ROSA LUXEMBURG STIFTUNG
Dialogue Programme Climate Justice

FAST AND FURIOUS FOR FUTURE

the dark side of electric vehicle battery components and their social and ecological impacts in Indonesia

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THE DARK SIDE OF ELECTRIC VEHICLE BATTERY COMPONENTS AND THEIR SOCIAL AND ECOLOGICAL IMPACTS IN INDONESIA

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FOREWORD

In order to tackle climate change, the EU has proposed a 2030 deadline to cut CO2 emissions by 55 percent, although this goal is not ambitious enough to meet the targets set out by the Paris Climate Agreement. The idea of the European Green Deal is therefore being heavily promoted. One essential pillar is the energy and mobility transition. To reach the necessary transition in mobility, the European Commission claims that 30 million electric cars must be in use by 2030.

But this claim does not take into account the overall "ecological footprint" caused by the production and usage of electric cars.

At the moment, China is leading in terms of investing in, producing, and using electric vehicles (EV), alongside other Asian investors and battery producers such as South Korea and Japan. In 2019 there were already 2.58 million battery electric vehicles (BEV) in China, compared to just 0.97 million in Europe. Over the last three years the number of Chinese EV manufacturers has tripled, with more than 400 registered nationwide.

Raw materials for EV batteries often come from three main regions. Lithium comes mainly from Latin America and accounts for 50 percent of global production. One significant problem there is the negative impact of water extraction on the nearby arid ecosystems from the Andes. The extraction of cobalt is mostly problematic because of social exploitation. Around 70 percent comes from the Democratic Republic of the Congo, of which between 15–30 percent of it is from small-scale mining. Often there are no safety measures in place, resulting in fatal accidents and workers coming into direct contact with heavy metals such as uranium. Usually children are among the workers in the small-scale artisanal mining facilities. For nickel, Indonesia is currently the biggest source, but here social and environmental exploitation is prominent, with air – and sea water pollution being especially large threats.

So can we call electric vehicles CO2-free and environmentally and socially friendly? If you look at the dimensions of the production process, the process of using EV, and the recycling process of batteries, there are severe doubts.

As mentioned already, there are severe negative impacts identified with the mining and production of EV batteries. It is not yet clear how batteries can and should be recycled. Nothing is defined by political regulations, and there is also no large-scale technology research on the matter. It is clear that after ten years of use, EV batteries have to be replaced. Theoretically more than 90 percent of the nickel and cobalt can be recovered from used batteries and up to 30 percent of the lithium.

The energy needed for EV production comes mainly from coal power plants, and in terms of charging EVs, globally only 26 percent of the electricity mix is from renewable energy. For the EU, this figure for EV charging is only slightly better: 38 percent of the electricity is generated from renewable energy. Also the question remains of how energy-intensive the recycling process of the batteries is, and how soon we can achieve 100 percent renewable energy sources.

So what has to be done over the coming years? First we need safeguards for the production process and supply chains such as "responsible mining" and "due diligence" schemes. It is also necessary to improve the already-existing certified trading chain initiatives, as for example from the German Federal Institute for Geosciences and Natural Resources (BGR). These labels should be included with the product. The first legal requirements exist for so-called conflict resources (e.g. gold in Congo). Besides this, there are several international initiatives involving companies that are trying to increase compliance with corporate due diligence obligations (e.g. the Global Battery Alliance [GBA], the Responsible Cobalt Initiative, and the Drive Sustainability partnership). GBA is designing a Battery Passport to allow EV users to check the supply chain of EV battery production.

Second, proper recycling schemes have to be put in place and should be part and parcel of the overall package of EV. The European regulation on sustainable battery production must contain a binding recycling quota for electric batteries in cars, that means also to reduce wastage not only in the EU but also outside. The Waste Electrical and Electronic Equipment (WEEE) Directive is a useful model here. International battery and vehicle manufacturers have to be included in the process; the European Battery

Alliance and the respective embassies in the countries of production also have to play an active role in order to create a real circular economy.

This can only be achieved on a broad scale through legislation and with a coordinated effort from the EU. Still, the successful implementation of the regulations also depends on how weak or strong the legislation and state institutions are in the respective countries of production.

Third, in order not to simply promote green consumption by repeating the same consumer patterns, we have to identify ways of establishing reduced yet smart consumption. Innovative town and infrastructure planning is needed to reduce the distance and effort of travel between work and home, and to carry out daily errands. More privileged bicycle lanes and bike ports would improve the situation. A car is on average only used for one hour per day.

That means there is huge potential for shared and common utilities. These smart ways of living could be achieved through more public and affordable, or indeed free transportation—surely with EV technology—and subsidized car-sharing schemes ideally also through EV technology. Some of the solutions would resolve the highlighted problems with the EV industry and would therefore offer a great opportunity for a real transition.

Laura Geiger
Director Dialogue Program Climate Justice

PREFACE & ACKNOWLEDGEMENT

Currently, the use of electric vehicles is believed to be one of the strategies to reduce the carbon emissions which have triggered the climate crisis as well as causing air and noise pollution. Indonesia has the world's largest nickel reserves and the electric vehicle industry will need nickel, which is one of the main minerals of lithium batteries. This means that efforts to overcome the climate crisis will be carried out by extracting minerals, mainly from Indonesia. Therefore, it is important to inspect and supervise the battery-grade nickel production process in accordance with internationally accepted environmental and social standards.

This research tries to map out the battery-grade nickel industry actors in Indonesia, starting from the shareholders of smelter operators, to where the products have the potential to move in the global supply chain. The potential environmental impacts of planned deep-sea tailings disposal (DSTD) are also explored in this document. Finally, this research reveals field findings from the impacts of mining activities and the nickel industry that are currently in operation and could potentially be amplified by the future development of the battery-grade nickel industry.

AEER would like to express its deep gratitude to the parties involved and who assisted in writing this research, especially the affected local communities in the villages of Bahomakmur and Fatufia in Morowali District; Lelilef Sawai Village, Lelilef Waibulan, Gemaf, and Sagea in Central Halmahera District; and Desa Minamin, Saolat, and Waijoi in East Halmahera District.

We would like to thank Yayasan Tanah Merdeka (YTM) Palu, the Central Sulawesi Mining Advocacy Network (JATAM), and the Indigenous Peoples' Alliance of the Archipelago (AMAN), North Molucca. We would also like to thank Rosa Luxemburg Stiftung, which has supported us in doing the battery-grade nickel study which resulted in this publication.

AEER also hopes that this research can be taken into consideration by policymakers and investors in formulating a nickel-based downstream battery industry plan for electric vehicles in Indonesia while still paying attention to environmental sustainability standards and the rights of local communities. This research is also aimed at helping local communities and non-governmental organizations to identify supply chain institutions in advocacy efforts.

Thank you.

Pius Ginting
Director AEER

CHAPTER I: INTRODUCTION

1.1. GLOBAL ELECTRIC VEHICLE TRENDS

In the midst of increasing global attention to environmental sustainability, electric vehicles are emerging as a solution to the high emissions released by fossil fuel-based vehicles. The *International Energy Agency* (IEA) has recorded a dramatic increase in the sales of electric cars over the last ten years.[1] In 2010, there were only 17,000 electric vehicles on the roads, while in 2019 there were 7.2 million electric vehicles. The IEA predicts that there will be 140 million electric vehicles in use around the world by 2030.[2]

China is the largest market for electric vehicles, followed by Europe and the United States.[3] Half of all global electric vehicle sales during 2019 were in China, with 1.06 million units, down two percent from the previous year. Europe is in second place, selling 561,000 units, followed by the United States with 327,000 units.

During 2019, 47 percent of the electric vehicles worldwide were in China, up from 45 percent in 2018. The number of electric vehicles in China in 2019 grew 46 percent from the previous year, to 3.4 million units. Meanwhile in Europe, electric vehicles reached 1.7 million units (25 percent of the total global electric vehicles), and in the United States 1.5 million units (20 percent of the total) in the same year.

Electric vehicles give out lower emissions compared to conventional internal combustion engine (ICE) vehicles that use fossil fuels. In addition, the energy consumption of electric vehicles is three to five times more efficient than conventional vehicles. Electric vehicles produce very low air pollution and have the potential to significantly reduce greenhouse gas emissions.[4]

Production of electric vehicle batteries is also expected to increase. The need for lithium-ion (li-ion) batteries continues to grow, from a production of 19

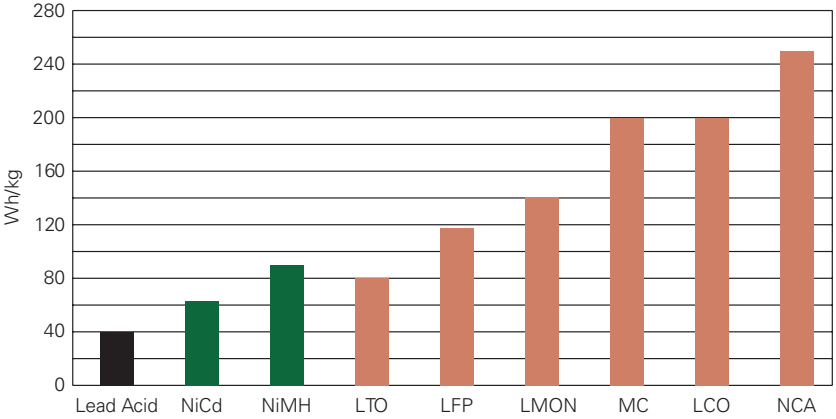
Table 1.1: Global electric vehicle sales during 2019 by factory

No.	Electric Vehicle Manufacturers	2019	%
1	Tesla	367,820	17
2	BYD	229,506	10
3	BAIC	160,251	7
4	SAIC	137,666	6
5	BMW	128,833	6
6	Volkswagen	84,199	4
7	Nissan	80,545	4
8	Geely	75,869	3
9	Hyundai	72,959	3
10	Toyota	55,155	2
11	Kia	53,477	2
12	Mitsubishi	52,145	2
13	Renault	50,609	2
14	Chery	48,395	2
15	GAC	46,695	2
16	Volvo	45,933	2
17	Great Wall	41,627	2
18	Dongfeng	39,861	2
19	Changan	38,793	2
20	JAC	34,494	2
Others		732,769	33
Total*		2,209,831	100

** The combined total electric vehicle sales from each individual manufacturer is higher than the stated 'total' sales in this table. Probably, the discrepancy is created by sales from joint-venture EV manufacturers being included for each individual manufacturer in the joint venture.*

Source: M. Kane (2020), "Global EV Sales For 2019 Now In: Tesla Model 3 Totally Dominated", InsideEVs, available at https://insideevs.com/news/396177/global-ev-sales-december-2019/. Last accessed on 20 October 2020.

Figure 1.1 Energy density contained in various type of lithium-ion batteries



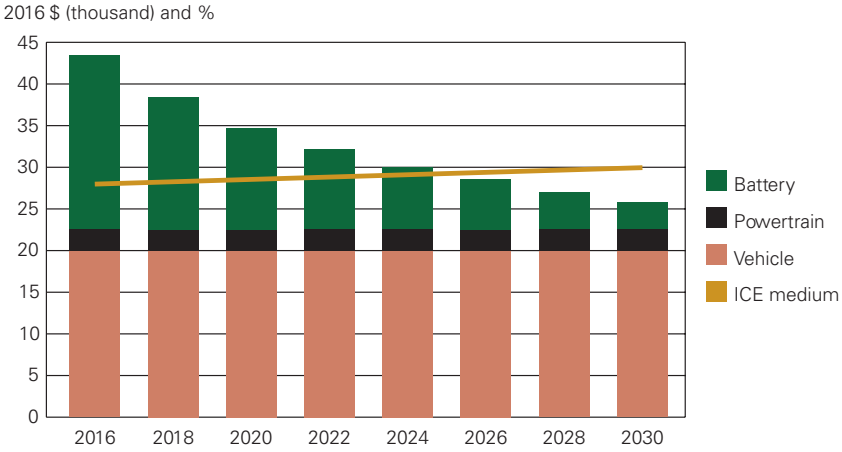
Source: "BU-205: Types of Lithium-ion," Battery University, originally published 2011, last updated 3 December 2020, available at https://batteryuniversity.com/learn/article/types_of_lithium_ion. Last accessed on 17 December 2020.

Gigawatt hours (GWh) with a production capacity of 30 GWh in 2010, to 60 GWh with a production capacity of 285 GWh in 2019.[5]

There exist various types of lithium-ion batteries, such as: LTO (lithium titanate), LFP (lithium phosphate), LMO (lithium manganese), NMC (lithium-nickel manganese cobalt oxide), LCO (lithium cobalt oxide), and NCA (lithium nickel aluminium oxide). Today, battery technology is shifting to nickel-intensive material for its higher energy density. NMC-type lithium-ion batteries containing nickel are currently the most widely used in electric vehicles, chosen with consideration for safety, energy efficiency, and price.

The world's leading companies have announced plans for the construction of various battery manufacturing facilities to be completed by 2023, with a capacity of 252.45 GWh, and spread across China, the USA, and the European Union.[6] Bloomberg New Energy Finance (BloombergNEF) estimates that the

Figure 1.2: Percentage of battery prices compared to the total price of electric vehicles, as well as the price of internal combustion engine (ICE) medium-sized vehicles, during 2016–30



N. Soulopoulos, "When Will Electric Vehicles be Cheaper than Conventional Vehicles", Bloomberg New Energy Finance, 12 April 2017, available at http://www.automotivebusiness.com.br/abinteligencia/pdf/EV-Price-Parity-Report.pdf. Last accessed on 17 December 2020.

total global production capacity of li-ion battery manufacturers will reach 1121 GWh by 2025.[7]

The trend of increasing electric vehicle battery production is followed by an increase in demand for battery material, the most expensive part of electric vehicles. However, the percentage of the price of batteries in comparison to the overall cost of electric vehicles is predicted to continue its decline, in line with the development of battery technology and the increase in production. One of the reasons is the transition from cobalt to nickel, with higher energy density and storage capacity, as well as lower costs.[8]

The shift in battery technology that uses more nickel can be seen from the projection of the type of battery cathodes that will be used in electric vehicles by 2025, such as NMC 811, NMC 622, or NMC 532, where the numbers

represent the ratio of the materials used. The number 811 means that it consists of 80 percent nickel, ten percent manganese, and ten percent cobalt.

It was estimated that by 2019, 48 percent of new batteries for electric vehicles using cathodes would contain at least 50 percent nickel.[9]

1.2. THE GROWTH OF THE BATTERY-GRADE NICKEL INDUSTRY IN INDONESIA

In 2019, global nickel demand was still dominated by the stainless steel industry, at 74 percent, while the need for batteries accounted for only five to eight percent of the total.[10] Even so, the need for battery-grade nickel is predicted to continue to increase, alongside the increasing use of electric vehicles. Wood Mackenzie, a consulting firm, recorded 162 kilotonnes of battery-grade nickel consumption in 2019. This consumption is estimated to increase to up to 265 kilotonnes by 2025.[11] The IEA predicts that the annual demand for class 1 nickel in 2030 will reach 925 kilotonnes per year, based on the stated policies scenario,[12] and 1,900 kilotonnes per year based on the sustainable development scenario.[13]

Stainless steel is capable of utilizing a combination of class 1 (greater than 99 percent Ni) and class 2 nickel, but the battery needs can only be met by high-purity class 1 nickel. Only 46 percent of total global production is class 1 nickel, with 70 percent coming from nickel sulfide ore. The remainder is produced using nickel laterite ore which has a lower nickel content than sulfide.[14]

Indonesia is the country with the world's largest nickel reserves, namely 23.7 percent of the world's total reserves.[15] The three regions with the largest nickel reserves are distributed across Southeast Sulawesi (32 percent), North Maluku (27 percent), and Central Sulawesi Province (26 percent).[16]

The implications of the enactment of Law No. 4 of 2009 on Minerals and Coal (Minerba) is the granting of permits for nickel mining activities through mining business permits (IUPs) issued by local government. The local governments

subsequently issued hundreds of nickel IUPs throughout Indonesia, which triggered an increase in nickel ore production and exports, especially to China. The peak occurred in 2013 when Indonesia's nickel ore exports reached 64.8 million tonnes with a value of USD 1.6 billion.[17] In the same year, Indonesia became the main supplier of nickel ore to China (accounting for 50 percent of their supply).[18]

The Indonesian government issued a ban on exports of low-grade nickel through the Regulation No. 11 of 2019 from the Ministry of Energy and Mineral Resources. This policy considers the added value of nickel through domestic processing as well as the rapid development of smelters in recent years, meaning that a sufficient nickel supply is required.[19]

In August 2019, President Jokowi also signed Presidential Decree No. 55 of 2019 on the Acceleration of the Battery-Based Electric Motor Vehicle Programme for Road Transportation. This regulation is aimed at stimulating the growth of the electric vehicle industry in Indonesia, especially for nickel-based batteries.

In 2013, the Indonesian and Chinese governments established an agreement to set up a nickel-based industrial area in Morowali, named Indonesia Morowali Industrial Park (PT IMIP).[20] In this area, the downstream nickel industry produces various types of products such as ferronickel, nickel pig iron (NPI), stainless steel, and in the future, nickel-based battery components for electric vehicles.

There are three companies that control PT IMIP. The following are the names of these companies followed by the proportion of PT IMIP shares owned: Shanghai Decent Investment Group (49.7 percent); PT Sulawesi Mining Investment (PT SMI) (25 percent); and PT Bintangdelapan Investama (25.3 percent). Shanghai Decent is a subsidiary of the titan of Chinese stainless steel, Tsingshan Group. Meanwhile, PT SMI shares are controlled by Shanghai Decent (46.55 percent), PT Bintangdelapan Investama (25.65 percent), and the rest by Reed International Ltd. and Fujian Decent Industrial Co., Ltd. This share ownership structure illustrates Tsingshan's power over IMIP.

IMIP received loans from several banks for construction and area development, particularly banks from China, such as China Development Bank (CDB), Export Import Bank of China, and Bank of China. In addition, HSBC, a British bank, also disbursed funds for this project.[21]

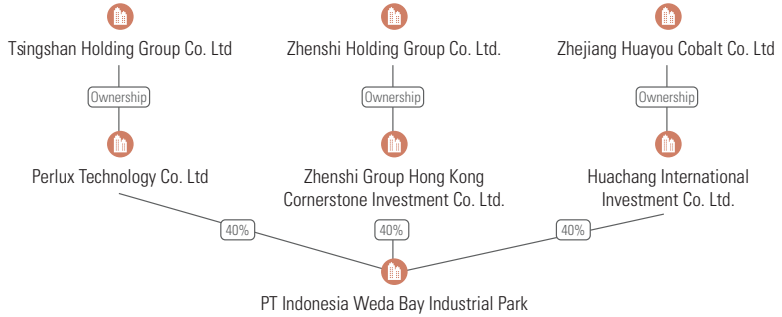
In 2019, two nickel-based battery component companies began the construction phase at IMIP. These were PT QMB New Energy Materials and PT Huayue Nickel & Cobalt.

