 80% of domestic coal use is for power generation needs (APBI ICMA 2021). Of the total 72,750 MW installed capacity of power plants in Indonesia, coal-based power plants, PLTU, accounted for 47.67% (ESDM 2021a).

The decarbonization of the electricity sector is urgently needed by shifting from coal, gas, and fuel oil-based plants to renewable energy plants. Although still small, the total installed capacity of global renewable energy-based power plants has reached 200 GW by 2020. It is expected to increase to 218 GW by 2021. Vital renewable energy is solar and winds power plants. By 2021, global solar photovoltaic generation will reach 38 GW.

In comparison, wind power generation is around 68 GW (IEA 2020). Indonesia has a very large NRE energy potential. Around 443,208 MW (PLN 2021), but very little has been utilized. The largest is hydroelectric power (PLTA), with an installed capacity of 7.75% of the total installed capacity of power plants in Indonesia in 2020. Power plants that use wind and solar are still very small (ESDM 2021a). PLN is targetting to build an EBT plant with a capacity of 20,923 MW during 2021-2030 (PLN 2021).

Decarbonization is also very important for the transportation sector because this sector directly contributed 14% of global GHG emissions in 2010. It mainly comes from the burning of fossil energy by land transportation (IPCC 2014). One solution is to switch from using fossil fuel vehicles to electric vehicles. There will be around ten million electric cars globally by 2020, and the number is expected to reach 145 million by 2030. Battery electric vehicles (BEVs) account for two-thirds of total electric vehicles by 2020 (IEA 2021a). The operation of electric vehicles does produce zero emissions.

Unfortunately, the production of the value chain of electric vehicle components is loaded with dirty energy. Battery production, for example, begins with mining, smelting, and refining activities that are greedy for fossil energy. The manufacture of nickel-containing batteries as fuel for electric vehicles requires processed nickel of good quality. The manufacturing process uses hydrometallurgical technology, the high-pressure acid leaching (HPAL), which produces high GHG emissions (Northgate and Jahanshah 2011). Currently, nickel-manganese-cobalt is the dominant chemical mixture for manufacturing Li-on electric vehicle batteries, with a market contribution of 71%.

Meanwhile, nickel-cobalt-aluminum alloys account for about 25% (IEA 2021). Although the use of electric vehicles in Indonesia is still very limited, Indonesia has become important in the value chain of electric vehicle battery production. As a country with the highest reserves and the main nickel ore producer globally (USGS 2021), Indonesia sees increased interest from foreign investors in building production facilities that produce raw materials for making electric vehicle batteries (Sangadji et al. 2019). Thus, the increasing use of battery-based vehicles as a substitute for fossil fuel vehicles contains a carbon footprint via the battery production value chain.

Many studies suggest that one solution to climate problems in the transportation sector is to make public transportation a mobility option (see Chaturvedi and Kim 2015; UITP 2014). In the United States, public transportation saved 63 million metric tons of carbon dioxide equivalent emissions in 2018 -- the equivalent of shutting 16 coal-fired power plants in operation for a year (McGraw 2021). Unfortunately, in Asian countries, including Indonesia, public transportation is not yet an alternative for citizens who want to travel. Many cities in Asia provide cheap public transport. But it is crowded, dirty, and unsafe, thus encouraging people to choose to travel by private vehicles (Timilsina and Shrestha 2009).

1.2 The Concept of Just Transition

The concept of a just transition emphasizes the pursuit of a new, lowcarbon society in the future. It rests on the principles of equality and equity (Newell and Mulvaney 2013). A just transition protects nature and workers in a decarbonization strategy (Stevis and Felli 2016). According to the UN Conference of the Parties to the Climate Change Convention (UNFCCC) in Cancún (2010), equitable transition ensures a step towards a fair, sustainable, sustainable, and legitimate low-carbon economy in the eyes of citizens. A just transition addresses the dual crisis of climate change and inequality. Just transition principles must be broad and multidimensional, address existing social and economic disparities, and not exacerbate them. It is done by placing workers and communities at the center of the transition debate, involving stakeholders throughout the decision-making process.

As a concept, just transition rests on the ideas about work and the environment. Thus it is not a surprise that historically, the idea of a just transition emerged from the labor movement (Wang and Lo 2021). The trade union movement introduced the earliest formulation of a just transition in the United States in the 1980s. The move was born as a reaction to the new regulations on air and water pollution, which had implications for closing factories to the detriment of the workers. It then spread to the UK and developing countries like South Africa. It finally got the attention of international labor organizations such as the International Trade Union Confederation (ITUC). This organization sees climate issues as an inseparable part of labor issues. Therefore, ITUC regards the transformation of the whole society as the main condition and not merely a simple solution to the problem of injustice and environmental degradation alone (Newell and Mulvaney 2013). ITUC then collaborated with the International Labor Organization (ILO) and the United Nations Environmental Program (UNEP) to introduce " green jobs " as a key element of a just transition (Stevis and Felli 2015).

In its development, the idea of a just transition is closely related to environmental justice (Evans and Phelan 2016; Wang and Lo 2021). With the concept of environmental justice, including climate justice and energy justice, the idea of transition to justice has also expanded its meaning. It is no longer solely related to industrial workers who produce and consume fuel oil. It is also about the people who live in high-pollution areas because fossil fuels-based industry also affects marginalized communities or people with non-capitalist economic life affected by natural resource extraction activities loaded with carbon. Politically, this expansion of meaning provides wider space and draws the support of vulnerable and marginalized citizens into a common front against the power bloc of the fossil fuel industries (Wang and Lo 2021).

A just transition is absolute because the earth we live in today is not

socially, economically, and environmentally sustainable. We live in a world experiencing a chronic organic crisis, the global climate change crisis. Burning fossil energy is the main cause. It has been so since the capitalist system, which commodifies nature for profit, became an integral part of the human race. (Malm 2016; Angus 2016; Alvater 2006). At the same time, the world is also facing a crisis of injustice. Never before in history, except under the capitalist system, did humankind experience such an abundance of wealth like today. But only a few people control the wealth. Data shows that the 66 richest people in the world have the same wealth as the 3.5 billion poorest people in the world (ITUC 2014). The control of wealth by the few sacrifices the majority's interests and nature.

Recognizing the climate crisis and the injustices caused by capitalism, theoretical solutions and actions for a just transition have been put on the agenda. One of them is in what is now popularized as the Green New Deal or Green Capitalism. It offers solutions that emphasize saving nature through government intervention and clean technology through market mechanisms. On the other hand, the ecosocialist view requires a fundamental change from a capitalist society to a post-capitalist society (Foster 2019). A new community based on shared democratic control over economic life prioritizes social and environmental interests (see Schwartzman 2011). Fundamental changes like this become the starting point for a just transition from an ecosocialist perspective. A change that will not happen without a struggle through collective protests, the labor movement, and any social forces mobilized to seize power at all levels. To oppose fossil capitalism (White 2020).

1.3 Research Purpose

- 1. Identify the impacts of nickel and coal mining and PLTU on local communities.
- 2. Identify the potential of local natural resources as a sustainable alternative economic base.



CHAPTER 2 RESEARCH METHOD



Chapter 2 Research Method

2.1 Research Location

The field research took place from October until December 2021 on three islands in Indonesia, namely Sulawesi, Kalimantan and Sumatra. The research team chose the three large islands because they host a rapidly growing, carbon-intensive, natural resource-based industry.



