SUSTAINABLE ENERGY FROM AN UNSUSTAINABLE SOURCE: THE NEED FOR SAFEGUARDS IN MANGANESE EXTRACTION FOR RENEWABLE ENERGY IN INDONESIA

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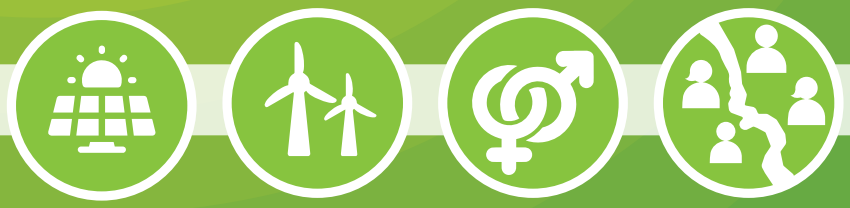

This paper is part of a research series on the energy landscape in Southeast Asia.

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ABSTRACT

Renewable energy has been massively promoted as one of the solutions for reducing emissions. With Paris Agreement targets and United Nations Sustainable Development Goals (SDGs) commitments on the horizon, the need for critical materials that go into the making of renewable energy would increase fourfold to achieve the targets for below 2ºC by 2040. Manganese mining is one of the key elements for innovative development of renewable energy. While low-carbon energy innovations are certainly needed, the sustainability aspects of mining must be taken into account in the search for raw materials. However, existing mining operations are alarming due to their social and environmental impacts. Taking the case study of Manganese mining in Manggarai District of East Nusa Tenggara (NTT) Province, Indonesia, this article highlights the social and environmental risks of seeking out the very materials that are needed for a renewable energy transition. The study examines how existing manganese mining operations are involved in water competition and social conflict with Manggaraian indigenous communities. Most of the springs communities use for drinking water and carrying out traditional rituals overlap with the mining permit area. Under the current law of Indonesia, those sites could be cleared anytime for mining. The current policy of Omnibus Law is to increase investments in renewable energy. Identified as the biggest source of manganese deposits in Indonesia, Manggarai District and other districts of NTT Province are likley to be targeted for new investments in mining. Although the water catchment area is protected by Indonesian law, the current mining law has no safeguards to protect the interests of local communities and the indigenous peoples. Therefore, it is important to strengthen safeguards and sustainability standards in the supply chain of renewable energy developments.

Key words: renewable energy, manganese mining, safeguards, Indonesia

BACKGROUND

Renewable energy is a global demand for a number of reasons. The two main causes of this demand are the depletion of fossil-based energy, and the need for clean energy to prevent further increase of greenhouse gas (GHG) emissions (Moriarty & Honnery, 2016). However, as elaborated by several studies such as Ellabban et al. (2014) and Gielen et al. (2019), expanding renewable energy to the level of being a considerable competitor to fossil fuels requires an increase in market demand and more innovations in technology.

In terms of innovation, most of the renewable energy technologies including wind turbines, electric vehicles, and power grids rely on critical minerals such as copper, lithium, nickel, cobalt, and rare earth elements. However, similar to other minerals, these minerals are also non-renewable and will deplete in the future (Pyakurel, 2019). A recent report from the International Energy Agency (IEA, 2021) has seen a worrying trend of an enormous gap between the world demand for renewable energy versus the availability of supporting minerals. With Paris Agreement targets (UN, 2015a) and United Nations Sustainable Development Goals (SDGs) (UN, 2015b) commitments on the horizon, IEA highlighted the need for critical materials would increase fourfold to achieve the targets for below 2^{o}C by 2040. The gamble at stake is thus to find new innovations which could be achieved in two tracts. In the immediate term is to develop a leapfrog innovation to unbind the world from its dependence on limited materials and onto more abundantly available materials. For the long run, the goal is to develop a new technology that is totally freed from non-renewable materials.

In aiming to expand innovations, a recent report (Herr et al., 2021) claimed that manganese (Mn) is the potential substitutive substance for iridium and ruthenium, which are key elements for luminescent materials and catalysts for converting sunlight into other forms of energy. It has an abundant stock in the earth's crust, about 900,000 times more than iridium. In fact, its sizeable supply could reduce the market price compared to the two other materials. As IEA reports, the cost for renewable energy raw materials is significantly increasing, which is about 40–50% more costly than five years ago. Therefore, getting a cheaper material is a must in innovation and recent research (Mathew et al., 2020) suggests manganese could be one of them. Currently, manganese top producers such as China and South Africa (Palisade Research, 2017) have mainly used the material for an alloy in steel production.

On the current trajectory of producing renewable energy, manganese is already on the list of the main materials (IEA, 2021) of the technology along with other vital components. But research innovation (Leotaud, 2021) shows that manganese has been recently competing with nickel in terms of top research into innovative breakthroughs in renewable energy

technology. In addition, research of more than 40 years ago (Rankin & Childs, 1976) and more recently (Zarasvandi et al. 2018), have shown that manganese is one of the main carriers of rare earth elements which is needed for almost the entire component of renewable energy devices. Mining manganese therefore not only pulls out Mn components but also rare earth elements. Thus manganese is more strategic for materializing the target for renewable energy.

On the demand side, China is a leading country investing in renewable energy. According to Yang et al. (2016), since 2000, the country has been progressively developing clean energy and since 2010, its application has been growing at about 62.5% annually. While its renewable energy mix was only about 12.66% in 2019, (Ritchie & Roser, 2021) the trend shows China could aggressively aim to provide 60% renewable energy sources by 2050 (Yang et al., 2016).

Though renewable energy is a global call, the process to provide raw materials should be equally important to consider towards the goal of sustainability. Amartya Sen (2013) wrote that sustainability is a correlated means and ends where aiming for intergenerational justice should be reflected in the process of progressing human freedom. In this case, The Brundtland report (1987) more than 37 years ago had included a clear goal for a better future. The goal can be described as something we as human beings can all aspire to, which is a just social, ecological and economical life. However, defining means is much more complex as they cross a number of intersections. These include violating peoples' rights, environmental justice, and the unequal access for future generations.

Mining in itself has a historical problem rooted in the extractive model of the economic system. It was passed on from an old version of an economic-political system with little guidance to sustainability (Laurence, 2011). Along with that is the ugly reputation (Lumbanrau, 2021) business-as-usual practices (JATAM, 2021), as well as a knowledge template (Rochmyaningsih, 2020) accompanying its performance. All of the baggage from the past cannot be immediately counted as sustainable as they lead to social conflict that could be prolonged for generations. For instance, the conflict between a nickel mining operation in Soroako in Sulawesi, Indonesia, and indigenous peoples in the area has lasted for over 50 years (Environmental Justice Atlas, 2019).

While there have been some changes over time (Andrews et al., 2017), the remnants from the previous generation is not easily eroded. Several cases of so-called "improvement" indicated that programs aiming to address social problems, especially corporate social responsibility (Frederiksen, 2019), on the contrary is hijacked by political elites. Thus, manganese mining should also be looked at from this perspective, alongside the reality that most of manganese mining is open pit (Downing, 2013).

A recent report on manganese mining operations in South Africa (Gonzalez & Ramsing, 2021) raised an alarming concern about the reality of manganese mining. Triggered by the market demand of ending products of manganese including renewable energy, miners in the country operated in poor standards, leading to human rights abuses and environmental damages. Furthermore, Dlamini et al. (2020) assessed 187 black South African manganese mine workers and found that parkinsonian indications were common and associated with estimated manganese exposure and poor quality of life.

METHOD

Conceptual framework

Social safeguards are a preventive mechanism or measure to avoid harm for the social aspects of communities (FAO, nd). There are a number of social safeguards promoted by international bodies, such as the World Bank, Asian Development Bank, and the International Fund for Agriculture Development. While several social safeguards are understood from the perspective of individual rights, for indigenous peoples it is culture that connects other dimensions (United Nations, n.d.). Therefore defining social safeguards includes building measures to do no harm in relation to traditions, spirituality, knowledge, land, and so forth.

Within a cultural identity, there is an interlinking between social and ecological values (Robbins, 2018). Discussing natural resources is not separate from social meaning. In fact, the harmonious tradition of indigenous peoples with nature is recognized in the report of the United Nations Secretary-General in the sixty-fifth session of the General Assembly (2010) under the title *Harmony with Nature*. In this document, the Secretary-General called for member states of the UN to approach sustainable development from a systems thinking or a holistic approach. It is learning from the rich indigenous traditions all around the world who emphasize the role of the earth as a mother.

Land and water are, therefore, not only defined into a physical substance but also in innate relationship with social values. For instance, in analyzing the water politics and identity in Andean communities, Boelens et al. (2010) describe that water is part of indigenous solidarity which is arranged in a cultural system which has historically survived, even in tough environmental and political challenges. In the case of the Wayúu people in Colombia, Ulloa (2020) elaborated their contestation against Cerrejón coal mine in La Guajira by defending the territory including water as part of their cultural identity. The territory for this group is not only physical, but more importantly includes a cultural existence to embody a

spirituality that reflects elements of social life of the community (Ullola, 2020).

Comparable definitions of water occurs in the indigenous peoples of the Murray-Darling Basin in Australia, where water value is in fact embedded with ecosystem services including cultural services, tradition, social norms, spatial arrangement, and land use (Bark et al., 2015). The Australian government took further steps to include a broader definition (Jackson, 2010) of water in their National Water Quality Management Strategy (NWQMS) (2018) to address water values from indigenous peoples in relation to culture and spiritual values. au

The broader value of water can be seen in the way indigenous peoples react when it is disturbed. For instance, in the case of San Cristobal mining in Bolivia, water scarcity can be a latent conflict that will somehow revolt into manifest conflict. In fact, even when a mining conflict has successfully transformed into an inclusive dialogue, water remains a problematic issue (Elizalde & Cordova, 2017). At any time, it can be a pretext to fueling another conflict.