The nickel industry is also expanding on Obi Island and in the Weda area in North Maluku Province. Harita Group has mining permits covering an area of 5,524 ha through two companies: PT Trimegah Bangun Persada and PT Gane Permai Sentosa on Obi Island, South Halmahera District.[22] Currently, Harita is building a nickel-based battery component factory in collaboration with the Chinese company Zhejiang Lygend Investment. Since 2018, Harita has operated a ferronickel smelter with Xinxing Ductile Iron Pipes Co., another Chinese company.[23]

Also in North Maluku Province, the construction of the Indonesia Weda Bay Industrial Park (IWIP) is still ongoing. It is located in the Weda area, Central Halmahera District. This project is planned to become an industrial area for smelting minerals and the production of integrated nickel-based battery components for electric vehicles. IWIP is one of the national priority industrial areas listed in the 2020–24 National Medium-Term Development Plan (RPJMN), following IMIP being categorized as a national priority industrial area in the previous RPJMN. The project began construction in 2018.[24]

The development of IWIP is divided into three phases. The first phase is focused on developing ferronickel production through pyrometallurgical smelters with a total investment of USD 2.5 billion. The financing for the first phase comes from 35 percent internal funding and 65 percent from bank loans with a repayment duration of ten years. The second phase is focused on developing nickel and cobalt production in the form of hydroxide through hydrometallurgical smelters with a total investment of USD 1.5 billion. The third stage is the development of electric car batteries with a total investment of USD 5 billion.[25]

Figure 1.2: Chart of shareholder structure for PT Indonesia Weda Bay Industrial Park



Source: Directorate General of General Legal Administration, Ministry of Law and Human Rights (2019), "Company Profile of PT Indonesia Weda Bay Industrial Park"

Like IMIP, IWIP is also the result of investment cooperation between three Chinese companies: Tsingshan Group, Huayou Group, and Zhenshi Group. Tsingshan is once again a major player with majority shareholding (40 percent) through its subsidiary, Perlux Technology Co. Ltd.[26] Meanwhile, Zhenshi and Huayou have 30 percent ownership each.[27]

As of October 2020, two smelter plants producing ferronickel have been operating at IWIP. Each plant is owned by PT Weda Bay Nickel (which is a joint venture of the French company Eramet and Tsingshan) and PT Yashi Indonesia Investment, owned by Tsingshan and Zhenshi.

CHAPTER II: CHARTING THE INDONESIAN NICKEL-BASED BATTERY ACTORS

KEY POINTS:

- *The lack of new nickel sulfide discoveries, the ban on exports of raw nickel ore, and the fact that the largest nickel reserves are in Indonesia have encouraged investors, especially from China, to build high-pressure acid leaching (HPAL) smelters in Indonesia to secure nickel resources for the global electric vehicle market, which is predicted to grow significantly in the next few years.*

- *Indonesia's deposits of nickel laterite ore encourage the construction of HPAL smelters, which have a track record of being more capital intensive than the initial plan and of having problems meeting defined production goals according to design capacity.*[28]

- *Indonesia's nickel-based battery component products will play an important role in the global supply chain for electric vehicles. At least nine factories which account for 40 percent of global electric vehicle sales have the opportunity to obtain battery supplies from Indonesia.*

2.1. NICKEL-BASED BATTERY COMPONENT INDUSTRY ACTORS IN INDONESIA

Global battery supplier companies are among the shareholders of nickel-based battery component manufacturers in Morowali District, Obi Island, and the Weda area. The potential nickel content in the three regions, and the presence of infrastructure for the battery component processing industry near the mining area, can both significantly cut battery production costs.

Nickel deposits in Indonesia are of the laterite type, with a lower nickel content than nickel sulfide. The world's nickel reserves currently consist of 60 percent nickel laterite and 40 percent nickel sulfide.[29] Nickel laterite is commonly found in tropical areas such as Indonesia and the Philippines, while nickel sulfide is found in South Africa, Russia, and Canada.

Nickel-based batteries require high purity, thus processing nickel laterite is more difficult than sulfides. The smelting and refining processes require more energy and technology, and are therefore more expensive.[30] One of the nickel laterite smelting methods is the hydrometallurgical process of high pressure acid leaching (HPAL), which is currently used by many battery-grade nickel manufacturers in Indonesia.

Two battery-grade nickel component factories began construction in 2019 at IMIP. The company PT QMB New Energy Materials (QMB), which started construction of its first HPAL plant in January 2019, is expected to start production in 2021. QMB was established with a capital of USD 998.57 million. The products to be manufactured are semi-finished nickel and cobalt in the form of mixed hydroxide precipitate (MHP) and the following refined products: nickel sulfate, cobalt sulfate, and manganese sulfate.

There are five companies that directly hold QMB shares. The first and largest shareholder is GEM (Jingmen) New Materials Co., Ltd., which is a subsidiary of GEM Co., Ltd., holding 36 percent of the shares. The second is Brunp Recycling Technology Co., Ltd., a subsidiary of Contemporary Amperex Technology Co., Ltd. (CATL), which controls 25 percent of the shares. The third shareholder is New Horizon International Holding Ltd., controlling 21 percent of the shares, and which is fully owned by Tsingshan Holding Group Co., Ltd., the main investor in the IMIP area through its subsidiary Shanghai Decent. Fourth, PT IMIP itself controls ten percent of QMB shares. Finally, a Japanese trading company, Hanwa Co., Ltd, holds eight percent of the shares (see Figure 2.1).

The second company is PT Huayue Nickel Cobalt (Huayue). With a total investment of USD 1.28 billion, this hydrometallurgical project will be built in two phases: first, carried out with a production capacity of 30,000 tonnes of nickel and cobalt hydroxide per year, then when the second phase starts, it

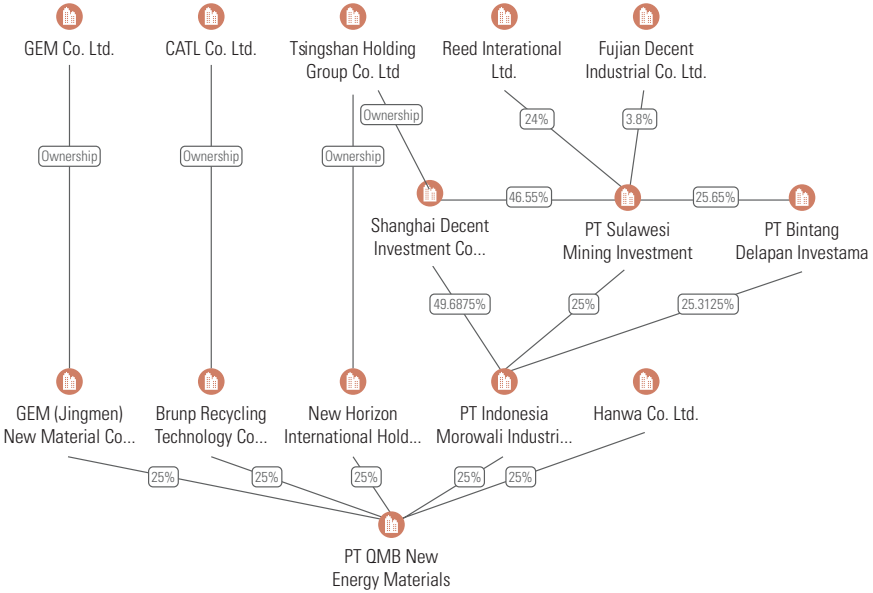
Table 2.1: Production capacity, investment value, and estimated production time of nickel battery companies in Indonesia

Location	Company Name	Products	Production Capacity (tonnes / year)	Equivalent Weight (tonnes / year)	Investment Value (USD)	Estimated Production
Indonesia Morowali Industrial Park	PT QMB New Energy Materials	MHP	142,857	50,000 Ni	998.57 million	2021
		Nickel sulfate	136,364	30,000 Ni		
		Cobalt sulfate	19,512	4,000 Co		
	PT Huayue Nickel & Cobalt	MHP	163,000	60,000 Ni	1.28 billion	2021
	PT Teluk Metal Industry	MHP	160,000	60,000 Ni	1.26 billion	2023
		Nickel sulfate	168,000	N/A*		
		Cobalt sulfate	24,000	N/A*		
	PT Fajar Metal Industry	MHP	160,000	60,000 Ni	1.26 billion	2025
		Nickel sulfate	168,000	N/A*		
			24,000	N/A*		
Obi Island	PT Halmahera Persada Lygend	MHP	365,000	55,875 Ni	1.06 billion	2020
		Nickel Sulfate	246,750	52,000 Ni		
		Cobalt Sulfate	31,800	6,000 Co		
Indonesia Weda Bay Industrial Park	PT Youshan Nickel Indonesia	Nickel matte	43,600	37,000 Ni	406.79 million	2020

**Where N/A is stated, data was not available.*

Source: Presentation Material of PT Hua Pioneer Indonesia (2020); Environmental Impact Assessment of PT QMB New Energy Materials (2019), PT Huayue Nickel & Cobalt (2019), and PT Teluk Metal Industry.

Figure 2.1: Chart of shareholder structure for PT QMB New Energy Materials



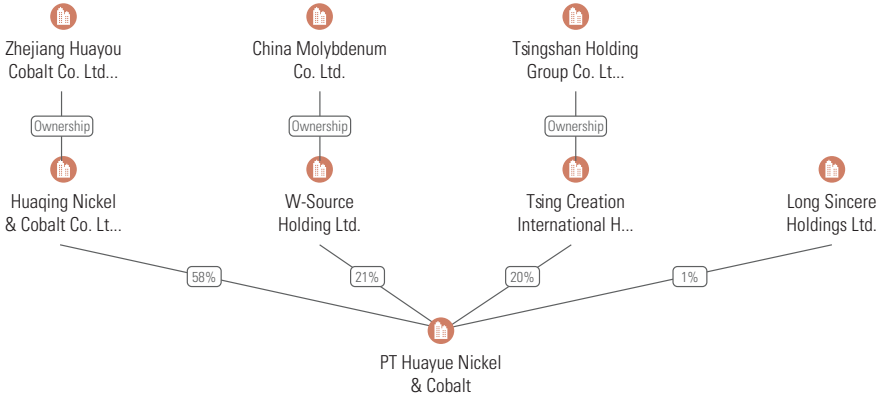
Source: Presentation Material of PT Hua Pioneer Indonesia (2020); Environmental Impact Assessment of PT QMB New Energy Materials (2019), PT Huayue Nickel & Cobalt (2019), and PT Teluk Metal Industry.

will increase to 60,000 tonnes per year. Huayue started construction in 2019 and is expected to start the production stage in 2021.[31]

Four companies control Huayue's shares. Huaqing Nickel & Cobalt Co., Ltd., the majority shareholder, controls 58 percent of the shares (see Figure 2.2).

Apart from the two companies described above, there are two more companies that are planning to build HPAL plants to produce electric battery components in the IMIP area.

Figure 2.2: Chart of shareholder structure for PT Huayue Nickel & Cobalt



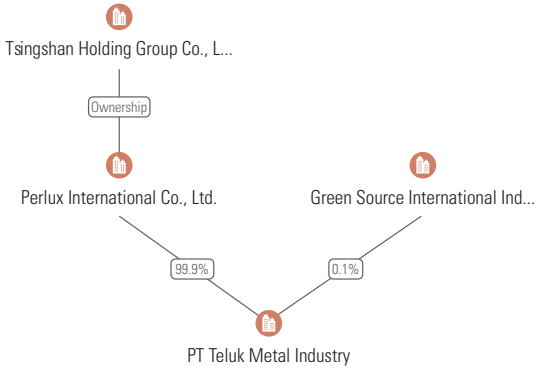
Source: Directorate General of General Legal Administration, Ministry of Law and Human Rights (2019), "Company Profile of PT Huayue Nickel & Cobalt".

The first is PT Teluk Metal Industry (TMI). The company plans to build a nickel sulfate crystal factory with a capacity of 60,000 tonnes per year, and an estimated investment value of USD 1.26 billion.[32] The company predicts smelter operations can begin in 2023.

TMI shares are controlled by two companies based in Hong Kong, namely Perlux International Co., Ltd., and Green Source International Industrial Ltd. Perlux International controls 99.9 percent of the shares while the remaining 0.1 percent is held by Green Source. Judging from the composition of the board of directors, TMI is almost completely controlled by the Tsingshan Group.

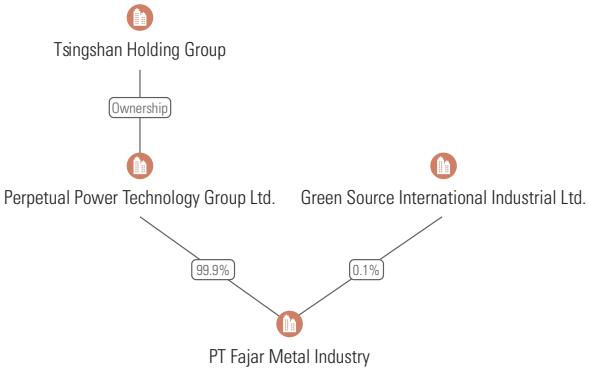
The second company planning to build an HPAL smelter is PT Fajar Metal Industry (FMI) with an estimated investment of USD 1.26 billion. FMI plans to produce nickel-cobalt in the form of mixed hydroxide precipitate (MHP). The refined products, namely nickel sulfate and cobalt sulfate, are needed for electric vehicle batteries.

Figure 2.3: Chart of shareholder structure for PT Teluk Metal Industry



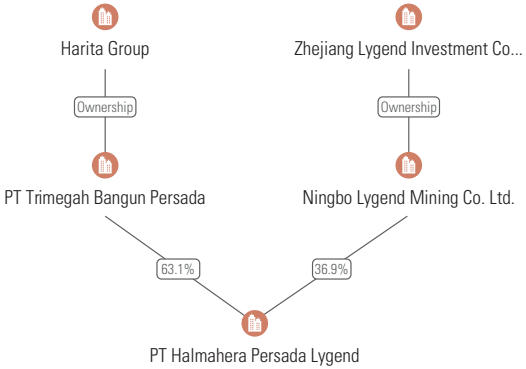
Source: Directorate General of General Legal Administration, Ministry of Law and Human Rights (2019), "Company Profile of PT Teluk Metal Industry".

Figure 2.4: Chart of shareholder structure for PT Fajar Metal Industry



Source: Directorate General of General Legal Administration, Ministry of Law and Human Rights (2019), "Company Profile of PT Fajar Metal Industry".

Figure 2.5: Chart of shareholder structure for PT Halmahera Persada Lygend shareholders



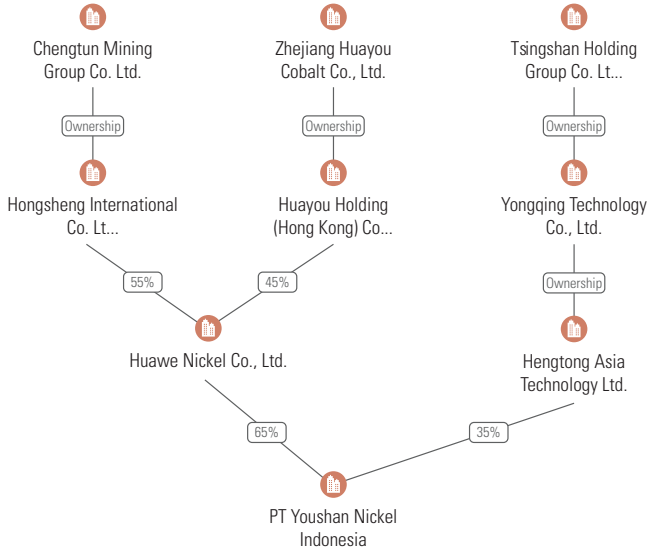
Source: Directorate General of General Legal Administration, Ministry of Law and Human Rights (2019), "Company Profile of PT Halmahera Persada Lygend".

As of the time of writing, FMI's shares are still held by two companies, namely Perpetual Power Technology Group Ltd., with 99.9 percent share ownership, and the rest being owned by Green Source International Industrial Ltd. (0.1 percent). Just like the previous companies, FMI is almost completely controlled by Tsingshan Group.

On Obi Island, South Halmahera District, PT Halmahera Persada Lygend (HPL) plans to build a nickel smelter that produces a mixture of nickel hydroxide and nickel sulfate. Capital of 1.5 billion USD is required for the construction of this smelter, which is planned to produce the main material for electric vehicle batteries. HPL will process nickel laterite on Obi Island by utilizing HPAL technology. This facility is estimated to be able to produce 246,750 tonnes of nickel sulfate and 31,800 tonnes of cobalt sulfate per year.[33] HPL began factory construction in September 2018. Production was expected to start in December 2020.

HPL is a joint venture company between Zhejiang Lygend Investment Co., Ltd. and the Harita Group. Zhejiang Lygend is a company from China

Figure 2.6: Chart of shareholder structure for PT Youshan Nickel Indonesia



Source: Directorate General of General Legal Administration, Ministry of Law and Human Rights (2019), "Company Profile of PT Youshan Nickel Indonesia".

working in the nickel industry. Via Ningbo Lygend Mining Co., Ltd., which is a subsidiary company, Zhejiang Lygend controls 36.9 percent of HPL shares. Meanwhile, the majority of the 63.1 percent of shares are controlled by the Harita Group through its subsidiary, PT Trimegah Bangun Persada. Since 2007, Harita has been undertaking mining and refining activities for nickel on Obi lands.

Meanwhile, in the Weda area, Central Halmahera District, PT Youshan Nickel Indonesia (Youshan), one of the tenants in the IWIP area, is a producer of battery-grade nickel components. In contrast to the projects in Morowali and Obi, Youshan is utilizing pyrometallurgical smelter technology, using a rotary kiln-electric furnace (RKEF). Youshan is estimated to have a production capacity of 43,600 tonnes of nickel matte per year, with a total investment

value of USD 406.79 million.[34] Apart from Youshan, another company whose name is not yet known is going to build a battery-grade nickel factory using HPAL hydrometallurgical technology.[35]

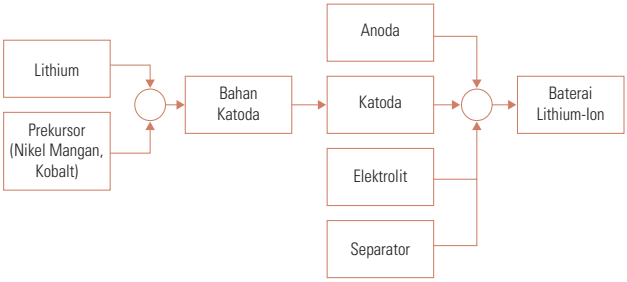
Youshan is a joint venture between Huayou Group, Chengtun Mining Group, and Tsingshan Group (see Figure 2.6).

2.2. THE POTENTIAL SUPPLY CHAIN OF INDONESIAN BATTERY-GRADE NICKEL PRODUCTS

In the battery-grade nickel component factories in Indonesia, the products which are going to be manufactured are cathode components for electric vehicle batteries. These products must go through two to three stages of processing in the battery manufacturing plant before they become complete batteries. This processing may be undertaken by other companies.