Picture 2.1. Research location

Sulawesi. In Sulawesi, the study focused on Central Sulawesi. In this province, nickel ore exploitation and its processing industry have grown rapidly since the last decade. North Morowali Regency, one of the regencies where nickel ore exploitation is growing, and its processing industry is developing, is the target of this study. This study was specifically conducted in three villages: Lembah Sumara Village, Tambayoli Village, Tamainusi Village, Soyo Jaya District, and North Morowali Regency.

Kalimantan. In Kalimantan, the study focused on East Kalimantan, a leading province in Indonesia's coal industry. This study selected East Kutai Regency, particularly in the Marang Kayu sub-district, with the study locus of Santan Ulu, Santan Ilir, and Santan Tengah villages. The three villages are closest to PT Indominco Mandiri's coal mining activities. Besides East Kutai, this study also selected Bontang City to look at coal-based power plants. The field study was conducted in Lok Tunggul Village RT 15, Bontang Lestari Village, South Bontang District, where residents live close to the PLTU.

Sumatra. In Sumatra, the research focused on North Sumatra Province, one of the provinces where large-scale PLTUs are already operating, and new PLTUs are still to be built. This study was centered in Langkat Regency where the Pangkalan Susu PLTU operates. The case studies were conducted in Pintu Air Village, Pulau Sembilan Village, and Pulau Kampai Village, Pangkalan Susu District. These villages are the closest villages to the Pangkalan Susu PLTU.

2.2 Tools and Materials

Tools and materials used in this study include data sheets used during the interview process, recorders during the interview process, stationery, and cameras for documentation.

2.3 Interview Method

The method used during the interview process is the snowball sampling technique (Neuman 2003). This method is used to identify, select, and take samples in a continuous network or chain of relationships. Interviews were conducted in villages to one respondent and then to other respondents based on the previous respondent's recommendations. Respondents interviewed were aged 17 years and over from different occupational backgrounds.

CHAPTER 3 RESULTS AND DISCUSSION



Chapter 3 Results and Discussion

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3.1 Central Sulawesi

Picture 3.1. Location of data collection in Central Sulawesi

3.1.1 Context

The three villages of the study area are agricultural villages integrated into a natural resource-based industrial circuit. The three villages are closest to the nickel mining and processing activities that have grown in North Morowali since the beginning of the last decade. They are industries full of carbon dioxide emissions in mining and transporting nickel ore. They consume millions of tons of fossil fuels and process nickel ore, requiring a large-scale electricity supply from coal-fired power plants. Thus, the target villages of this study are directly and indirectly affected by nickel mining and processing

activities there.

Several mining companies holding mining business permits (IUP) have concession areas around these villages. According to the Minerba One Data Indonesia (MODI) of the Ministry of Energy and Mineral Resources, the list includes PT Cipta Hutama Maranti, with a concession area of 199 hectares, PT Mega Indah Persada with an area of 193 hectares, PT Latanindo Mining with an area of 131 hectares, and CV Surya Amindo Perkasa with an area of 160 hectares. These companies hold IUP production operations. Excluding PT Mega Indah Perkasa, which will expire next year, the other three IUP holders will expire in the early 2030s.

Nickel mining activities in North Morowali began in the early 2010s, after the district government issued hundreds of IUP nickel, producing nickel ore for the international market. Uncontrolled nickel mining is ubiquitous in North Morowali. Illegal mining is also taking place inside the Morowali Nature Reserve, a conservation area covering an area of 209,400 hectares. The miner is PT Gemah Ripah Pratama (GRP), owning an IUP issued by the Regent of Morowali in 2011, covering an area of 145 hectares. The company mines within the conservation area. The company also cleared 1.5 kilometers of mangrove forest in Tambayoli Village, Tamainusi Village, and Tondoyondo Village in Soyo Jaya District. The Mining Advocacy Network (Jatam) of Central Sulawesi once reported the alleged illegal mining case to the Ministry of Forestry. But no legal action has been taken (Adhi KSP 2012; Maruto 2013; Mongabay 2013). Mining activities then stopped following the ban on nickel ore exports in early 2014.

Companies holding IUPs have resumed operations after the Indonesia Morowali Industrial yard (IMIP) began operations in the middle of the last decade. They include the companies that are operating in North Morowali. They generally process nickel ore and supply it to IMIP, Indonesia's largest nickel-based base metal industrial area. The smelter industry growing in the region consumes tens of millions of tons of nickel ore every year to produce nickel pig iron (NPI) and stainless steel derivative products (Sangadji 2020). The expansion of the nickel processing industry has also extended to North Morowali. A nickel-based industrial area, Stardust Estate Investment (SEI), has been established in Bunta, Bungintimbe and Tanauge villages, Petasia and East Petasia sub-districts. The manager is PT SEI. There are already three tenants in the industrial area. The three have each built a semi-finished nickel smelter: PT Gunbuster Nickel Industry (GNI) is expected to produce NPI with a capacity of 1.8 million tons per year; PT Nadesico Nickel Industry (NNI) with a total capacity of 150,000 tons per year.

The GNI smelter project has experienced rapid development in its construction. The company plans to build a smelter facility with a total investment value of USD 2.7 billion with 52 production lines based on rotary kiln electric furnace (RKEF) technology. By the end of 2021, the 24 lines will absorb 13 million tonnes of nickel ore annually (Liu 2021). As an energy-intensive industry, the company will operate a steam power plant with an installed capacity of 1,095 MW. This development will trigger an explosion in the exploitation of nickel ore by IUP holders, especially in North Morowali. The implication is that the pressure on the population and natural resources in North Morowali will increase.

GNI itself is a subsidiary of De Long Nickel Co. Ltd from China. The company, headquartered in Jiangsu, also has the largest nickel smelter facility in Konawe, Southeast Sulawesi. Operating through PT Virtue Dragon Nickel Industry (VDNI), De Long controls the NPI-producing industry and stainless steel working within the Virtue Dragon Nickel Industry Industrial Park there.

3.1.2 Lembah Sumara Village

a. Village Profile

Lembah Sumara Village is close to the Morowali Nature Reserve and protected forest. This village has a population of 229 families consisting of 777 people. The majority of the population is Muslim (771 people), while the rest are Christians. Most of them are farmers (158 people), while the others work

as civil servants (ASN), temporary employees, and private employees. The population consists of transmigrants from Java who have been placed there by the government since the early 1990s. In addition to transmigrants from Java, some Bugis people migrated there spontaneously and became the local natives.

The Lembah Sumara and its surroundings have been open, even since colonial times. The area has been mainly a center for tapping, trading, and exporting resin since the colonial period (Schrauwers 1997; Henley 2002), including the Wana Tribe, the indigenous tribe there. Wana itself comes from the Sanskrit language, which means forest. Outsiders used the term Wana to identify them as "people of the forest" (Atkinson 1989).

b. Socioeconomics

Lembah Sumara Village is the main rice producer for North Morowali Regency. The rice fields in this village have great water conditions. Farmers do not need to use an artificial irrigation system.



Picture 3.2. The condition of the rice fields in the Valley of Sumara Village

A farmer was recruited by a civil servant living in Kolonodale (Figure 3.1.) to plant and maintain an oil palm plantation of 22 ha. Oil palm grows very well in this village and produces a good harvest.

c. Problem

Rice farmers have a detrimental problem. They predicted a drastic increase in pests, such as rats that ate their rice and caused crop failure. In addition, several farmers stated that there was a shift in seasons, with the rainy season getting longer and the dry season getting shorter. It causes more frequent flooding, which results in crop failure. A farmer said the floods that occurred in 2020 caused several crocodiles to enter their fields.

Mining activities have a direct impact on farmers. They claim that dust particles from mining activities are sometimes blown into the rice fields. If these dust particles stick to the plant's surface, it can affect plant growth and crop yields.

