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REVIEW ARTICLE

# Manganese for Whom? A Review on Manganese Mining Permits towards the Existence of Springs' Sacred Forest in Manggarai Flores

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**ABSTRACT**

Amid global efforts to find minerals for renewable energy, social-environmental concerns related to mineral extraction are still ongoing. Various agreements at the global level are calling for the renewable energies market to uphold principles of sustainability throughout the entire supply chain, including raw materials extraction, to protect the integrity and objectives of the industry. Importantly, such action must extend beyond the narrow parameters of environmental management to inclusively consider impacts on community wellbeing as well. This article evaluates concerns around land and spring conversion in manganese mining operations in Manggarai, Flores, East Nusa Tenggara Province, NTT. The study is critical to designing a bridging model of water institutional development at the district level that would help realize the water rights of the villagers toward actual action. The analysis of how water institutions function in villages is an area of study that has not been widely examined in Indonesia, even though water issues are increasingly prominent in many regions. This article seeks to analyze functioning water institutions using institutional critical analysis. We apply spatial analysis to mining operation areas to identify land use contestations between mines and the springs as well as settlements. The analysis integrates in-depth interviews with the officials from three key government institutions related to land uses and the springs. Both the spatial analysis and qualitative data are then analyzed alongside the legal framework of land use and spring used to distill the institutional barriers leading to the issuance of permits in such contexts. The analysis then briefly traces the current political economy of mining's permits underlying the institutional interactions to better understand why the institutions behave as they do. Ultimately, the study finds that mining operations occur in spaces with common resources of sacred springs and settlements. Even though the overlapping was deemed illegal by state law, causes such as poor institutional authority over spring governance, economic rather than social-based motivations for reviewing permits, and election incentives drive institutional behavior, not simply law. In light of this, the study concludes that springs-related institutions at the district level are at a crossroads regarding whether to protect the springs due to the changes in several laws, including regional government law in 2014. However, the expectation of economic growth, local politics, and global demand for manganese remains a significant underlying influence of allocating permits to manganese mines.

**KEYWORDS**

Sustainability; Common pool resources; Institution; Arena; Critical Analysis; Critical mineral.

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## 1. INTRODUCTION

Manufacturers have long used manganese as an irreplaceable alloy for steel (Jacob et al., 2020; Sun et al., 2020). Its substantial contribution to steel manufacturing and other uses makes it rank 4th among the most used metals on earth (Tangstad, 2013). Moreover, recent research (Mathew et al., 2020) suggests that manganese could play a central role in solving current renewable energy challenges. As Leotaud (2021)

indicated, manganese has recently been competing with nickel in terms of top research regarding innovative renewable energy technology breakthroughs due to manganese's ability to provide more acceleration in electric vehicles. In addition, manganese also carries other rare earth elements that are needed across the entire spectrum of renewable energy technologies (Rankin & Childs, 1976; Zarasvandi et al., 2018).

Today, pushed by several global demands and consensus, renewable energy is the world's top strategy for addressing the depletion of fossil-based energy and the need to reduce greenhouse gas (GHG) emissions (Moriarty & Honnery, 2016). However, despite being central to the global priority, the race to mine critical minerals for use in renewable technologies is laden with socio-environmental risks. A recent report on manganese mining operations in South Africa (Gonzalez & Wilde-Ramsing, 2021; González & de Haan, 2020) raised an alarming concern about the sustainability of manganese mining. Triggered by market demand, including from the renewable energy sector, miners in the country operated with poor standards that led to human rights abuses and environmental damages (Downing, 2013; Dlamini et al., 2020). Similarly, Indonesia's expansion to mine raw materials for renewable energy is also alarming due to the lack of transparency (Kurniawan et al. 2010) and reports of human rights abuses throughout the supply chain (BHRRC, 2023). Therefore, the socio-ecological prerequisite in providing renewable energy materials should be an equally important component of sustainability measures. Sen (2013) wrote that sustainability is a correlated means and end, where aiming for intergenerational justice should be reflected in the process of progressing human freedom. Against this backdrop, one of the requirements for sustainability should be respecting the rights of indigenous communities, including rights to land, natural resources, culture, and spiritual life.

This article diagnoses the operation of manganese mines via a case study in Manggarai District, Flores, East Nusa Tenggara Province. The case study analyzes the rights of the villagers to protect the nearby springs' ecosystem, which is a critical common resource for the area, given the fact that the area is mainly dry. Villagers mainly source drinking water from the springs. For generations, the indigenous communities in the area have adapted themselves to fit the rainless climate, including selecting crops that could be sustained with a limited water supply. Some farmlands that consume more water have relied on the availability of groundwater, including from the springs. Therefore, the protection of the springs is central to the protection of livelihoods in the area.

The arrival of mining in the area has inevitably been a huge concern for many environmentalist groups as well as village leaders (Jebadu et al., 2009). Since 2010, community members, catholic church organizations, and environmental activists have rejected the presence of manganese mining, which included causing a temporary suspension for the permit holder to operate (Arti, 2020; Regus, 2019; Jebadu et al., 2009). However, mining companies persisted in legally obtaining permits from the district government that allow the companies to operate for up to 15 years and are valid until 2032 (Steni et al., 2023). New narratives of battery technology and the like within the national agenda (Reyseliani et al., 2021) are a potential push to escalate the support for renewable energy.

Using a critical policy approach, this article aims to analyze whether the demand for manganese is consistent with spring conservation as required by formal-legal institutions as well as traditional norms and whether such institutions effectively protect springs according to their mandate. The approach analyzes the actual functions of working institutions for springs and land use based on their critical performance, including leadership, capacity, and legitimacy. Indeed, rather than being linear and harmonious interactions, as mainstream analysis considers, the actual performance of

the institutions is often contested (Hall et al., 2014).

The application of critical analysis is particularly important for this analysis, given the fact that the approach has never been used in analyzing spring institutions in the area. Previous well-known studies, including that of Regus (2015; 2019) and Erb (2016; 2021), mainly analyzed the actors with an anthropological point of view of mining that take institutions as a *socio-geology* setting, which is to approach mining as an interplayed arena of biophysical, socio-legal, political interaction, as well as cultural existence. Socio-geology is a concept that Erb and other authors resonate with from Jebrak (2017) to suggest that planners comprehend mining policies in a multi-disciplinary approach to prevent discord and backlash outcomes. In another study on ethnic identity and tourism, Erb (2016) elaborated on the dynamic tension between actors, especially local elites, towards the concept of tourism that may change the traditional way of rituals as well as the culture. Erb also addressed the challenges that local government faced from top-down-driven laws and policies about decentralization.

This article strengthens the position Erb took that social-legal institutions play a significant role in understanding how laws and policies are being institutionalized and carried forward in practice. As Ostrom (1990) elaborated, understanding the actual functions of institutions, in turn, points to a range of answers for governing common pool resources beyond the offers from the market and state. However, in those studies, Erb did not analyze the *rule set,* including authorized agencies, the functions they played, and their legitimacy based on actual actions. While most of these settings were driven by national regulations of decentralization, as Erb suggested, they were also driven by the local actors' attitudes towards the concept. In the tourism concept, the locals took it as what they called an *opportunity.* They used it to indirectly oppose mining by igniting the other regulation of land use for tourism. This paper aims to critically investigate how local institutions react to rules to strengthen pros or contra to mining while weakening or ignoring others. While political actor analysis and anthropological perspective are vital to understanding the socio-political context in the study area, rules-driven institutional analysis is particularly missing from the current literature. Ultimately, the article suggests some institutional development pathways from a context-driven policy perspective and emphasizes the urgency in addressing environmental issues and social issues faced by critical mineral exploitation not only in the research area but also in other remote islands, for instance, in Sulawesi and Maluku Indonesia.

Within this article, the conceptual framework centers around the Critical Institutional Analysis Development (CIAD) (Figure 1, adapted from the framework developed by Hall et al. (2014), Van Laerhoven & Barnes (2014), Cleaver & de Koning (2015), and Whaley (2018). The CIAD is a development of Ostrom's institutional analysis development (IAD) framework (Ostrom, 1990; 2005) towards the *Common Pool Resources* (CPR). The framework suggests three layers of the institutions for analysis: *external variables*, the *arena*, and *outcomes*. This article adaptively uses those three main concepts and definitions in the following application, depicted below in Figure 1.

The first is the *arena*, which is an overarching concept described as the point where agents as well as communities observe information, interact, take actions, and project the outcome of their interactions towards the CPR (McGinnis, 2011). These actual actions - which in this research are the interactions between the springs and other land uses - imply a set of working rules that dictate the outcome. In this case, the outcome would impact the sustainability of resources (Ostrom, 2005; 2011). The working rules are sets of directions that guide actors to take certain actions, including making policy choices regarding the CPR. The paper selects district-level institutions as the *arena*

where organizations arrange and decide policy and programs for the springs, given the context of decentralized governance in Indonesia.