To ensure that consumers get products that pass due diligence in terms of the environment and workers' and human rights, the charting of potential supply

Figure 2.7: Stages of processing electric vehicle battery components

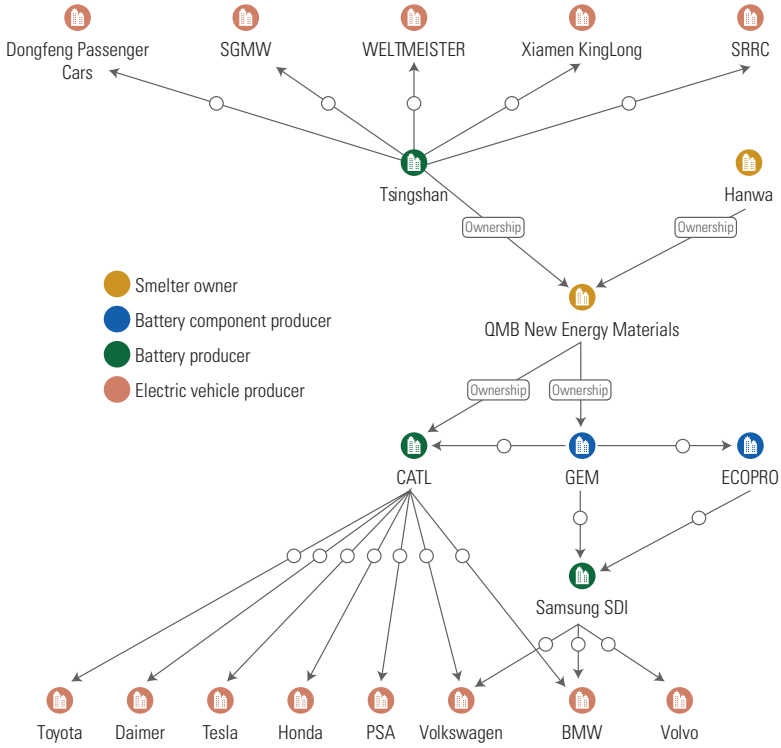


Source: "Everything You Always Wanted to Know About Secondary Batteries", POSCO Newsroom, 11 December 2018, available at https://newsroom.posco.com/en/everything-you-always-wanted-to-know-about-secondary-batteries/. Last accessed on 17 December 2020.

chains is carried out. Local communities can use this chart to hold accountable the responsible parties along the electric vehicle supply chain.

As previously mentioned, PT QMB New Energy Materials is a company building a battery-grade nickel factory in Morowali, and one of its parent companies is GEM Co., Ltd. (GEM). GEM controls eight percent of the nickel mines in China, 30 percent of the global market for battery components made of nickel and cobalt, and 20 percent of the world market for ternary precursors, used to produce power batteries.[36] Together with ECOPRO, an

Figure 2.8: Potential supply chain flow of PT QMB New Energy Materials



electric vehicle (EV) battery component company from South Korea, they agreed to supply 170,000 tonnes of NCA lithium cathode material over the period of 2019–23.[37] GEM has also entered the supply chain of another global battery company, namely Samsung SDI. This can be seen from the joint venture between ECOPRO and Samsung SDI in building an NCA cathode material factory in Pohang, South Korea in 2020. The factory is expected to start production in 2022.[38] Samsung SDI has battery supply contracts with European electric car producers: BMW, Volkswagen, and Volvo.[39]

GEM has also entered into agreements with three Chinese battery cathode manufacturers: Ronbay Technology for 29.3 kilotonnes of Nickel Cobalt Manganese (NCM), which is a precursor cathode active material (PCAM), for 2019–23; Brunp Recycling for 45 kilotonnes of PCAM NCM for 2019–23; and Xiamen Tungsten for 33 kilotonnes of PCAM NCM for 2019–23.[40]

Apart from QMB, GEM will also be supplied nickel from the PT Halmahera Persada Lygend (HPL) battery-grade nickel factory on Obi Island. Under the agreement, which was formalized on 2 September 2020, HPL will supply 74.4–178.6 kilotonnes of nickel, 9.3–22.3 kilotonnes of cobalt in the form of MHP, and a number of nickel and cobalt sulfates for eight years (2021–28), in other words 9.3–22.3 kilotonnes of nickel and 1.2–28 kilotonnes of cobalt annually.[41] This is equivalent to 20–40 percent of the annual production of HPL. Under the agreement, the factory owned by the Harita Group and Lygend Group must enter commercial production before 30 June 2021.

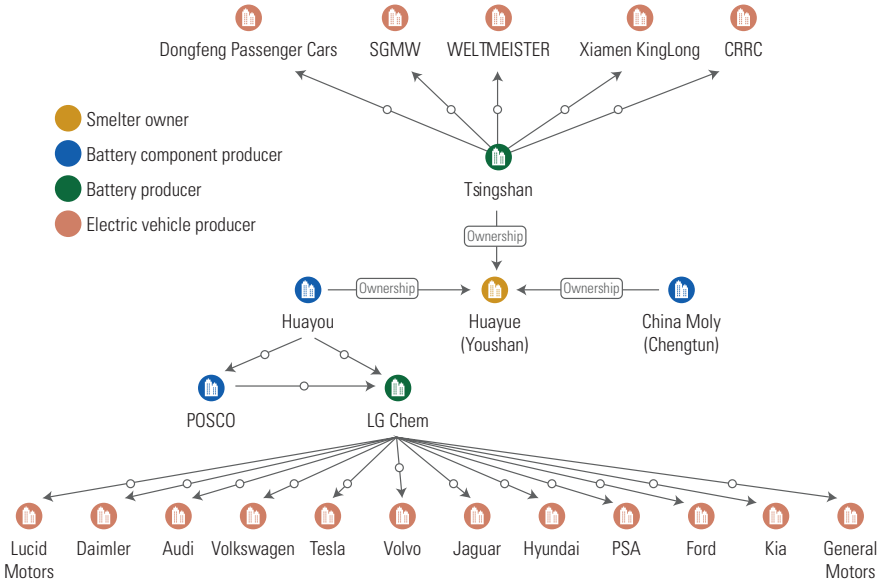
CATL, the second largest shareholder of PT QMB, is a vehicle battery company based in Ningde, China. CATL also became the world's top seller of EV batteries in 2017 by overtaking Panasonic. In 2020, CATL signed a contract with Tesla Inc. for the battery supply for the Model 3 electric car manufactured at its new factory in Shanghai, China. The duration of this contract is for two years, namely 2020–22.[42]

A year earlier, CATL signed a memorandum of understanding (MoU) with Japanese EV manufacturer Honda Motor to supply li-ion batteries until 2027 with a storage capacity of 56 GWh. According to Tomoko Takemori, a spokesman for Honda, the batteries from CATL will be used in products marketed in Asia and possibly North America.[43]

Another global EV manufacturer that is a CATL customer is BMW. The German carmaker signed a contract for battery supply for 2020–31, with a contract worth USD 11.07 billion.[44] CATL is also a supplier for other world-class electric car manufacturers such as Toyota (Japan)[45]; Daimler, BMW, and Volkswagen (Germany)[46]; Hyundai Motor (South Korea)[47]; and PSA (France).[48]

In July 2018, CATL announced that it would inject an investment of USD 2 billion to build a li-ion battery factory in the German city of Arnstadt, Thuringia. This will be the first li-ion battery factory in Germany. Construction began in October 2019. The factory is planned to reach a battery production capacity of 14 GWh by 2022.[49] BMW, which is also a CATL consumer, has also invested in this factory. According to the plans, BMW will get a battery supply worth USD 4.7 billion from CATL, some of which will come from the factory located in Thuringia.[50]

Figure 2.9: Potential supply chain flow of PT Huayue Nickel & Cobalt (PT Youshan Nickel Indonesia)



Huayou Group, the shareholder of the Huayue smelter in Morowali as well as the Youshan smelter in the Weda area, is the largest cobalt producer in China. In recent years, Huayou has been eyeing the EV battery market in line with the market's prospects for the future. One of its products is the ternary precursor for li-ion batteries' cathode material.[51]

In 2018, Huayou started a partnership with a South Korean battery component company, POSCO, to build a factory for precursors and cathode materials in Zhejiang, China.[52] In the same year, Huayou also built two joint ventures with LG Chem: Huajin New Energy Materials Co., Ltd based in Zhejiang, China; and Leyou New Energy Materials Co. Ltd. based in Jiangsu, China. These are to produce precursors and cathode materials with a production target of 40,000 tonnes per year, with production beginning in early 2020.[53]

LG Chem is also currently the main cathode buyer from POSCO and POSCO Chemical.[54] This collaboration will enable two Indonesian battery-grade nickel factories (Huayue and Youshan) that are owned by Huayou to access a very broad battery supply chain, because LG Chem consumers are spread all over the world: from Tesla, General Motors, and Ford (US); PSA and Renault (France); Volkswagen, Audi, and Daimler (Germany); Hyundai Motor and Kia (South Korea); to Volvo (Sweden).[55]

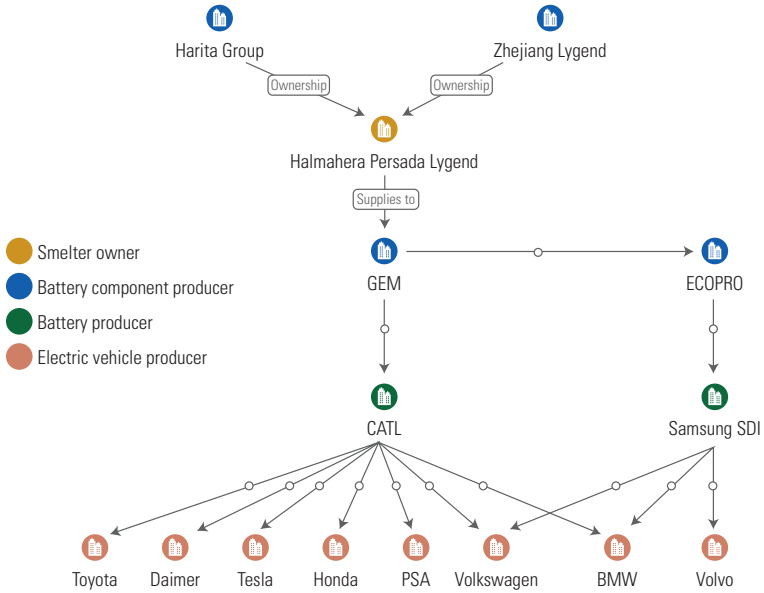
Next, Tsingshan Group has a subsidiary engaged in electric vehicle batteries, Ruipu Energy Co. Ltd. (Ruipu). They are mostly engaged in the Chinese domestic market by supplying NCM and LFP batteries to local electric vehicle manufacturers such as Dongfeng Passenger Cars, Weltmeister, SGMW, CRRC, and Xiamen King Long.[56]

China Molybdenum (China Moly), an investor in the Huayue Morowali project, is a major shareholder in one of the largest cobalt-copper mines in the Democratic Republic of Congo, Tenke Fungurume. This makes China Moly the second largest cobalt mining company in the world after Glencore.[57] China imports 98 percent of its cobalt from Congo and produces half of the global cobalt refined product.[58] China Moly's step into the Indonesian nickel industry can be read as an effort to expand its access to raw materials for electric vehicle batteries or to diversify from the cobalt business, which is used less and less for battery technology.

In the mineral sector for electric vehicles, Chengtun Mining, a company based in Xiamen, has long been conducting copper-cobalt mining activities in Congo along with processing smelters. Chengtun plans to increase cobalt hydroxide production capacity to produce 1,626 tonnes of hydroxide in the first half of 2020. A new installation is also under construction in Congo with a projection to produce 3,500 tonnes of cobalt hydroxide per year. In 2019, Chengtun produced 3,811 tonnes of cobalt with sales of 3,685 tonnes.[59]

In addition, in June 2019 Chengtun started construction of a lithium factory in Sichuan Province, China with an annual production capacity of 60,000 tonnes. The project is expected to reach full-scale production by 2023.[60] Chengtun's penetration of the Indonesian nickel industry complements their involvement in the three main minerals of electric vehicle batteries (see Figure 2.9).

Figure 2.10: Potential supply chain flow of PT Halmahera Persada Lygend



Finally, Zhejiang Lygend is a company that has recently entered the mineral industry for the electric vehicle battery production sector. Even so, Zhejiang Lygend is not a new player in the nickel business, especially in China. During 2016–19, Zhejiang Lygend was listed as the number one importer of nickel ore in China. The imports came from the Philippines, New Caledonia, Turkey, and Tanzania.[61] In 2019, their nickel laterite ore sales volume reached 20 million tonnes or 28 percent of China's national volume.

Electric Vehicle Companies in the Nickel-Grade Battery Industry

In order to capture market share in China, electric vehicle (battery) companies have also opened factories there. LG Chem (indirectly linked to PT Huayue Nickel & Cobalt in Morowali and PT Youshan Nickel Indonesia in Weda) has built a second battery factory in Nanjing which began fully operating in 2020, so that it can supply 21,700 batteries to Tesla, which has itself also opened a factory in China, the Gigafactory 3 in Shanghai.[62]

The Minister of Industry, Agus Gumiwang Kartasasmita, stated that Tesla was interested in building a battery factory in Indonesia so the government directed it to build a factory in the Batang Integrated Industrial Zone, Central Java, located 17 km from the 2,000-MW Batang coal-fired power plant.[63] Meanwhile, CATL and LG Chem plan to invest USD 20 billion to build an electric vehicle battery component factory.[64] Both companies have signed heads of agreement with PT Aneka Tambang Tbk (Antam), an Indonesian state-owned mining company.

2.3. THE POSITION OF INDONESIAN NICKEL IN THE GLOBAL ELECTRIC VEHICLE SUPPLY CHAIN

With the high demand for nickel batteries, Indonesia's position in the global nickel industry is important. This can be seen from the size of Indonesia's nickel reserves, which has led electric vehicle battery manufacturers to plan the building of smelter plants in Indonesia.

During 1990–2019 there were 50 discoveries of deposits containing 96.4 million tonnes of nickel, of which ten were nickel sulfide deposits, accounting for 19 percent of the total deposits found, or 18.1 million tonnes. [65]However, in the last ten years (2010–19), there were only three new discoveries, which only equalled seven percent of the total deposits found.

Of those ten new nickel sulfide locations, only Voisey's Bay, Canada, owned by Vale (with nickel reserves equivalent to 1.6 million tonnes) is in the production phase. The other three locations have fulfilled the feasibility study and are expected to start production in the next few years. The scarcity of nickel sulfide resources is forcing the battery industry to be more reliant on nickel laterite.

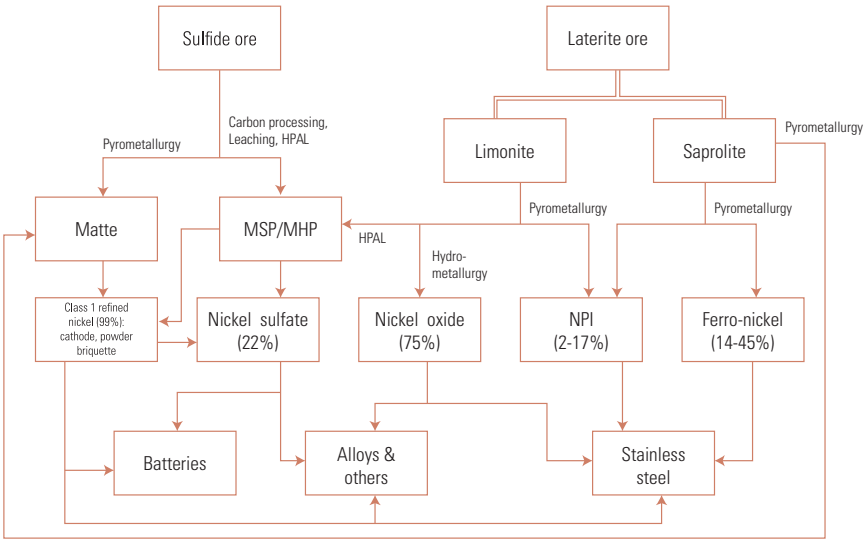
To process class 1 nickel from nickel laterite, a high pressure acid leaching (HPAL) hydrometallurgical smelter is required. Through this technique, laterite ore can be processed into intermediate materials in the form of hydroxide or sulfide (MHP/MSP). Furthermore, the result of this process is refined into nickel sulfate, which is the cathode material of the battery. HPAL is also capable of extracting cobalt which is contained within the nickel laterite ore.

However, laterite processing is somewhat more difficult than processing sulfides in terms of technology, cost, and processing time. This is because, when compared to sulfides, nickel laterite contains lower levels of nickel, as well as higher levels of unwanted minerals that must be removed.[66] In order to process nickel laterite, a large amount of energy and high pressure are required. Then, large costs are required for the use of sulfuric acid. In addition, the average global HPAL project only reaches 80 percent of its design capacity after four years.[67] This shows how difficult it is to reach production levels that are equal to design capacity.

The waste resulting from the processing of metal ore to obtain certain minerals is known as 'tailings', and this requires additional infrastructure and technology to be adequately managed and in order to meet environmental and social standards.

Vale's HPAL Goro New Caledonia project, which has been operating since 2011, is known to have spent USD 4.5 billion (originally budgeted at USD 1.5

Figure 2.11: Process diagram for nickel products

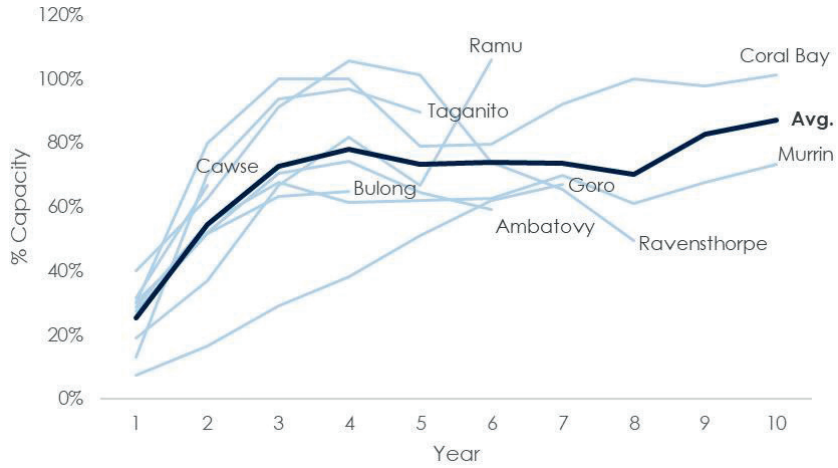


Source: L.E. Young, "Nickel and the Battery Revolution: A New Dawn for Nickel in Batteries", DBS Group Research, Asian Insights Office, 2019.

billion) because the process to reach designed production capacity took longer than was initially planned, and was beset by problems of engineering and process.[68] Vale admitted that it was preparing to close Goro's operations after the Australian company, New Century Resources, cancelled the acquisition.[69] The Ambatovy project in Madagascar had similar conditions. Owned by Japan's Sumitomo Metal Mining (SMM), the Canadian firm Sherritt, and Korea Resources, it was built at a cost of USD 5.5 billion for a design capacity of 60 kilotonnes Ni/year, and an additional USD 1.7 billion was spent during the process to achieve design capacity. Sherritt reportedly resigned from the Ambatovy shareholder structure, and since March 2020 operations have been temporarily suspended due to the Covid-19 pandemic.[70]

Apart from experiencing several failures, HPAL smelters have also recorded successes. Two successful projects are Coral Bay and Taganito, both located in

Figure 2.12: Graph showing changes in the percentage of global HPAL production capacity



Source: J. Gabb, "HPAL: Upping The Pressure", Global Mining Research, Presentation, March 2018, available at https://www.gigametals.com/site/assets/files/4861/2018-03-19-hpal.pdf. Last accessed on 16 December

the Philippines. The majority share in the project is held by SMM.[71] Coral Bay started production in 2005 with a design capacity of ten kilotonnes reached in 15 months. Now, the production scale has increased to 20 kilotonnes of nickel per year.