Scope of the Study

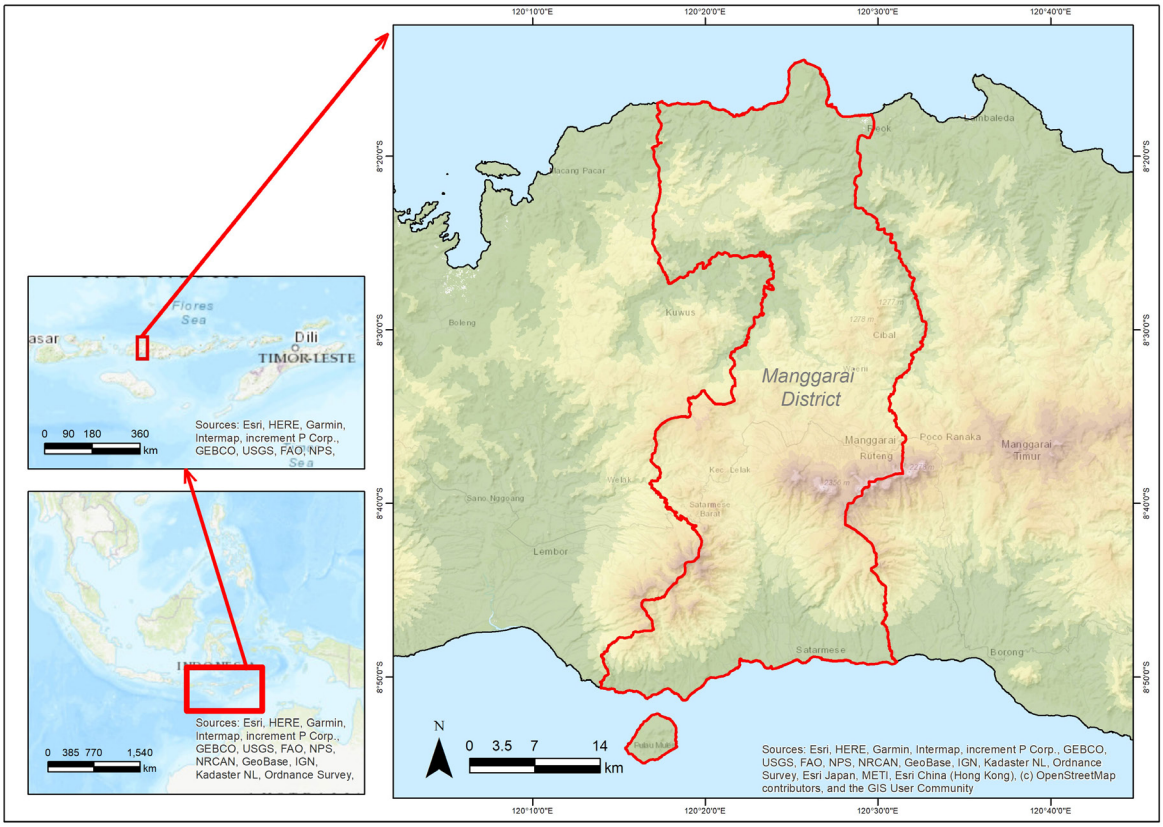
This research analyzes the mining allocation and land use of the indigenous peoples including the water springs, settlements, and farming lands. It identifies whether mining allocation respects the other land uses. The main focus is to analyze the area of the mining concession in relation to the water spring locations.

This research also shares narratives from the indigenous groups about the social processes taken by the companies before the operation. It expresses the village circumstances after mining started operations, including what could be the impact of mining on their water supply.

This analysis is also useful in terms of understanding the impact of Indonesia's current ambitions of the *Job Creation Law* (JCL), especially in relation to the current *Mining Law 3/2020*. Under this law, the government uses an omnibus approach to complete significant changes across more than 70 laws affecting the areas of environment, spatial planning, investment, and conservation. The main aspect of this law is to give government a leeway to fulfill the macro target of development including energy security from renewable sources such as geothermal and hydropower.

Location

Figure 1. Manggarai Regency (District) in East Nusa Tenggara



Topography and Climate

Manggarai Regency is located on Flores Island, at coordinates 8° 36′ 45.72″ S, 120° 27′45.36″ E. Similar to Flores Island in general, this district has a hilly topography. The dominance of the morphology of the volcanic mountains stretches from the south to the central mountains of the island and the structural rocks of volcanic deposits fill the central mountains to the north and the karst region in the north.

This area has an average rainfall of 3,849 mm/year, more than the average rainfall in East Nusa Tenggara province which only reaches 1,164 mm/year (Mulyani et al., 2013). However, some of them are semi-arid areas that have rainfall below 1,000 mm/year. Therefore, the climatic variations in this area range from very dry climates to very wet climates.

The diverse climate, although generally relatively wet on average, allows for a more diverse use of agricultural land in Manggarai. Some farmers use the land to carry out active rice fields with two harvests in a year. Provincial statistical data records that 45% of active rice fields (30,561 hectares) which are harvested 2–3 times a year are in the Manggarai area (BPS–NTT, 2019). Most of the land use is allocated for agriculture in line with the majority of the population's livelihood being farmers.

The people and land

The people of Manggarai are indigenous to the area with a long history of settlement. Some research on indigenous architecture in Manggarai traced the history of traditional architecture that has survived for 17 generations in the area (Lad, 2017). The Manggaraian people also continue to live with long traditions attached to beliefs, norms, and social structures that shape their daily attitudes towards land and territory.

One of the main dimensions of tradition is the significance of water and how it implicates land use within their system. The people of Manggarai have given meaning to water as a central cultural asset for their continuation of social existence. For instance, in many rituals or ceremonies of thanksgiving to the spirits for gratitude of good harvests, water is the central entity for every member of the community to respect (Makur, 2021). Moreover, as indicated by some results of participatory maps initiated by Badan Registrasi Wilayah Adat (BRWA, n.d.-a), or "Ancestral Domain Registration Agency", an NGO-based initiative to document indigenous territory, the source of water and the surrounding ecosystem is guarded carefully by social regulations. There are cases where Manggarai people applied customary laws against transgression on water catchment areas and the transgressor was punished accordingly (BRWA, n.d.-b).

In terms of land cultivation, land management is done as an integrated part of conserving water by preserving forest cover in water spring areas and places that are sacred for traditions (Iswandono et al., 2016). The tradition also maintains the trees that are believed to protect the sustainability of the water supply from catchment areas. It is prohibited to chop down these trees and a heavy punishment applies when a member of the community breaks that prohibition. In fact, the overall tradition of the Manggaraians is to respect nature in a way that every intervention from humans to nature should initially ask consent from nature. This approach is symbolized through some forms of interactions such as sacrificing animals, offering chicken eggs, betel and betel nuts, traditional wine (*arak*), and so forth. Commonly, the rituals are executed in the areas where human activities are planning to operate. An intermediary communicates via a traditional mantra and will be given an answer in how to run the planned activities. Sometimes the answer received is "no". If so, it should be enough to restrain people from carrying out any activities in the area.

Most of the land in Manggarai was communal land called *lingko* (Makur et al. 2019). The claim for lingko was erected through traditional battles and aforementioned rituals. The land used to be controlled by *adat* (customary) authority, who had extensive verbal knowledge on land boundaries. Most of the borders used to be documented in a map filed at the District Government Office. But the building was burned some years ago (Barron & Sharpe, 2005), resulting in losing the only written records of land boundaries in Manggarai.

Meanwhile, younger generations could not be relied upon for this history, as unlike their predecessors, they have no comparable memory to track the history of land. Today, the absence of oral and documented evidence has led to a conversion of a large amount of communal lands into individual assets.

The impact of individualizing land has significantly triggered massive communal land conflict in the area. As reported by the World Bank study (Barron et al., 2007), the area was one of the bloodiest land conflicts which cost lives and properties. Traditionally, when verbal dialogue is no longer trusted, documented evidence is needed to outline the final settlement. Since that evidence is gone, the only way to resolve the situation is through the last option of settlement that they call *perang tanding*, or "counter-war" in English. It is a physical duel to death as the resolution to determine who owns the land. This tradition has survived and lived on through to the modern era, especially when the formal system was not effective. In 2004, it was exacerbated to a structural (vertical) conflict with the government, due to a conservation program (Erb & Jelahut, 2007). In the name of conservation, local government led a large campaign to restore forests. Some areas with coffee plantations were designated to be cleared and replaced with forest trees. In resistance, four people were killed and hundreds of others left their coffee plantation and crops for fear of being hunted by forest guards and police.

Currently, local government recognizes the role of customary institutions by establishing some regulations. In East Manggarai Regency, local government has recognized the existence of the indigenous peoples through *District Regulation No 1* of 2018, and the Manggarai Regency has also stipulated *District Regulation No 1* of 2018 to make use of indigenous peoples-based dispute settlement. Although these policies could fill the gap of the lack of legal recognition, the conflict due to the mining operations has already been underway before these regulations were recognized.

Spatial planning for manganese mining

Similar to other districts in Indonesia, Manggarai Regency requires a spatial planning policy to regulate the land use allocation. The model used is to follow the uniform format provided by the National Spatial Planning policy (RTRWN) and based on the *Spatial Planning Law 26/2007*. One of the designations stipulated in the RTRWN is the allocation for mines. In this case, Manggarai Regency followed this policy.