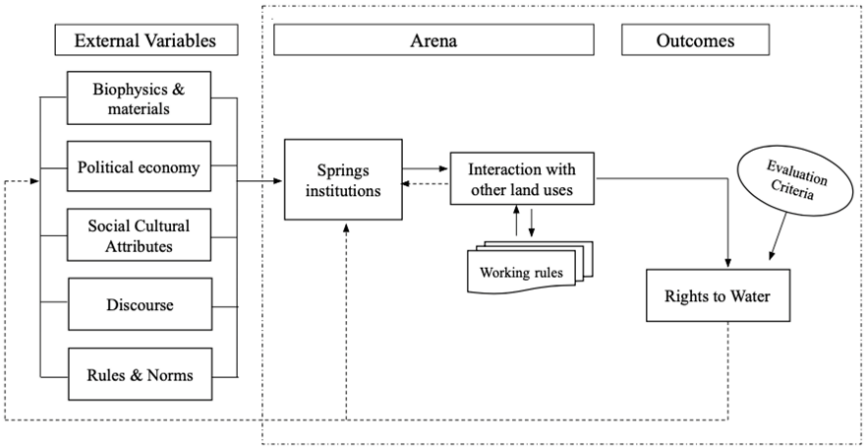


**Figure 1.** Critical Institutional Analysis Development, adapted from Hall et al. (2014), Van Laerhoven & Barnes (2014); Cleaver & de Koning (2015), and Whaley (2018)

Part of understanding the *arena* involves incorporating a set of parameters for evaluating the working rules applied in the *arena* and the implication of such rules for resource sustainability. At this point, the paper applies the concept of *functioning attributes* from the critical institutional analysis proposed by Whaley & Cleaver (2017) to evaluate the interactions within the *arena*. Of 8 functioning attributes, three are applied in this research: authoritative leadership, capacity, and legitimacy. These selected attributes are the key to understanding the arena of regulations and policies that the bureaucrats uphold the most. Several studies (Gaus et al., 2017; Turner et al., 2019) pointed out that these three attributes are the portrait of the existing pendulum of bureaucratic reform in Indonesia, which is a combined model between the old-fashioned patronage system and the new model that absorbs New Public Management (NPM) and New Public Service (NPS). We recognize the patronage model in this study through the attribute of leadership as rule-driven order and command ability of a leader. Capacity and legitimacy are the elements of NPM and NPS in a way that the officials should have a set of skills to drive programs, activities, and innovation in action. Legitimacy is related to the trust that an institution is built on responsiveness, interaction, and collaboration, as theorized by NPS (Turner et al., 2019).

The limitation to three attributes implies narrowing the span of research and analysis regarding institutional design. First, the description would not trace to the cultural setting of bureaucracy that many public policy analyses would emphasize. Second, it would exclude the economic parameters such as the efficiency and effectiveness of the institutions as modeled by NPM's bureaucratic reform.

Table 1 is the illustration of the three applied attributes in this research. Cleaver and Whaley propose this framework after analyzing the reality of water point management interactions in sub-Saharan Africa. They propose these attributes as a method for critically reviewing the institutional stability of community-based management given assigned role and external influencing factors, including politics and policies. Based on their research in three sub-Saharan countries (Ethiopia, Malawi, and Uganda), the investigation revealed that effective water point management in daily life was not about normative design but how things were done in everyday life (Whaley et al., 2021; Whaley & Cleaver, 2017). Similarly, this research article also aims to reveal

the interaction among institutions to have a sense of how springs are considered by policymakers within the context of mining. While the socio-ecological setting of the research is different, the aforementioned attributes are designed to be adaptive in various socio-ecological contexts of resource management, including this research.

**Table 1**. Functioning institutional attributes

| Institutional Attributes | Description |
|---|---|
| Leadership | Authoritative leadership exists to direct others and take a clear position on issues. |
| Capacity | The institution has the capacity to make and enforce decisions, including on rules-in-use. |
| Legitimacy | The institution is recognized as legitimate by both users and the local governance structure. |

Adapted from Whaley & Cleaver (2017) and Whaley et al. (2021)

In addition to the *arena*, the CIAD model also analyzes *external variables,* which in turn drive the working rules of the institutions. The *variables* include the following: (i) biophysics and materials, (ii) political economy, (iii) social culture attributes, (iv) discourse, and (v) rules and norms (Hall et al., 2014; Van Laerhoven & Barnes, 2014; Cleaver & de Koning, 2015; Whaley 2018). In this article, the *variable* of political economy is highlighted more as it is related closely to the functionality analysis of interacting institutions in the *arena*, as described in the previous paragraph. As Cleaver and Whaley elaborated, the position of an organization is a point where functions are interrelated with politics. Contesting the springs and mining is not only about laws and policies but also as indicated by Warburton (2018), linkages to priority politics. Therefore, permitting is not only a normative task but a politically driven agenda. In this regard, a report from NGOs (Greenpeace et al., 2018), investigative journalists (Gecko Project and Mongabay, 2018), and other studies (Henderson & Kuncoro 2011; Risal et al., 2021; Silitonga et al., 2023) incorporate a permit politics theory that the costly local election led to a permit transaction where an elected politician orchestrated concessions to a supporting business.

Finally, the CIAD model examines *outcomes*, which for this case study centers around rights to water protection. The analysis investigates whether the interaction of institutional attributes led to addressing sustainability concerns around the community's rights to have a sustainable water supply. This paper acknowledges the scope of rights to water as laid down by international norms and national regulations. The United Nations General Assembly specifies the character of such rights through Resolution A/RES/64/292, which emphasizes the physical parameters of rights, such as safety, proximity, and hygienic nature of water. However, this article is more aligned with the concept of community-based natural resources management, or a system where some rights are articulated towards resources held in common that extend beyond physical parameters (Schlager & Ostrom, 1992). In many communities, springs are not only a physical reality but, beyond that, have a cultural meaning that entangles politics, laws, and policies. In Andes, Latin America, Boelens (2005) presented a portrait of water identity encompassing culture and politics. Studies on Balinese Subak (Roth, 2014; Roth & Sedana, 2015) also reveal that the traditional value of water influences the management of a landscape, then implicates the politics and policy of land use. As a result, the source of water, including the spring ecosystem, is protected by local norms (Ross et al., 2016). Some Indigenous concepts, such as that of the Maori, are even defining rivers as a legal subject (O'Donnell & Talbot-Jones, 2018). The tradition of water management has been passed on from generation to generation, such as the Foggara tradition in the Algerian Sahara Desert (Idda et al., 2021) and river

management in Thailand (Sitthisuntikul, 2013). This research applies to this concept of traditional management, that springs are intertwined resources that are inherently embedded with other material and immaterial worlds. It differs structurally from formally driven institutions given the fact that decisions and consensus are generally determined by non-formal rules, mostly unwritten and dependent on oral tradition passed down from previous generations to the next.

Research has also demonstrated that community-based natural resources management consistently proves to maintain resources more sustainably than any other type of management (Dawson et al., 2021; Robinson et al., 2021). The community's ability to manage resources was demonstrated in a study of the application of Ostrom's design principles conducted by Cox et al. (2010) and Baggio et al. (2016), who analyzed 91 and 69 cases, respectively. These two studies found that most communities were successful in implementing stable and effective institutional design principles, although some principles still needed to be readjusted to address some institutional challenges.

## 2. RESEARCH LOCATION

The research area is located in Manggarai District, East Nusa Tenggara Province (NTT), Indonesia, specifically in the northern part of Manggarai in subdistrict Reok and West Reok (Figure 2). The area has an average rainfall of less than 1500 mm per year (Mulyani et al., 2013), which is similar to the other semi-arid tropics such as Sub-Saharan Africa and much of Southern and Eastern Africa (Vandenbeldt, 1992). Therefore, water availability is a critical need for the communities residing in the region. The main source of drinking water is from a series of springs that also irrigate some farming land. The springs with water debit of more than 2 liters/second could support a few farmers to develop rice paddies up to twice a year. But overall, farmers leverage the limited water supply in the area to do intensive farming. Despite the dry climate, the area is known as a producer of cashews and candlenuts. The average citizen gets their income from these two commodities.

The people of Manggarai are indigenous to the area with a long history of settlement. Some research on indigenous Manggarai architecture finds traditional architecture that has survived for 17 generations (Lad, 2017). People indigenous to Manggarai continue to live with long traditions attached to beliefs, norms, and social structures that shape their daily attitudes towards land and territory. This customary institution also oversees the collective management of springs. Some studies have documented that each village in Manggarai has a sacred forest containing a spring where an annual ritual called *barongwae* takes place along with the post-harvest traditional festival (Perdana, 2016; Lawang, 2004). These are customary rules that are applied in the area of the spring, including a rule that it may not be utilized for other uses. The Manggaraians believe that water is a part of the system of life that forms their identity (Lon & Widyawati, 2020; Iswandono et al., 2015; Wahyu & Edu, 2018).