Meanwhile, the Taganito project, which started producing MSP in 2013, is known to have spent USD 1.7 billion on achieving a design capacity of 30 kilotonnes of nickel per year. The production capacity was increased to 36 kilotonnes per year in 2017.

These two HPAL projects were considered successful in terms of increasing production scale according to design capacity. In addition, HPAL Coral Bay and Taganito cost less than other HPAL projects and produce nickel in the form of

mixed sulfide precipitate with medium-scale production (20 and 36 kilotonnes of nickel per year respectively).[72]

As of October 2020, four battery-grade nickel factories (QMB, Huayue, HPL, and Youshan) owned by Chinese investors are being built in Indonesia with an annual nickel production comprising 135.875 kilotonnes of mixed nickel hydroxide precipitate (MHP), 82 kilotonnes of nickel sulfate, and 37 kilotonnes of nickel matte.

When the four of them are able to operate according to planned capacity, then Indonesia's nickel sulfate will account for 6.8 percent of the global supply of class 1 nickel. However, the majority of Indonesia's battery-grade nickel production will be in the form of MHP, which must be refined later to become nickel sulfate (class 1 nickel). Indonesia's MHP production—

according to design capacity from the three HPAL plants that are being constructed—will be equivalent to 50 percent of the combined MHP/MSP design capacity production from the global HPAL plants that are currently operating (see Table 2.2). The series of conditions above indicates that Indonesia's nickel industry is strategically positioned in the global electric vehicle supply chain.

The depletion of nickel sulfide reserves forces the industry to rely on laterite ore, with Indonesia having the largest nickel laterite reserves in the world (accounting for 24 percent of the global total). This has led to increased use of HPAL technology.

Based on the charting of the supply chain potential in the previous section, it is a certainty that Indonesia's battery-grade nickel products will enter the global electric vehicle supply chain. Indonesia is connected to at least nine of the 20 top-selling EV manufacturers for 2019. The nine manufacturers together have 40 percent of the global EV sales share, linked through battery (component) producers who hold shares in Indonesian battery-grade nickel factories, and companies that have agreed supply contracts with factories.

Nickel ore, which goes through various processes in order to be made into a battery in electric vehicles, has added value. Based on Figure 2.13, it can

Table 2.2: Costs and capital intensity of HPAL globally

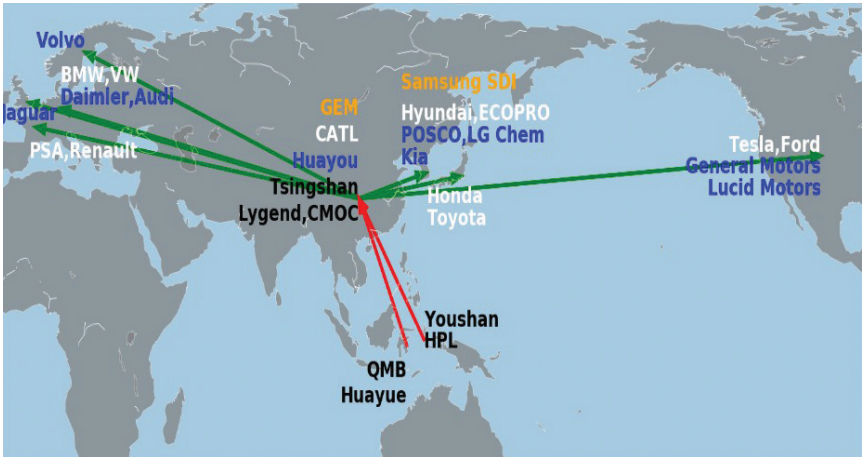
Project	Country	Nickel Production (Ni tonnes / year)	Capital (million USD)	Capital intensity (thousand USD / tonnes)	Year of Operation
QMB	Indonesia	50,000	998.57	20	2021
Huayue	Indonesia	60,000	1,280	21.3	2021
HPL	Indonesia	55,875	1,060	19.0	2020
Moa	Cuba	32,000	451	14.1	1999
Bulong	Australia	9,000	160	17.8	1999-2003
Cawse	Australia	9,000	234	26	1998–2001
Murrin Murrin	Australia	40,000	1,300	32.5	1999
Coral bay	Philippines	20,000	500	25	2005
Ravensthorpe	Australia	50,000	2,100	42	2007
Goro	New Caledonia	60,000	4,500	75	2010
Ramu	Papua New Guinea	33,000	2,100	63.6	2012
Ambatovy	Madagascar	60,000	5,500	91.7	2012
Taganito	Philippines	36,000	1,700	47.2	2013

Source: J. Gabb, "HPAL: Upping The Pressure."

be seen that the global supply chain allows battery and EV manufacturers in developed countries in Europe, America, and East Asia to use nickel from Indonesia. Thus, EV users in those countries must pay more attention to the nickel supply chain, including the environmental and social problems that are triggered by mining and industry activity at the area of origin, in this case Indonesia.

Without adhering to environmental and social standards, the globalization of vehicle electrification only repeats the previous history that triggered the climate crisis today, namely the exploitation of natural resources in developing countries to meet the consumption needs and accumulation of wealth in developed countries.

Figure 2.13: Map of Indonesia's nickel battery product flow in the potential global supply chain of electric vehicles



Source: J. Gabb, "HPAL: Upping The Pressure," Global Mining Research, Presentation, March 2018, available at https://www.gigametals.com/site/assets/files/4861/2018-03-19-hpal.pdf. Last accessed on 16 December

CHAPTER III: POTENTIAL ENVIRONMENTAL IMPACTS OF DEEP-SEA TAILINGS DISPOSAL

KEY POINTS:

- *Upwelling indications in the Obi Island waters near the outfall of deep-sea tailings disposal (DSTD) potentially exacerbate the damage to the marine ecosystem, therefore not being in accordance with the Indonesian Ministry of Environment and Forestry Regulation No. P. 12/2018, detailing requirements and procedures for submarine waste disposal.*[73]

- *The Morowali, Obi Island, and Weda area marine spatial zoning plans do not allow submarine tailings disposal.*[74]

- *DSTD has been abandoned and opposed by many countries, including China.*

- *Areas with high seismic activity and rainfall do not require DSTD to be the only tailings management method. The high pressure acid leaching (HPAL) project in Taganito, Philippines—with similar geographical characteristics to project locations in Indonesia—uses a downstream tailings dam with a medium production capacity (36 kilotonnes Ni/year).*

Environmental aspects of sustainability should not be absent from the downstream development plan for the nickel industry for electric vehicle batteries.

Tesla CEO Elon Musk said his company is ready to provide large contracts for parties capable of supplying large amounts of nickel in compliance with environmental sustainability standards.[75] In Europe, Volkswagen announced that it will audit the supply chains of its mineral suppliers to ensure that its business partners meet environmental protection, working conditions, and human rights standards.[76] At the present time, the Initiative for Responsible Mining Assurance (IRMA) will not certify submarine tailings disposal.[77] One of

IRMA's members is BMW Group.[78] In fact, the Global Battery Alliance (GBA) industry group is currently preparing a battery passport, a digital platform that allows quality verification and sharing of data primarily related to the compliance of li-ion battery manufacturers with environmental and human rights standards.[79] Members of GBA include Audi, BMW Group, Groupe Renault, Huayou Cobalt, Honda Motors, LG Chem, Volkswagen, and Volvo.[80]

In meeting the need for nickel-based batteries, environmental sustainability and the welfare of local communities must be safeguarded. The aim of global vehicle electrification to reduce greenhouse gas emissions should not create new injustices for local communities, since they will be the first to bear the impacts of mining activities and the battery-grade nickel industry. In fact, local communities are the least responsible actor when it comes to excessive global carbon emissions.

The activities of nickel mining and the nickel industry have caused problems in the field, such as air pollution from road dust and mining transportation, loss of forests, and severe erosion on the coast.

3.1. TAILINGS DISPOSAL PLANS FOR BATTERY-GRADE NICKEL SMELTERS IN INDONESIA

Companies use hydrometallurgical high pressure acid leaching (HPAL) technology to process nickel ore into electric vehicle battery components, which produces waste in the form of slurry, called tailings.

Chinese investors plan to build HPAL plants in three locations: Morowali District, Obi Island, and the Weda area. In the first two locations, the companies want to dispose of tailings in the sea in a deep-sea tailings disposal (DSTD), as the available land for waste disposal is considered unsuitable, being prone to earthquakes and high levels of precipitation.

Four companies (QMB, Huayue, FMI, and TMI) are planning to build separate HPAL plants at IMIP. These four also together established PT Hua Pioneer Indonesia to request a DSTD permit in Morowali waters. Meanwhile a

request for DSTD permission in Obi Island waters was made on behalf of PT Trimegah Bangun Persada (TBP). As of October 2020, Hua Pioneer and TBP are still waiting for DSTD permission from the government, even though Nani Hendiarti, an official of the Coordinating Ministry for Maritime Affairs and Investment, stated that Hua Pioneer had withdrawn its DSTD permit request. However, the CEO of PT IMIP, Alexander Barus, said that his company was still asking the government to grant their permit request.[81]

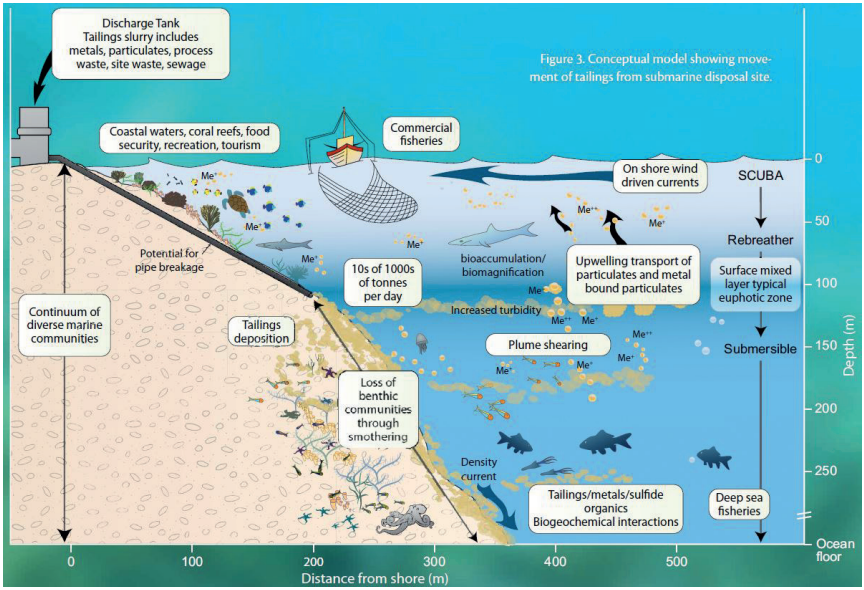
No company has submitted a permit request for the Weda area, although Hua Pioneer's presentation listed Weda as one of the projects that will implement DSTD. Therefore, there is also the possibility of DSTD permit requests for Weda area projects, also considering the similarity between the industrial actors behind IMIP and IWIP.

In Morowali, Hua Pioneer will dispose of tailings through a pipe four kilometres from the coastline at a depth of 250 m with a discharge rate of 31,522 m3/hour or about 25 million tonnes per year.[82] The plants will operate 24 hours a day throughout the year, and are planned to operate until 2038 (QMB and TMI) and 2040 (Huayue).[83] Meanwhile, in the waters around Obi, TBP plans to dispose of 5.75 million tonnes of tailings per year at a depth of 230 m, and as far as 700 m from the coastline.[84] If the permit is issued, the DSTD practice in Morowali will become the second largest in the world after the Batu Hijau gold mine owned by PT Amman Mineral Nusa Tenggara, which dumped around 58.4 million tonnes of tailings per year into the Sumbawa sea, West Nusa Tenggara, Indonesia.[85]

3.2. THE ENVIRONMENTAL IMPACT OF DSTD

The tailings from mining often contain chemical additives from mineral processing and the extraction processes. On an industrial scale, large volumes of tailings with their toxic potential are one of the most serious environmental issues in the mining world.[86] According to the United States Environmental Protection Agency (EPA), water contamination due to mining is one of the biggest environmental threats in the world.[87]

Figure 3.1: Illustration of the impact of DSTP on deep sea ecosystems



Source: A. Reichelt-Brushett, "Risk Assessment and Ecotoxicology: Limitations and Recommendations for Ocean Disposal of Mine Waste in the Coral Triangle" Oceanography vol. 25, pp. 40–51.

The basic idea of DSTD is that the movement of tailings out of the discharge pipe will become a stream that moves into deeper waters because its density is greater than that of seawater. The tailings are expected to move to a stable area in the deep sea. In addition, DSTD is considered capable of preventing acid mine drainage, which is the process whereby sulfides interact with air and then undergo oxidation to form acid. DSTD is believed to prevent this due to the lack of oxygen content in deep waters.

Contrary to the arguments of the parties that encourage the application of DSTD, there are potential environmental impacts that are not trivial. There is

still minimum research on deep sea ecosystems, resulting in low awareness of these potential impacts.

In fact, the deep sea is not devoid of organisms. Of the 71 percent of the Earth's surface which is covered by water, half of which has a depth of more than 3,000 metres, the deep-sea samples that have been studied in detail are only equivalent to the area of several football fields.[88] On the other hand, new and often unexpected discoveries regarding deep-sea ecosystems and organisms continue to occur. In 2018, for example, a deep-sea expedition in the southern waters of Java, Indonesia which was initiated by the National University of Singapore and the Indonesian Institute of Sciences, observed more than 800 species and found more than 12 new species including crabs, prawns, and lobsters, among others.[89]

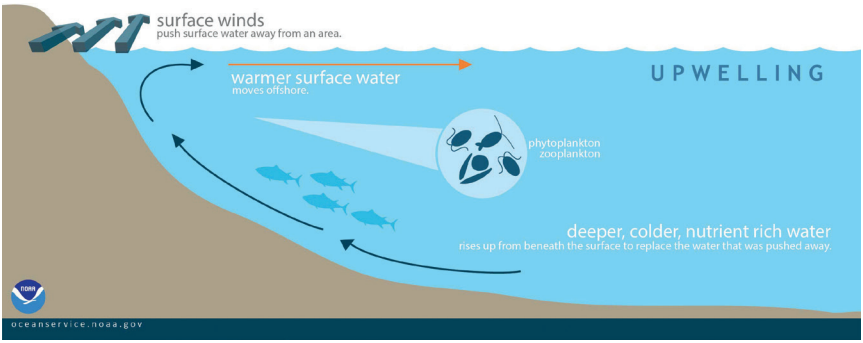
The lack of knowledge about deep-sea ecosystems should encourage more caution, rather than resulting in a tolerance of activities that disturb the balance of the ecosystem. Not to mention the need to consider local natural phenomena that may exacerbate environmental impacts and consequently negatively affect local communities.

Upwelling is one of the oceanographic phenomena that can amplify the negative impact of DSTD. Upwelling is a process in which deep, cold water rises toward the sea surface.[90] This phenomenon can be identified by the low temperature and nutrient-rich water at the sea surface. This is due to the surface water being displaced by winds, allowing for the cold, nutrient-rich deep-sea water to be pushed upwards to replace it.

Usually, upwelling areas become high-productivity fishing areas. However, the existence of upwelling becomes a threat when it comes to DSTD. Tailings discharged into the deep sea can be lifted to the surface, thereby polluting the marine ecosystem. Regulation No. P.12/2018 from the Indonesian Ministry of Environment and Forestry, which deals with the dumping of waste in the sea, states in Article 8, paragraph 2 (c) that DSTD is prohibited in areas where a mixing process caused by upwelling occurs.[91]

Furthermore, the thermocline, which is a transitional layer between warmer mixed water at the ocean's surface and cooler deep water below,[92] is

Figure 3.2: Illustration of the upwelling process



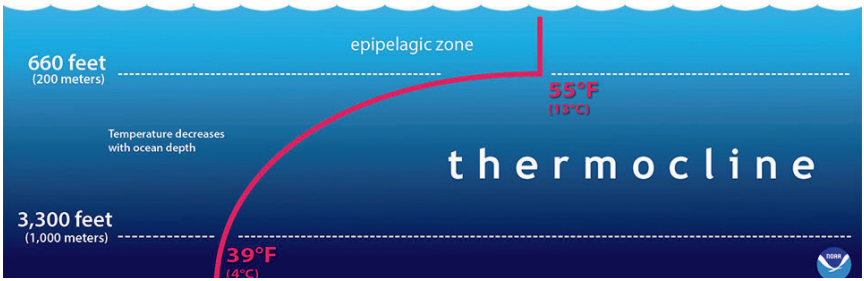
Source: "What is upwelling?," National Oceanic and Atmospheric Administration, undated, available at https://oceanservice.noaa.gov/facts/upwelling.html. Last accessed on 17 December 2020.

expected by promoters of DSTD to be able to hold the tailings within deeper waters, yet it does not provide adequate protection.

It should be noted that the depth of the thermocline layer changes over time due to seasonal factors. The vertical movement of the thermocline is more affected due to the interannual ocean-atmosphere interactions that affect Indonesian waters, such as the El Niño–Southern Oscillation (ENSO) in the tropical Pacific Ocean.[93] One of its results is the movement of warm or cold water from the eastern waters of the tropical Pacific Ocean near the western coast of South America, to the western waters near the Philippines and Indonesia, and vice versa.

An example of tailings being resuspended and brought to sea surface level occurred at the Newmont Minahasa gold mine, Indonesia. Tailings discharged at a depth of 82 m spread and then flowed to the surface, adversely affecting coral reefs and fish at depths of up to ten metres.[94] The affected area is ten times larger than the prediction of the model.[95]

Figure 3.3: Distribution of temperature to depth



Source: "What is a Thermocline?," National Oceanic and Atmospheric Administration.

Incidents of tailings spreading and upwelling have also occurred due to the inaccuracy of data in determining the seasonal variation of the thermocline depth. This should ring alarm bells and highlight the importance of environmental impact assessments by independent research groups.

The environmental losses that follow the DSTD fall into two main categories: dispersal of toxic substances contained in the tailings, and destruction of marine biodiversity. From these two categories, derivative impacts will be felt not only in terms of the environment, but also in social aspects.

Pollutants in the Tailings

Bioaccumulation is the process whereby organisms absorb metals and accumulate them in body tissues.[96] Meanwhile, biomagnification is an increase in metal content in organisms along the food chain that can reach at least 2–3 trophic levels.[97] Through these two processes, metals and chemicals from mining processing can via tailings enter the organs of living things, including humans.

Several metals are essential for the metabolic functions of living organisms. However, there are nonessential metals which serve no biological function, and which are detrimental if they accumulate. Even essential metals can become toxic if the dosage exceeds certain limits.

Metal content in the bodies of biota (the flora and fauna of a region) varies for each level of the food chain (trophic level).[98] Metal concentration is also influenced more by the physiology of the organism and the biological role of the metal than by trophic level.[99]

The lack of specific knowledge in each species regarding the rate and process of metal accumulation means that there is still uncertainty over the interpretation of how organisms respond to the presence of metals in waters. In addition, habitat area and the range of vertical and horizontal motion of a number of fauna in the sea have a significant effect on metal exposure, including its impact.

The various metals contained in the tailings also complicate the interactions between metals and marine life. This is due to the mixing of certain metals that worsen potential effects and cause more complexities.