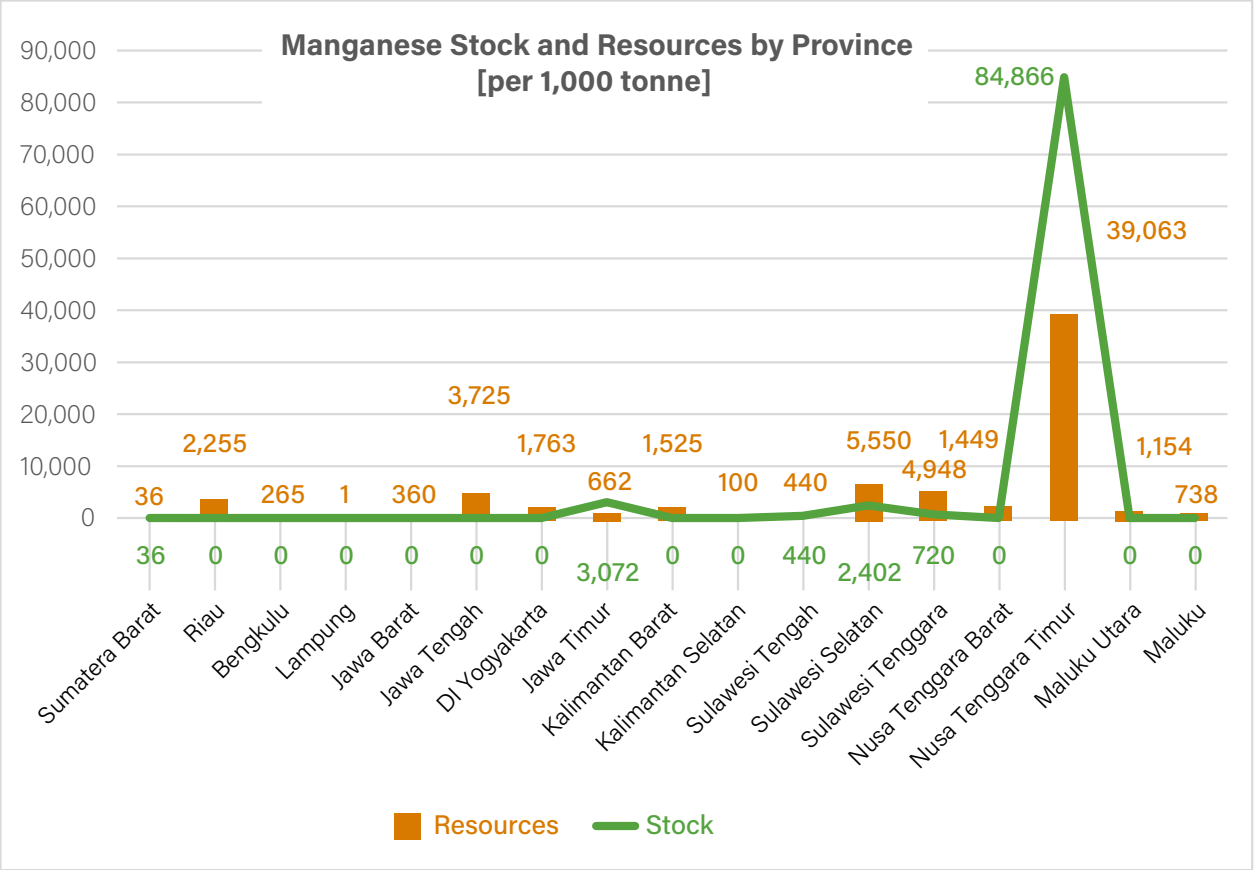
In fact, Manggarai Regency has been familiar with mining policies since the 1980s when the allocation was first given to a mine manganese company in the subdistrict of Reo in the northern part of Manggarai (Regus, 2011). The authority to mine minerals at that time was generally given at the national level, but it could be delegated by the Minister to provincial

level (Article 3 of the *Basic Mining Law 11/ 1967*). After the enactment of Regional Autonomy, especially the version before 2014, mining authority was given to districts/regencies and municipalities. Therefore, mining business permits are granted during periods when the authority is still held by the Regent or Mayor.

In line with this authority, manganese exploration permits have been issued by the Regency Head of Manggarai (*Bupati* in Bahasa Indonesian) in several locations since 2007. Several companies have not continued exploration to the exploitation stage due to insufficient rock deposits. After 2009, some companies continued the process to the operating license stage. After 2010, the District Government issued 9 operational permits for manganese mining in the northern area of Manggarai Regency. Currently, there are 10 active manganese permits in the area, legally named as IUP (Mining Business License), with the majority operating until 2029.

The development of granting mining permits in Manggarai Regency is in line with regional developments at the provincial level. In a period of less than 10 years (2007–2014), districts in East Nusa Tenggara province issued 315 permits to mining companies, especially for manganese (Erb, 2016). This increasing trend can be understood in the context of the supply side of manganese in the province, which is the region with the largest manganese deposits in Indonesia. The Ministry of Energy and Mineral Resources (Supriadi et al., 2017) noted that 70% of Indonesia's manganese reserves are in this area, and also highlighted that the best manganese quality that Indonesia has is from East Nusa Tenggara (KESDM, 2013). Statistically, the province is indeed the main producer of manganese mining in the country, with more than 92% of mining stock located here and approximately only about 46% of it is being utilized (Figure 2). In 2016, the national Geological Agency reported that East Nusa Tenggara has a capacity to produce manganese ore of more than 37 million tonnes, which is about 60% of national capacity (Supriadi et al., 2017).

Figure 2. Manganese stock and resources by province in Indonesia



Source: Ministry of Energy and Mineral Resources (KESDM, 2019)

Since 2018, in rushing to have ore processing domestically as required by the law, provincial governments have permitted a manganese company from Australia, PT Gulf Mangan Group, to build a smelter hub in Kupang, capital city of East Nusa Tenggara province. It plans to produce 22,000 TPA (Tonnes Per Annum) at the initial stage and could be increasing to over 200,000 TPA FeMn alloy (Gulf Manganese, 2017). The smelter will process the manganese ore supply from Putra Jaya Indonesia (Gulf Manganese, 2019) which is one of the manganese permit holders already operating on Timor Island of East Nusa Tenggara province (Khamyam, 2012). Putra Jaya also has a manganese ore washing smelter nearby its operation area in Timor Tengah Selatan district of the province.

While mining expansion was underway, a call for a moratorium was successfully accepted by the provincial government. However, the suspension was no more than a pause. It had no design of reform such as performance indicators, working criteria, and so on to improve the existing mining operation and limit the amount of mining areas. The provision in spatial planning law has the word "proportionality" as the criterion to determine the balance of land use allocation between protection and cultivation area. But it is still unclear how this criterion is defined, let alone becomes a working definition in reality.

Data collection

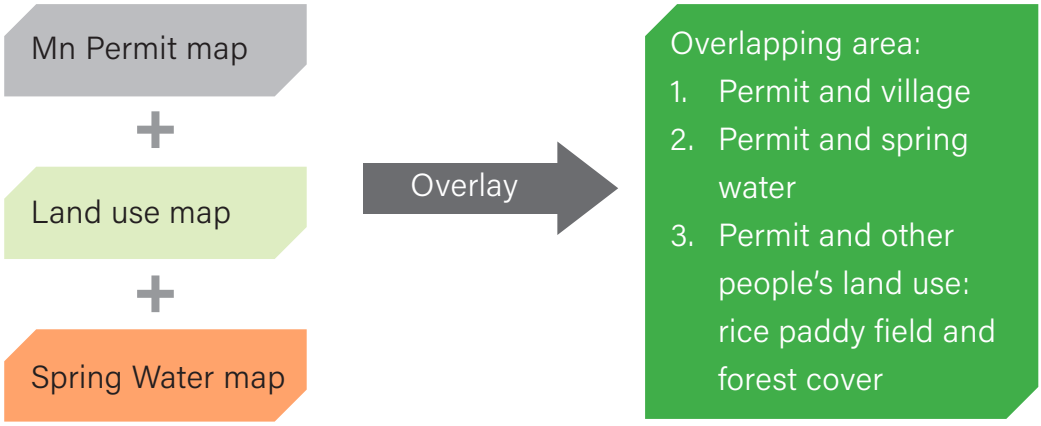
There are three layers of spatial data collection: the manganese permit, land cover, and water spring coordinates. Data on the manganese mining location were obtained from the manganese mining database from the Ministry of Energy and Mineral Resources: https://geoportal.esdm.go.id/indonesia-overview/. Land cover data were downloaded from national land cover annual updates from the Ministry of Environment and Forestry: https://nfms.menlhk.go.id/peta.

Data on water spring locations were taken from portraits using NoteCam (n.d.) application. The application is a camera app combined with GPS information (including latitude, longitude, altitude and accuracy), time, and comments. It was downloaded from Google Play Store and installed in a normal camera with Android operating system 10. The results were further clarified with village members regarding the name and the main function of the water sources.

The information on the loss of water springs and what might be the impact of mining were explored from interviews with the villagers. These views are subjective and by definition, social reactions are definitely not an ecological analysis. But collective subjective notions indicated that after mining began, there have been problems related to water. In addition, these testimonies were provided based on individual and communal memories of longer-term exposure to the local environment. It is therefore evidence that cannot be suddenly categorized as "not true". Instead, they should be further explored, through additional academic study or even legal inquiries.