Since early 2000, the north Manggarai area has become one of the major sites for investments in manganese mines. Under a system of decentralized law for issuing permits, including mining ones, the district government of Manggarai has granted permits to companies for manganese mines (Erb, 2016, 2021; Arti, 2020). While traditionally managed by customary land use, the northern part has recently become legally defined by district spatial planning regulation of 2012 for mining purposes. Consequently, tension has already arisen between the traditional land use system and the mining area.


Figure 2. Study Area

## 3. METHOD

### 3.1 Research approach

The following research uses mixed methods, mainly qualitative approaches, and primarily focuses on the working institutions for land use and water policies at the district level. The data was collected from September to October 2022. The research aims to clarify whether regulations on spatial planning and water protection issued by the District of Manggarai protect springs that could otherwise be impacted by mining permits. The supporting quantitative data mainly includes spatial data regarding the current location of springs, mining areas, agriculture, and settlements. The research also identifies and reviews working institutions for land use to evaluate the consistency of land uses and spring protection. Therefore, the critical data produced by this research is whether the springs' related institutions at the district level genuinely protect springs. Along with that picture, the research paper also aims to document the institutional interactions surrounding the governance of the springs, specifically whether spring protection is considered a priority by national and district agendas.

Therefore, three steps were taken to collect and identify data. First, the team collected relevant geospatial data from preexisting maps. The team acquired mining permit data and a land use map, which is currently accessible online through the one map platform from lined ministries at the national level, which is the Ministry of Energy and Mineral Resources and the Ministry of Environment and Forestry. The critical policy approaches to institutional analysis consider political economy as the underlying force producing certain regulations and policies (Fairclough 2013; Campbell 1998). Therefore, the research team purposely selected spatial data from 2011 and 2017 to consider the correlation between the period of a new regime and the permit issuance. The team also selected the year 2024 to have an updated context of the study area. To clarify the permit politics, the team then confronted the spatial information and primary

sources of local NGOs who intensely observed the mining cases.

Second, the team collected information about springs within the target area. The team carried out a field survey to collect data on the springs' coordinates, width, and physical conditions. The survey was carried out from 2021 to early 2023. During the visit, the coordinates of the springs were taken with an Android phone in the selected villages. We used the NoteCam application to take photos due to its useful features for identifying geolocation and objects (numbers 1 and 2 in Figure 3). It also can retrieve coordinates in non-internet areas. At the district level, the team consulted a spring map that included geolocations, names, and water debit that had been produced by a consultant for the Public Works and Spatial Planning Agency (PUPR). The map had been forgotten and absent from policy discussion due to miscoordination and a disjointed transition from the previous regime to the current one. Neither other relevant agencies nor employees within PUPR itself knew about the map. However, the map is very valuable and provides important basic data for research.


**Figure 3.** Camera to take geolocation

Third, the team collected data on policies regarding land use and springs at the district level. This involved combing through the official website of the district government of Manggarai and collecting data on national policies on these topics, especially regarding the Omnibus Law and official programs related to springs. Finally, a series of focus group discussions and interviews were conducted with district-level offices. This included the environmental agency, the spatial planning and public works agency, the village empowerment agency, and technical units of provincial agencies, including the forest management unit and mineral resources unit. Table 2 provides information on the number of officials during the group discussion and the rank they had within the institution.

**Table 2**. Group Discussion

| Agencies | Number Involved | Ranks |
|---|---|---|
| Environmental agency | 5 | Head of the agency, lead of unit for waste, lead of unit for environmental management plan, and lead of unit for pollution, and staff |
| Spatial planning and public work | 5 | Head of unit for spatial planning, head of unit for water management and staff |
| Village empowerment | 2 | Head of the agency and the lead for village empowerment |
| Forest management unit | 3 | Head of Forest Management Unit of Manggarai and staff |

Although recognizing the dynamics of different opinions and positions among officials within an agency, the interview aimed to capture a portrait of interaction between agencies. Therefore, each interview was not an individual position but rather an *institutional* attitude towards the issues of mining and the springs. We conducted interviews in both group and individual settings. The group interviews consisted of 2-5 officials regardless of their structural position in the bureaucracy (table 2). The intention was to capture a corps perspective towards the other agencies. In this regard, we assume the concept of organizational "esprit de corps" that galvanizes the officials' common position and differentiate them from the others (Boyt et al., 2005). The concept was developed in the army command, then introduced in the conventional bureaucratic order in Indonesia during the totalitarian regime of New Order and is still being found in today's administration (Pierskalla, 2022).

However, using the critical approach, we went through certain individuals to grasp the hidden information from a seemingly ordered and united position of the officials to what critical institutional analysis named "the hidden and invisible dimensions of institutional life" (Whaley, 2018). We explored whether the sentiment of togetherness permeated individual behavior. We collected their reactions towards contested issues between mining and springs and recorded their comments on the daily life of institutional capacity, functions, and legitimacy concerning the spring's protection. The critical institutional development analysis (Hall et al., 2014) highlights the interplay between the organizational position and individual stance as the determining factors in projecting the outcome from the decision arena of common pool resources. We also interviewed officials individually who frequently interacted with critical groups, including NGOs and the local catholic church. The intention was to examine the arena from within to see whether it is truly perceived as "esprit de corps" as commonly labeled by the top level of bureaucracy. In addition to officials, we also individually interviewed local NGOs from the church organization (JPIC), a priest, as well as the former head of the district who was charged by the NGOs with administrative misconduct and potential corruption.

### 3.2 Analysis

The focus of this article is the situation within the *arena* and the *external attributes* of political economy. Hence, the *arena* is analyzed by applying the institutional framework of three selected attributes (leadership, capacity, legitimacy) to guide the triangulation approach of data, consisting of spatial information, regulations and policies, and interviews (Figure 4). We conducted spatial analysis to indicate the springs area and mining permits; then, the information was further clarified by analyzing regulations and policies on how springs are maintained after permits were given. In addition to evaluating the implementation of the regulations and policies, the analysis reviews the function of existing institutions at the district level. Guided by the institutional framework, the analysis sketches the policies and programs from the government agencies regarding spring protection, including in mining areas. Such sketching confronts the contradictions between spatial information and regulations, as well as lays out the underlying working rules that motivate the organizations, including the actual policies, programs, and directions for spring protections.

The main aspect of the *arena* is the position of the responsible institutions regarding the springs. To understand their positions, we analyzed information from the interviews and classified them based on three attributes from the institutional framework. For the leadership component, the scope is (a) whether the authorities have regulations to define their formal position and (b) the interpretation they apply when turning the regulations into programs and activities. Authority-driven regulation is one of the core

thoughts of bureaucracy principles provided by Weber and is applied globally (Byrkjeflot, 2018). In this study, it is a substantial element of hierarchy within the government *arena*. The second component is capacity, which is the ability to monitor actual programs and to enact further implementation activities based on the regulations. On many occasions, as Artuc et al. (2020) found, strong regulation does not materialize in actuality due to the lack of capability of an administrative system. Finally, regarding the component of legitimacy, the analysis explores how agencies interacted and understood each other's positions. The dynamic of the answers, especially regarding legitimacy, is further elaborated along with the analysis of the external variables of the *arena* through the political setting of the policies.

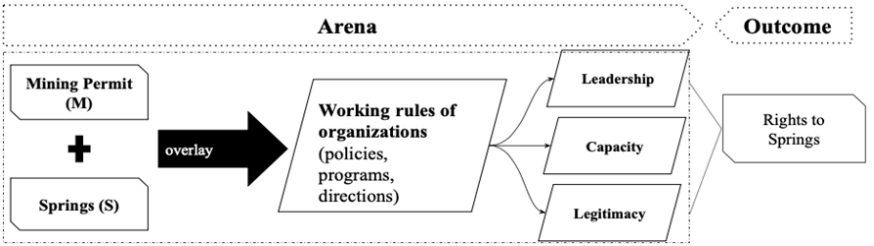


**Figure 4.** Framework of analysis

Further, a local political economy analysis is applied using some supporting studies, secondary data, and interviews to identify the linkage between permit acquisition and local politics. Viewing permitting as the *arena* of political transaction, we used the reports from online media and documents from NGOs as the secondary data and then crosschecked the information through interviews. One of the critical elements for the political economy analysis is the lack of consensus on certain sensitive issues, particularly in this case the political transaction of permitting that may have been due to corruption. We, therefore, used the secondary sources' data to identify the position of actors regarding the transaction and then confront it with the interviews. One of them was an interview with the previous head of the district, whose permitting decisions were criticized by local NGOs.