Hypersedimentation

Hypersedimentation is the burial of an area by sediment. In this case, the sediment comes from the injection of a large amount of tailings. In fact, assuming the disposed tailings still fall within toxicity limits set by environmental standards, there will be at least one area of the seabed that will be buried under tailings. In benthic fauna (marine organisms that live on the seabed), the thick depositing of large amounts of tailings sediment can cause the so-called 'dead zone' around the discharge point, the disappearance of species, changes in community composition and structure, changes in population and biomass abundance, and other problems.[100]

In a longer timescale, the composition and structure of the marine biota community reflects the level of disturbance. This is marked by the loss of sensitive species and the abundance of species that are more tolerant of

tailings.[101] This imbalance in fauna composition has the potential to trigger a biodiversity problem that is similarly generated by eutrophication (an over-enrichment of water by nutrients, that has impacts including algae bloom, depletion of fish species, and general deterioration of water quality).[102]

The pattern of post-DSTD recolonization has not been widely studied. The study at the Lihir and Misima DSTD sites in Papua New Guinea found that the area around the tailings disposal had a much smaller benthic abundance than the area on the opposite side of the island.[103] The taxonomic diagram of marine life around the discharge area is also significantly affected. This last point is an indicator of the reduced biodiversity of marine organisms around the DSTD point.

Plume Shearing

Tailings consist of both large (coarse) and fine particles. When the tailings exit the pipe and enter the sea, fine tailings particles will escape from the central stream and then flow away. This is called plume shearing.[104]

These fine tailings particles are often found in various layers of the sea and can travel many kilometres away. Plume shearing can expand exposure to heavy metals up the food chain because fish can ingest tailings particles or they can enter through the gill membrane.[105] Plumes can also muddy the waters and cause less sunlight to enter the water so that photosynthetic activity is affected.

Migratory fish, such as tuna, often avoid areas where tailings have been disposed of. This is because tailings can be a threat due to the sharp particles that can damage the skin and gills of the fish and cause infection.[106] In the DSTD case study at the HPAL Ramu factory, Papua New Guinea, it was found that fish migration routes were disrupted by the distribution of tailings, which had an impact on local fishing activities.[107]

Meanwhile, the abundance of deep-sea fish was found to be decreasing around the DSTD site located in Lihir, Papua New Guinea.[108]

Vertical Migration

Marine biota does not live in only one layer or depth of water. Therefore, the metal volume from the tailings consumed by biota in deeper waters can be moved into shallower waters by marine organisms that perform vertical migrations along the water column. This migration is carried out on several timescales, namely from daily vertical migration (DVM), to seasonal or ontogenetic (following lifespan of biota). DVM is the largest animal migration in term of marine biomass that includes zooplankton to predators.[109]

DVM plays an important role in the marine system, especially with regard to the transfer of organic substances between the surface and the deep sea through the biological pump, by delivering carbon and other substances. DVM is carried out by communities of pelagic fish in such a way as to allow the transportation of pollutants between organisms, even to humans.[110] The migration distance depends on the body size of the organism. Animals as small as plankton (smaller than one millimetre) usually migrate as far as 10–20 m, as well as *Systellaspis debilis* shrimp with a length of five centimetres, which live in the mesopelagic zone (depth of 500–600 m) during the day and can swim to a depth of 50 m at night.[111]

Research at Lihir found that at least one third of copepod taxa each day move from deep water to the photic zone (depth of less than 200 m, accessible to sunlight) through the pynocline/thermocline layer.[112] Other studies have stated that the highest diversity of these taxa is at a depth of 900–1000 m. Most of them are migratory species.[113]

The evolution of the predator-prey relationship occurs in response to the DVM of mesopelagic species (200–1000 m), causing predators to migrate to follow prey or towards zones where prey is present.[114] This means that the vertical cycle across the ocean layers takes place through the food chain.[115]

Degradation of Biodiversity

Underwater fauna has an important function in the global ecosystem. The ocean is connected to the entire planet Earth through the exchange of

substances and energy from shallow to deep waters. This role is the key to survival on planet Earth, including for human civilization.[116] Some of the functions of the marine ecosystem include: primary productivity in the euphotic zone; microbial and fauna processes in the water column and seabed as part of the nutrient cycle; carbon storage via a biological pump; and energy flux through the pelagic and benthic animal food chains. These functions support human activities such as fisheries, among others.[117]

Several trends, such as rising sea temperatures due to receiving atmospheric heat (ocean warming), ocean acidification due to absorbing CO_2, and decreasing oxygen all have a major impact on the marine environment at a depth of greater than 200 m.[118] The margin in continental ecosystems, which refers to the bottom zone of waters separating thin and thick oceanic plates, is very vulnerable to the above phenomena, especially when coupled with human activities such as tailings disposal.[119]

Substances that are carried with the tailings, including those that are toxic, have the potential to affect the biogeochemical processes of the bottom waters and the water column as well as other aspects of climate such as ocean acidification, etc. As a result, the cumulative effects can be wide-ranging: changing habitat conditions, changes to multiple functions (e.g. biodiversity and calcification), as well as to important ecological processes (nutrient cycling, etc.).[120] In the end, it is the livelihoods of people who depend on marine resources that are badly affected.

Eastern Indonesian waters—including the waters of Morowali, Obi, and Weda—are earthquake-prone areas (seismically active) with several continental plates and oceans converging. In fact, it was for this reason that the DSTD method was chosen, despite being counter-intuitive due to the choice of waste disposal into the sea.

3.3. LOCAL OCEANOGRAPHIC PHENOMENA AT THE PLANNED DSTD LOCATION

Rationalizations regarding the determining of DSTD locations differ from one place to another. One of the most important aspects of this consideration is the local oceanographic phenomena. This aspect is important to ascertain the potential risks of DSTD, which are influenced by physical marine phenomena. Ocean dynamics will directly affect the distance and extent of the tailings distribution. This phenomenon directly results in significant negative impacts on human life.

Morowali

The three locations (Morowali, Obi, and Weda) that are planned for the DSTD are located in the coral triangle. The coral triangle area covers the waters of the western Pacific Ocean, including Indonesia, and it contains a very high diversity of coral reef species. There are 605 species of coral reefs (76 percent of the world's total species), 53 percent of the world's coral reefs, 37 percent of the coral reef fish species, and the largest mangrove areas in the world.[121]

There are at least 4,000 ha of living coral reefs in Morowali waters. In Bahodopi, the sub-district where IMIP operates, there are coral reefs covering approximately 710 ha, mangroves covering 92.73 ha, and seagrass covering 64.21 ha.[122]

Andrianus Sembiring found that there are 40 types of hard corals from 12 families in Bahodopi waters. The largest family types are *Acroporidae*, *Faviidae*, *Poritidae*, *Fungiidae*, and *Pocilloporidae*. Meanwhile, for reef fish, there are 66 species from 17 different families.[123] Of the types of reef fish found, the largest number of fish species came from Target fish (a commonly consumed fish) from the *Acanthuridae* family, and Major fish (a group of fish that play a role in the food chain) from the *Pomacentridae* family.

Some of the mangrove and seagrass reefs have been replaced by infrastructure to support industrial activities in the northern part of the IMIP area. In addition to overlapping with the entirety of the IMIP infrastructure,

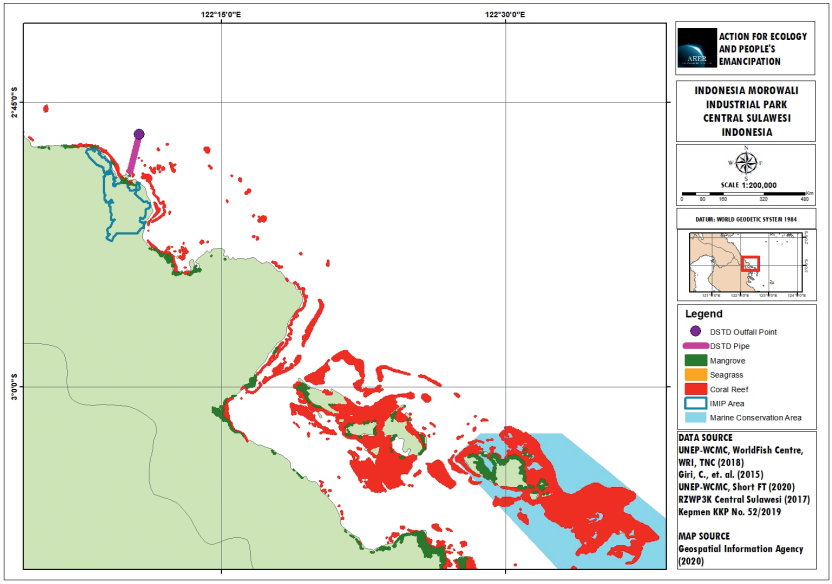
Figure 3.4: Map of the coral triangle coverage area and the planned location of the DSTP

Source: "About Coral Triangle Atlas"," The Coral Triangle Atlas, available at http://ctatlas.reefbase.org/about.aspx http://ctatlas.reefbase.org/about.aspx. Last accessed on 17 December 2020.

coastal biota are also threatened by coal-fired power plants (known in Indonesia as PLTU) dumping waste into the sea. This activity is allowed through the Ministry of Environment and Forestry Decree 259/2018, a permit granted on behalf of PT Indonesia Morowali Industrial Park.[124]

In 2018, Morowali contributed 34.12 kilotonnes of caught fish for Central Sulawesi Province, equivalent to 20 percent of the total catch of the province. These results make Morowali the district with the highest catch productivity in the province. The catch is valued at 678.9 billion Indonesian Rupiahs (IDR), which is approximately EUR 396,000.[125]

Figure 3.5: Map of zoning and marine biodiversity around IMIP



Based on the 2017–37 Coastal Zone and Small Islands Zoning Plan (RZWP3K) stipulated in Central Sulawesi Regional Regulation No. 10/2017, Langala Island, which is about one kilometre from Kurisa Hamlet, Fatufia Village, right across from the IMIP area, is designated as a coastal and small island tourism zone.[126] In addition, Bahodopi waters (the sub-district of the standing IMIP area) is designated as a mangrove forest area. The waters around the DSTD point also include a capture fishery zone for demersal and pelagic fish species. Disposal of waste is prohibited in this area.

Next is the Ministry of Marine Affairs and Fisheries Regulation No. 52 of 2019, regulating the coastal conservation area and small islands in Morowali, North Morowali, and the surrounding waters.[127] Of the four main areas, one of them is Umbele Island, which is 45 km southeast of the DSTD point. The area covers 247,739.89 ha and consists of a main zone, a limited use zone (fishing, fish farming, and marine tourism), and an ecological rehabilitation zone.

Planned deep¬-sea tailings disposal will threaten the potential and rich biodiversity which has been protected in these regulations. Meanwhile, the Ministry of Environment and Forestry prohibits disposal of waste in sensitive zones where it might have a negative impact, as specified in Ministerial Regulation No. P.12 of 2018.[128] Marine conservation, tourism, coral reef ecosystems, and fisheries management areas are included in these sensitive zones. Therefore, the DSTD practice in Morowali waters violates the above regulations.

Obi Island

In the document reviewing the DSTD plan in the western waters of Obi Island, PT Trimegah Bangun Persada (TBP) claims there is no indication of an upwelling in the relevant area. However, we found that these claims were not entirely true.

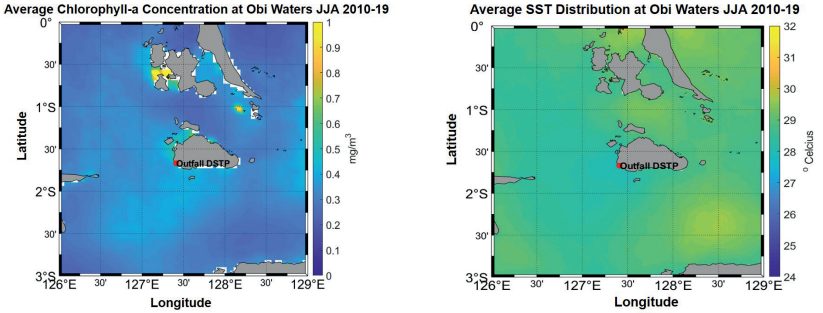
Upwelling can be identified by the low sea surface temperature (SST) and high levels of nutrients in the waters. Utilizing SST and chlorophyll-a data from the Aqua-MODIS satellite with a resolution of four km over a period of ten years (2010–19), upwelling in the western waters of Obi Island is indicated during the Indonesian eastern monsoon, which lasts from June to August (JJA) as well as September, the first month of the transitional season.

In the eastern monsoon (JJA) of 2010–19, in the western waters of Obi Island, where the DSTD practice will be implemented, it was found that the average SST was lower than its surrounding waters, with a value of around 27.5 oC (see Figure 3.6). Likewise for the chlorophyll-a concentration, the value is around 0.45–0.5 mg/m3, higher than its surrounding waters.

To check indications of upwelling, which is indicated by low SST and high nutrient levels (in this case chlorophyll-a), observations on monthly distribution in June, July, August, and September were conducted.

For the three consecutive months of June, July, and August, Obi Island's western waters show comparatively lower SST than surrounding waters (see Figure 3.7). In July, the SST in the area reaches a value of around 27 oC. In

Figure 3.6: Distribution of average chlorophyll-a (left) and SST (right) in Obi Island waters during the eastern monsoon (specifically June–August) 2010–19



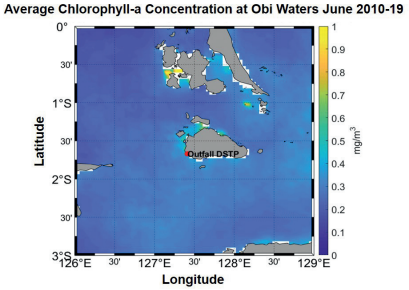
Source: Aqua-MODIS satellite

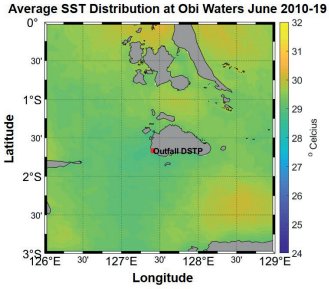
the following month, the water area with such a temperature scale extends to the north. Furthermore, for chlorophyll-a, the same water area shows a higher concentration than other areas. Chlorophyll-a concentration increased on a monthly basis with the highest value occurring in August, reaching 0.6–0.7 mg/m3.

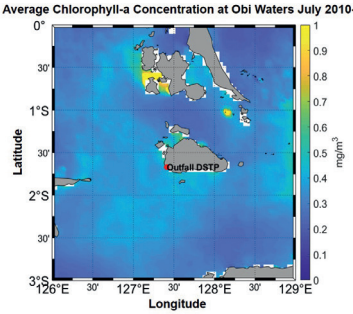
In September, chlorophyll-a concentration still increased up to approximately 0.8 mg/m3 in the Obi western waters. Meanwhile SST is still at about 27 °C, the same as the previous month. In October, the chlorophyll-a concentration returned to its low value and the SST slowly increased.

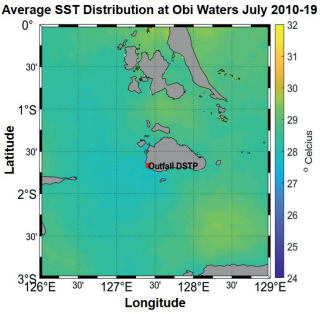
The high chlorophyll-a in the Obi western waters, which is followed by a decrease in SST during the eastern monsoon, peaks in September. This is a strong indication of upwelling during that time, even though there is a river that empties into the water area. If the high chlorophyll-a is caused by total suspended solids or river runoff, then high chlorophyll-a should not occur in one month only, but be more uniform over a longer period of time.

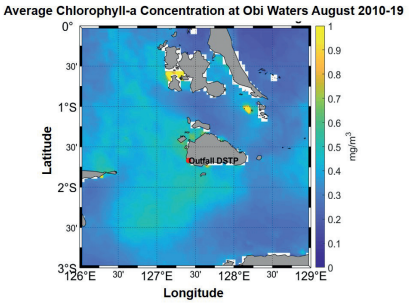
Figure 3.7: Distribution of monthly average chlorophyll-a (left) and SST (right) in Obi Island waters during the eastern monsoon (June–August) 2010–19

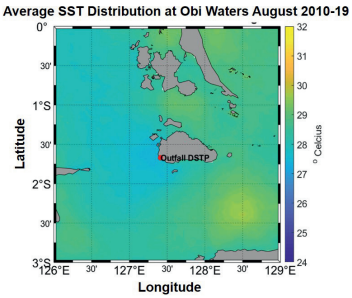






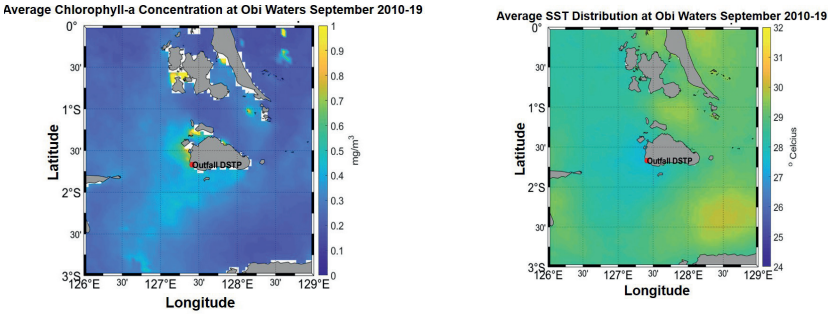






Source: Aqua-MODIS satellite

Figure 3.8: Average distribution of chlorophyll-a (left) and SST (right) in Obi Island waters during September 2010–19



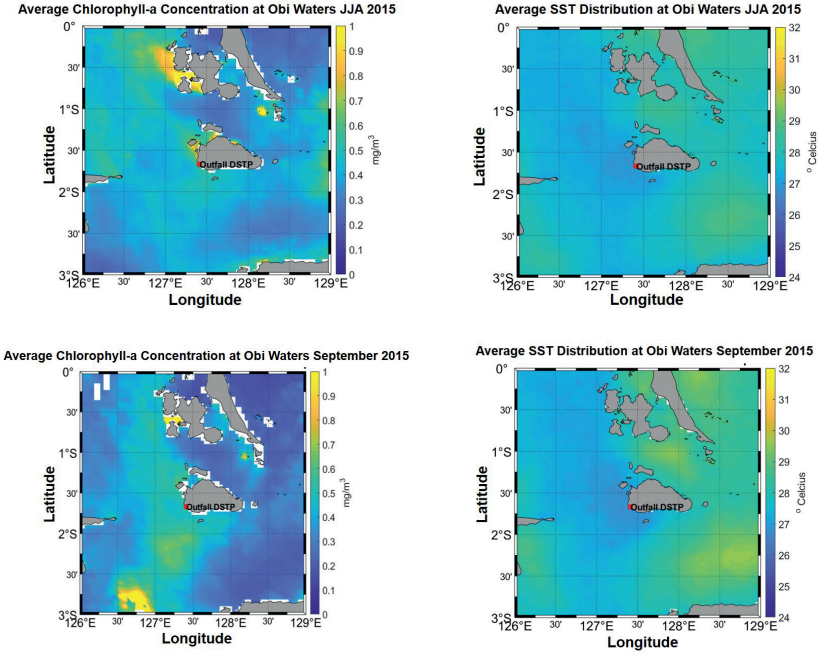
Source: Aqua-MODIS satellite

Special observations were made when the El Niño–Southern Oscillation (ENSO) was in the El Niño phase in 2015. The phenomenon in this phase is important because the mass of cold water makes the thermocline layer shallower and may intensify upwelling. Meanwhile, in the La Niña phase, the warm water from the Pacific Ocean will enter Indonesian waters and then deepen the thermocline layer.