Farmers cannot grow crops other than rice because other secondary crops cannot grow in soil with too much water. They used to grow corn and chillies. However, the growth is not normal, as it tends to be stunted and wilt quickly.

Farmers can find land to grow crops on the slopes of the mountains. The pitches are already included in the protected forest area, so they can't take advantage of it.

During the expansion of oil palm plantations by a large private sector in North Morowali, several residents are also planting oil palm. There is good potential for farmers to grow oil palm as an alternative. However, it isn't very easy for farmers because it requires large capital to buy palm seeds.

d. Potentials

Some farmers try patchouli cultivation (Pogostemon cablin). They are successful because there are no pests that eat these plants. But its maintenance requires a lot of great labor. They are ultimately not interested in growing this

plant.

Livestock is another potential resource in this village. It is a good source of income for cattle breeders to reap big profits because grasses are abundantly available. In addition to raising cattle, raising chickens can also improve the community's economy. Chickens in this village cost around IDR 150,000 per kilogram and eggs for IDR 2,000 per egg.

3.1.3 Tamainusi Village

a. Village Profile

Tamainusi Village is a village with an area of 272.27 km2. It has 183 families consisting of 678 people. Most villagers work as farmers (145 people) and fishermen (40 people), while the rest work as employees and carpenters. The population has diverse ethnicities, from local indigenous tribes to immigrant tribes. The majority of residents are Muslim. Only one person is Christian.

b.Socioeconomics

The residents of Tamainusi Village generally grow pepper, cocoa, patchouli, bananas, potatoes, cloves, sago, and cayenne pepper. They sell garden produce in their village, apart from selling to buyers who come from outside of the village. Usually, the buyers come from Poso Regency.

c. Problem

Tamainusi Village is very close to the nickel ore mining site, still operating today. Therefore, it is a village that is heavily affected by mining activities. When nickel mining began to flourish in the early decades, mining activities occurred in areas that overlapped with land owned by residents. At that time, some of the villagers who previously worked as stone crushers around the river could no longer do it. Because a mining company already controls the area. Including closing the public road to the village port because heavy vehicles belonging to the company passed (Reny Sri Ayu 2012) Nickel mining also has an impact on the fishers in the village. Currently, they are complaining because the fish catch has decreased drastically. They can no longer catch certain types of fish they previously often get. Fishermen claim that they could catch up to 5,000 fish five years ago. Now, they already feel lucky if they can get 1,000 fish.

Nickel mining has a wide impact on the marine ecosystem there. In the rainy season, open-pit mining materials are carried into the sea and change the color of the seawater to reddish. Sediments cover coral reef bodies and destroy them. Meanwhile, coral reefs are a place to find food and breed fish. Fishermen claim the presence of dolphins in their fishing grounds because they follow nickel ore barges. They consider dolphins to be pests because they eat fish and damage their trawls.

The negative impact of nickel mining has made one resident say that there are no more natural resources for their children and grandchildren. He even asked his son to leave the village and find another source of livelihood in a better place.

Farmers in the village also faced crop failure. For example, pepper mold on the stems in the soil causes pepper trees to die. The existence of climate change, such

d. Potentials

The village has the potential for fish ponds. Ponds can help fishermen cultivate fish because the productivity of marine fish catches has decreased. However, making fish ponds requires a lot of money. It is estimated that the value reaches IDR 100 million.

In terms of food crop agriculture, this village can develop rice crops. It's just that the availability of rice fields is very limited. It is what causes residents to choose gardening near protected forests.
3.1.4 Tambayoli Village

a. Village Profile

Tambayoli village has an area of 114.2 km2. The population is 714 people. The majority of them work as farmers (217 people). The people are from diverse ethnic backgrounds.

b. Socioeconomics

Farmers grow various types of crops with traded agricultural products. They sell rice directly to Kolonodale. They also sell it in their village while waiting for buyers from the outside. The farmers also sell cloves, pepper, cocoa beans, sweet potatoes, chillies, sugar cane, bananas, and patchouli. One of the villagers planted oil palm with capital and seeds obtained from someone in Kolonodale.

In this village, there is the Wana Tribe who live in the Morowali Nature Reserve. The Wana tribe has received recognition of the rights of indigenous peoples in managing forests based on the Decree of the Minister of Environment and Forestry Number: SK. 6747/MENLHK-PSKL/KUM.1/12/2016. The Central Sulawesi Natural Resources Conservation Center (BKSDA) census stated that there were 104 families with a total of 592 people living in the Morowali Nature Reserve. They live in the valleys and hills along the Salato River. The tribe also farms and gardens in the forest. They clear the land by burning, and the fields are cultivated for 1 to 2 years. After planting several times, they leave the area for three years to restore soil fertility (Directorate General of KSDAE nd). Usually, the results of farming and gardening are only used for daily food. They only sell patchouli plants to the market. Apart from gardening and agriculture, they also utilize non-timber forest products such as resin and rattan. They are looking for gum resin to sell. If it's bee season, they also look for honey to sell.

c. Problem

Nickel ore mining has occurred in the Morowali Nature Reserve. But it stopped a few years ago. In 2012, GRP was one of the nickel mining companies

that destroyed the conservation area. The company built a hauling road, a mining corridor to the port, crosses residential neighborhoods, and a nickel ore stockyard in Tambayoli Village. It covers an area of 1 hectare. Many people in Tambayoli Village were workers in mining companies (Mongabay 2013; Adhi KSP 2012). However, after the company ceased to operate due to licensing issues, they returned to being farmers.

Morowali Nature Reserve is still a habitat for Sulawesi endemic animals such as the maleo bird, Sulawesi hornbill, anoa, babirusa, and couscous. Their habitat is threatened due to nickel ore mining in North Morowali. One resident stated that the mining company is still taking nickel samples in the nature reserve. It is feared that illegal mining carried out in the protected area will threaten the life of endemic animals. Mining in the conservation area will also threaten the Orang Wana, an ethnic minority, the fortress of life in the forest area.

d. Potentials

In addition to the agricultural sector, the Wana tribe has potential for the village. The development of cultural tourism can provide an attraction to get to know the culture of the Wana tribe. Apart from the fact that these ethnic minorities play a role in maintaining the Morowali Nature Reserve, they take full advantage of the results provided by nature and naturally improve them. Suppose the tribe is disturbed due to mining activities. In that case, it is feared that it will cause conflict because the Wana tribe faces difficulty moving to the village. However, the government has tried to resettle them through resettlement programs. Also, the Morowali Nature Reserve, which houses endemic animals, is an attraction for animal researchers and nature lovers. In essence, cultural tourism and ecotourism can grow in the village.

3.2 East Kalimantan



Picture 3.3. Research location in East Kalimantan

3.2.1 Context

East Kalimantan is the main coal area in Indonesia. Therefore it is strongly linked with carbon emission footprints. This province has coal resource deposits of 59,691.15 million tons and reserves of 10,951.37 million tons in 2020, or equal to 40% of the total resources and 42.40% of the total coal reserves in Indonesia. The government issues permits in various forms for various investors to process it. There are 25 Coal Mining Concession Work Agreement holders (PKP2B), 13 foreign, and 265 domestic investment IUP holders (ESDM 2021b). This province's history of coal exploitation dates back to the Dutch colonial period (Ter Braake 1977).

Coal is very central to East Kalimantan's economy. In 2020, the province's production figure will reach 187.8 million tons or 33.27% of Indonesia's total coal production (BPS Kalimantan Timur 2020; APBI ICMA 2021). The 2020 production figure increased from 2019, which was 111.7 million tons.