Data Analysis

Figure 3. Spatial analysis research on overlapping areas



The spatial analysis (Figure 3) has three main steps:

- Identification of the mining permit locations
- Overlay the mining permits and land use maps
- Overlay the mining permits and water spring locations

Identification of mining permit locations

Information for mining holders is selected by the name of company, area of operation, total size of permitted area, and permit validity period.

Overlay the mining permit and land use

There is a number of information on land use. Selected information that is taken particularly for this analysis is the use for forest cover, rice paddy fields, and settlements. While there is no participatory map from the indigenous peoples yet, the land use map from the government was said by community members to align with their daily use. These uses are the strategic area for indigenous peoples' daily life and to exercise their cultural identities.

Overlay the mining permit and water spring locations

The information about water springs is in the form of spots. The permitted area for manganese mining is then evaluated against these spots, whether they overlap. Water is the most valuable ecological resources in the area, and the main function of the water source is clarified with the villagers into categories: drink water, cattle, irrigation, and ritual function. Some of these water springs fit into more than one function.

Defining unsustainable sources

The mining area that overlaps with one of the strategic uses of the indigenous peoples should be defined as an unsustainable source. Traditionally, the activities that are overlapping with the prohibited area are punished to stop the operation and pay traditional fines to apologize to the spirits for transgression. The function of punishment is not mainly to redress the ignorance of the perpetrators but to prevent the risk of anger from the spirits.

Moreover, the conflicting area of mining with land uses of indigenous peoples should be regarded as illegal (Table 1). The definition of illegality and punishable acts for these activities are defined by national laws. In general, the violations are set to be punished strongly, meaning that lawmakers identify these activities as clearly illegal and view them as a form of "moral treason" against public virtue.

Table 1. Definition of illegalities for overlapping land use

Laws	Illega l activities	Sanctions
Water spring areas must be protected and should be defined as protected area (*Land and Water Conservation Law 37/2014, Job Creation Law 11/2020*)	• Mining, plantation, and other use that open and operate in water catchment areas. • Strongly prohibited to operate in water springs, pollute and damage the water springs	Penal sanctions (3 years maximum of jail and fines of IDR 1 billion) Administrative sanctions (permit revocation and legal status revocation)
Prohibited to mine in settlement areas *(Land and Water Conservation Law 37/2014, Job Creation Law 11/2020)*	• Overlapping with settlement areas • Claiming the settlement area without consent • Destroying villages, cultivation areas, and communal property	Penal sanctions (3 years maximum of jail and fines of IDR 1 billion) Administrative sanctions (permit revocation and legal status revocation)
Rice paddy fields are protected for sustainable livelihood *(Job Creation Law 11/2020)Presidential Reg 59/2019 – Article 17)*	Other land use should not replace rice paddy fields	Administrative sanctions (permit revocation, legal status revocation, rehabilitation of the area)

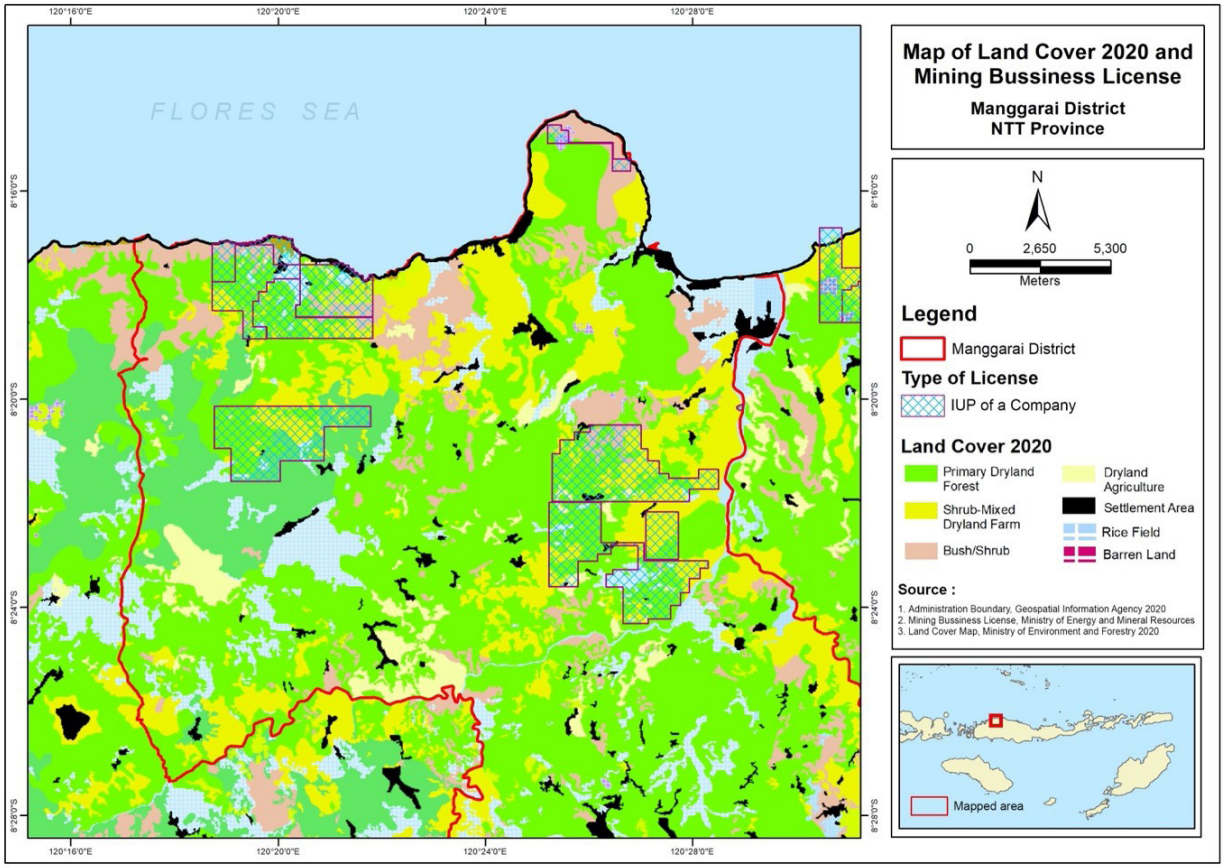
Result

Mining permits

The mining permits are located on the northern part of Manggarai Regency (Figure 4). Currently, it has 10 active manganese mining permits with a total area of about 4.940,73 ha (hectares). The validity period for most permits will expire in 2029. The majority of them were authorized to operate by the Bupati when districts/regencies and municipals still held authority to grant permits for mining. After 2020, a new mining law removed the mining permit authority from district/municipal level to the provincial level. Although the Bupati no longer has the authority, the permits they gave before 2020 are still valid for operation and could be extended under the new authority of the province after the period expires.

The permits are cut across karst areas of northern Manggarai which is valuable for water reserve areas. In 2016, Indonesia's Human Rights Commission suggested the government protect karst areas for its social, economic, and ecological functions. Karst ecosystems become prominent ecological factors in areas it regulates and reserves water, which is the key resource to fulfill peoples' rights to water (Komnas Ham, 2016).

Figure 4. Map of land cover and mining business licenses in northern Manggarai in 2020

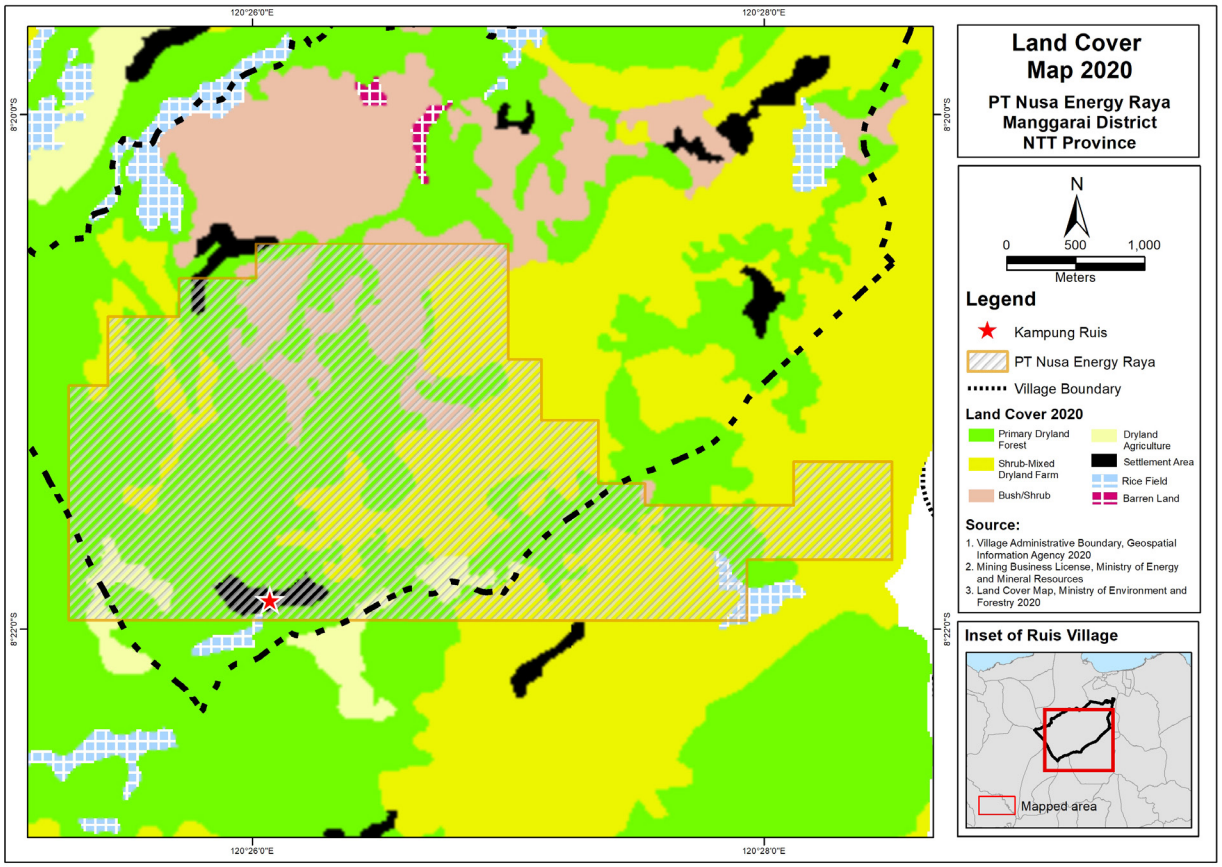


Overlapping with land use

One of the 10 companies is a company that began operations on 14 May 2012 which will be completed by 14 May 2022. It is legally operated based on a permit from the Bupati of Manggarai through the decree *SK/151/2012*, with a total permit area of 1,043 ha. The company can apply for a permit extension for another 10 years or more, depending on the manganese deposits and consideration from the authority.