As can be seen in Figure 3.9, from June to September 2015, the area of waters showed low SST values and high chlorophyll-a to the west of Obi Island more widely. This value is also higher than the ten-year average, as previously described. These conditions are most likely influenced by the occurrence of El Niño so that the thermocline layer gets shallower and the upwelling experiences intensification.

This finding is in line with the results of the hydrodynamic modelling by Mustikasari, et al. who found that in the eastern monsoon (August 2007), strong upwelling appeared in the south and north of the Sula Islands to the west of the Obi Islands. Then, in the second transitional season (October 2007), upwelling was found to be strong and relatively wide to the south of the Obi Islands and to the west of Halmahera Island.[129] Similar findings

Figure 3.9: Average distribution of chlorophyll-a (left) and SST (right) in Obi Island waters in the ENSO El Niño phase (June to September 2015)

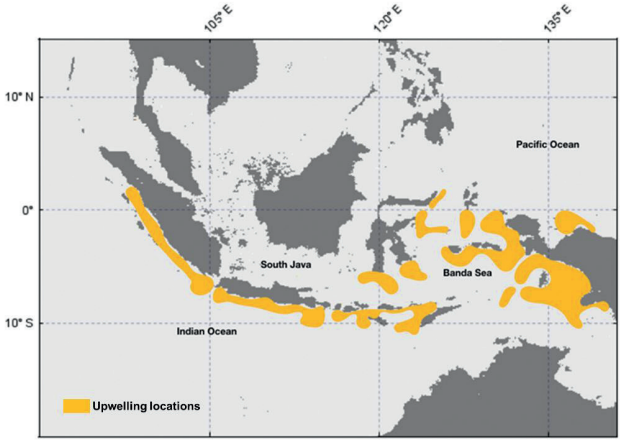


Source: Aqua-MODIS satellite

are also seen on the upwelling map in Indonesian waters which depicts the waters of Obi Island as being one of the upwelling locations.[130]

The potential evidence of upwelling, which is indicated by an increase in nutrients in the form of chlorophyll-a and a decrease in SST around the planned point for DSTD in the western waters of Obi Island, should be important when considering the granting of TBP's DSTD permit.

Figure 3.10: Map of the location of upwelling in Indonesian waters

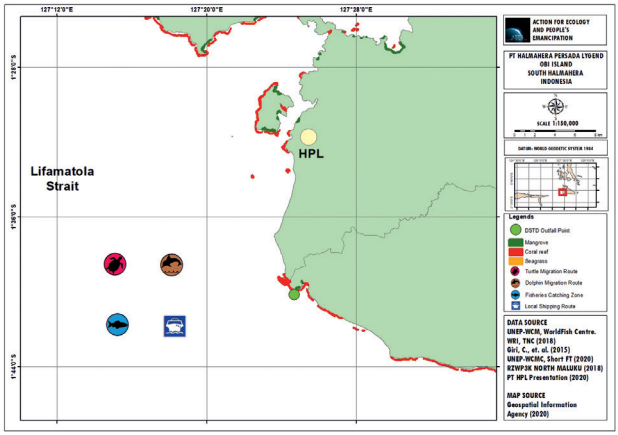


Source: N.P. Purba and A. M. A. Khan, "Upwelling Session in Indonesia Waters", World News of Natural Sciences, vol. 25, pp. 72–83.

Tailings could potentially be lifted into shallower water layers, thus threatening marine biodiversity. Furthermore, the metal content in the tailings can accumulate in the bodies of marine life, threatening the health and economy of the local community, especially coastal communities who work as fishermen.

Based on North Maluku's Coastal and Small Islands Zoning Plan (RZWP3K), as mandated in Regional Regulation No. 2/2018, the waters around the DSTD location proposed by PT TBP intersect with a number of water zoning areas.[131] The Lifamatola Strait that connects Sula Island (west of Obi Island) and Obi Island is designated as a migration route for turtles and dolphins. The waters west of Obi Island are also regulated as a pelagic capture fishery zone and are considered to be part of local shipping routes. These three types of areas are classified as sensitive zones with the prohibition of waste disposal practices listed in the Ministry of Environment and Forestry Regulation No. P.12 of 2018.[132]

Figure 3.11: Map of zoning and biodiversity of the west waters of Obi Island



Weda

Based on the North Maluku RZWP3K, Weda Bay is designated as a pelagic and demersal fishing zone as well as a potential zone for underwater tourism.[133] As an area that includes the coral triangle, coral reefs, mangroves, and living seagrass in Weda Bay, there are 1,733.6 ha of living mangroves in Weda, Central Weda, North Weda, and parts of South Weda.

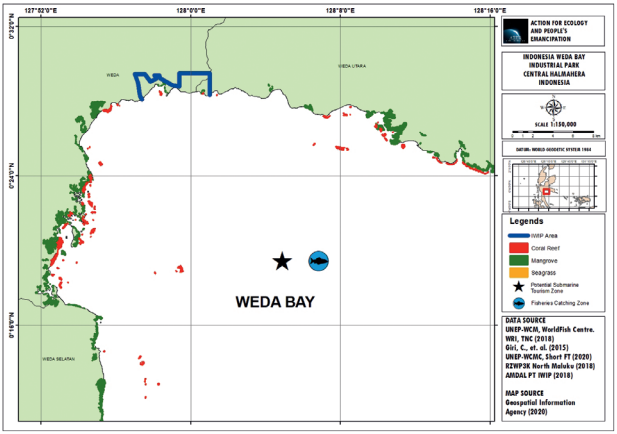
There are 13 species of mangrove found in the coastal waters of Weda Bay with seven species dominating: *Bruguiera gymnorizha*, *Sonneratia alba*, *Rhizophora apiculata*, *Rhizophora mucronata*, *Rhizophora stylosa*, *Xylocarpus granatum*, and *Ceriops decandra*.[134] Mangroves are one of the forest trees or shrubs with the highest carbon storage capacity in the tropics, amounting to 1,023 tonnes of CO_2 per hectare.[135] With this function, mangroves play an important role in efforts to overcome the climate crisis caused by the release of excessive carbon emissions into the atmosphere.

Mangroves also play a role in the balance of coastal abrasion with their function as a damper for ocean waves. The disposal of tailings into the sea and the expansion of the nickel-based battery industrial area that cuts down on mangrove areas are in fact contrary to the globalization of vehicle electrification's original goal of reducing greenhouse gas emissions.

There are 85 coral clusters which were identified in the waters of Weda Bay, with a total area of 1,773.41 ha, while the number of sandy coral clusters was 18 clusters with an area of 418.05 ha.[136]

Meanwhile, the area of seagrass beds in 2014 was thought to be 111.11 ha, and is dominant in the northern and central parts of Weda Bay with 18 clusters.[137] There are ten types of seagrass in Weda Bay, namely *Enhalus acoroides*, *Halophila ovalis*, *Cymodocea rotundata*, *Thalassia hemprichii*, *Halodule uninervis*, *Halophila decipiens*, *Halodule pinifolia*, *Halodule minor*, *Cymodocea serrulata* and *Syringodium isoetifolium*. In fact, seagrass has a carbon absorption function of 6.59 tonnes of C/ha/year or equal to 24.13 tonnes of CO_2/ha/year.[138]

Figure 3.12: Map of zoning and water biodiversity around IWIP



3.1. DEEP-SEA TAILINGS DISPOSAL: AN OLD, CHEAP, AND ABANDONED METHOD

Of the 2500 industrial-scale mining activities around the world, there are only 15 operations that practice DSTD.[139] Most of the beaches in the world are not suitable for DSTD operations. Only 0.14 percent of the world's coasts have water depths of more than 1000 m with a range of two kilometres, including the regions of North America, Europe, and Southeast Asia.[140] The disposal of tailings in the sea itself is banned in the United States and Canada.[141] In fact, China is one of the 51 countries that agreed to ban the practice of dumping tailings into the sea at the International Union for Conservation of Nature Congress, 2016.[142]

Indonesia has itself experienced the horror of tailings disposal into the sea. For eight years, (1996–2004) PT Newmont Minahasa Raya dumped a total of four million tonnes of gold mine tailings at a depth of 82 m in Buyat Bay.[143] The tailings pipe repeatedly leaked, causing damage to marine and coastal ecosystems including coral reefs.

The authors of a study in *Extractive Industry Review*, working under the World Bank Group, stated that the practice of dumping tailings into the sea should be prohibited in waters with important ecological functions such as coral reefs. This statement was in response to the Buyat Bay tailings incident.[144]

The Indonesian National Agency for Development Planning (BAPPENAS) also launched a plan to stop the disposal of tailings into the sea.[145] However, this plan was never implemented as the government administration changed.

Of all the HPAL plants that have operated around the world, only the Ramu NiCo mining project in Papua New Guinea—the majority of which is owned by the Metallurgical Corporation of China (MCC)—dumps tailings into the deep sea. Since beginning operations in 2012, the Ramu NiCo project has been discharging five million tonnes of tailings annually into the sea at a depth of 150 m, as far as 450 m from the coast.

A pipeline leak occurred on 24 August 2019, spilling 200 thousand tonnes of tailings into Basamuk Bay, the location of the Ramu NiCo DSTD. The tailings

Figure 3.13: The coast of Basamuk Bay polluted by the Ramu NiCo HPAL tailings spill

Source: I. Morse, "Locals stage latest fight against PNG mine dumping waste into sea", Mongabay, 22 May 2020, available at https://news.mongabay.com/2020/05/locals-stage-latest-fight-against-png-mine-dumping-waste-into-sea/. Last accessed on 16 December 2020.

spill rate was relatively small, at around 2.5 percent of the annual volume of discharge, when compared to the total tailings disposed of since the factory started operations in 2012. However, the damage caused was not minor.

Some of the consequences that occurred from this spill: the beach and sea turned red, the fish died on the beach due to exposure to tailings-borne toxins (also killing some baby dolphins), and one person died allegedly after eating fish from Basamuk Bay.[146] The governor and an independent consultant called this incident the biggest environmental disaster in Papua New Guinea's history. Based on the consultant's analysis, 15 percent of Ramu NiCo's tailings slurry does not rest on the seabed but is scattered into the surrounding waters.

For the losses incurred, a local community coalition consisting of 5,000 residents and the Madang Provincial Government demanded MCC stop the practice of DSTD. In addition, they are also demanding the restoration of polluted ecosystems, as well as implementing compensation of USD 5.2 billion.

This incident shows that the DSTD has environmental costs borne by local residents, instead of by the companies which are exploiting natural resources.

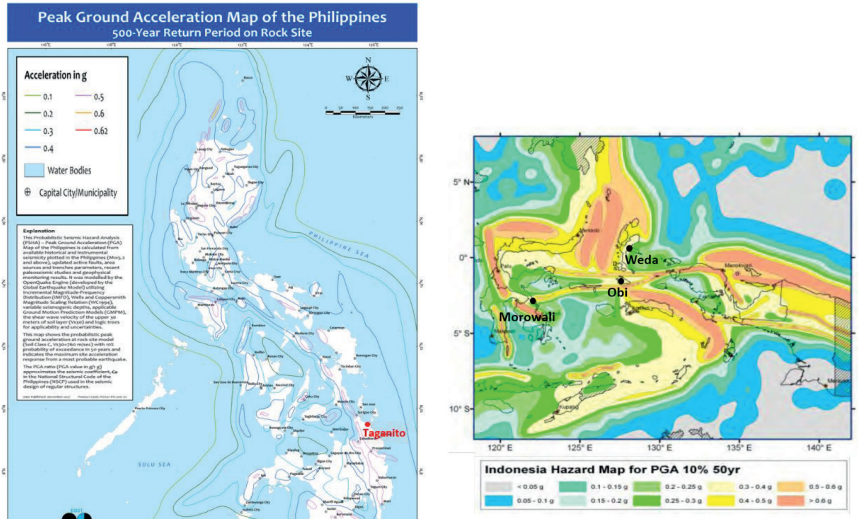
Companies in Indonesia cite the high seismic activity and rainfall at the HPAL plant site as the reasons to choose the DSTD method. However, the Taganito HPAL project in the Philippines has a location with similar geographic characteristics and does not use DSTD. The Philippines and Indonesia are located in the 'Ring of Fire', the zone where 90 percent of the world's earthquakes occur, and covers the belt that surrounds the Pacific Ocean.[147]

Taganito is located on Mindanao Island which has high seismic activity, as with Morowali and Obi Island. Taganito is included in the area with peak ground acceleration (PGA) of 0.4 g, with a ten percent chance of this being exceeded within 50 years.[148] The location of the HPAL plant in Indonesia shows similar values. Morowali has a PGA on the same scale: of 0.4–0.5 g. Meanwhile, the PGA values in Obi and Weda were 0.3–0.4 g.[149] As many as three to four earthquakes per year threaten Taganito. The intensity of the earthquakes in Taganito are classified as IX-XII degrees on the modified Mercalli intensity scale, meaning that they have the potential to produce tremors and heavy damage.[150] The facts above show that three Indonesian HPAL locations have less than or equal seismic activity when compared to Taganito.

Similarly to Indonesia, Taganito also has high rainfall. Taganito is designated as having a type II climate which means there is no dry season, with the rainy season occurring from November to January. Climate type II has the highest rainfall compared to the other three climate types. The town of Claver, which is the location of the Taganito HPAL plant, had precipitation of 2,136.9 mm in 2019.[151] Meanwhile, Bahodopi, a district within the larger Morowali District, recorded 2,686.3 mm/year of rainfall; Obi Island 2,112 mm/year; and around the IWIP project 2,599.7 mm/year.[152]

Moreover, the Philippines is also one of the regions with a high frequency of tropical cyclone events.[153] Taganito is included in an area that is hit by one tropical cyclone per year. The intensity of tropical storms in Taganito falls into category 4 on the Saffir-Simpson scale with a ten percent chance of storms hitting 210–249 km/h in the next ten years.[154]

Figure 3.14: Map showing possibility of ten percent peak ground acceleration within 50 years in the Philippines (left) and Indonesia (right)



Source: Modifications from the Philippine Institutes of Volcanology and Seismology, , Peak Ground Acceleration Map of the Philippines 500 Year Return Period on Rock Site, Quezon: PHIVOLCS, 2017; M. Irsyam, et al., "Lecture 9 Combined Hazards".

Although they have similar geographical characteristics, Taganito does not dump its tailings into the sea. Since starting operations in 2013, tailings have been managed using a dam system developed using the downstream method.[155] As of 15 March 2019 the dam volume reached 18.65 million m3. It is estimated that in five years the volume of the dam will reach 41.47 million m3. This shows that there are other options besides disposal into the sea, even with earthquake-prone conditions and high rainfall.

Inevitably, the selection of DSTD can be seen as an effort by companies to lower the cost of construction for HPAL smelters. Dick Zandee of Placer

Dome wrote an article on the disposal system in Calancan Bay, Philippines, stating that "dumping sewage into the sea costs less than half of the tailings dam operation".[156] The Kitsault mine in Canada is estimated to save USD 25 million annually by dumping tailings into the sea instead of managing the disposal on land. The United States Department of the Interior states that on average, overboard tailings disposal saves 17 percent of capital costs by increasing operating costs by 1.6 percent.[157]

Except for Ramu NiCo, all HPAL plant projects—whether still operating or that have ceased operations—use dams as a tailings management method instead. This method is by no means flawless. In 2018 at HPAL Ambatovy, two incidents occurred regarding a pipeline to the tailings dam.[158] The first was a pipe leak from the factory to the tailings dam, which led to the tailings being spilled near the local community. The second incident was a pipe leak from the dam to the point where the wastewater was discharged into the sea, causing the clean water sources of six villages to be polluted. This indicates that every tailings management process must be closely monitored and checked for feasibility periodically, and that this should prioritize safety and the interests of local communities.

Mining activities and their downstream industries will certainly have environmental impacts. One way to control these impacts is to prioritize the carrying capacity of the environment. Its form uses the best technology options available today. Project planning must prioritize the safety of local communities and comply with standards which meet the environmental carrying capacity.

To achieve this, governments can start by issuing environmental protection regulations such as banning the disposal of tailings into the sea. By doing so, the government improves the reputation of investment related to climate change mitigation. It reduces the debate about waste management standards for electric vehicle nickel batteries, for which good standards and practices are demanded by the public.

The battery-grade nickel project for use in electric cars is seen as an attempt to help save the planet from the climate crisis. Therefore, practices that ignore environmental sustainability are contradictory and risky for the battery-grade nickel product itself. Last, but equally important, project planning must involve local communities, and avoid the use of fossil fuels with associated high greenhouse gas emissions.

CHAPTER IV: FIELD FINDINGS: THE NICKEL-BASED BATTERY INDUSTRY AND POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

KEY POINTS:

- *Nickel mining and industrial activities have a major impact on the environment and result in the degradation of local communities' sources of livelihood, as well as creating difficulties when accessing this livelihood. In Bahodopi and Weda, fishermen and farmers who depend heavily on natural resources are most affected.*

- *It is indicated that the exploitation of natural resources by companies has exceeded the carrying capacity of the environment, as seen in Morowali and Weda which experience floods with increasingly high intensity and danger.*

- *The way in which the company, which is supported by the local government, treats the local communities cannot be described as favourable. This can be seen from the vulnerability of exploited workers, the reluctance of companies to fulfil their workers' rights, and the various environmental and socio-economic impacts faced by residents, which are not accompanied by properly targeted and equitable assistance from the company to the communities.*

"Why is the company directing waste disposal towards us Kurisa people? Are [we] intentionally killed? Meanwhile, we fishermen only hope [to catch] fish and seafood, while the waste flows here"

— Amir (80), a fisher\man from Kurisa, Morowali.[159]

The development of the nickel industry and mining activities have had a major impact on the environment and massively altered the economic and social landscapes of local communities. In both Morowali and the Weda area, the roads leading to industrial areas are increasingly crowded with shops, ATMs, restaurants, and so on. This marks a shift in consumption patterns and people's livelihoods. These conditions were accompanied by the abandonment of what had previously been principal livelihoods, including that of fishermen and farmers. Both are highly dependent on natural resources and the balance of the ecosystem. These are also both affected by mining activities and the nickel industry.

In this section, field findings on communities around industrial and mining areas will be presented to examine the environmental and socio-economic impacts and how they affect each other. The development of a nickel-based battery component industry has the potential to exacerbate the current environmental and social impacts.

4.1. DEGRADATION OF LIVING SPACES FOR LOCAL COMMUNITIES

Apart from nickel, Morowali was previously also rich in marine resources. One such resource-rich area was the Kurisa hamlet in Fatufia Village, Bahodopi District, which is located right across from the IMIP area. Kurisa fishermen are Bajo people who previously lived on Langala Island, around a kilometre away from Kurisa. After 1993, they moved and settled in Kurisa at the request of the local government. Before settling in Kurisa, they lived and worked on boats. Fishing is the only profession they have been in for a long time. They admit that this is the only skill they have. The majority of Kurisa's older population did not attend formal education.