However, it is still far below the 2018 production figure of 257.1 million tons. More than 60% of East Kalimantan's coal production comes from PKP2B. The rest are from companies holding IUPs (BPS Kalimantan Timur nd). Part of East Kalimantan's coal production is to meet the needs of the international market. In 2020, the export value of FOB coal (in various forms of products) reached USD 9.6 billion or 74% of the total export value of East Kalimantan (BPS Kalimantan Timur 2020).

East Kalimantan's coal production is also for the domestic market to supply the needs of PLTU operating in various provinces in Indonesia, including the PLTU in East Kalimantan. The total capacity installed by the PLN and IPP reached 834 MW or 47% of the total established power generation capacity of East Kalimantan in 2020 (ESDM 2021). Thus to supply millions of tons of coal every year is a must.

It has often happened that the presence of the coal mining industry and related industries have changed the landscape and the socio-economic life of the surrounding population. Air and water pollution and displacement of people often trigger disputes with affected residents. In general, East Kalimantan is the main producer of coal. However, at the same time, it is often an example of the negative impacts associated with this industry. Acute respiratory infections, floods, human rights abuses, prostitution and the accompanying disputes are among the many problems this industry poses in the province (Down to Earth 2010a; Down to Earth 2010b).

3.2.2 Company Profile

3.2.2.1 PT Indominco Mandiri

PT Indominco Mandiri (selanjutnya, IMM) berdiri pada tahun 1988 dan PT Indominco Mandiri (IMM) was established in 1988 and started commercial operations in 1997. IMM is a company engaged in mining, construction and general trading. IMM's mining sites are located in the regencies of Bontang, Kutai Kertanegara and East Kutai, East Kalimantan province. Under PKP2B, the company has a total concession area of 24,121 hectares and is valid until March 31, 2028. IMM has a coal resource of 296.3 million tons and reserves of 37.8 million tons. The IMM mine will be closed in 2025. IMM is a PT Indo Tambangraya Megah Tbk (ITM) subsidiary with 100% share ownership. However, a Singapore legal entity, namely Banpu Minerals (Singapore) Pte. Ltd., controls 65.14% shares and the public 31.79% shares in ITM. In 2007, ITM conducted an initial public offering. The majority of the funds are used for IMM projects (PT Indo Tambangraya Megah Tbk 2021).

ITM has several subsidiaries operating in the coal mining sector. Among them are IMM, PT Trubaindo Coal Mining (TCM), PT Bharinto Ekatama (BEK), PT Kitadin (KTD), PT Jorong Barutama Greston (JBG), PT Tepian Indah Sukses (TIS), PT Nusa Persada Resources (NPR), and PT Graha Panca Karsa (GPK), In 2020, ITM produced 18.4 million tons of coal. Of this amount, IMM contributed 48%. Since 2010, IMM has operated the 2x7 MW Bontang Power Plant. In 2020, the unit will supply 28,653 megawatt-hours (MWh) of electricity (2019: 58,076 MWh) to IMM's production facilities and port. In addition, IMM has also operated a 3 MW solar hybrid power plant since December 2019. In 2020, the unit will supply 2,162 MWh of electricity to IMM (PT Indo Tambangraya Megah Tbk 2021).

Referring to the PKP2B, IMM's mining location is forest, of which 20,990 hectares are Permanent Production Forests. But 20,292.53 hectares have been issued for borrow-to-use forest area permits (IPPKH). In addition, the mining area of 4,131 hectares is part of the Bontang Protection Forest. But 3,973.40 hectares have been given to companies who have obtained IPPKH. With IPPKH, IMM can build roads in forest areas for coal transportation. There is a 24.90 km long road in the Limited Production Forest area of 14.25 km, and 10.65 km long in the Bontang Protection Forest area (Susmiyati 2017).

The presence of IMM certainly impacts the residents around the project site. The residents have been complaining about the flood that damaged the people's agriculture, the discolouration of the river water, which became muddy, and the smell of coal from burning coal in power plants. Not surprisingly, a study showed that most residents living around IMM's operational areas said the company's presence was not beneficial for them (Susmiyati 2017). A recent survey conducted by Jatam East Kalimantan on the quality of river water polluted by mining activities concluded that IMM had failed to implement environmental management (Jatam East Kalimantan 2020)

In 2020, IMM employed 574 workers, a decline from 880 workers in 2019. IMM employees represented 23.54% of ITM's total workforce in 2020 (PT Indo Tambangraya Megah Tbk 2021). In 2019 IMM carried out unilateral termination of employment (PHK) for employees working at the subcontractor PT Kanitra Jaya Utama. The reason is that the company is doing cost efficiency due to reduced production and falling coal prices on the world market. The number of employees who have been laid off is about 40 people. Ten of them are from Santan Tengah Village and Santan Ilir Village. Unilateral layoffs have drawn protests from employees from Santan Village. These villages are Ring 1 of IMM's mining operations area. They protested because the company broke its promise to employ the locals and improve the residents' standard of living of Santan Village.

3.2.2.2 PT Graha Power Kaltim

PT Graha Power Kaltim (GPK) operates a steam power plant with a capacity of 2 x 100 MW. This PLTU is located in Salantuko Village, RT. 13, RT. 14, and RT. 15 Bontang Lestari Village, South Bontang District, Bontang City. The company PT Graha Power Kaltim, located in the coastal area of Bontang City, began operating PLTU Unit 1 in 2019, while Unit 2 began operations in 2020. The electricity supply from this PLTU flows into the Mahakam subsystem electricity system (PLN 20201).

The power plant is owned by CNEEC Kaltim Power Ltd and PT Graha Power Utama (GPU). CNEEC Kaltim Power controls 45% of the shares while GPU owns 55% (Indonesia Corruption Watch 2020). Thus, this PLTU is an Independent Power Producer (IPP) or a private electricity provider.

The operation of the PLTU has an impact on the surrounding residents. The settlement of residents in RT 15 Lok Tunggul, Bontang Lestari Village, South Bontang District, is polluted with coal dust. The company is also suspected

of dumping its waste into the sea. In early October 2021, residents staged a protest at the Bontang DPRD building. They said the steam power plant polluted their village and claimed coal dust had entered the house and blackened food and drink. The chairman of the Bontang DPRD asked the GPK to immediately resolve the pollution case with the affected residents (Media Kaltim 2021; Inspirasa 2021).



Pciture 3.4. Condition of PT Graha Power Kaltim

3.2.3 Santan Village History

Geographically, Santan Village is located in the Marangkayu sub-district, Kutai Kartanegara Regency. Three villages use the name Santan Village, namely Santan Ulu, Santan Tengah, and Santan Ilir. These three villages border the city of Bontang in the north. In the south, it is bordered by the Muara Badak sub-district and directly adjacent to the Makassar Straits in the east.

Of the three villages, Santan Ulu Village has the largest area. Part of the area

is hills and lowlands. Santan Tengah Village has a lowland that is not hilly. In contrast, Santan Ilir Village is a coastal area.

Santan Village has great natural resource potential, one of which is the Santan River. This river extends for 78 kilometers and flows upstream through Santan Ulu Village, Santan Tengah Village, and empties into Santan Ilir Village. Therefore the Santan River has a very important role in the life of the Santan Village community, such as for clean water, agricultural irrigation, fishing grounds for the anglers, and traditional transportation.

3.2.3.1 Santan Ilir Village

a. Village Profile

Santan Ilir village is 12,500 hectares wide. This village is directly adjacent to IMM's coal mine. The location of Santan Ilir Village is also close to the sea (Figure 4.1). Five hundred eighty-one families consist of 2,088 people living in the village. All of the residents are Muslim. Meanwhile, as many as 376 residents work as miners, 113 farmers, and 90 fishermen, while the rest work as traders, breeders, construction workers, and civil servants.