The *outcome* of the institutional analysis reveals the stability and consistency of district-level institutions' interest and ability to protect community rights to springs, especially customary rights regarding sacred forests around the springs.

## 4. RESULT & DISCUSSION

### 4.1 Policy arena

The spatial analysis reveals that in 2011, the government granted manganese permits to a few areas within the sub-districts of Reok and Reok Barat (ESDM one map 2023). In turn, three companies operated there with permits issued mainly from the Head of the District to run the manganese mines until 2029. In 2017, the area of mining plots increased after the addition of three major permits from the Head of District, which authorized mining operations until 2032. The mining law says that the permit period could be extended for another 10 years.

The spatial analysis demonstrates that actual land uses of mining are not significant compared to the total area of these sub-districts: mining consisted of 0.46 % of land in 2011, 0.51 % in 2017, and 0.34 % in 2024. However, the maps reveal an overlap between mining areas and numerous springs and settlement lands (see Figures 5, 6, and 7). In fact, for land use in 2017, 15 out of 117 springs (≥ 5 liter/second), or

roughly 12.8% of springs within the sub-districts, were in areas overlapping with mining permits. Other sites opened near the springs.

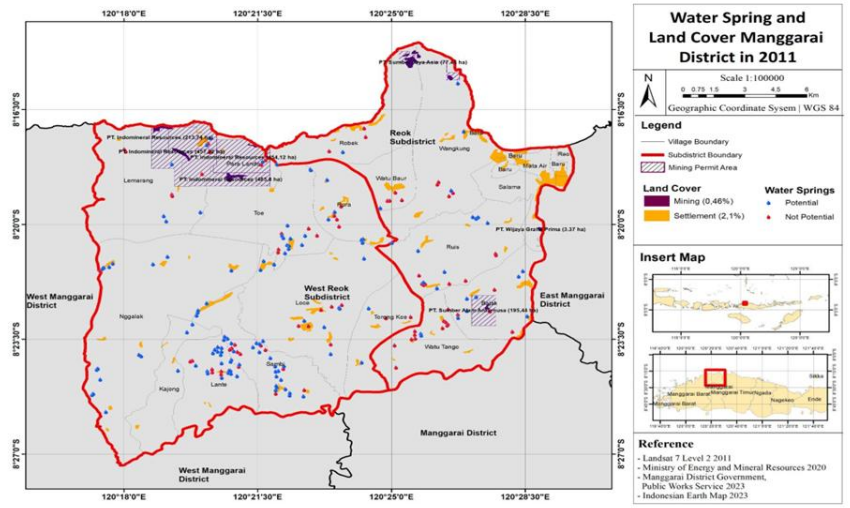


Figure 5. Mining vs the springs and settlements in 2011

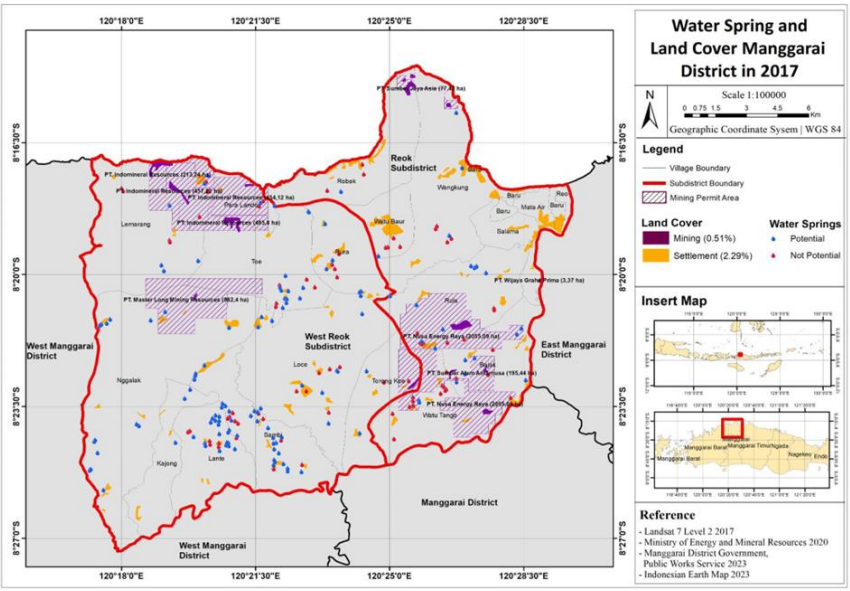


Figure 6. Mining vs the springs and settlements in 2017

Although there is no scientific report yet about the potential impact of active mining on the springs nearby, several studies pointed out the risk of mining to the groundwater supply. For example, Shen et al. (2021) indicated that the optimum production of mining by 24% in drylands would lead to 24% depletion of groundwater sources. Another study by Tomiyama & Igarashi (2022) analyzed 88 articles of 380 relevant studies related to mines and their impact on groundwater. Overall, the article found a serious impact of mining on groundwater quality, particularly due to drainage

pollution. A report from Lakshman (2024) similarly indicated a serious risk of contamination and depletion of freshwater from critical minerals mines, which include waste from mining and processing and the residue of hazardous chemicals. The report warned of a potential increase in pollution from mining in water-stressed areas, such as drylands and arid, due to the increasing global demand for critical minerals, including manganese (Lakshman, 2024). In the case of manganese mines, Caruso et al. (2012) found the pollution in the Caucasus mountains, mainly in water. Contamination occurred in wells, springs, rivers, and streams connected to the slopes and hills where the manganese mines are located. Ren et al. (2015) found drinking water pollution in Hongxin Hunan Province of China was mainly caused by manganese mining with the chemical composition of Zn and Mn was mainly caused by ore mining, transportation of mineral waste, tailing slag, and smelting plants. It can be concluded that the studies confirm the risk of manganese mining to groundwater.

The spatial analysis of mining allocation also suggests no limitation regarding the proportion of land that can be permitted for mining, even when such permitting overlaps with preexisting land uses. Figure 6 shows that one company received more than 2000 ha of land. This dwarfed the total land use allocated to settlements in the two impacted sub-districts, which consist of only about 791 ha of land. As a result of the allocation size, the permit overlapped with three different villages. While the operation area was not known by the villagers, local NGOs shared information about the risk of mining, including land use conflicts. The villagers were aware of the risks since the presence of mining sparked horizontal disagreement among neighbors and families between pro vs. contra mining.

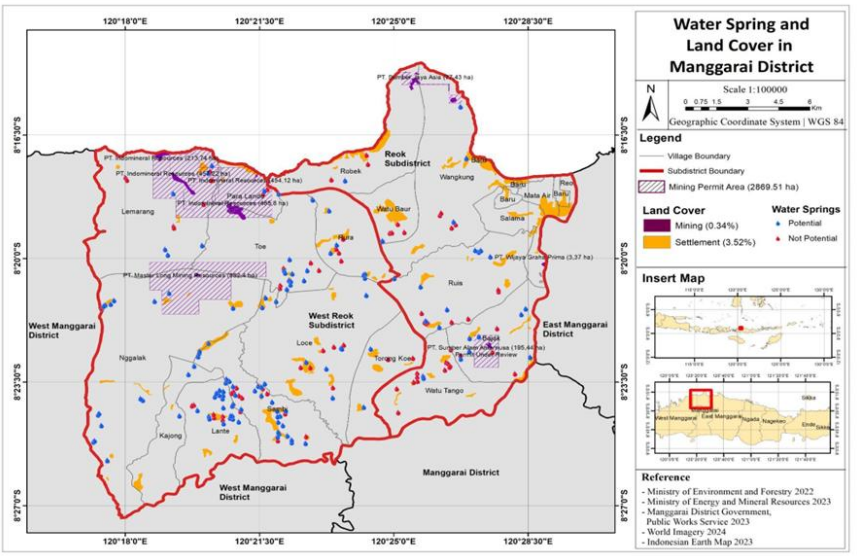


Figure 7. Mining vs the springs and settlements in 2024

Similarly, studies in other regions such as Sumatera (Pearce, 2021) and Kalimantan (Gandi & Sunito 2015) expose the social risk of mining to village life. In the Kutai Kartanegara District of East Kalimantan Province, Indonesia, mining has wiped out agricultural life and forced the farmers to become manual workers in the mining industry (Gandi & Sunito, 2015). Concerning critical mineral mines, a report from 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. The situation went unnoticed by the health department. The IEA (International Energy Agency) recognized the risks of the current pace of mineral hunting for human rights violations, including displacement, loss of land, human rights abuses, and corrosion of governance and the rule of law (IEA, 2023). Therefore, IEA called for renewable energy supply chains to only source sustainable and responsible critical minerals to prevent those risks from occurring.