The permit area overlaps with the entire settlement of Ruis village and half of Rura village in the northern part of the permit. It also overlaps with primary dryland forest and dryland agriculture (Figure 5).

Figure 5. Land cover map of Ruis village area with mining license area of PT Nusa Energy Raya in Manggarai



Overlapping with rice paddy fields

Another striking feature of overlapping is with rice fields at the southern part of Ruis village, claimed by the permit decree as being part of the permitted manganese area of the company (Figure. 5). Currently, there is no precise data in numbers on the real size of overlapping areas, but the permit map shows clearly that it crosses over about a quarter of the rice field.

Overlapping with water springs

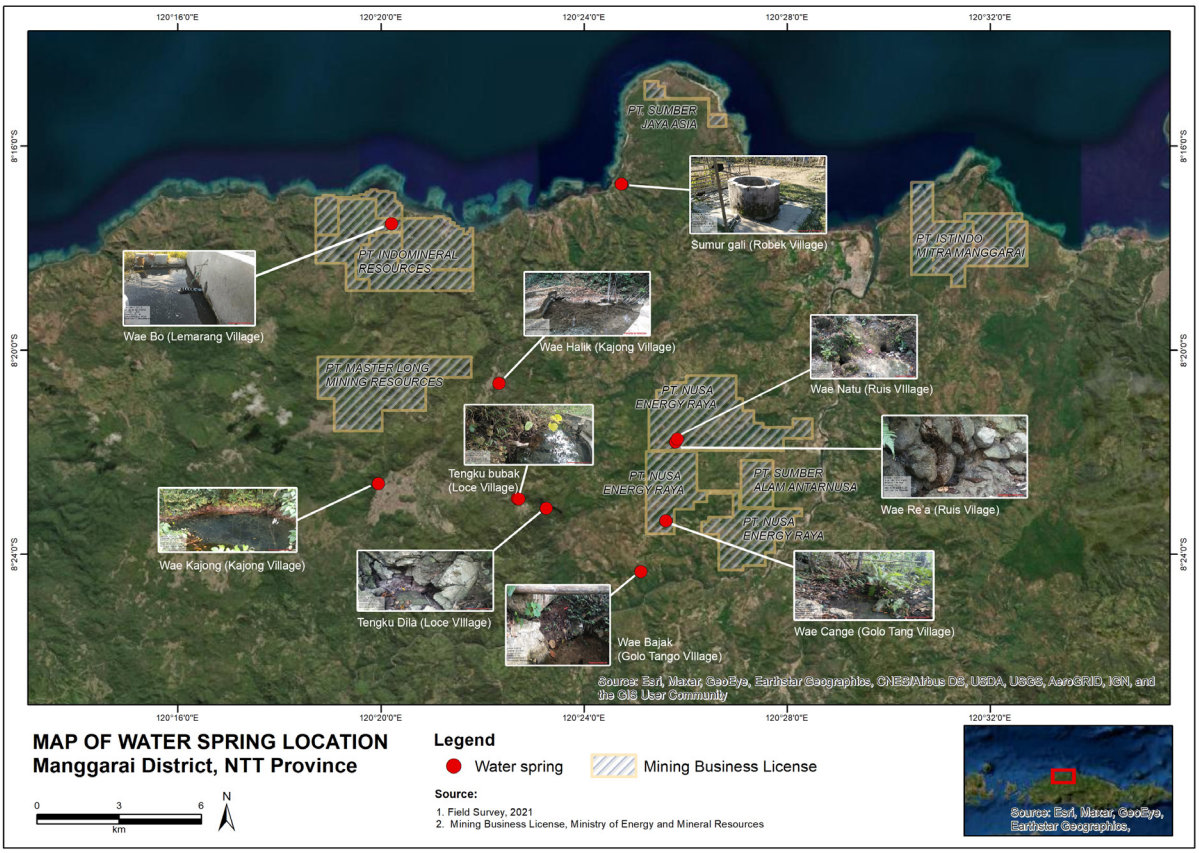
Similar to other strategic uses for indigenous peoples, water spring spots are also identified within the mining permit boundaries. Of 10 identified water springs, three are located precisely within permitted areas (Figure 6). The residents of Ruis outlined that one of these springs has significant meaning for their cultural identity as it is the main location for villagers to organize water-related rituals. In another village of Robek, the residents said that after mining began, well water turned black, smelly and tasted of "strangling inside the neck" when people drank it. The villagers suspected a serious intrusion of pollutants from dynamite explosions from the mining operation nearby. The water became normal when the mining operation was slowing down. In spite of that, the women in particular worried that people would potentially become sick due to water consumption.

In the village of Gincu, there is a water spring named "Wae Bar" that used to produce large volumes of water. It became smaller and smaller when mining started operations. But people keep accessing it regularly as it is the only water source within reach for villagers. They bring large containers to collect water and use it for a couple of days.

Other water sources are quite far from the mining operations. However, some of them are positioned lower than the mining areas. People are afraid the water flow would be at risk of contaminants and other kinds of impacts. Although this information has been conveyed to the government, there is no indication to identify the cause of the problems. Environmental activists from the Franciscan group JPIC (Justice Peace and Integrity of Creation) posted information online to generate awareness and responses to this situation (Dulmin, 2020).

4. ACCELERATING JUST REGIONAL ENERGY TRANSITION

Figure 6. Map of water spring locations and mining permit areas in northern Manggarai

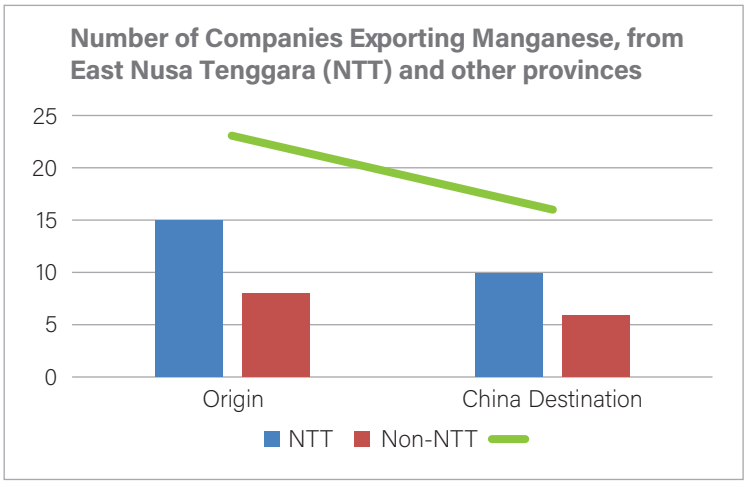


Supply chains

The statistical data from 2011 and 2015 indicated that most of the manganese products from East Nusa Tenggara were exported to China (Figure 7). The main business of these companies is steel and iron manufacturing, although a few have also diversified the products for ferroalloys which include batteries. Some are broker companies that connect the raw materials to other demands. Most of the importing companies put their name on mineral freight that is recorded by the Indonesian government, but only few of them have a public website or digital profile.

However, there is no available data regarding the direction of supply chains (traceability) from East Nusa Tenggara to China regarding the flow of products from mining companies, exporters and importers. The data provides aggregate information by region. It is not clear yet where each of the mines send the ore or other processing products of manganese. Moreover, updated data is not publicly available after 2015.

Figure 7. Number of manganese export companies from East Nusa Tenggara (NTT) compared with other provinces (Non-NTT)



Source: Government Statistic on Coal and Mineral 2015

DISCUSSION

Besides the contradiction to the indigenous peoples' value of space, overlapping areas of mining permits have some legal implications. As illustrated in Table 1, overlaps with a settlement, land for food security, and water springs are categorized as serious illegalities that could be punished. Most of these provisions are maintained by the Job Creation Law of 2020.

In line with illegal definitions, overlapping operations with primary dryland forests could reduce the primary forest area. This is due to the fact that manganese operations are open pit. In contrast, Indonesia has been committed to the Paris Agreement of reducing emissions from forest and land use sources. The existing operations and potential extensions of the permits would implicate this commitment.