Picture 3.5. Map of Santan Ilir

b. Ecosystem

The ecosystem of this village includes the habitat of mangrove trees on the beach. But much has been cut down for ponds. According to some fishermen, IMM and a company from Bontang once provided a mangrove planting program in Santan Ilir Village. The company cooperates with local fishermen.



Picture 3.6. Residents' coconut plantations

Apart from mangroves, other plants that can be seen are coconut and oil palm. The plants belong to the residents planted in the garden, even in front of their respective homes. Some residents also grow mangoes, cassava and corn.

c. Socioeconomics

People who work in plantations are more focused on planting coconuts and

oil palm. Some grow elephant grass for cattle feed and vegetables. Coconut yield can reach between 200 and 1,000, harvested every two or three months. The farmers sell them to Bontang and Sanggata, with each costing IDR 2,500 to IDR4,000. Meanwhile, palm oil yield can reach 1.5 tons for IDR 2,000 thousand per kilogram. Oil palm can be harvested every 20 days. The price of oil palm seeds is around IDR 35,000. Farmers will sell the harvest to intermediaries who come to the village.

The pond farmers who participated in this study cultivate milkfish and shrimp. Milkfish seeds were purchased from Bontang for IDR 400,000, while shrimp seeds were obtained naturally. They usually harvest milkfish once a year.

There are also cattle ranchers. The selling price can reach IDR 17 million per head. But the selling price drops drastically to IDR 3 million per head if he gets sick.

d. Problem

Santan Ilir Village is directly adjacent to IMM's coal stockpile and PLTU. The residents who live in two hamlets, Hamlet Handil Pangulu and Hamlet Ajjalang, are always affected by runoff from coal dust that flies into the house and makes the floor black. The smell of coal that resembles sulfur is unpleasant when inhaled. Affected residents did not receive aid funds from the spread of coal dust that entered their homes. Once a year, IMM only donated one can of milk per person for each household.

Floods have always been a scourge in Santan Ilir Village. When the water from the Santan River overflows, two hamlets are always affected by flooding, namely Hamlet Handil Pangulu and Hamlet Ajjalang. Meanwhile, the Salo Sembilang hamlet was not affected by flooding because the land condition was higher than the other hamlets. The Santan River that flows and empties into this village was once clean, drinkable, used for bathing, and as a source of water for pond cultivation. However, since the start of mining operations in the upstream area of the Santan River by IMM, the river water quality has decreased. River water that used to meet the needs of residents is now no longer drinkable. Therefore, IMM provides clean water assistance in a reservoir near the company entrance. Residents freely take care of their drinking water needs. There are also drilled well assistance facilities that residents can access for washing and bathing.



Picture 3.7. PT Indominco Mandiri donation of access to clean water

Respondents who have jobs as fishermen are most affected by IMM operations. In the past, before the presence of the company, they could sell one catch of fishing between IDR 500,000 and IDR 1,000,000. Now one-time income from fishing only is between IDR100,000 and IDR250,000. The amount of catch has decreased drastically. Seaweed cultivation has also experienced a decline or failed altogether. Seaweed turns white and brittle, so it crumbles when touched. This situation has occurred in the last four years. Fishermen have also cultivated fish and shrimp by making ponds near mangrove forests. The

farmed fish and shrimp all die because the seawater is contaminated with waste. The government has tested samples of seawater in fisherman's ponds. As a result, seawater is polluted.

One respondent has a husband who once worked at IMM. This respondent works as a small scale trader who obtains business capital from the People's Business Credit (KUR) facility. The results of the trade can meet the family's daily needs. Her husband has been laid off from the company since the COVID-19 pandemic. After being dismissed from IMM, her husband worked odd jobs. The plan is that he will look for work in Central Kalimantan next year.

Another problem is the struggle of cattle farmers and coconut growers. They are facing a reality of their cows being killed or poisoned when they enter other people's gardens. Meanwhile, coconut growers face the problem of squirrels, monkeys and rats.

e. Potentials

This village has the potential for the local economy, one of which is from the coconut plant. Apart from not being affected by flooding, coconuts thrive near the coast, close to people's homes. It's just that the harvest time is a bit long. Another potential is cattle farming. The condition of the village with large lands planted with coconuts and weeds that grow wild allows cattle farming. Another potential is the development of freshwater fish ponds.



Picture 3.8. Residents' cows eating grass in a coconut garden

3.2.3.2 Santan Tengah Village

a. Village Profile

Santan Tengah Village is a village located not far from the IMM location. The total population of this village is 2,695 people consisting of 675 families. Most of the villagers are Bugis migrants. The number reached 2,665 people. Other tribes include 24 Javanese, 4 Banjar people, and 2 Kutai people. 100% of the citizens are Muslim. The occupations of the residents vary, including in the private sector (332 people), farmers/planters (298), civil servants (33 people), entrepreneurs (26 people), and fishermen (14 people).



Picture 3.9. Map of Santan Tengah Village

b. Ecosystem

This village is generally dominated by plantations of oil palm, coconut, and rubber. Many coconut and oil palm trees can be seen in the gardens at the back and sides of houses. Apart from coconut and oil palm, the residents also have rubber plantations. But many are not worked on because no one is available for tapping. In addition to these three plants, some residents grow horticultural crops such as guava, manganese, oranges and vegetables.

c. Socioeconomics

Many villagers work in the garden. The majority of crops grown include coconut, oil palm, rubber, and citrus. The residents' gardens range from 2 hectares to 10 hectares. The gardens are mostly planted with coconut and oil palm. Respondents who own oil palm admit that they used to grow coconuts. Because coconuts are relatively old, over 20 years old, and unproductive, they cut them down and replace them with oil palm.

Coconut harvest takes place every three months. The result can reach 20,000 coconuts once harvested. The wages of workers who harvest coconuts are IDR 800,000, including cleaning the coconut from the fibers. Coconuts are sold for IDR 5,000 per piece.

The average yield of oil palm is between 500 kilograms and 10 tons, depending on the area of land planted with oil palm. Harvesting can be done almost twice a month. If there is a flood, harvesting can only be done once a month. The selling price of palm oil is IDR 2,400 - IDR 3000. Farmers buy oil palm seedlings in Samarinda for IDR 25,000 small size and IDR 35,000 large size. Everything is ready to plant. Some residents can earn IDR 50 million every four months from the palm oil harvest.

Before oil palm, residents also planted rubber. Since the 1998 fires, they have turned to oil palm. The falling selling price has made no one interested in tapping rubber. In contrast, tapping must occur every day to obtain good quality sap. New rubber can be harvested after the age of five or six years. In summer, rubber productivity decreases. Low rubber prices are also exacerbated by intermediaries who harm rubber farmers. The advantage of rubber is a longer product life. However, compared to palm oil, rubber yields are much lower. All these considerations make farmers switch to oil palm. Oil palm plants are suitable for growing in swamps but require a lot of fertilizer. Currently, the availability of fertilizers is limited. Meanwhile, fertilizers from the government are only given to farmers who are members of farmer groups.

d. Problem

Natural events now occur frequently and are difficult to predict. Since the 2000s, Santan Tengah Village has often experienced flooding when it rains heavily. In the past, older people could forecast when the rain would come. They could no longer do that.