As of 2024, the total permitted operational area remains the same, except for one company whose operational date expired in 2022. Although mining operations have been temporarily halted due to ongoing community resistance, the permits remain legal for operations to continue in the future. The operation could recommence anytime, considering the potential deposits of manganese, policy priorities on energy transition and mining (Ali & Kim, 2024), as well as the increase in global demand (Sun et al., 2020).

The discovery of mining operations on 12.8% of springs in the sub-district is significant since, by law, this should be considered illegal. Legislation prohibiting mining development on land with springs includes the Water Resources Law of 2019 (Law No. 17 of 2019), the Spatial Planning Law of 2007 (Law No. 26 of 2007), and the 2015 locally established regulation of springs (*Perda* 5 of 2015). Punishments should be applied to any infringements against spring areas. However, since 2011, no operating companies have been punished or warned for operating near springs. Recently, one of the mining companies that was given a concession in 2017 negotiated to reopen several mining areas, including one next to the ritual springs of the village. This is in line with another recent study (Muhdar et al., 2023) in that mines mostly prevail even when contested with different land uses.

### 4.2 Institutions and working rules

The study on the *arena* of mining contestation in Manggarai has been developed in various scopes. Regus (2019) used the tripolar theoretical framework to understand the dynamic interaction between the state, market, and communities. He then focused on the community's resistance against the market and state institutions/actors due to experience of domination, marginalization, ecological degradation, and socio-cultural degradation. Arti (2020) analyzed specifically the role of the Catholic Church in organizing the opposition against mining that impacted local indigenous peoples. She argued that unlike other anti-mining movements in different parts of Indonesia that were mostly driven by activist or nationalist agendas, Manggarai was led by religious forces. Erb (2016) and Erb et al. (2021) presented the contested policies of mining based on decentralization, deposit potential, and the ambiguity of mining plans, which leads to confused spatial planning policies. Erb underlined the lack of capacity to understand the socio-geological context of the mining deposit area, which is neither considered in spatial planning policies nor in decentralization.

Although these studies helped identify the socio-political setting of mining and geological context, they did not analyze the interaction among district-level actors. Erb's analysis concerning the Spatial Planning Office and the Mining Agency at the province and district level helped to clarify how they understood and interpreted laws and policies. However, she did not analyze the interaction among district-level institutions. As CIAD suggests, the institutions in the *arena* have a socio-legal context (Hall et al., 2014; Whaley & Cleaver, 2017; Whaley, 2018) that shapes their positions regarding laws and their relationship with other agencies. Such positions produce underlying issues that, according to CIAD, should be critically analyzed. In this case, the *arena* comprises several government bodies and non-government institutions, including local Catholic churches and NGOs. Government institutions consist of the

following offices: Planning (Bappeda), Public Works (PUPR), Environment (DLH), village empowerment (DPMDes), Agriculture, Forest Management Unit (KPH). Meanwhile, non-government organizations include the local university of St. Paulus (UNIKA), JPIC (Justice Peace and Integrity of Creation), Ayo Indonesia, Kehati, and WALHI (Wahana Lingkungan Hidup Indonesia). Each institution plays several roles and takes positions regarding spring protection and manganese mining. However, the main government institutions that are formally tasked to arrange for mining allocations and water conservation are distributed among the Mining Office, the Public Works Agency, and the Environmental Office. Considering the formal and actual role dictated by regulations and policies, the analysis focuses on the position and interaction of these three institutions within the *arena* of spring protection.

The government agency's scope of work concerns laws and regulations. In this respect, the mining agency within the government is mandated by Mining Law 2009 to recommend permits to the district head. It is entitled to carry out fieldwork to analyze mineral deposits. Similarly, the public works agency is mandated by Spatial Planning Law 2007 to arrange for land uses, including mining and the spring areas, and monitor the implementation. Meanwhile, the environmental agency is responsible for ensuring that land uses are in line with the requirements of environmental protection.

Since 2014, a new regional government law transferred some districts' responsibilities to the central and provincial government instead, including responsibilities regarding mining and forests. In effect, the entire office of mining and forests was suddenly liquidated. This change is significant as it implies that districts now have little power to maintain several crucial elements of water conservation, including the ability to review mining operations. The district also has no control over mining allocations approved by the province. A switch that shifts the goal of decentralization law to a centralization end (Sahide et al., 2016). It leads to an ambiguity of decentralization regarding whether district agencies could monitor the existing mining operation.

While the attributes of the agencies listed in Table 3 are definable, they are not separated by obvious borders and often are affected by the strengths or weaknesses of other attributes. One attribute, for instance, the capacity to protect the springs, could fail to work if the legitimacy to do the job is not present. The Public Works agency, for example, is mandated to process land use planning, which presumably includes spring points. Under the spatial planning law of 2007 at the time and the current one of 2021, the local government is supposed to delineate springs, zone them as protected areas, and monitor them accordingly. But, because the agency has to compile data from other sectors and then harmonize the spatial application – a difficult task – rather than independently conduct regular monitoring, the agency fails to adequately monitor land use.

Without the capacity to gather actual data and updated results from regular monitoring, the agency has the legitimacy to act regarding the overlap among land uses, including between mining and springs. During the interview, the officials recognized that because the agency leans on other agencies' spatial data, they choose to avoid dealing with land use monitoring. Such dynamics reverberate with the agency's timid confession that despite recognizing the extreme importance of the springs for land use planning, the agency barely has the capacity to manage springs. Considerations given its reluctance to facilitate the transfer of socio-ecological data from other agencies.

**Table 3**. Functioning attributes of three agencies

| Attributes | Description of working rules | | |
|---|---|---|---|
| | Environmental Agency | Mining Agency | Spatial Planning Agency |
| Leadership | The agency is authorized by environmental law 2009, District regulation 2015, and District Head Regulation 2016 to (a) protect the environment, (b) mitigate and manage risks, and (c) conserve natural resources. The conservation of resources includes the management of SEAs (Strategic Environmental Assessments), the District Environmental Management Plan (RPPLH), and Environmental Impact Assessments. The Agency must also identify and protect springs. However, it is unclear how the Agency plans to ensure that environmental policies guide development planning, including things such as mining. The next step of the protection strategy for the 1,275 identified springs remains vague. | The agency was authorized by Mining Law 2009 to carry out technical work for the Governor or Bupati (Head of District) before mining permits could be granted. The district agency rarely provided technical guidance for mining implementation, as most of the operational instructions were determined by the provincial ministry. The law also authorizes the agency to monitor the implementation of permits including the implementation of water protection, land rehabilitation, and environmental carrying capacity. The government regulation in 2010 even authorizes the district agency to suspend a mining operation as a temporary measure if there is a negative evaluation. However, no public documents demonstrate that such measures have ever been taken. | This office receives its mandate from the spatial planning law of 2007, the job creation law (Omnibus Law) of 2020, and the District Head Regulation 2016. The agency's main role and function is to develop district spatial planning; detailed spatial planning; and general and operational plans for water resources, water infrastructures, and maintenance. The agency has led the spatial planning review and consultations to national bodies for the last 5 years, but has gained no approval to revise it yet. The main reason was that the agency has no intermediary facilitator to accelerate the process. The agency conducted a district-wide mapping of the springs and intended to create a protection plan. However, the plan has been left in limbo for more than five years. |
| Capacity | The agency has no actual power to control manganese permits, including post-mining rehabilitation activities. It has no ability to take retributive action for clear violations of law including when a company invades a | After 2014's shifting of power from the district to the province, the provincial agency developed 7 sub-offices in some districts with an expectation that this would enable it to monitor the mining operation at the district level. Manggarai has one office with very few | The agency is supposed to compile and collect data, then harmonize the spatial allocation accordingly. It has no actual power to evaluate and review land uses, including mining allocations, however. Although there was 2018's mining moratorium |

| Attributes | Description of working rules | | |
|---|---|---|---|
| | Environmental Agency | Mining Agency | Spatial Planning Agency |
| | protected area. In one example, the agency was only able to implant physical signs prohibiting mining, and this occurred after the company in question had already stopped mining. The agency appears confused over the extent of its jurisdiction for intervention given its claim to have no role in the conservation and rehabilitation of mining-impacted land, including water conservation surrounding the area. The agency prioritized water conservation for strategic springs that have substantial volume but only conducted sporadic reforestation activities. It recently issued an SEA to prevent mining in dry areas, but the efficacy of the document remains unseen. | staff given the size of the district. Hence, the agency admitted their limited capacity to conduct effective monitoring. The agency has some technical roles in reviewing permit applications and conducting field inspections based on mining law requirements. Many officials within the agency have expertise in mining and geology, although the head of the office has no technical background. Driven by public pressure, the provincial government announced a mining permit moratorium in 2018. After two years of implementation, no public document was provided for the public to grasp the situation and give space for feedback on moratorium policies. | policy issued by the province, the agency held no part in its implementation. The agency is figuring out its role in protecting springs, but some of the officers were dispatched to other agencies, which will take time for the replacements to understand the issues and policies, let alone the implementation. However, the agency is proposing to include a springs protection aspect in its water infrastructure program, where a small portion of the budget would be allocated to tree planting activities. The agency has no formal plan yet how to continue the 2016's springs mapping document, but it sees the document as a departure point for implementing the District Regulation 5/2015 under the scope of spatial planning. The agency was indeed bold to take the identification report forward, but they remain uncertain of where to start now that they had the results from the data collection. |
| Legitimacy | Other agencies recognize DLH as central for environmental protection. However, they also criticize DLH for its inability to successfully secure budgeting for spring protection programs. | Other agencies acknowledge this office's power in terms of issuing mining permits. It is also seen by other agencies as structurally aligned with national priorities and known as having strong political backup | The agency relies on other agencies to provide the actual land use data and programs, a dynamic that isolates it from actual landscape realities. It has no data for monitoring either jurisdictionally or by |