Another national commitment is food security and access to clean water which are reflected in national documents regarding the United Nations Sustainable Development Goals (SDGs). One of the targets is that by 2020, governments protect and restore ecosystems related to water resources, including mountains, forests, wetlands, rivers, groundwater, and lakes (Bappenas, n.d.-a). The target is wide enough to include karst areas where most of the mining operates. Far from protecting the source, water access remains the main challenge for East Nusa Tenggara. It is an extra effort for government to achieve the target given the province's natural landscape is dryland. Currently, East Nusa Tenggara's performance index for the SDG of access to water is one of the lowest (second last) compared to other provinces (Bappenas, n.d.-b). It is hard to project how

this province will fulfill this objective when its development trajectory is to welcome large expansions of mining in each island. In fact, pressure for expansion in Flores Island (where Manggarai Regency is located) is not as much as on Timor Island, the other island part of East Nusa Tenggara province. In the last decade, a big portion of mining permits were sold for Timor Island. Market presence stimulated small scale mines to dig up any possible spots rampantly (Fisher et al., 2019). For most of the indigenous peoples, they received nothing besides land and environmental conflict since the miners started mining other people's land without permission (Environment Justice Atlas, 2020; Fisher et al., 2019).

Obviously, crucial impacts would also be called out for the social dimensions of land use. Since the settlement area of Ruis and other villages also overlaps with mining licenses (IUPs), it may be possible for the permit to run operations into the kampong, or village itself. Any implications should be listed in the projections, considering the lack of information regarding the working areas of these operations. Therefore, other places on the list that have cultural significance such as sites for rituals, cemeteries, and social facilities could also be potentially excavated now or tomorrow. The precedent for such an unethical act occurred in several places like East Kalimantan province where mining in cemeteries have been investigated (Koran Kaltim, 2018).

Clearly, a number of indigenous groups call for a stop to mining in the area. It is expected that local residents would express feelings of negativity towards mining. Furthermore, this is also a latent conflict that could at any time explode, as has happened in the history of the Manggaraians. Varied legal definitions are also a sign that some of the legal requirements might not be consistently implemented in mining operations, with the contested areas of spatial allocations already an indication of violations. All of these indications are examples of what may be perceived to define the unsustainability of manganese operations from this area.

However, with regards to the mining operations, mining law is generally different. By the definition of mining law, permit areas are under the control of the permit holder. Therefore, within the area, the permitted company can run the operation for the purpose of permit implementation. *Mining Law 3/2020* Article 36 clearly says that "the permit holder of IUP may carry out part or all of the exploration and production activities of mining." Exploration activities include general investigation, exploration, and feasibility studies, while production activities could include construction, mining, processing and/or refinement or development and/or utilization, as well as transportation and sales.

In terms of the period of operation, the IUP holder is given 20 years duration of operation. It can apply for an extension twice for another 10 years each time. However, there is a change in legal terms that may implicate the procedure of extension. Before 2020, the terms used in the provision of the *Mineral and Coal Mining Law 4/2009* was "can". It means an option,

whether to continue or not, based on certain conditions. Under the current law of 2020, the extension is guaranteed if the miners are in accordance with the regulations. Although an alignment with the regulations could be seen as conditions, in reality those words are merely administrative. It means that the company may only carry out paperwork rather than field verification like it used to. Therefore, some activists raise their objections on this provision (Ekuatorial, 2020).

Following this provision is a punishable act for those who are considered to have disturbed mining activities. Article 162 of the mining law says: "Anyone who hinders or interferes with the activities of the mining business of those who own IUP, IUPK, IPR, or SIPB and has met the legal requirements of Article 136 paragraph (2) shall be subject to a maximum imprisonment of 1 (one) year or a maximum fine of IDR 100,000,000 (one hundred million rupiah)." This provision is threatening for indigenous peoples who feel injustice and seek redress. Simply put, this provision protects the mining operation from any protest, blockade and so on. In fact, the provision has been applied many times to protesters, especially environmental activists (WALHI, n.d.). It is a move called by human rights groups as "criminalization" (Jong, 2018).

At the same time, the lawmakers require all grievances and complaints be addressed through the formal justice system. According to the mining law (Article 145), those who are directly impacted by mining operations are entitled to compensation due to the wrongdoing of the company in implementing mining activities. The compensation procedure is regulated in accordance to the regulations. The same article also says that adjudication procedures are provided to claim for the loss for the illegal operation of the company.

Despite possibilities to use the justice system, these provisions undermine the fact that most of the mining cases for community justice have failed in the court. Therefore, while the procedure is sometimes exercised to seek justice, environmental lawyers do not expect to win (Jong, 2021). Moreover, what is defined as environmental cases in the court are mainly forestry-related cases which is unfavorable for indigenous peoples (Syarifah et al., 2020). Many so-called "criminals" in these cases are the indigenous peoples who are considered as illegal occupants of forest areas (Wijaya, 2016). This is one of the concerns that the Alliance of Indigenous Peoples of the Archipelago (AMAN) raised in 2017 to the universal periodic review mechanism regarding Indonesia's five-year performance on human rights (UPR Info, 2017).

The need for good practice for mining is actually recognized by the government. It is literally stated in the *Ministerial Decision of the Ministry of Energy and Mineral Resources No. 1827 K/30/MEM/2018* about the guidance for good mining practice. It is suggested for miners to apply good mining techniques including the analysis of river capacity, hydrology,

hydrogeology, geological structure, and lithology that would be potentially affected by mining operations. It also refers to some other standards to apply in the case where national laws are not as fully developed. For instance, the earthquake coefficient is referred to in SNI (Indonesia's National Standard) 1726:2012 and cyanide application uses the International Cyanide Management Code.

However, the mining ministry has no further elaboration on how the social dimensions of mining should be addressed. Under the current pressure of a post-pandemic economic recovery, it seems that government will continue to park social questions behind economic priorities. This objective is boosted by the current omnibus law or *Job Creation Law 11/2020* (JCL). A couple of regulatory leniencies are provided by this law to pave the way for investment. The most controversial one is the repeal of environmental permits.

Before this law, an investment required an environmental impact assessment (EIA) as an environmental permit prior to having a clearance permit to operate. Without it, a business had no legal right to run the activities. Under the JCL, a company only needs to apply for a business permit to go. Although the EIA is still necessary, its status is downgraded to a study that will be integrated into a business permit. The impact is obvious, that the environmental impact projections cannot immediately prevent a business from getting a business permit to operate. The worst scenario is that the environmental assessment can be ignored to welcome the company to invest. A number of NGOs have strongly opposed the scenario of the JCL as it is projected to be highly risky for the environment (Jong, 2020).

One of the priorities of JCL is to support the implementation of energy projects that were postponed mainly due to overlapping with conservation areas (Richter, 2011). In fact, JCL was designed to accelerate the renewable energy projects (Guild, 2020), including domestic nickel mining (PwC, 2020). Therefore, it is inevitable that although most of the implementing framework is not yet available, JCL is already an impetus for speeding up renewable energy projects on the ground. As a result, mass protests from communities is underway, including in West Manggarai Regency where a project for geothermal energy is being cleared to operate (Dagur, 2021).

Given this trend, mining for raw materials for renewable energy should be globally discussed to define criteria about the traceability of the source. It includes the involvement of market players to develop the parameters of social, environmental, and economic sustainability.

REFERENCES

Andrews, T., Elizalde, B., Le Billon, P., Oh, C. H., Reyes, D., & Thomson, I. (2017). *The rise in conflict associated with mining operations: What lies beneath*. Canadian International Resources and Development Institute (CIRDI). https://cirdi.ca/wp-content/uploads/2017/06/Conflict-Full-Layout-060817.pdf

Australian Government. (2018, March). *Charter: National Water Quality Management Strategy*. Department of Agriculture and Water Resources. https://www.waterquality.gov.au/about/charter

Badan Pusat Statistik – Provinsi Nusa Tenggara Timur [Statistics Indonesia – East Nusa Tenggara Province]. (2019). *Profil Sektor Pertanian Provinsi Nusa Tenggara Timur 2019*, [*Profile of Agriculture Sector of East Nusa Tenggara Province 2019*]. https://ntt.bps.go.id/publication/2020/09/30/c38cf903120952149320de94/profil-sektor-pertanian-provinsi-nusa-tenggara-timur-2019.html

Bappenas [Ministry of National Development Planning]. (n.d.-a). *SDGS Tujuan 6* [*SDGS Goal 6*]. Retrieved October 6, 2021. http://sdgs.bappenas.go.id/tujuan-6/

Bappenas [Ministry of National Development Planning]. (n.d.-b). *SDGS dashboard*. Retrieved October 6, 2021. http://sdgs.bappenas.go.id/dashboard/#!/layouts/layout3.html

Bark, R. H., Barber, M., Jackson, S., Maclean, K., Pollino, C., & Moggridge, B. (2015). Operationalising the ecosystem services approach in water planning: A case study of indigenous cultural values from the Murray–Darling Basin, Australia. *International Journal of Biodiversity Science, Ecosystem Services & Management 11*(3), 239–249, https://doi.org/10.1080/21513732.2014.983549

Barron, P., & Sharpe, J. (2005). Counting conflicts using newspaper reports to understand violence in Indonesia. *Social Development Papers, Conflict Prevention and Reconstruction*, World Bank Working Paper Series No. 25. https://documents1.worldbank.org/curated/en/573271468042564373/pdf/WP250Web.pdf

Barron, P., Diprose, R., & Woolcock, M. Local conflict and development projects in Indonesia: Part of the problem or part of a solution? World Bank Working Paper Series No 4212. https://documents1.worldbank.org/curated/en/491351468285607493/pdf/wps4212.pdf

Boelens, R., Getches, D., & Guevara Gil, A. (2010). Water struggles and the politics of identity. In R. Boelens, D. Getches, & A. Guevara Gil (Eds.), *Out of the Mainstream. Water Rights, Politics and Identity* (pp.3–26). Earthscan.