Floods make life difficult for residents. Residents' crops such as vegetables, sweet potatoes, and corn could not grow because of the flood. Seeds from the government also cannot be planted. In addition, plants also need a lot

of fertilizer and will not grow if not given fertilizer. In the past, residents could enjoy the fruits of their vegetable and fruit gardens. Now they have to buy because floods often hit their yard. During floods, residents also cannot install traps/nets. The overflow of mud in the web makes the shrimp difficult to catch. In addition, irrigation conditions in the village are also not well managed. During the rainy season, small rivers that experience shallow water quickly overflow everywhere.

Mining waste has damaged the river ecosystem. It is known that IMM disposes of its waste into the Palakan River. Although this river is the habitat of estuarine crocodiles, it flows through the village of Santan Tengah. If there is a flood, the crocodile will enter the village. Residents say that since the dumping of mining waste into the river, more and more crocodiles have appeared in the village and prey on their livestock. Crocodiles even prey on the locals. Disposal of mining waste into rivers also results in stunted fish with larger heads and smaller bodies.

IMM mining has a wide impact on residents. Mining causes water to become dirty. In the past, residents used water for drinking and bathing. Now they have to buy clean water. IMM does provide clean water assistance to residents. But its mining activities have deprived residents of their natural access to clean water. Another impact of mining is the loss of the mussel population.

e. Potentials

A Young Farmers Group in this village cultivates fruit and coffee plants. The location of cultivation is not too affected by flooding. This group helps food diversification efforts. This group also provides access or makes it easier for residents to market agricultural products.



Picture 3.10. The activities of the Young Coconut Milk Farmer group in making coconut milk

Although oil palm was the first interest of the residents, this plant absorbs too much water and nutrients. This plant has potential and is in demand by villagers because it has greater profits, is flood-resistant, and has a faster harvest period.

3.2.3.3 Santan Ulu Village

a. Village Profile

Santan Ulu Village is the village closest to the mining area. Most of the villagers work as farmers, planters, and ranchers. Some residents work at the mining company IMM. The population in Santan Ulu Village consists of the Kutai tribe, which is a native and some tribes from Sulawesi, especially the Bugis

b. Socioeconomics

Agriculture is the main livelihood of the people. The plants in Santan Ulu Village are oil palm, sugar palm, rubber and bananas. Sugar palm grows naturally. Some residents tap sugar palm to be used for brown sugar. They sell it for between IDR 6,500 and IDR 7,000 per seed. In this village, there are also swallow breeders to trade swallow nests. Building a swallow house is around IDR70 million to IDR100 million. This nest business is risky. Swallow farmers reap satisfactory results by obtaining a swallow's nest of 0.5 kg per harvest. One kilogram of bird's nest is around IDR 13 million. On the other hand, some farmers have not obtained encouraging results even though he has been in this business for three years.

c. Problem

Farmers in Santan Ulu Village said it was difficult to develop paddy fields because there are many insect pests, gold snails, and rats. Floods are also at risk of causing crop failure. Therefore, most people turn to oil palm because the results are more satisfying than other plants. Oil palm is also considered flood-resistant. In the past, agricultural land in the village was very fertile, so various kinds of horticultural crops such as vegetables and fruits were easy to grow.

However, since the presence of mining companies, the quality of the river has declined. In the past, the water could be drunk and used for bathing. Now the condition is muddy and undrinkable. The elders also used to be able to predict flood cycles. Now it is difficult for them to do so. Floods often occur and result in crop failure. Farmers and planters are also hesitant to plant other crops because of the risk of crop failure.

d. Potentials

Santan Ulu Village has an area of 60,483 hectares. Residents use some areas to develop plantations and agricultural commodities. Part of the Santan Ulu Village upstream of the Santan River is a forest area. They protect the forest by using it sustainably for economic improvements such as swallow business and the use of non-timber forest products.

3.2.3.4 Lok Tanggul Village

a. Village Profile

Lok Tanggul Village is located at the entrance to the PLTU owned by GPK. This village only has one neighborhood community known as RT, namely RT 15, which sees most people are from Mamuju (West Sulawesi). The majority of residents work as fishermen and seaweed cultivation. The ecosystem in this village includes mangroves and coconut and mango plants.

b. Socioeconomics

Villagers mostly use seaweed cultivation for economic life. Seaweed cultivation provides high profits because it can produce IDR 14 million per harvest. The presence of PLTU around the village has caused seaweed production to decline by up to 50%.

The fishermen also make cages by placing seeds of red snapper. These fish also provide great benefits because the price can reach IDR 80,000 per kilogram.

c. Problem

Coal dust is a serious problem for villagers. Dust often flies into the house. The barrel to collect rainwater in front of the house is often contaminated with coal dust and will settle to the bottom of the barrel if it is not cleaned. A fisherman said that, in the past, he did not have to go far to look for fish because it was available next to the house. Now it is no longer possible because of coal. The fisherman also cultivates red snapper with cages beside his house. But now, fish die more often because of coal dust, even before harvest time. Some residents in this village used to work in GPK, but they have not been working since the 2020 pandemic. Some had lost their jobs even when the pandemic got better. Companies choose to hire workers from elsewhere. Those who lost the job were confused. At least 15 worked for the company until September 2021, and six stayed until October (Media Kaltim 2021). They used to work as fishermen and worked on seaweed cultivation. They can no longer be fishermen because seawater is polluted with coal.

d. Potentials

This village has great potential for fruit agrotourism. Some fruit that can grow well is local mango, durian, and rambutan. Livestock can also be an alternative for the villagers' economy.

3.3 North Sumatera

3.3.1 Context

During the administration of President Susilo Bambang Yudhoyono (SBY), the construction of PLTU gained momentum. SBY issued Presidential Regulation (Perpres) Number 71 of 2006, which assigned PLN to build dozens of steam power plants throughout Indonesia with a total capacity of 10,000 MW (President of the Republic of Indonesia 2006). The Presidential Regulation was later amended by Presidential Decree No. 59 of 2009, which reaffirmed the acceleration of PLTU development (President of the Republic of Indonesia 2009). The 35 PLTUs built in the 10,000 MW acceleration project consume more than 31 million tons of coal (Arif 2014). The government's encouragement also marked the issuance of Presidential Decree No. 59 to use a public-private partnership (PPP) approach in electricity projects. Joko Widodo continued what SBY had done. In the first five years of his government, Jokowi has ambitions to build a power plant with a total capacity of 35,000 MW. This ambition rests mainly on fossil fuel-based generation. The target is that by the end of 2019, around 60% of the power generation will come from coal-fired power plants. Up from 56% in 2015 (PwC 2016).

Major PLTU projects in North Sumatra are part of the electricity programs of the last two presidents. The province has the largest capacity in the entire Sumatra island. In 2020 there would be an estimated 4,626,90 MW of installed capacity. The installed capacity of the PLTU reaches 1,090 MW, or 23.55% of the total installed capacity of power plants in the province (Ministry of Energy and Mineral Resources 2021). The main power plants in North Sumatra are the PLTU Pangkalan Susu 1 & 2 with an installed capacity of 2x220 MW, and the PLTU Pangkalan Susu 3 & 4 with a capacity of 2x200 MW. Both are in the Langkat Regency. There is also the Labuhan Angin PLTU with a capacity of 2x115 MW, which is located in Sibolga (PLN 2021). According to the 2021-2030 RUPTL, a steam power plant with the capacity of 2x150 MW is under ongoing construction. The project, called PLTU Sumut-1, is scheduled to operate in 2023 (PLN 2021).