Since moving to Kurisa, the fishermen's lives have been much better, with abundant marine resources. The distance from the house to the fishing area is very close, about 200 m. The fish catch is sold to merchants, markets, or retailers in front of their houses, with a daily income of around IDR 100,000. Whenever it is low tide, residents go to catch octopus, squid, shellfish, or

Figure 4.1: Settlement of Kurisa

Source: AEER documentation

crabs around the coral reefs. In fact, people only need to throw a fishing line behind the house to meet their daily food needs.

However, since the mining company entered their village, and IMIP started operating, fishing activities have experienced disruption. Fatufia was transformed into an industrial area with the construction of nickel processing factories, loading docks, airports, and so on. Not only that, the wastewater from the cooling of the PLTU is disposed of in Kurisa waters, making the Kurisa fishing area no longer productive. This activity is regulated by the Ministry of Environment and Forestry Decree No. 259/2018, which grants permission for the disposal of wastewater into the sea on behalf of PT Indonesia Morowali Industrial Park. Not to mention the red soil from the mining excavation which is carried away by the river and empties into the waters near the coast.

"Now it is getting more difficult to go to sea, a distance of 1–2 miles does not mean that you can get fish, because the sea is polluted and the coral reefs are all dead. Where we used to look for fish and *meti* [a kind of clam found in shallow waters], now a port owned by the company has been built—all the fish ran", said Amir (80), the head of the Kurisa Hamlet fishing group.

Figure 4.2: Amir's boat and customers arriving to collect fish

Source: AEER documentation

Amir admits that now they have to go out to sea for one week or three to four days at the very least. The catch has decreased greatly, and is not equivalent to the costs spent on fuel and supplies while at sea. In one trip, their net income ranges from IDR 100,000–500,000 or roughly EUR 6–29. Going to sea in an unpolluted area costs extra and takes longer.

It is not uncommon for Kurisa fishermen to go to buy fish on the southern islands of Bapa and Bungku, which are around 30 km away, and then take them to Kurisa to be sold again to residents and merchants. Fish merchants who buy fish from fishermen do not pay for them up front. According to Amir's statement, the merchants come to collect fish and then bring them to be sold at the Bahodopi market, before paying the fishermen back after all the fish are sold. If the weather is bad, Amir is forced to ask for help from neighbours who have food to spare.

During the several years the company has operated, the people of Fatufia have received compensation on only four occasions, amounting to a total of IDR 3,500,000 (EUR 202.27). For public facilities, PT BDM has provided assistance for the construction of a mosque in Kurisa.

After that, fishermen never received any more assistance. On several occasions, Amir and his group submitted financial assistance requests to

Figure 4.3: Map of the location of IMIP, Kurisa Hamlet, and Pulau Ayah

Source: Google Earth, 2020

Figure 4.4: Bahodopi coastal waters contaminated with red soil

Source: AEER documentation

companies and the government but never received a positive response. Amir admitted that his village once received fishing gear and boats, but the assistance was given to residents who were not fishermen. Amir's group also often carry out protests but it never produces positive results.

Similar conditions were experienced by residents of the villages of Lelilef Sawai, Lelilef Waibulen, and Gemaf in the vicinity of the IWIP area. Local Weda fishermen usually catch fish for their daily needs. If they get a bigger catch, the surplus will be sold to fellow residents. However, today there is a decreasing number and variety of fish catches.

Before the mining company and IWIP started operating, local fishermen were active in nearshore waters. Others can throw the hook using a *hohati* (a traditional fishing rod), from the pier. This is enough to meet daily needs.

However, now they have to go further—about one to two kilometres offshore—and spend more money. The time spent meeting the daily catch target is also longer. Previously, they only needed to go 200–300 m from the coast.

According to Hengki Burnama (55), a fisherman from Lelilef Sawai:

> *Not long ago I was fishing near the village, the result was only two [fish] were brought home at night. So at 7 a.m. [we] buy bait, come home at night, [and] the result is only two fish. Before there were other companies, there used to be a lot of fish in the sea, now the fish have started to decrease. In the past, using boats and sails, we didn't have to go far to fish, and went home early at 3 p.m. with satisfying results. So we used to go to the sea and just pick up the fish—now looking for fish in the sea is like looking for gold.*[160]

A similar statement was given by Maks Sigoro (50), a fisherman from Gemaf. According to him, PLTU waste heats up seawater, preventing fishermen from conducting activities in the Lolaro area, which was once a fishing area.[161] He also said that the activity of barges carrying coal supplies and coal dust from the PLTU is reducing the catch.

Apart from fishermen, farmers are also facing a decline in the quality of the arable land. In Bahodopi sub-district, in Block A of Bahomakmur Village to be precise, the productivity of the farmers has decreased because the land they are working on is less fertile. In addition, the amount of land is also reduced because most of it has been sold to the company.

The residents of Bahomakmur Village, who were part of a so-called transmigration programme,[162] work as farmers. Since arriving in 1992, the community have been working on the land given by the government, covering an area of two hectares per family head.

A Bahomakmur farmer who transmigrated from East Java, who we will refer to by his initials, SB (62), explained that he was still planting rice until 2010.[163] At that time, the capital needed to plant rice, from cultivating the land to being ready for planting, was two million rupiah. This amount does not include

fertilizers and medicines. SB usually borrows capital from friends and is then paid after the harvest. Even though he often loses money, SB still plants rice for daily consumption. He explained:

> *When I was still tending the rice fields, there were no results. Nor is it worth the energy expended. The capital did not return. Planting rice in the three-quarter hectare area costs approximately two million [rupiahs]; that doesn't include fertilizer, poison, and paying for labour. Crops are also damaged by rats and pigs.*

The thing that stopped SB and other Bahomakmur farmers from planting rice was a decrease in land productivity due to irrigation sources that were contaminated by red soil excavated by the industries around the mines, oil, and diesel. The community suspects that the waste originates from the mining activities of PT Bintang Delapan Mineral (BDM). As a result, plants die, or even if they live they do not bear fruit. He also said that PLTU dust also killed rice.

> *The dust used to destroy the rice. When it bears fruit, it expands, so when it opens, the dust enters and the result is half-dry fruit [rice grain] and the tip is black. It can't be eradicated. Rats can be given poison.*

Now, SB uses part of the land measuring 20x50 m behind the house to plant kale, leeks, spinach, corn, beans, sweet potatoes, and papaya and sells them to buy rice. Yet this land cannot be wholly used to cultivate crops because some parts of the land contain rocks and pipes.

4.2. CONSTRICTION OF LIVING SPACE

After mining activities commenced and the nickel industry began operating, local communities also had difficulty accessing farmlands or waters that used to be used for fishing.

SB and several residents of Bahomakmur Village still have a total area of around 50 ha across the river. In the past, they used to travel 200 m via

Figure 4.5: Map of the location of Block A, Bahomakmur Village, the people's land across the river, and alternative access points

Source: Google Earth, 2020

suspension bridges. However, the bridge was destroyed in the flash floods of 2015. As a result, residents have to walk through the company's nickel ore transportation road (hauling road) and then make a round trip of around 3.5 km. However, company security officers often prohibit residents from crossing the hauling road.

SB explained the situation in more detail:

> *They say it's not a public road, it's a company road. But I answered like this, I said, if I can't pass, please get the things I need for me. Or if not, please build a road, so that I don't come this way. I was there before the company was here. Before there was a company I was free to pass. Before the company [was there], if you returned from the land you could immediately drink river water, [but] now you can't because it's turbid.*

Local residents call it sleeping land because it cannot be cultivated. When the river flow was less fast, SB had to take the risk of crossing the river directly with a wooden stick as a support.

Figure 4.6: The suspension bridge of Bahomakmur Village which has been cut off since the 2015 flash flood

Source: AEER documentation

Based on the Geoportal of the Ministry of Energy and Mineral Resources, the company operating upstream of the river is PT BDM.

Local communities around Weda nickel processing facility also experience restrictions on their access to living space. Afrida Burnama (66), a resident of Lelilef Sawai Village, said that she and other mothers could no longer fish in Tanjung Uli, Karkar, and Cacu because it was prohibited by the company.[164] Usually groups of women fish on the beach using a traditional fishing rod called *hohati*. However, due to prohibitions from companies, reclamation, and construction of various infrastructure in the IWIP area, they rarely fish anymore. In addition, they are also prohibited from taking firewood.

Figure 4.7: SB crossing the river to access the land

Source: AEER documentation

Afrida explained:

> *Now [the] company has been operating and we are expelled, unable to fish in the area —we even have to ask for a permit so we can enter. The Tanjung Uli area is good for fishing, but it cannot be done anymore because it has been prohibited by the company. Residents are prohibited from taking firewood and expelled. The Wosia area has also been claimed by the company and covered with soil, so residents cannot collect firewood and fish.*

Figure 4.8: Reclamation in the Karkar area

Source: AEER documentation

PT IWIP's reclamation of nickel ore storage areas was carried out in Cacu and Karkar. The area was previously used for local fishing activities. Usman Nahrawi, Secretary of the DPC of the Bulan Bintang Party in Central Halmahera District, even stated that the reclamation in Karkar was not accompanied by an environmental risk assessment, known as an AMDAL.[165]

4.3. The Decreasing Quality of Life of Local Residents

Mining and industrial activities have contributed to suppressing the quality of life of local communities in the form of worsened respiratory health, increased impact of floods, and being charged for access to water.

Both in Morowali and Weda, nickel industry activities utilize coal-fired power plants (PLTU) as the main energy source. IMIP utilizes PLTU, which has a total capacity of 2,410 MW.[166] Meanwhile, IWIP is planned to be supplied by three PLTU units, each with capacity of 250 MW, by the end of 2020. The daily requirement for coal for this PLTU is 5,000 tonnes for each PLTU unit.[167] The

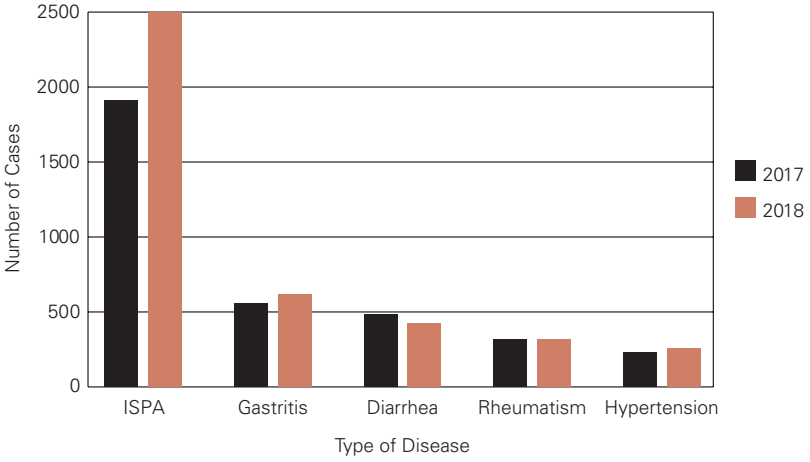
Figure 4.9: Coal mounds in the IWIP area

Source: AEER documentation

installed capacity will be gradually increased to 2,000 MW with a coal requirement of 248,000 tonnes per day or 8,860,000 tonnes per year.[168] The coal used is classified as low calorie, with a calorie content of 4,200 kcal/kg.

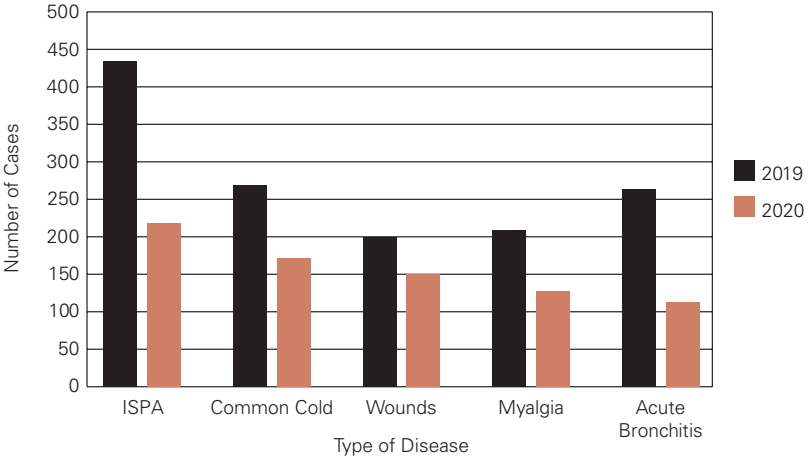
The villagers of Lelilef Sawai, Lelilef Waibulan, and Gemaf complained about respiratory problems due to air pollution from the PLTU. In addition, storage of coal piles not far from the

Figure 4.10: Diseases with the highest number of cases based on patient visits to Community Bahodopi in 2017 (April–December) and 2018



Source: A. Sangadji, M. F. Ngoyo, and P. Ginting, "Electric Vehicle Battery-grade Nickel: Ecological Injustice in the Origin Region Resource," Action for Ecology and People's Emancipation, 2019, available at http://aeer.info/wp-content/uploads/2020/02/Nikel-Baterai-Kendaraan-Listrik.pdf. Last accessed on 30 December 2020.

Figure 4.11: Diseases with the highest number of cases based on patient visits to Sagea Village Community Health Centre, North Weda Sub-district in 2019 and between Jan-Oct 2020



Source: Sagea Community Health Centre, 2020

transportation road is left unrestricted, allowing coal dust to become airborne. The impact of coal dust worsens in the dry season as dust can enter the house. The residents of Bahodopi, Morowali, reported similar conditions.

The effect of PLTU operations on people's respiratory health can at least be seen from the data on the number of cases, both in the sub-districts of Bahodopi, Morowali, and Sagea Village, Central Halmahera District. During April–December 2017 and throughout 2018, acute upper respiratory infections (URI) became the dominant medical issue in the Community Health Centre of Bahodopi, when compared to other documented medical issues.

The number of cases in Central Halmahera has the potential to increase, because IWIP started construction in 2018 and then the first smelter began operating in mid-2020. Meanwhile, IMIP's first smelter has been operating since 2015.

We interviewed three residents of Bahodopi and five residents in the vicinity of the Weda nickel processing area, who admitted that there had never been any assistance from the company regarding residents' access to healthcare. Residents of Kurisa Hamlet, Bahodopi, which is right across the IMIP area, even had to pool money for medical treatment.

Amir, who is one of the residents we interviewed, explained:

> *If the wind blows west, the roof of this house is all black because of the coal, there are many more sick people, usually catching a cold and coughing. To cover the cost of going to the hospital, we usually pool money because we cannot afford it ourselves. We also never received assistance from the government, be it Jamsosda (Regional Social Security), KIS (Healthy Indonesia Card), or others, including companies, we never received any assistance.*

Floods in Morowali and the Weda nickel processing area have also increased in intensity and severity. In July 2020, floods hit Bahodopi, Morowali, cutting off transportation and logistics routes to the sub-district. Previously, in June 2015, flash floods hit three villages, so they suffered the worst damage. The villages are Bahomakmur, Keurea, and Bahodopi.

Seven houses in Bahomakmur were destroyed, three houses in Keurea were badly damaged, and one house near the beach of Bahodopi Village was damaged.[169] Large floods also occurred on 24 July 2010 with floodwaters reaching 1.5 metres in height. The flood caused rice fields, gardens, livestock, and people's houses to be flooded. As a result, the residents' crops failed. Next, on 12 July 2011, the Bahongkolangu River overflowed, causing the road and hauling bridge to collapse. As a result, the houses of residents in Bahodopi, Keurea, Fatufia, Trans Makarti, and Bahomakmur were submerged.

Figure 4.12: Bridges in Bahodopi destroyed by floods in July 2020

Source: "Morowali hit by floods, broken bridges and submerged IMIP area", AsiaToday.id, 16 June 2020, available at https://asiatoday.id/read/morowali-diterjang-banjir-jembatan-putus-dan-kawasan-imip-terendam. Last accessed on 30 December 2020.

SB compared the flood conditions in his village, Bahomakmur, before and after a mining company operated:

> *[Before the company existed] if there was a flood but it was small, the water was still clear. In the past, there were still trees on the banks of the river, now they are all bare. Since the company existed, every year there are [floods]. Usually I pay attention, if there is a flood in the fourth month (April), usually in the seventh month (July) there isn't. Recently during the fourth month it was just a small flood. Hopefully there will not be another big flood.*

In the Weda area, on 26 August 2020, a one-metre high flood inundated villages and roads, including the IWIP area, after two days of heavy rain. The Ake Sake River overflowed causing flooding to hit the areas. Activities in the IWIP area were reportedly halted due to this flood.[170]

Floods in the villages near two nickel industrial areas may indicate that mining activities have exceeded the carrying capacity of the environment. For example: reduced water absorption due to logging for mining, or the damming and diversion of the Ake Sake River for the planned smelter construction site.

Figure 4.13: Floods inundating the IWIP area

Source: Ino, "The river overflowed, PT IWIP area was inundated", Halmahera Post, 26 August 2020, available at https://halmaherapost.com/2020/08/26/sungai-meluap-kawasan-pt-iwip-tersulap-jadi-kolam/. Last accessed on 30 December 2020.

At the time of the 2020 flood, it was also reported that food prices also soared because the logistics route was flooded. This situation coincided with the conversion of land use from rice fields to mining, which contributed greatly to the reduction of local communities' food sovereignty and security. As a result, access to basic needs, namely food, is limited due to the cascade effect of a decrease in the carrying capacity of the environment as well as the process of extensive land use change.

Clean water sources are also no longer accessible to the local people of Bahodopi and around the Weda nickel industrial area. Before the presence of a mining company, residents could get clean water from the river, however the upstream area has since been converted into a mining site. SB, for example, stated that he used to be able to drink river water after returning to work on the land. Now, the river has turned brown from the red soil, making it unfit for consumption. Drinking water must be purchased in gallons.

Similar conditions are found around the Weda nickel industrial area. The 3.01 km Ake Sake River was dammed and diverted for the construction of one of the IWIP smelters. Ake Sake together with Wosia, Seslewe Sini, Kobe and other rivers used to be a source of clean water for the local Weda community.

Figure 4.14: Diverted Ake Sake River

Source: AEER documentation

However, now everything is tainted, as can easily be seen by the water's colour, which has turned brown.

"Now we have to spend about IDR 200,000 per month on water, [which we buy] in gallons. Our rivers and wells also taste different, they are not as good as before the company was here", explained Marsolina Kokene (47), a resident of Gemaf Village.[171]

4.4. ISSUES SURROUNDING THE BUYING AND SELLING OF LAND

Conflicts between local communities and companies occurred in the Weda nickel industry. Problems include the very low bid price from the company, evictions, and sales of land that are yet to be paid for.

The local community reported that they had no other choice but to sell the land to the company. This is because the local government is working with companies to encourage residents to sell land at very low prices (IDR 8,000–9,000/m2, equal to only around half a euro cent). They claim that the figure is based on regional regulations. Negotiations related to land acquisition

Figure 4.15: Demonstrations by South Wasile residents against mining expansion in Kao Rahai

Source: Local community documentation

do not occur between the company and local residents but with the local government.

The majority of residents have sold their land. Maks Sigoro is one of the few Gemaf residents who still refuse to sell their land to the company. The reason is that the company has not yet even paid for the other land which it has already bought.

"I can't hand over my crops to the company because I still want to enjoy and eat my crop harvest. [It won't be] until the people of Gemaf have handed over all of their plantations to the company, [that] I will hand [my land] over to the company", said Maks.