Brundtland, Gro Harlem. (1987). *Report of the World Commission on environment and development: "Our common future"*. United Nations. https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf

Badan Registrasi Wilayah Adat [Ancestral Domain Registration Agency]. (n.d,-a). *Wilayah Adat Gelarang Colol*, [*Ancestral Territory of Gelarang Colol*]. Retrieved October 4, 2021. https://brwa.or.id/wa/view/eU9zVzhZXzM4Mmc

Badan Registrasi Wilayah Adat. [Ancestral Domain Registration Agency]. (n.d,-b). *Wilayah Adat Wongko Kigit*, [*Ancestral Territory of Wongko Kigit*]. Retrieved October 4, 2021. https://www.brwa.or.id/wa/view/MmRjLUdMb0dLNzQ

Dagur, Ryan. (2021, June 21). Indonesian bishop in hot water over geothermal plant row. *UCA News*. https://www.ucanews.com/news/indonesian-bishop-in-hot-water-over-geothermal-plant-row/92938

Dlamini, W. W., Nelson, G., Nielsen, S. S., & Racette, B. A. (2020). Manganese exposure, parkinsonian signs, and quality of life in South African mine workers. *American Journal of Industrial Medicine*, *63*(1), 36–43. https://pubmed.ncbi.nlm.nih.gov/31647574/

Downing, J. H. (2013). Manganese processing. In *Encyclopedia Britannica*. https://www.britannica.com/technology/manganese-processing

Dulmin, V. (2020, August 16). Perempuan di Balik Tambang [English translation]. https://jpicofmindonesia.org/2020/08/perempuan-di-balik-tambang-berjuang-demi-kehidupan/

Ekuatorial. (2020). Understanding how the revised mining law favors mining giant. Retrieved June 17, 2020. https://www.ekuatorial.com/en/2020/06/understanding-how-the-revised-mining-law-favors-mining-giants/

Elizalde, B., & Córdova, H. (2017). Field Case Study 4: Minera San Cristobal Bolivia. *Canadian International Resources and Development Institute.* https://cirdi.ca/wp-content/uploads/2017/06/Case-Study-4-Minera-San-Cristobal-Bolivia-060517.pdf

Ellabban, O., Haitham, A. R., & Blaabjerg, F. (2014). Renewable energy resources: Current status, future prospects and their enabling technology. *Renewable and sustainable energy reviews*, 39,748–764.

Environmental Justice Atlas. (2019). Karonsi'e Dongi People and Vale Mine in Sorowako Sulawesi Indonesia. Last modified March 20, 2019. https://ejatlas.org/conflict/karonsie-dongi-people-and-vale-mine-in-sorowako-sulawesi-indonesia

Environmental Justice Atlas. (2020). Illegal manganese mining in North Central Timor Indonesia. Last modified April 28, 2020. https://ejatlas.org/conflict/illegal-manganese-mining-in-north-central-timor-indonesia

Erb, M. & Yosep, J. (2007). For the people or for the trees? A case study of violence and conservation in Ruteng Nature Recreation Park. In N. S. Sodhi, G. Acciaioli, M. Erb & A. Khee-Jin Tan (Eds), *Biodiversity and human livelihoods in protected areas: Case studies from the Malay Archipelago*, 222–240. Cambridge University Press.

https://doi.org/10.1017/CBO9780511542169.016

Erb, M. (2016). Mining and the conflict over values in Nusa Tenggara Timur province, eastern Indonesia. *The Extractive Industries and Society, 3*(2), 370–382, https://doi.org/10.1016/j.exis.2016.03.003

Food and Agriculture Organization of the United Nations. (n.d.) Social Safeguards. *Investment Learning Platform*. Retrieved October 2, 2021.

https://www.fao.org/investment-learning-platform/themes-and-tasks/environmental-social-safeguards/social-safeguards/en/

Fisher, R., Ling, H., Natonis, R., Hobgen, S., Kaho, N. R., Mudita, W., Markus, J., Bunga, W., & Nampa, W. (2019). Artisanal and small-scale mining and rural livelihood diversification: The case of manganese extraction in West Timor, Indonesia. *The Extractive Industries and Society*, *6*(1), 229–240, https://doi.org/10.1016/j.exis.2018.08.004

Frederiksen, T. (2019). Political settlements, the mining industry and corporate social responsibility in developing countries. *The Extractive Industries and Society, 6*(1), 162–170, https://doi.org/10.1016/j.exis.2018.07.007

Gielen, D., Boshell, F., Saygin, D., Bazilian, M. D., Wagner, N. & Gorini, R. (2019). The role of renewable energy in the global energy transformation. *Energy Strategy Reviews*, *24*, 38–50, https://doi.org/10.1016/j.esr.2019.01.006

Ghaliya, G. (2020, October 9). Problems in jobs law not only about labor sector: What we know so far. *The Jakarta Post*. https://www.thejakartapost.com/news/2020/10/09/problems-in-jobs-law-not-only-about-labor-sector-what-we-know-so-far.html

Guild, J. (2020, October 26). Jokowi's 35000 megawatt dream. *Inside Indonesia*. https://www.insideindonesia.org/jokowi-s-35000-megawatt-dream

Gulf Manganese. (2017, August 2). *Equity research*. https://www.gulfmanganese.com/wp-content/uploads/2017/08/OPENING-THE-GATEWAY-KUPANG-SMELTER-COMPLEX.pdf

Gulf Manganese. (2019, July 4). *Gulf strengthens high-grade manganese ore supply chain* [Press release]. https://www.gulfmanganese.com/wp-content/uploads/2019/07/20190704-Gulf-Strengthens-Ore-Supply-Chain.pdf

Gulf Manganese. (2021). *Kupang Smelting Hub Overview*. Retrieved October 5, 2021. https://www.gulfmanganese.com/portfolios/portfolio-1/

Herr, P., Kerzig, C., Larsen, C. B., Häussinger, D. & Wenger, O. S. (2021). Manganese (I) complexes with metal-to-ligand charge transfer luminescence and photoreactivity." *Nature Chemistry*, *13*, 956–962. https://doi.org/10.1038/s41557-021-00744-9

International Energy Agency. (2021) The role of critical minerals in clean energy transitions. *World Energy Outlook Special Report*. https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions

Iswandono, E., Zuhud, E. A. M., Hikmat, A., & Kosmaryandi, N. (2016). Traditional land practice and forest conservation: Case study of the Manggarai tribe in Ruteng Mountains, Indonesia. *Komunitas: International Journal of Indonesian Society and Culture*, 8(2), 256–266. https://dx.doi.org/10.15294/komunitas.v8i2.4945

Jackson, S. (2006). Compartmentalising culture: the articulation and consideration of Indigenous values in water resource management. *Australian Geographer*, *37*(1), 19–31, https://doi.org/10.1080/00049180500511947

JATAM. (2021, March 25). Why a big mining project could wipe out rural villages in Indonesia. *Press Room News*. https://www.jatam.org/en/why-a-big-mining-project-could-wipe-out-rural-villages-in-indonesia/

Jong, H. N., (2018, January 26). Indonesian ruling rings alarms over criminalization of environmental defenders. *Mongabay*. https://news.mongabay.com/2018/01/indonesian-ruling-rings-alarms-over-criminalization-of-environmental-defenders/

Jong, H. N. (2020, November 4). Indonesia's omnibus law a 'major problem' for environmental protection. *Mongabay*. https://news.mongabay.com/2020/11/indonesia-omnibus-law-global-investor-letter/

Jong, H.N. (2021, July 7). Activists take Indonesia's mining law to court, but don't expect much. *Mongabay*. https://news.mongabay.com/2021/07/indonesia-mining-law-judicial-review-constitutional-court/

Kementerian Energi dan Sumber Daya Mineral [Ministry of Energy and Natural Resources]. (n.d.). Energy and Mineral Overview. Retrieved October 6, 2021. eshttps://geoportal.esdm.go.id/emo/

Kementerian Energi dan Sumber Daya Mineral [Ministry of Energy and Natural Resources]. (2013). Kajian Supply Demand Mineral. Pusat Data dan Teknologi Informasi Energi dan Sumber Daya Mineral Kementerian Energi dan Sumber Daya Mineral. https://www.esdm.go.id/assets/media/content/Supply_demand_mineral_2013.pdf

Kementerian Energi dan Sumber Daya Mineral [Ministry of Energy and Natural Resources]. (2019). Indonesian Minerals Yearbook 2018. *Badan Geologi*. https://geologi.esdm.go.id/en/media-center/news-archives/indonesian-minerals-yearbook-2018

Kementerian Lingkungan Hidup dan Kehutanan [Ministry of Environment and Forestry]. (n.d.). Simontana. Retrieved October 7, 2021. https://nfms.menlhk.go.id/peta

Khayam, K. K. A. (2012, June 20). PT Putra Indonesia Jaya akan Buka Pabrik Mangan di TTU [PT Putra Jaya will open the manganese factory in North Central Timor]. *Kompas.com*. https://regional.kompas.com/read/2012/06/20/08330997/~Regional~Indonesia%20Timur

Komnas HAM. (2016). Ringkasan Eksekutif Pelestarian Ekosistem Karst dan Perlindungan Hak Asasi Manusia, [Executive summary of karst ecosystem preservation and the human rights protection]. https://www.komnasham.go.id/files/21841exesum-tim-tarst-$HAY7.pdf

Koran Kaltim. (2018, February 27). Kawasan Kuburan Dijadikan Tambang, Oknum Polisi Ditetapkan Jadi Tersangka, [Cemetery area turned into mining, police officers named as suspect]. *Korankaltim.com*. https://korankaltim.com/headline/read/14093/kawasan-kuburan-dijadikan-tambang-oknum-polisi-ditetapkan-jadi-tersangka

Lad, J. (2013). Preservation of the Mbaru Niang Wae Rebo Village, Flores Island, Indonesia. *2013 On Site Review Report*. https://s3.useast1.amazonaws.com/media.archnet.org/system/publications/contents/9538/original/DTP102021.pdf?1397037668

Laurence, D. (2011). Establishing a sustainable mining operation: an overview. *Journal of Cleaner Production*, *19*(2–3), 278–284.