| Attributes | Description of working rules | | |
|---|---|---|---|
| | Environmental Agency | Mining Agency | Spatial Planning Agency |
| | In turn, the other agencies blamed DLH for water scarcity and illegal logging. DLH also did not actively reach out to the public, particularly NGOs and local churches which strongly oppose mining operations. The agency's lack of outreach became an issue when it did not hold a public forum after issuing an environmental impact assessment of a 2017 mining permit application. This ultimately led to a lack of public understanding about the company's actual operations that then prompted massive resistance from local and national civil society organizations. | in terms of decisions regarding land use. When the agency was under the District Authority, some officers built a conditional allyship with the social-environmental NGOs, especially when environmental and social issues heightened. This included a private exchange of unpublished documents initiated by some officers to the public, especially NGOs. Therefore, some NGOs also recognized the benefit of having a personal ally within the agency. | sectors. Other agencies have, however, strongly emphasized that the Spatial Planning Office should have the mandated role to carry out infrastructure development, including safeguarding springs. In that capacity, it would overlap with the environmental agency's role, although neither was firm about the role. Nonetheless, this agency is well-known for having a bigger budget allocation compared to the environmental agency. This is partially the reason why the agency was deliberating the budget opportunity for allocating money to springs rehabilitation projects. |

Another story from the Environmental Office also depicted the delicate complexity of the governance interactions among the authorized institutions. While the leadership of the environmental office as an environmental institution is present, as justified by the agency's name, its legitimacy and capacity are quite low in the eyes of other agencies. From an internal interview within the agency, the department lamented the shifting role of conservation from the district to the provincial level. The changes caused them to discontinue the budget allocation for spring conservation. In 2019's budget, the agency allocated about IDR 56 million to conserve water with programs to replant the spring's ecosystem area. The allocation was decreased to about IDR 49 million in 2021 and limited to degraded land outside of forest area. In 2023, the allocation disappeared totally. The situation amplifies the findings from previous studies, such as Dethier (2017), that environmental programs are not a priority, especially in poor areas, as it is a trade-off with other development agendas. Moreover, another study by Anugrah et al. (2020) found that despite the environmental crisis, pressing issues like waste have little priority in the district's budget allocation, which is approximately below 1 % of the district's budget.

Although it is obvious that some roles, such as carrying capacity analysis and environmental management and planning, remain in the Environmental Agency, the officers did not directly see them as relevant to conservation or protection programs. However, it should be noted that other agencies did not see the budget allocation as an influential force to begin with. In fact, during group discussions, it was revealed that

the environmental agency had conducted no planning at all for finalizing a strategy to actualize spring protection, including no determination of locations, timeframe, method, and local communities' participation as provided by the Perda 5 of 2015. The lack of capacity and willingness to demonstrate legitimacy, including via a public communication strategy, prevents the agency from gaining any actual leadership on environmental issues.

On the other hand, the Energy and Mineral Resources Agency has the technical capacity to carry out field analysis regarding land uses. It also has strong power bestowed by laws and policies. According to the head of the agency, in a case where a field assessment finds critical areas, including springs, the permit applicant is required to delineate a boundary of 200 meters in radius around the spring. The location should be defined explicitly in the concession maps. Only with that background can the permit application be processed further. However, the fact that 7 out of 10 permit locations in 2017 (Figure 6) overlapped with springs is evidence that such a technical requirement is merely a text expression. It should also be mentioned that the textual law of 200 meters has no scientific justification.

Several environmental NGOs noted that several communities protect their springs beyond 500 meters in radius. When the point was raised, the mining agency and two other agencies did not react. In the case of high public pressure against mining in 2009-2012, some of the officials circulated the mining maps to the public, which was useful for transparency. The move was driven by a personal feeling from those officials about mining, although it cost the officials serious consequences for their careers, as one of them was immediately transferred from the Mining Agency to a lower position in the Population and Civil Registration Service. Local NGOs understand that such a move was punishment for disobedience, as many disposed and disliked officials ultimately end up being reassigned to the Population and Civil Registration Service Agency. Ultimately, such a move of administrative disobedience became ammunition for the public to ask for more transparency regarding the permits, which eventually led to a suspension of the mining operation.

All three agencies were aware of the lack of leadership across agencies to monitor and evaluate how mines take measures to protect springs in their vicinity. All three district agencies blame the shift in authority on water conservation and mining from the district to the province level which prevented them from holding the companies accountable. But, even when the authority was there before 2014, and public opposition was intense against mining allocation, the district did little to enact monitoring and evaluation. Nor did they provide actions for community-based water management that has survived for generations. Currently, the district agencies seem to be silent about the environmental impacts occurring in the mining area, although, by law, the permit status is still active for the next 10 years. According to the Environmental Law of 2009 (Law 32 of 2009) and Spatial Planning Regulation of 2021 (Government Regulation No. 21 of 2021) the district environmental agency, as well as spatial planning, still hold legal and legitimate power to monitor and act for such impacts.

### 4.3 Outcome of rights to water

In 2011, most mining activities stopped operating due to the massive resistance from the Indigenous communities, the Catholic Church, and local NGOs (Arti, 2020; Tukan & Hasfaria, 2018). However, after pulling out from the area, mining companies left no resources to rehabilitate the area as required by the law. In our discussion with the current Head of the District and the former Head of the District, only one company paid the reclamation fund in 2017, as required by the Mining Law of 2009, which was 80

million Rupiah (equal to about 5,063 USD) since the beginning of operations back in 1997. Some NGOs argued that the amount was too cheap compared to the impacts. However, the absence of a standard for the sum of reclamation funds for Manggarai makes the NGOs' claim baseless. The national government just recently announced that the government is planning to collect a reclamation fund from the mining companies of approximately 200 million Rupiah per hectare (Muliawati, 2024). The news almost seems to mock the fund that the District of Manggarai previously received, as in 2017, it had about 159 hectares of the abandoned mining area. Such a large area would need billions of rupiah for rehabilitation. Some of the mines have even been left for more than 10 years without proper treatment. The failure to rehabilitate the area reflects the absence of the authorities' plan for a systemic and coordinated response to mining impacts. Monitoring and evaluation were also absent. The authorities pursued it only after public scrutiny and media attention intensified.

For local communities, water's centrality in their daily lives is linked to what can be called the socio-landscape of water, a characterization that has its roots in institutional analysis (Van Laerhoven & Barnes 2014; Cleaver & de Koning 2015; Whaley, 2018). To coin Murugesu Sivapalan's term of socio-hydrology (Sivapalan, 2012), water is related to the broader context of social-environmental dynamics, where its essence is part of the intertwined human-environment relationship and thus should be analyzed as such (Palmer, 2021). For Manggaraians in the area, socio-environmental dynamics can be illustrated through cultural traditions like that of using Torong Besi Hill as a point of customary-based weather forecasting (ksi-Indonesia, 2015). The elders said that when the hilltop of Torong Besi was cloudy, the villages nearby immediately prepared for seasonal transition as the rainy season was about to arrive. Torong Besi is a traditional ecosystem signal that was used by the indigenous peoples of Manggarai to build their knowledge about the weather. It is a conventional practice of the local Manggaraians, where nature is understood as not alien but reincarnated in human life (Verheijen, 1991). However, after the mines opened on top of the hill, the socio-hydrological role of Torong Besi was erased completely (ksi-indonesia, 2015).