Picture 3.11. Research locations in North Sumatra

3.3.2 The Pangkalan Susu PLTU

PLTU Pangkalan Susu 3 & 4 is a PLTU operating in the Pangkalan Susu area, Langkat Regency, North Sumatra Province. The construction of this PLTU began on May 7, 2015. Sinohydro Co.Ltd Consortium and PT Nusantara Energi Mandiri are working on the construction. PLTU unit 3 has been operating commercially since June 26 2019, and PLTU unit 4 since September 5 2019. The operations of PLTU Pangkalan Susu 3 and 4 strengthen the Northern Sumatra (SBU) system, which is reflected in its contribution of up to 16.75% to the peak load of the SBU system (Nur Alfi 2020).

PLTU Pangkalan Susu 3 & 4 is claimed to reduce the cost of production (BPP) of the SBU system, thus saving IDR 82.9 billion per month. The PLTU uses 4,200 kcal/kg coal as the main fuel for its operation, with a coal demand of 2.16 million metric tons per year (Praditya, 2020; Nur Alfi 2020).

After operating, this PLTU will have an impact on residents. First of all, this PLTU provides job opportunities for 1,200 people. The PLTU manager also assists with drilled wells and reservoirs to villages classified as ring 1. They also distribute various humanitarian aids such as aid for orphans, widows, and others.



Picture 3.12. Supporting drilling wells from PLTU in Pintu Air Village

54

However, the impact of the PLTU operation has begun to be felt by residents. Coal ash and PLTU waste disposal pollute the sea. Residents said that the fish around Pintu Air Village started to move away because of the pollution.

3.3.3 Pintu Air Village

a. Village Profile

The majority of villagers work as fishermen and farmers. Usually, they will catch fish since dawn because the water conditions are still high. They return to the village to work in the fields in the afternoon. The fish they caught is for daily needs. Agricultural products, especially rice, are traded. This village is one of the largest rice barns in Pangkalan Susu. Yields can reach five tons per hectare, which farmers usually sell to intermediaries. Some of the products are for their personal needs for the next few months. Not all farmers grow rice on their land. In hamlet 3, for example, many people plant rice on land owned by other people because they have sold their lands to other residents, including people from outside the village. These landless farmers then rented the land and worked it. The yield is then divided by two.

Apart from fishermen and farmers, some residents work in shrimp and crab ponds. This village's harvest from ponds, especially crabs, is integrated into the international market trade chain. The process starts with intermediaries buying the crabs from the farmers. The intermediaries then sell the products to the soka crab middleman. He will sell the products to Branda to be sold abroad. The price of crabs sold to intermediaries in the village is around IDR 52,000 per kilogram. In contrast, the cost of soft-shelled crabs sold abroad reaches IDR 250,000 - IDR 300,000 per kilogram.

There are many oil palm plantations owned by residents and people of Chinese descent in this village. The average area of oil palm plantations owned by residents is only about 0.2 hectares. In contrast, the citizens of Chinese descent own more than 1 hectare. The yields would be usually sold at around IDR 2,000 per kilogram, but the locals use them only for their daily needs. Some residents own cattle, goats, oxen, chickens, and ducks. But they are few.



Picture 3.13. Panoramic conditions at Jigo Beach tourist attractions

The village has a Jigo Beach tourist spot located in the mangrove area. The tourist location has an attraction because there are mangrove forests and cranes. Visitors can also look for shellfish and fish directly when the water is receding to be cooked and consumed on-site. Twenty-five residents manage this tourist spot. This beach is crowded with visitors on holidays and provides additional income for the residents who work there

c. Problem

Rice field farming is one of the biggest commodities. However, farmers face obstacles due to the absence of modern irrigation. Farmers only use rainwater. They could harvest 5 tons if the water conditions in the fields are stable. If there is no rainy season, crop productivity will decrease. Farmers get a yield of about 3.5 tons if there is a drought. It would be difficult to water rice fields far from ditches or water sources. In addition to drought, farmers also face rice disease, in which the neck of the rice plant turns yellow, resulting in slow

growth.

Fishermen have a problem with the Pangkalan Susu PLTU. They find it difficult to find fish because the seawater is affected by the ash and waste from the power plant. Fish farmers have to be smart in using seawater because they will kill the shrimp and crabs if they don't. Those who are far from seawater must drill wells. But it is very expensive, and they must find brackish water because the shrimp will die.

Jigo Beach Tourism also has problems in management. Residents have applied for a permit to the Forestry Service to obtain the legality of managing the tourist spot. They hope that the license will make it easier for residents to repair and maintain the tourist spot. However, the permit is hampered at the Tourism Office. Their permit letter has not been issued until now

d. Potentials

This village has great agricultural potential because extensive land is still available. It's just that they need an irrigation system to raise yields. Ponds also have enormous potential because the sales of crabs can provide a large income for residents. Extensive pond land also a potential for shrimp and crab pond management.

The management of Jigo Beach tourism can also support natural tourism in the village. Need support for post-tidal rehabilitation and repair of facilities at the site. Thus, attracting the attention of tourists.

3.3.4 Pulau Sembilan Village

a. Village Profile

Pulau Sembilan village is 127.06 square kilometers wide. This village is close to the Pangkalan Susu PLTU. This village has 529 families with a total population of 2,132 people. The majority of the population is Muslim. The tribes that inhabit this village include 467 Malays, 480 Javanese, 322 Banjarese, and 155 Acehnese.

b. Socioeconomics

The majority of villagers work as farmers. The main crop of farmers is paddy. The yields can reach 6 tons per hectare, with grain prices reaching IDR 4,200 per kilogram. Paddy is sold to intermediaries who sell it back to Pangkalan Susu.

Apart from rice, residents also grow oil palm. An oil palm plantation company also employs women in this village. Mothers work to clear grass in oil palm plantations. They get daily wages from the company.

Some residents work as fishermen. Many fishermen in this village have cages. They cultivate snapper in the cages and sell it for IDR 50,000 per kilogram.

Some others become pedicab drivers. The rickshaw drivers will usually wait for Pangkalan Susu ships to transport residents' goods. Seven boats go back and forth every day. Rickshaw drivers take turns transporting goods from the ships. They are paid around IDR 5,000 and IDR 10,000 for assisting one passenger for short distances and IDR 20,000 per passenger for long distances.

c. Problem

This village is one of the rings of PLTU Pangkalan Susu. It is also a place to dock coal tugboats. In the past, fishermen used to have cages where coal tugboats rested. They cannot do that anymore because the water is contaminated with coal waste, and the area has been occupied. Fishermen do not have the capital to maintain cages because fish often die. They can still make cages, but it isn't easy to catch fish in Tanjung Ape or on the 180-degree side of the location where the barge is leaning. At low tide, they look for shells (white clams and feather mussels). People in this village also buy fish from Pangkalan Susu.



Picture 3.14.The condition of the barge tugboat leaning on the sea in Pulau Sembilan Village

Agricultural productivity in this village is not optimal. Rats often attack, thus crop yields are less than optimal. Irrigation only uses rainwater. Although oil palm plantations dominate the crops in the village, the palm leaf wastes are not usable due to a lack of tools. The leaves are thus burnt.

Many of the villagers work at the PLTU Pangkalan Susu. There are about 40 to 50 people. In the past, only a dozen people worked at PLTU. They become unskilled workers who have to share half of the salary with the tokey (the boss) who employs them. It is very difficult to get a job at a steam power plant now unless you know "insiders". PLTU still opens job opportunities for residents but only as manual work like ash cleaning. The health risk is too high due to exposure to dust in the lungs. Even workers who wear four-layer masks can still be exposed to coal dust so that their noses turn black.

d. Potentials

This village has good agricultural potential. It can produce 6 tons per hectare in each harvest without modern irrigation systems. It is necessary to make irrigation to anticipate droughts that occur at any time. Pest control is also needed to prevent harvest failure.