Land feuds are still heated in East Halmahera District. PT Weda Bay Nickel, whose shares are controlled by Tsingshan, Eramet, and Antam, is opening a new nickel mining area in the Kao Rahai area. This plan has come under fire from residents of South Wasile sub-district. This is because the expansion of mining land is increasingly threatening the living space of the indigenous

Tobelo Dalam people who still live in the forest. Apart from that, the company is also bidding on the land at a very cheap price, IDR 2,500/m2 (equalling less than a sixth of a euro cent).

This refusal was conveyed in a series of protests. One of them happened in July 2020 when 450 South Wasile residents walked for two days to Kao Rahai. They blockaded roads by building tents and halting mining activities.

At the latest meeting, it was discovered that PT IWIP management negotiated with the head of South Wasile sub-district, Man Usman, for the purchase of the land at a very low price.[172] As a result, the sub-district head was asked to resign by the head of East Halmahera district, the late Muhdin Ma'bud and Deputy Chairman II of the East Halmahera Regional People's Representative Council (DPRD), Idrus Maneke. At that time, the head of the district could not immediately fire the head of the sub-district due to the Bawaslu (Election Controller Agency) ban, because of the imminent elections for the head of local government.

4.5. VULNERABILITY OF WORKER CONDITIONS IN NICKEL INDUSTRIAL ESTATES

Below are the most recent labour cases. A more detailed background on the IMIP workers' struggle can be found in *Road to Ruin: Challenging the Sustainability of Nickel-Based Production for Electric Vehicle Batteries*, published by Rosa Luxemburg Stiftung.[173]

Leading activists of the United Labour and People's Alliance (Alliance) which consists of three labour unions—the Morowali Industrial Workers Union (SPIM), the Morowali Indonesian Prosperous Labour Union (SBSI), and the Morowali Indonesian National Federation of Workers' Unions (FSPNI)—were dismissed unilaterally on 14 August 2020 by the management of the company due to their union activity in the pandemic time.

This incident was the aftermath of a series of interactions between the Alliance and the company that started with around 2,000 workers who were

sent home or told to quarantine due to the Covid-19 pandemic. Workers saw that their employment status was unclear, with no projected time to return to work.

On 30 June 2020, in the office of the head of Morowali district, a meeting between the company and the Alliance resulted in several points of agreement, including: the requirements for proof of health for workers returning from leave, or being sent home until they can bring one; and the company's obligation to comply with the health protocols for handling Covid-19 in the process of calling workers after leaving or being sent home.

On 3 July 2020, through letter number 560/0713/TND/VII/2020 Regarding Recall of Post-Leave and Furloughed Workers, the head of Morowali district stated that the return of post-leave and furloughed workers, as well as the granting of leave must be guided by Covid-19 protocol handling.

On 7 July 2020, PT IMIP followed up on the results of the meeting by announcing information on the entrances and exits of the area for employees who were dismissed. The company announced that the summons of dismissed employees would be carried out in several groups starting with the employees who were sent home first. Every two days, 120 employees would be summoned per day. Meanwhile, the workers' leave process would be carried out after all the workers who have been furloughed have returned to work.

However, by 1 August 2020 there had been no summons for workers. By counting the 14 days of quarantine which started on 10 July 2020 after an agreement had been reached, all the workers who were sent home should have been able to return to work on 13 August 2020.

Meanwhile, according to local workers, foreign workers could be seen moving freely in and out of the IMIP area. This indicates unfair treatment or even discrimination against local workers. This delay in summons also hinders workers on site from exercising their leave rights.

In addition, PT IMIP released a regulation in the midst of this pandemic that can be detrimental for workers. For example, Article 15 which regulates

working time does not explain the shift work system in detail so that it has the potential to make working hours exceed reasonable limits.

Although it was promised that workers would be paid more for overtime, this will be followed by a decline in health conditions which in turn create the possibility of increasing workplace accidents. Therefore, policies related to working time must be regulated in detail.

Next is Article 41 of the Company Regulation regarding fines and compensation for employees who commit violations. This regulation is considered to be very detrimental to IMIP workers. For example, if workers get the first to third warning letter they will be fined in consecutive amounts of IDR 70,000, IDR 150,000, IDR 350,000, and IDR 500,000.

Employees who arrive late are charged regardless of the reason, even though the transportation facilities within the IMIP area provided by the company are still limited and are not available for all departments. This condition also contributes to the high number of traffic accidents along the Trans Sulawesi Road during working hours, which is the only access to the IMIP area.

The Alliance also explained that there are many unwritten rules that serve as the basis for the issuance of sanctions for workers. These rules are only conveyed through social media or a spokesperson. Therefore, on 1 August 2020 the Alliance released the following nine demands:

1. Re-employ laid-off workers;
2. Give workers the right to sick leave;
3. Stop all forms of privileging foreign workers over local workers;
4. Reject Company Regulations that will harm workers;
5. Stop unilateral reassignments;
6. Abolish the unwritten rules;
7. Eliminate the programme of three teams/three shifts;
8. Increase employee entry and exit routes to minimize congestion and accidents;
9. Improve the quality of health services and adjust the dates for the letter of health (SKS).

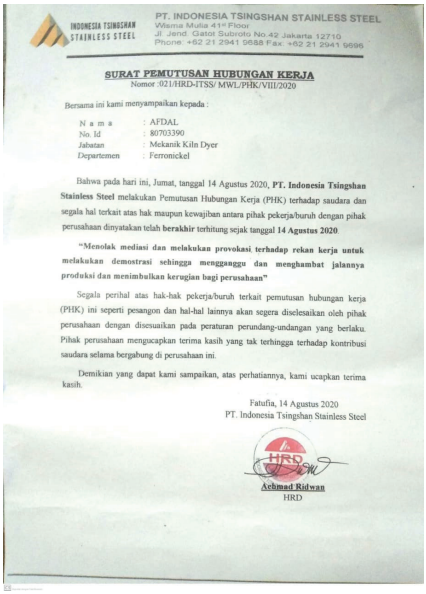
Figure 4.16: IMIP worker demonstration on 5 August 2020

On 5 August 2020, the Alliance held a demonstration which ended in front of the IMIP office. This action finally brought together representatives of the Alliance and PT IMIP, which was mediated by the government through the Bahodopi sub-district secretary (Sekcam). Because of the tough discussions, the Morowali government was willing to facilitate and mediate the 10 August meeting between the company and the Alliance at the office of the Morowali district head. The Sekcam also told the protesters that PT IMIP management would not fire any workers who participated in the protest that day.

On 7 August, there was a message circulating via a WhatsApp group regarding the dismissal of workers who participated in the 5 August action. The Alliance sent a letter to PT IMIP on 8 August questioning the legality of the dismissals for taking part in the 5 August demonstration. In fact, the labour union had written to PT IMIP for a collective permit to hold a demonstration for union and non-union members. The sanction is based on a company regulation which has not been in effect since 2018.

The government never made an official report of the agreement. Considering the meeting pointless, on 11 August 2020, the Alliance sent a letter announcing a planned strike for 18 August 2020 to the Morowali Manpower Office and PT IMIP.

Figure 4.17: Letter of dismissal addressed to Afdal (left) and Sahlun Sahidi (right)



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SURAT PEMUTUSAN HUBUNGAN KERJA
Nomor :021/HRD-ITSS/ MWL/PHK/VIII/2020

Bersama ini kami menyampaikan kepada :

N a m a	:	AFDAL
No. Id	:	80703390
Jabatan	:	Mekanik Kiln Dyer
Departemen	:	Ferronickel

Bahwa pada hari ini, Jumat, tanggal 14 Agustus 2020, **PT. Indonesia Tsingshan Stainless Steel** melakukan Pemutusan Hubungan Kerja (PHK) terhadap saudara dan segala hal terkait atas hak maupun kewajiban antara pihak pekerja/buruh dengan pihak perusahaan dinyatakan telah **berakhir** terhitung sejak tanggal **14 Agustus 2020**.

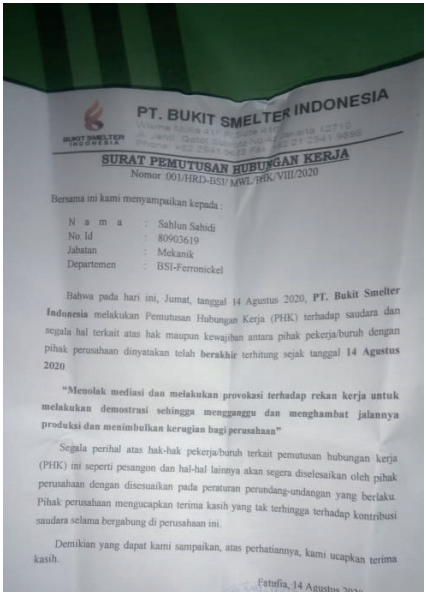
"Menolak mediasi dan melakukan provokasi terhadap rekan kerja untuk melakukan demostrasi sehingga menggganggu dan menghambat jalannya produksi dan menimbulkan kerugian bagi perusahaan"

Segala perihal atas hak-hak pekerja/buruh terkait pemutusan hubungan kerja (PHK) ini seperti pesangon dan hal-hal lainnya akan segera diselesaikan oleh pihak perusahaan dengan disesuaikan pada peraturan perundang-undangan yang berlaku. Pihak perusahaan mengucapkan terima kasih yang tak terhingga terhadap kontribusi saudara selama bergabung di perusahaan ini.

Demikian yang dapat kami sampaikan, atas perhatiannya, kami ucapkan terima kasih.

Fatufia, 14 Agustus 2020
PT. Indonesia Tsingshan Stainless Steel

Achmad Ridwan
HRD



PT. BUKIT SMELTER INDONESIA

SURAT PEMUTUSAN HUBUNGAN KERJA
Nomor :001/HRD-BSI/ MWL/PHK/VIII/2020

Bersama ini kami menyampaikan kepada :

N a m a	:	Sahlun Sahidi
No. Id	:	80903619
Jabatan	:	Mekanik
Departemen	:	BSI-Ferronickel

Bahwa pada hari ini, Jumat, tanggal 14 Agustus 2020, **PT. Bukit Smelter Indonesia** melakukan Pemutusan Hubungan Kerja (PHK) terhadap saudara dan segala hal terkait atas hak maupun kewajiban antara pihak pekerja/buruh dengan pihak perusahaan dinyatakan telah **berakhir** terhitung sejak tanggal **14 Agustus 2020**.

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Segala perihal atas hak-hak pekerja/buruh terkait pemutusan hubungan kerja (PHK) ini seperti pesangon dan hal-hal lainnya akan segera diselesaikan oleh pihak perusahaan dengan disesuaikan pada peraturan perundang-undangan yang berlaku. Pihak perusahaan mengucapkan terima kasih yang tak terhingga terhadap kontribusi saudara selama bergabung di perusahaan ini.

Demikian yang dapat kami sampaikan, atas perhatiannya, kami ucapkan terima kasih.

Fatufia, 14 Agustus

On 11 August, the government, through the head of Bahodopi sub-district, again invited the Alliance to find common ground with PT IMIP. This mediation was attended by the Alliance and PT IMIP. However, this meeting again did not achieve any common ground because PT IMIP persisted with the company's decision. Through this meeting, the Alliance was persuaded to cancel the planned strike on 18 August 2020. However, the Alliance remained steadfast in its desire to conduct a strike unless its demands were met.

On 14 August, three union leaders who are members of the Alliance, Afdal (SPIM), Sahlun Saidi (SBSI), and Agus Salim (FSPNI) received summons from the management of PT Indonesia Tsingshan Stainless Steel (ITSS) and PT Bukit Smelter Indonesia (BSI) to hear information related to alleged disciplinary violations. This ended with the unilateral dismissal of the three union leaders.

In the dismissal letter, the company stated that Afdal and Sahlun "refused to mediate and provoked colleagues to hold demonstrations so as to disrupt and hinder production and cause losses to the company."

As a result of the layoffs of union leaders, the strike planned for 18 August was postponed to 22 August. Finally, the strike was held for three days, from 22 to 25 August 2020.

On 25 August, the Alliance had a meeting with PT IMIP which was mediated by the local government. The meeting resulted in several agreements such as: recalling workers laid off due to the pandemic; granting worker leave permits which had been pending; improvements in company regulations; rescinding allegations of worker absence following the 5 August demonstrations; and stopping the strikes. A number of discussion points have yet to find common ground regarding the three team/three shift system, union bans, and the layoffs of union leaders.

Bipartite forums have been held on the last point, but no agreement has yet been reached. On 6 September 2020, Afdal and Sahlun filed a lawsuit to hold a tripartite forum involving the local government.

Based on the 25 August meeting, the implementation of the agreement must be supervised by all parties concerned in order for PT IMIP to fulfil its responsibilities.

Another conflict is still ongoing between two PT IMIP and SBSI members, Jemi Token and Faisal Gunawan, who were left without income or severance pay after they were unilaterally fired. Both of them sued PT IMIP and won in the District Court and the Supreme Court in 2018. PT IMIP was obliged to pay severance pay of IDR 22,126 million to Jemi and Faisal.[174] However, PT IMIP did not fulfil its obligations. The team of bailiffs at the Poso District Court, which was about to carry out the seizing of funds, was blocked by PT IMIP security officers.[175] As of September 2020, Jemi and Faisal still had not received the compensation they were due.

At IWIP, violations of workers' rights also occur. During the pandemic, the construction of the area's infrastructure and smelters continued as usual.

The pyrometallurgical smelters owned by PT Weda Bay Nickel and PT Yashi Indonesia Investment successfully started operations in May and June 2020. According to one of its former employees, the company was not giving permission for workers who were sick to go on leave; workers were unable to take leave before working for five consecutive months; and there is discriminatory treatment against local workers, who are forced to work 12 consecutive hours without rest.[176]

This is not to mention the high density of workers in the IWIP area, which prevents the effective application of Covid-19 protocols such as physical distancing. This series of situations was recounted by a former IWIP worker at a webinar held by AEER in May 2020. He was fired from his job on 18 April 2020, after uploading a video to Facebook containing his complaints regarding the injustice and vulnerability experienced by workers in the area.

CHAPTER V: CONCLUSION AND RECOMMENDATIONS

5.1. CONCLUSION

The discussion in this report includes: an overview of the nickel-grade battery industry actors in Indonesia and their potential supply chains; potential environmental impacts of planned deep-sea tailings disposal; as well as field findings regarding the impacts of the nickel industry activities which have been taking place in Morowali and Weda.

First, it is predominantly Chinese investors who make up the shareholders of a nickel-based battery component manufacturer that is currently planning to plant itself firmly in Indonesia. These shareholders consist of companies producing electric vehicle components and batteries. Furthermore, the company is linked with global electric vehicle manufacturers.

This indicates an effort to secure a nickel resource that is increasingly being used in electric vehicle batteries. As it has the largest nickel reserves in the world, Indonesian nickel is in an important position in the global supply chain for electric vehicles. Indonesia must take advantage of this opportunity to develop a downstream nickel industry that prioritizes environmental sustainability and protects the rights of local communities.

Second, the choice of the DSTD method can be seen as a way for the company to reduce the operating costs of the HPAL plant, which is known to be risky and capital intensive. This method can be inexpensive because the company, with government permission, transfers the costs of managing environmental and social impacts to local communities. In other words, this practice prioritizes economic benefits over environmental sustainability. This goes against the purported aim of the globalization of vehicle electrification. Meanwhile, the local marine ecosystem will be at risk, with ocean phenomena and local marine biodiversity determining the level of danger to the environment due to DSTD.

Reflecting on the Taganito HPAL project which has similar geographic characteristics, HPAL operations that prioritize environmental concerns are still possible through use of the best technology available today and limiting nickel production capacity. Tailings management practices which follow international standards also contribute to maintaining the image of Indonesian nickel-based battery products on the global market by requiring nickel to be produced cleanly and without harm to local communities.

Third, the development of the battery-grade nickel industry for electric vehicles has the potential to exacerbate the environmental and social impacts that have been experienced by local communities, particularly Morowali and Weda, due to the activities of the nickel industrial area. The consequences of global supply chains allow the exploitation of nature in previously untouched areas as well as the exploitation of workers through increasingly complex routes, as can be seen from the field findings.

Fourth, improving worker welfare and improving working conditions. Indonesian nickel products are among the cheapest on the international market, thus even subject to anti-dumping tariffs by importer countries. A significant increase in wages in factories producing components of nickel-based batteries makes it fairer for workers.

5.2. RECOMMENDATIONS

Based on the findings obtained from this study, there are a number of suggestions for relevant parties: namely for the government, investors, and the public.

The government should:

1. Not issue permits to dispose of tailings into the deep sea around Morowali and Obi Island. In addition to damaging the marine ecosystem on a large scale, this also presents a poor image of Indonesian battery-grade nickel products. Granting DSTD permits at these two locations would also set a terrible precedent and allow other companies planning to build HPAL plants to apply for similar permits.

2. Issue regulations regarding tailings management standards, considering that more HPAL smelters will be built in Indonesia. These regulations should include a ban on the disposal of tailings into the sea, require research from independent third parties, and also oblige employers to apply the best technology and attain the active involvement of local communities.

3. Encourage the development of an electric vehicle battery recycling industry to limit nickel mining activities for the purposes of electric vehicle batteries.

4. Manage regulations that require HPAL smelter operator companies to use renewable energy sources, given the initial goal of the globalization of vehicle electrification, as well as reducing funding for PLTU construction.

Suggestions for investors:

1. Tailings management should be carried out by applying the best available techniques such as: backfilling, namely returning the tailings to the mine pit; and dry stacking, which minimizes the water content in the tailings in order to reduce the environmental footprint.

2. Considering the capital intensity, the uncertainty in the length of time taken to reach the design capacity, as well as the environmental carrying capacity, it is recommended that HPAL smelters be built with moderate production capacity.

3. Audit the mineral supply chain that goes into the production of electric vehicle batteries to ensure minerals are sourced from responsible processes and meet international environmental standards.

4. Issue internal regulations related to responsible tailings management. Investors can refer to documents from non-governmental organizations such as *Safety First: Guidelines for Responsible Mine Tailings Management*, published by Earthworks.[177]

5. Get involved in industry groups creating platforms to monitor supply chain cleanliness, such as the Global Battery Alliance which created battery passports.

6. Fulfil the normative rights of workers and distribute assistance to local communities affected by mining activities and the nickel industry, and ensure that assistance is distributed evenly and on target.

7. Empower local communities by encouraging involvement of companies in those communities, for example by buying fish and food supplies from fishermen and farmers around the company's operational area.

Local communities should:

1. Build and strengthen advocacy networks among communities in villages surrounding mines, to jointly advocate for company compliance with environmental protection standards and local community rights.

2. Build networks with environmentally-conscious citizens who are the principal market for electric vehicles abroad, so that they also involve themselves in the fight for community-supporting, ethical, and environmentally-sound business practices in the electric vehicle battery industry.

3. Build a network of workers and local residents who organize around both work and environmental protection: long working hours and overly intensive work are not good for the well-being of workers, and the exploitation of natural resources from mining and landfills is a highly destructive force which adversely affects the well-being and livelihoods of local communities.

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“Shifting from fossil fuel to electric vehicles is inevitable. However, the production of electric vehicles from upstream to downstream must be clean, meet environmental standards, and make the surrounding community prosperous, without exception. Without following these principles, we will only repeat the cycles of injustice for the environment and local people.”