The way Manggaraian ancestors determined a settlement by locating the presence of springs is another example of a socio-environmental relationship (Verheijen, 1991; Lon & Widyawati, 2020; Sutam, Interview October 2022). Expressed in the annual tradition of *barongwae*, the villagers of Manggarai maintained the sacred tradition of thanksgiving for the springs and would ask the spirits to continue blessing the village. Beyond annual rituals, some of the villagers' daily behavior towards the springs articulated deep cultural meaning. During our research observation, the villagers respected the point of the spring using certain gestures, such as slightly bending down their upper bodies and speaking softly. Also, they were forbidden to say bad things when they passed through and before the main source of water. Studies (Sutam, 2016; Niman et.al, 2023) mentioned that such behavior is passed down from generation to generation. They believe that spirits within the springs deserve respect, as they have provided the villagers with enough water to sustain life. The presence of mining has not directly changed this practice. An interview with local NGOs and previous studies (Regus, 2019) highlighted that the essence of the springs was the reason for resistance against mining. Still, the absence of strong leadership and capacity from the district government would mean that manganese mining operations in this region may resume at any time. The Mining Law of 2020 implies that the granting of a permit to a mining company would give them full power to develop and use the land as desired. The reality of current encroachments on springs, including the illegal overlapping on 15 active springs (Figure 6), was an alarming fact for the traditional village-level institutions. They felt that mining operations, enjoying their privileged status among other land use

types, faced no obstacles to their decision-making on environmental management (Muhdar et al., 2023).

Up to late 2023, a spring protection program still has not manifested in any district agencies, even though the district already has a 2015 *Perda* on spring protection and an SEA document that excludes mining in dry areas. In fact, the Village Law of 2014 provides that the district could play a significant role by facilitating the villages to bring down the *Perda* into village regulations. The Village LAw would provide capacity and policy support from the district for villages to strengthen the management of springs. In the interview with the head of DPMDes, some villages had provided *Perdes* (village regulation) to set up a village organization, OPAM (Organisasi Pengelola Air Minum – Drinking Water Management Unit). OPAM oversees managing water sources, including conserving, and preventing pollution of water. Content-wise, the OPAM regulation that was mostly endorsed by the Head of Village from 2017 onwards should reflect the 2015 *Perda* on spring protection. But it turned out, oddly, that none of them recognized the 2015 *Perda* as the legal basis. The Head of DPMDes clarified that their role is to facilitate the villages to have the institutions in place, not to provide technical capacities that belong to other agencies, such as DLH and PUPR. However, the aforementioned agencies were not aware of the village regulations on water management. Such lack of information signaled miscoordination among agencies, a classic problem of government in Indonesia (Turner et al., 2019; Huda et al., 2024)

### 4.4 Local Political Economy Setting

#### *4.4.1 Power to permit*

Since 2001, the Decentralization Law of 1999, founded on the concept of power distribution between the central government and lower levels, has been implemented at the district level around Indonesia, (Hidayat, 2017). This included authority vested in the head of the district to grant several types of permits, including mining concessions. During this period, mining companies could receive exploration permits for 3 years as provided by the 2001 Government Regulation before applying for an exploitation permit or IUP. Although the decentralization law was changed in 2004, the district's authority to permit mining remained. The New Mining Law of 2009 did not change it and maintained the structure of mining authority at the district level. These laws serve as the legal basis for the District of Manggarai to issue mining permits from 2007-2014 (Steni et al., 2023; Erb, 2016).

As previously stated, the northern part of Manggarai mainly sources candlenut and cocoa, and some lowland areas have produced rice for generations. Although these commodities have significantly contributed to the local economy, mining permits have increasingly become part of the land use allocations in that area. The allocation for mining can be traced back to the district's political orientation towards land use. In 2012, the district government developed a district spatial planning plan that allocated the northern part of Manggarai as a mining area. The government articulated the requirement to protect the area within 200 meters of a spring and also required the local government to limit the expansion of mining. Similarly, local-based exception criteria were provided to prevent mining in cases where it overlapped with other land uses. Those criteria included agriculture, protected forest, marine, fishery, tourism, and coastal areas (Steni et al., 2023; Tukan & Hasfaria, 2018). Still, the spatial planning strategy faced public scrutiny. Two years later, the government stipulated Regulation 5 of 2015 to explicitly protect springs through the process of identification, boundary stipulation, and conservation actions. The regulation was considered a key achievement compared to other districts in the area. The regulation set up criteria to prevent spring zones from intruders, especially activities known for polluting water,

such as excessive agriculture, cattle fields, and tree chopping. Most significant was a direct prohibition to carry out general investigation activities, exploration, or exploitation of mining materials in the spring area.

However, despite these clear regulations, in 2017, another mining permit located on the site of a village's sacred spring was authorized (Figure 6-7). The Governor granted the permit in line with the authority given by the new regional government law of 2014. The public reaction was much the same as it had been with the previous permits. Organized community resistance caused mining operations to stall and stirred again the preexisting concern of the transition of permitting power from the district to the provincial government.

Continued local contestation of mining remains on the horizon. In 2016's regional election, the current head of the district was one of the candidates who had amplified the opposition to mining in his campaign. Though he lost the race, in a 2017 media interview, he reiterated the same concern that he would not allow mining and instead wanted to prioritize agriculture. He criticized the previous head of the district for allowing permits. (Abba, 2017). The political wind changed, and in 2021 he won the election. But, by the time this research was carried out two years into his tenure, there was still no official policy from his district government to evaluate the existing mining permits. During our interview with him in 2022, he claimed not to work on "sensitive issues," including mining, as he needed to stabilize his program in the first term. He said to work on those issues in his second term (Herybertus G.L Nabit, Personal Communication 11 Oct 2022). However, at the same time as his recent campaign for the second term, mining companies started to reopen in areas they claimed to have purchased from the local people (Davids, 2024). More surprisingly, during his recent campaign for a second term in office, the mining issue was vaporizing from his agenda.

The issue of mining linked to political transactions is a common topic among the anti-mining movement (JATAM, 2018). A suspicion emerged in Manngarai after a pattern was noted between a significant increase in permits in 2011 and 2017 alongside the occurrence of local elections for the Head of District in 2010 and 2016 and the governor election in 2013. In our interview with the head of JPIC, a church-based organization, the transaction of permit allowances in exchange for political support was widely assumed by the anti-mining movement (Simon Suban, Personal Communication, 26 Sept 2022). The NGOs collected a few indications and then reported the Head of the District to the Anti-Corruption Commission (JATAM, 2018). The NGO Gerakan Rakyat Anti-Tambang Manggarai also publicly questioned the likely procedural flaw in granting mining, as they were issued by the Governor without a recommendation from the head of the district (Kompas.com, 2012). The NGOs suggested the transactions had occurred due to the high political cost of local elections. Against this backdrop, while massive anti-mining protests organized by church organizations, including JPIC and NGOs, occurred from 2010 onwards (Arti 2020; Regus 2015), the Head of the District continued to maintain permits. According to sources from local NGOs, the mining companies only dared to undertake their operations in sacred springs areas due to the promise of political backup. Moreover, the local NGOs underlined that the head of the district reacted negatively to the criticism of the mining operation. Similarly, the district police agency strongly opposed any demonstrations against mining and was suspected of receiving payments from the manganese companies (Hardum, 2013). This resonates with Aspinall and Berenschot's thesis that permitting manifests as a specific type of political transaction (Aspinall & Berenschot, 2019).

*4.4.2 Revenue-driven evaluation*

Several studies link the cause of irresponsible mining to the common challenges of decentralization policies, which include poor governance, corruption, and misinterpretation of the law (Syarif, 2023; Hayati 2011; Venugopal, 2014; Ocallaghan 2010). Originally, decentralization to the districts had been designed as a solution to prevent totalitarianism, bad governance, and other systemic failures under the era of Soeharto (Hidayat, 2017; Carnegie, 2008). However, after the first tranche of power distribution in 1999 and the second one in 2004, many central government agencies and experts realized the decision posed a dilemma (Syarif 2023; Kurniawan 2020; Jaweng, 2014; Hayati 2011). Decentralization allowed decision-making to reflect the local realities better, but it also prompted corruption and led to issues regarding the quality of governance, human resources management, transparency (Lele, 2019), and transactional politics (Aspinall & Berenschot, 2019; Berenschot & Mulder, 2019). This, alongside other reasons, prompted the central government to revise the regional government law of 2004 via the 2014 law to curb the power of the district significantly and move several authorities to rest at the provincial level instead (Asrinaldi 2022; Maksum, 2021). One of the immediate consequences was the transfer of permitting authority from districts to provinces.

After shifting most of the power of permits from the district to the province, the Ministry of Energy and Mineral Resources established a transition policy (Ministerial Regulation 43 of 2015) that mandated the province to evaluate mining permits. Along with that policy and driven by his political campaign and civil society's pressure, in 2018, a newly elected governor of the East Nusa Tenggara Province announced a 2-year temporary ban on issuing permits for mineral and coal mining (Governor Decree of No.359/KEP/HK/2018, 14 November 2018). The decree prompted environmental and human rights groups to expect the government to substantively review the permitting process, including environmental and social measures. However, it later became apparent that the review was only an administrative and financial one. Some local activists commented that the moratorium was merely to evaluate the compliance of the permit holders regarding taxation requirements (WALHI, 2018). It was not conducting comprehensive evaluations of the mining permits it issued, especially those with violations against social and environmental requirements (de Rosary, 2019). The process was merely top-down, creating no space for the districts to participate. Therefore, most district agencies we interviewed were unaware of the review process and recommendations.