Cages are also a potential resource for villagers. But, it is only usable in locations far from the power plant to avoid ash and coal. It is necessary to procure fish seeds so that fishermen can be independent.

Chicken and duck farming is also one of the potentials for the economic development of residents. The price of eggs can reach IDR 2000 each. Residents no longer need to buy eggs from outside the island. It's just the procurement of feed that must be considered because it's still out of control.

3.3.5 Pulau Kampai Village

a. Village Profile

The main occupation of the villagers is fishermen. One catch can result in three tons of fish. Fishermen can catch sharks and rays. The fishing location is not far from the island.

Apart from fishing, fishermen also farm snappers and harvest them every six months. Some of the cages are also owned by companies. The fishermen help improve the life of the people. In the past, their house was made of planks. Now it's made of bricks.

The area of agricultural land in this village reaches 850 hectares. People plant rice. They can harvest 5 tons of rice per hectare on average. They sell it for between IDR 4,700 and IDR 4,800 per kilogram.

Nearly 90% of villagers own oil palm plantations. Meanwhile, 5% of palm oil belongs to the company. The area of oil palm plantations is almost 3,000 hectares. The price of palm oil is around IDR 2,400 per kilogram.

Some residents work to take care of natural coastal tourism. Village groups manage tourist attractions.

Home industries are also growing in this village. Women or youth groups produce shrimp paste from Ebi shrimp. Ebi shrimp are obtained from nature which is still abundant. Terasi production is sold in the village to Pangkalan Susu.

c. Problem

It was easy for fishermen in this village to get tons of fish in the past. Now, it's not easy because of fishing gear technology. In the past, they used fishing gear in the form of a crane. However, now they only use ordinary nets, so the catch decreases.

In the agricultural sector, yields are now much lower. Farmers can harvest a maximum of 1 ton per hectare. Some only get as much as two burlap sacks. It happens because the soil quality has begun to decline in the last 15 years. The reason is that oil palm plants absorb many nutrients and water. Waste from oil palm leaves that fall into waterways turns brown or has a peat-like color. The irrigation system is also not good because it makes seawater into agricultural fields.

Residents who manage home industries can already produce shrimp paste products. However, BPOM and halal labels have not been carried out due to cost constraints, limited access to the city center, and large-scale marketing challenges. Terasi is only known in the village and Pangkalan Susu. Another obstacle is that the shrimp paste cannot be dried during the rainy season and cannot be processed or wrapped because it is wet. Drying equipment is a necessity for this home industry.



Picture 3.15. Processed shrimp paste made by local women and youth groups in Pulau Kampai Village

d. Potentials

The economic potential in the village is home industries. The residents are very excited, but they need assistance to make the manufacturing and marketing process more organized. In addition to shrimp paste, training on the use of mangroves can also be carried out. In the village, there are approximately 1,000 hectares of mangrove plants. However, there has been no attempt to use it. The wood can be used to make juice and dyes for making batik. Mangroves that are maintained also save a lot of potential for crabs that lay eggs better. Crab in this village has been marketed everywhere. Therefore, the use of mangroves and their protection is urgent.

Another potential is to produce salt, which raw materials are available at sea. Residents can take seawater and process it. In this case, only experts and community assistants are needed for the manufacturing and marketing process. Quoting the head of Pulau Kampai village, "assistance is important because it will encourage the community to be more active in developing the potential that exists in the village".

CHAPTER 4 STUDY OF POTENTIAL



Chapter 4 Study of Potential

Table 4.1. Assessment of the potential in three islands

Province	Village Name	Potential type	Opportunities	Challenges
Central Sulawesi	Lembah Sumara Village	Patchouli cultivation	No pests eating the plant. The results also support the economy	Maintenance requires a lot of effort
		Cattle	The land is abundant, and a lot of grass is available for cattle.	The price of the calf is high, thus requires a lot of money.
	Tamainusi Village	Fish pond	A pond can help fishermen cultivate fish because the sea in their village no longer produces fish.	The cost is high, reaching 100 million rupiahs.
		Agriculture	The land is still fertile.	The soil used for agriculture is poor quality. Therefore residents grow plants near protected forests.
	Tambayoli Village	CA Morowali and the Wana	A potential area to develop research on conservation efforts of Sulawesi endemic animals, cultural tourism for children to introduce the culture of the Wana Tribe	The distance to the location of the Wana community, who live in the forest, is very far. One has to walk a long distance. There is a threat of nickel mining because the company is still looking for samples for the mine site

Province	Village Name	Potential type	Opportunities	Challenges
East Kalimantan	Ilir Santan Village	fish pond	Not using the polluted seawater so the possibility for fish to grow is bigger. The PT Indominco Mandiri company has polluted seawater. The cessation of industrial activities and mangrove planting on the beach can help the sea neutralize metal or ex-mining waste.	It's been done before, but all the fish died because the seawater was exposed to waste
		Cattle	Offers high profit when sold.	Exposure to diseases include diarrhea. There is a threat of cattle being killed and poisoned by people who don't want cows entering their land.
		Coconut plant	Abundant harvest in 2 or 3 months	There are rats and squirrels
	Central Santan Village	Hot spring tour	Close to major roads and easy access	Sometimes hot water doesn't come out
		Orchard and coffee	A group of young farmers willing to share planting tricks and monitor yields. Can help in the marketing process	Floods make plants die easily; it's even difficult to plant seeds.
	Ulu Santan Village	Swallow bird nest	Close to the cave in the forest so that the intensity of the swallow to come to the artificial nest is higher. Yields reach tens of millions.	The construction of nests is quite expensive.
		Non-timber forest products	Unprotected wood can be used for making house materials and even nests for swallows.	The difficulty of transportation to the location, only relying on boats to bring forest products to the village.

Table 4.1. Assessment of the potential in three islands

Province	Village Name	Potential type	Opportunities	Challenges
North Sumatra	Sluice Village	Crab pond	Mangrove is still abundant, so there are still a lot of crabs.	Lack of land for developing crab farming.
		Agriculture	There is a lot of land.	Inadequate irrigation system, only using rainwater.
	Nine Island Village	Fish cage	There is still a lot of marine potential near Tanjung Ape, and the sand is still white, so there is potential for visitors to travel.	It can't be done near the barge berth because the fish will die.
		Chickens and ducks	An alternative source of income because the residents don't have to buy eggs from outside their island.	The feed system is lacking because it has not been able to utilize agricultural waste that can be used for feed
	Kampai Island Village	Home industry	Making trays without preservatives that can be developed and done by housewives	Obstacles in the marketing process. BPOM requires hygiene tests that must be carried out at its central headquarters. Obtaining halal labels require assistance.
		Salt making	Ingredients can be found directly at sea.	Need assistance and land for production.

Table 4.1. Assessment of the potential in three islands

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The idea of a just transition is closely related to the idea of environmental justice. With the concept of environmental justice including climate justice and energy justice, the concept of a just transition has also expanded its meaning. It is no longer only related to industrial workers who produce and industrial workers who consume fuel oil, but also includes people who live in the midst of high-pollution areas due to the existence of industries based on fossil fuels as experienced by marginalized communities, or people with non-capitalist economic life but affected by natural resource extraction activities that are loaded with carbon. Politically, this expansion of meaning provides wider space and draws support from vulnerable and marginalized citizens into a common front against the power bloc of fossil fuel industries.

A just transition is absolute because the earth in which we live today is not socially, economically and environmentally sustainable. We live in a world that is experiencing a chronic organic crisis, namely the global crisis of climate change





JARINGAN ADVOKASI TAMBANG MINING ADVOCACY NETWORK S U L A W E S I T E N G A H





Website: http://aeer.info Email: aeermail@gmail.com