Leotaud, V., L. (2021, May 2). Manganese, nickel, silicon are main focus of battery research. https://www.mining.com/manganese-nickel-silicon-main-focus-of-battery-research/

Lumbanrau, R. E. (2021, June 7). Dimana Ada Tambang Disitu ada Penderitaan dan Kerusakan Lingkungan, Nelangsa Warga dan Alam di Lingkar Tambang, [Where there

is mine, there is suffering and environmental damage, the suffering of the people and the environment around mining area]. *BBC News Indonesia*. https://www.bbc.com/indonesia/indonesia-57346840

Makur, A. P., I. Sutam, B. Gunur,. & B. Rampung. (2019) . Lingko: Interweaving Manggarai culture, and mathematics." *Journal of Physics: Conference Series*, *1315*(1), 012006. https://iopscience.iop.org/article/10.1088/1742-6596/1315/1/012006

Makur, M. (2021, August 18). Ritual Barong Wae di Manggarai, Harmonisasi dengan Sang Pencipta, Alam, Leluhur, dan Roh Penjaga Mata Air [Barong Wae ritual in Manggarai, harmonization with the creator, nature, ancestors, and the guardian spirit of the spring]. *Kompas.com*. https://regional.kompas.com/read/2021/08/18/145009878/ritual-barong-wae-di-manggarai-harmonisasi-dengan-sang-pencipta-alam?page=all.

Mathew, V., Sambandam, B., Kim, S., Kim, S., Park, S., Lee, S., Alfaruqi, M.H., Soundharrajan, V., Islam, S., Yunianto Putro, D., Hwang, J-Y., Sun, Y-K., & Kim, J. (2020). Manganese and vanadium oxide cathodes for aqueous rechargeable zinc-ion batteries: A focused view on performance, mechanism, and developments. *ACS Energy Letters*, *5*(7), 2376–2400. https://doi.org/10.1021/acsenergylett.0c00740

Moriarty, P., & Honnery, D. (2016). Can renewable energy power the future? *Energy Policy*, *93*, 3–7. https://doi.org/10.1016/j.enpol.2016.02.051

Morse, Ian. (2019, October 22). Indonesian villagers fighting planned mine garner national support. *Mongabay*. https://news.mongabay.com/2019/10/indonesian-villagers-fighting-planned-mine-garner-national-support/

Mulyani, A., Priyono, A., & Agus, F. (2013). Semiarid soils of Eastern Indonesia: soil classification and land uses. In S. A. Shahid, F. K. Taha, & M. A. Abdelfattah (Eds.), *Developments in Soil Classification, Land Use Planning and Policy Implications* (pp. 449–466). Springer. https://link.springer.com/chapter/10.1007%2F978-94-007-5332-7_24

NoteCam. NoteCam Guide. Retrieved June 26, 2021. https://notecam.derekr.com/download/Introduction_EN_20180223.pdf

Palisade Research. (2017, March 24). Manganese – the third electric vehicle metal no one is talking about. *MINING.COM*. https://www.mining.com/web/manganese-the-third-electric-vehicle-metal-no-one-is-talking-about-it-heres-how-to-take-advantage/

PricewaterhouseCoopers. (2020, October). Energy, utilities and resources newsflash. *Newsflash No 69*. https://www.pwc.com/id/en/energy-utilities-mining-newsflash/assets/2020/eur-newsflash-2020-69.pdf

Pyakurel, P., (2019, January 11). Lithium is finite – but clean technology relies on such non-renewable resources. *The Conversation*. https://theconversation.com/lithium-is-finite-but-clean-technology-relies-on-such-non-renewable-resources-109630

Rankin, P. C., & Childs, C. W. (1976). Rare-earth elements in iron-manganese concretions from some New Zealand soils. *Chemical geology*. *18*(1), 55–64. https://doi.org/10.1016/0009-2541(76)90061-9

Regus, M. (2011). Tambang dan Perlawanan Rakyat: Studi Kasus Tambang di Manggarai, NTT. [Mining and People's Resistance: A Case Study of Mining in Manggarai, NTT.]

MASYARAKAT: Jurnal Sosiologi, *16*(1), 1–26. http://journal.ui.ac.id/index.php/mjs/article/view/4879

Richter, Alexander. (2011, April 5). Indonesia gurantees geothermal development project not to devastate protected forests. *Think Geo Energy*. https://www.thinkgeoenergy.com/indonesia-guarantees-geothermal-development-not-to-devastate-protected-forests/

Ritchie, H., & Roser, M. (2020). Renewable Energy. *Our World in Data*. Retrieved October 2, 2021. https://ourworldindata.org/renewable-energy

Rochmyaningsih, D. (2020, August 26). Rare plants that 'bleed' nickel. *BBC Future Planet*. https://www.bbc.com/future/article/20200825-indonesia-the-plants-that-mine-poisonous-metals

Sen, A. (2013). The ends and means of sustainability. *Journal of Human Development and Capabilities*, *14*(1), 6–20. https://doi.org/10.1080/19452829.2012.747492

Supriadi, A., Sunarti, Kencono, A. W., Kurniasih, T. N., Prasetyo, B. E., Kurniawan, F., Kurniadi, C. B., Alwendra, Y., Aprilia, R., Rabbani, Q., Setiadi, I., & Anggreani, D. (2017). Kajian Dampak Hilirisasi Mineral Mangan Terhadap Perekonomian Regional [Impact study of the downstream processing of manganese mineral on regional economy]. *Pusat Data dan Teknologi Informasi Energi dan Sumber Daya Mineral Kementerian Energi dan Sumber Daya Mineral [Ministry of Energy and Mineral Resources]*. https://www.esdm.go.id/assets/media/content/content-kajian-hilirisasi-mineral-mangan-2017.pdf

Syarifah, N., Arsil., Jebabun, A., Sati, N. I., Yosefin, M. & Kurniawan, A. T. (2020). Assessment report on court decisions on environmental cases. *Lembaga Kajian dan Advokasi Independensi Peradilan (LeIP), [Indonesian Institute for Independent Judiciary]*. Jakarta. https://leip.or.id/wp-content/uploads/2021/01/Buku-ASSESSMENT-REPORTON-COURT-DECISIONSON-ENVIRONMENTAL-CASES_ISBN.pdf

Ulloa, A. (2020). The rights of the Wayúu people and water in the context of mining in La Guajira, Colombia: Demands of relational water justice. *Human Geography*, *13*(1), 6–15. https://doi.org/10.1177/1942778620910894

United Nations (2015a). *Paris Agreement*. https://www.un.org/en/climatechange/paris-agreement

United Nations (2015b). *Transforming our world: the 2030 Agenda for Sustainable Development*. https://sdgs.un.org/2030agenda

United Nations. (n.d.). Culture. *UN Department of Economic and Social Affairs – Indigenous Peoples*. Retrieved October 3, 2021. https://www.un.org/development/desa/indigenouspeoples/mandated-areas1/culture.html

United Nations. (2010). Harmony with nature. *Report of the Secretary-General*, General Assembly Sixty-Fifth Session Item 20 (i) the Provisional Agenda, Sustainable Development: Harmony with Nature, August 18, 2010. https://www.un.org/esa/dsd/resources/res_pdfs/res_ga65_unedited/SGReportHarmonywithNature.FinalVersionSingleSpace.pdf

University Periodic Review Info. (2017). Indonesia review on 3 May 2017. *NGO Submissions by Aliansi Masyarakat Adat Nusantara*.

https://www.upr-info.org/sites/default/files/document/indonesia/session_27_-_may_2017/aman_upr27_idn_e_main.pdf

Wahana Lingkungan Hidup Indonesia [Indonesian Forum for the Environment]. (n.d.). Tumpang Pitu Menuntut Keadilan [Overlapping demand for justice]. Retrieved October 6, 2021. https://www.walhi.or.id/tumpang-pitu-menuntut-keadilan

Wijaya, C. A. (2016, January 27). Criminalization, discrimination against indigenous people worsening: AMAN. *The Jakarta Post*.

https://www.thejakartapost.com/news/2016/01/27/criminalization-discrimination-against-indigenous-people-worsening-aman.html

Yang, X. J., Hu, H., Tan, T., & Li, J. (2016). China's renewable energy goals by 2050. *Environmental Development*. 20, 83–90. https://doi.org/10.1016/j.envdev.2016.10.001

Zarasvandi, A., Rezaei, M., Sadeghi, M., Pourkaseb, H., & Sepahvand. M. (2016). Rare-earth element distribution and genesis of manganese ores associated with Tethyan ophiolites, Iran: A review. *Mineralogical Magazine*, *80*(1), 127–142. https://doi.org/10.1180/minmag.2016.080.054

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SUSTAINABLE ENERGY FROM AN UNSUSTAINABLE SOURCE: THE NEED FOR SAFEGUARDS IN MANGANESE EXTRACTION FOR RENEWABLE ENERGY IN INDONESIA

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