At the national level, the Ministry of Energy and Mineral Resources (MoEMR) and the Anti-Corruption Commission subsequently reviewed the progress of mining revenue in comparison with actual state returns. In 2016, the mining permits came under public scrutiny when MoEMR publicly mentioned that 3.966 permits were not in compliance with the law (Hukumonline, 2016). The Minister forwarded the review by revoking 2.078 mineral and coal permits in 17 provinces for being unequipped with work plans for years (Kemen ESDM, 2022). A month later, the NTT province was added to the review through a letter from the Directorate General of Mineral and Coal of the Ministry of Energy and Mineral Resources Number B-571/MB.05/DJB.B/2022 on February 7, 2022, concerning the temporary suspension for 1.036 mining operations. One of the companies was Sumber Alam Antarnusa, which had been granted a permit in the sub-district of Reok in 2009 to exploit manganese up to 2029. The company's operation overlapped with two springs, Wae Ndaca, and Wae Lendeng, the main drinking water source for two sub-villages (*Dusun*) in Bajak Village (see Figure 5-7).

Despite the actual overlapping with the springs, similar to reviews at the provincial level, national-level revocations stemmed from administrative evaluations that were mainly conducted to generate tax returns. Such reviews were not intended to consider revoking permits due to the presence of springs, settlements, rivers, and many other critical resources in mining areas. In addition, the permitting reviews did not address concerns about political transactions that underlie mining permitting, as raised by several studies (Risal et al., 2021; Greenpeace et al., 2018; Henderson & Kuncoro, 2011). The district officials also shared the same concern about the loss of revenue. In the interview with the three aforementioned agencies, none of the government officials otherwise shared the need for a comprehensive review other than regarding income for the district.

The main issue of both mining reviews was neither about the social-environmental impacts nor the decentralization of power. The impetus was income-generation, which also mirrored the same motivation at the beginning of the decentralization process of 2000 that drove several district governments to seize mining as an opportunity for regional economic expansion (Agustina et al., 2012; Talitha et al., 2020). Later, the economic growth in mining regions such as East Kalimantan Province served as a pretext for other district governments to justify embracing mining investment (Lestari, 2017; Talitha et al., 2020). This included the district government of Manggarai, which defended mining as a way to generate economic income and create employment for local people. In 2019, however, this was disproven when the statistics agency revealed that the financial contribution of mining was only 2.89% compared to farming, which contributed 21.9% (BPS Manggarai, 2022). Despite this fact, the desire for revenue drove institutional behavior toward mining, surrendering environmental and social considerations in return. Mining continued to enjoy greater permitting privileges than farming.

*4.4.3 Global demand*

This demand for revenue is also a driving force in the race to secure renewable energy, where the need for critical mineral investment is hugely driven by the global market, especially in China (Sun et al., 2020). In that context, manganese is a critical element of renewable energy, largely to create Li-ion batteries (Horiba et al., 2003). It is likely that manganese supply also plays a role in the increasing trend of granting mining permits in the province, given the fact that Manggarai contains 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 in Indonesia is from East Nusa Tenggara (Kemen ESDM, 2013). Statistically, the province is indeed the main producer of manganese mining in the country. More than 92% of mining stock is located there, and approximately only about 46% of it is currently being mined. In 2016, the National Geological Agency reported that East Nusa Tenggara can produce manganese ore of more than 37 million tonnes, which makes up about 60% of the total national capacity (Supriadi et al., 2017).

The statistical data from 2011 and 2015 indicates that most of the manganese products from East Nusa Tenggara were exported to China (Figure 8). This is in line with the general trend analysis that globally, China is the leading country in importing manganese, importing about 10.2 Mt or 42% of the current global supply (Sun et al., 2020). This far outpaces the other competing countries of the USA (1.9 Mt), India (1.3 Mt), Japan (1.1 Mt), and Germany (1.1 Mt) (Sun et al., 2020). Currently, China also leads other countries in installing renewable energy technologies, leveraging 1.161

gigawatts of renewable energy compared to the USA, the second largest consumer with 0.352 gigawatts (Statista, 2024).

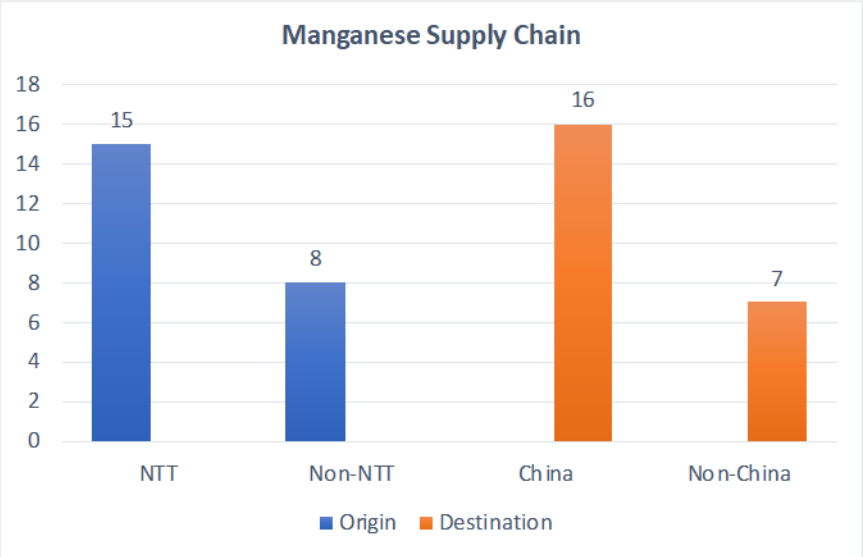


Figure 8. Export companies from East Nusa Tenggara (NTT) compared with other provinces (Non-NTT) [Source: Kemen ESDM 2017, Steni, 2021]

With such a global trend, manganese operations in Manggarai are of national economic importance. It is unsurprising that, although the SEA document for the middle-term development plan suggested avoiding mining in the area, the head of the district has remained silent on confronting mining issues. Similarly, the Office of Energy and Mineral Resources at the provincial level has stuck closely to the laws and regulations to be neutral. During an interview, an employee reiterated that if, by spatial planning, the area is allowed to be mined, then operations are legitimate. An interview with district authorities revealed that the delicate politics around mining is the underlying cause of the district's reluctance to offer public opinion. As Warburton (2017) noticed, mining is often regarded as a national priority that attracts national political support. Therefore, taking a different direction from the national trajectory is not a fruitful gesture for a local politician. The pause in mining operations came instead from public pressure in Manggarai, alongside some transparency measures from low-level bureaucrats, rather than from the true duty-bearer.

## 5. CONCLUSION

The study focused on the institutional design for spring protection in interaction with land use policies in Manggarai, particularly the land use allocation for manganese mining. We employed spatial data on the areas of spring and mining permits area to analyze the overlapping areas. Then, we reviewed the institutional responses about spring protection concerning mining allocations and the possible implications to the rights to water of the village communities. This method can be applied in other areas with a similar approach of combining spatial information, actual institutional interaction, and policy formulation to critically examine whether the institutional design would secure rights to water of community-based water management.

Despite the replicability, the method is not sufficient to unfold the underlying factors of institutional behavior. It needs political economy analysis, which in this study

we applied to move into the hidden problem of institutional performance. It found that in addition to leadership, capacity, and legitimacy, the institutional stability of springs is also very much interlinked with transactional politics and revenue-driven motives at every level of government. Moreover, the increased demand from the global market heightened actors to race for new potential critical minerals. As a result, spring protection in drylands like Flores is not merely about function and the authorities of the institution, including decentralization policies as most of the experts suggested, but also about the political dimension of natural asset policies. Natural capital, including springs, can be viewed as merely a commodity to be traded for other forms of revenue.

The study illustrates the usefulness of the CIAD framework in understanding the interaction among the nested institutions at the district level that link up to province, national, and global levels. However, the study has not gone deeply into the daily interactions of village-level institutions, which could provide a more detailed portrait of actual positions of community-based water management as Cleaver and Whaley unmasked in the sub-Saharan Africa context. It is one of the main gaps in this institutional analysis that future studies could address.

**Author Contributions:** The contributions of each author are as follows. BS designed, conducted field research data collection and systematized the findings. HK assisted in compiling the theoretical framework, especially CIAD. SA contributed to the qualitative methodology. RDD assisted in organizing the legal and policy framework. Before this study was published, HK (Hariadi Kartodihardjo) passed away. We dedicate this article to honor his presence in the thoughts we express here.

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